Characterization of female sex workers in Brazilian state capitals, 2016*

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Objective: To describe the characteristics of female sex workers (FSW) in 12 Brazilian cities. **Methods:** This was a cross-sectional biological and behavioral surveillance study with FSW recruited by respondent-driven sampling (RDS) in 2016. HIV prevalence, sociodemographic, behavioral and sex work profession variables were estimated by city. The chi-square test was used to compare these distributions. **Results:** Among 4,328 FSW, HIV prevalence was 5.3% (95%CI 4.5;6.3), ranging from 0.2% (95% CI 0.0;1.2), in Campo Grande, to 18.2 (95%CI 13.2;24.7) in Salvador. In half of the cities, HIV prevalence in the samples was >5.0%, while Campo Grande, Brasília and Belo Horizonte had prevalence rates <1.0%. Significant differences between cities were found in distributions according to educational level, income, workplace, age sex work started, and illicit drug use. **Conclusion:** The characteristics of the samples in each city were distinct and have influenced local HIV prevalence.

Keywords: HIV; Sex Work; Sampling Studies; Social Networking; Vulnerable Populations, Brazil.

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Introduction

Ever since the beginning of the AIDS epidemic, the female sex worker (FSW) group has been recognized nationally and internationally as a population more vulnerable to HIV infection.[1] From the epidemiological point of view, it is known that unprotected sex and multiple sex partners are important determining cofactors of sexually transmitted infection (STI) transmission.[2] From the social point of view, stigma and discrimination are the main barriers hindering FSW access to and use of health services.[3]

> **FSW vulnerability increases according to sociodemographic characteristics, length of time in the profession, place of work and use of alcohol and drugs.**

In the case of concentrated epidemics, in which HIV prevalence is greater than 5% in key populations and less than 1% in the general population, as is the case in Brazil, groups at greater risk of HIV infection play a fundamental role in the dynamics of the epidemic, in which virus dissemination is influenced by the nature and the intensity of interactions between subpopulations that have high infection rates and the general population.[4] Depending on the patterns of sexual relations between population subgroups, small changes in the contact rate between low-risk groups and high-risk groups can alter the speed of HIV transmission in the general population.[5]

HIV prevalence among FSW has been estimated by studies conducted in Brazil and has always been found to be much higher than prevalence among the general female population. A study conducted in the city of Santos in the state of São Paulo in 1997, revealed 8% HIV prevalence among FSW.[1] Another study conducted between 2000 and 2001 estimated HIV infection prevalence to be 6.1% among FSW for some Brazilian state capitals.[6] These studies indicate prevalence around 15 times greater among FSW, when compared to the Brazilian female population as a whole.[7] However, Brazilian studies conducted up until the mid 2000s generally used unsystematized convenience samples, making it difficult to estimate parameters for HIV/AIDS monitoring in this population group on a national level.[8]

At the end of the 1990s,[9] the respondent-driven sampling (RDS) method was proposed for recruiting populations at greater risk of HIV infection. In Brazil, one of the first biological and behavioral surveillance studies to use the RDS method for recruiting FSW dates from 2009 and was conducted in 10 Brazilian cities;[10,11] Its findings enabled gaps to be filled on relevant information about FSW behaviors, attitudes and practices.[12,13] Subsequently, the second biological and behavioral surveillance study was conducted in 2016 in 12 Brazilian cities[14] and the overall sample found HIV prevalence of 5.3% (95%CI 4.5;6.3),[15] although estimates per city varied greatly, from 0.2% to 18.2%.

FSW vulnerability increases according to sociodemographic characteristics, length of time in the profession, place of work and use of alcohol and drugs. These characteristics can determine unprotected sex attitudes and practices,[16,17] and can be different depending on the city. As such, publicizing the results of these studies with the disaggregated sample is important for planning local interventions.

The objective of this article was to describe the characteristics of FSW in 12 Brazilian cities.

Methods

This was a cross-sectional biological and behavioral surveillance study with FSW recruited using RDS in 12 Brazilian cities in 2016.

The cities were selected by the Health Ministry's Department of Chronic Conditions and Sexually Transmitted Infections, according to criteria based on geographical location and epidemiological relevance in terms of HIV infection in Brazil. The chosen cities were state capitals distributed over the country's five regions:

North – Manaus and Belém
Northeast – Fortaleza, Recife and Salvador
Southeast – Belo Horizonte, Rio de Janeiro and São Paulo
South – Curitiba and Porto Alegre
Midwest – Campo Grande and Brasília

The selected citites were different in terms of the size of the 15-49 year-old female population: São Paulo had the largest number in this age range accounting for approximately 3 million; while Campo Grande had the smallest number at around 200,000 women in the same age group. Important inequalities also existed with regard to social indicators: the North and Northeast regions had lower human development indices (HDI) in 2010,

below 0.8 for all the cities of these regions taking part in the study, while in the South and Southeast regions, only the city of Rio de Janeiro had an HDI below 0.8.[18]

The eligibility criteria for FSW participation in the study were:

a) being a woman biologically (of the female sex);

b) being 18 years old or over;

c) being a sex worker in one of the cities taking part in the study;

d) having had sexual intercourse for money at least once in the four months before the study was conducted;

e) presenting a valid coupon for taking part in the study (distributed by a seed or other participant);

f) not having taken part in this edition of the study; and

g) not showing signs of being under the influence of drugs or alcohol when taking part in the study.

The sample size per city was established beforehand in a Ministry of Health call for proposals: a minimum number of 350 valid interviews, sufficient to estimate proportions of 30% within a 95% confidence interval, with 5% bilateral error, considering a design effect of 1.4. Further details about RDS implementation in the 12 Brazilian cities have been described by Damacena et al.[14]

Before the study started a formative assessment was conduted in each city with the aim of establishing local lines of conduct for the study. Between five and ten FSWs, referred to as "seeds", were selected in a non-random manner in each city. Each of them was requested to recruit a further three FSWs they knew, and so on, until the sample size for each city was reached. Each participant received primary incentives for their participation in the study: snacks, a small purse with personal care items, condoms and lubrication gel. Financial reimbursement was also provided to cover transport costs to and from the study site; as well as secondary incentives – in the sum of R$ 30.00 – in exchange for each of the three people recruited as long as they effectively took part in the study.

In the majority of the cities, the study was conducted in public health services. Only in Rio de Janeiro and Belo Horizonte, other places were chosen, close to prostitution areas in order to facilitate participants' access.

Data collection involved (i) administration of a sociobehavioral questionnaire by duly trained interviewers, and (ii) HIV, HBV, HCV and syphilis rapid tests in accordance with Ministry of Health guidelines.[19] All samples with positive test results were submitted to confirmatory tests,[15] and participants who had rapid tests with positive results received specific counseling and were referred to National Health System (SUS) services for follow-up.

The sociodemographic characteristics analyzed were: age range (in years: 18-29; 30-39; 40-49; 50 or over); race/skin color (White; non-White); schooling (according to level of education: never studied/incomplete elementary education; complete elementary education/incomplete middle school education; complete middle school education/incomplete high school education; complete high school education or above); and monthly income (less than or equal to R$500; more than R$500 and less than or equal to R$1,000; more than R$ 1,000 and less than or equal to R$2,000; more than R$ 2,000).

The variables relating to the profession were: place of work (streets; other places); price of sexual services (less than R$ 50; R$ 50 to R$ 99; R$ 100 or more); and age when started as a sex worker (in years: younger than or equal to 13; 14-17; 18 or over).

The indicators of condom use with clients were: frequency of condom use in vaginal sex with clients (never; sometimes; always); and whether they would accept having sex with clients without a condom for some reason (when they know the client; when the client asks or demands; when they are very much in need of money; when they have sex with a lot of clients on the same day; when they have a skin allergy or irritation caused by condoms; when they do not have a condom at the time they have sex; when they are unconscious because of drug or alcohol use; other reason).

With regard to illicit drug use in the six months prior to the study, the indicator was obtained from the combination of the questions about crack or "merla" (freebase), ecstasy, inhaled cocaine, cocaine or other drug injected in the vein, any other drug, once a week or more frequently – cannabis use was not considered.

The 'use of drugs during sex' variable was estimated based on the following question, "In the last 6 months, how frequently have you taken drugs shortly before or during sex?", which was asked of FSW who reported using drugs at least once a week.

With regard to alcohol use, the 'frequent use of alcohol' variable considered use of alcoholic beverage at least 5 days a week. The 'use of alcohol during sex' variable was obtained based on the following question, "In the last 6 months, how frequently have you drunk alcohol shortly before or during sex?", asked of women who reported use of alcohol at least once a week.

The variable regarding non-use of condoms because of alcohol or drug use (sex without a condom – alcohol or drugs) was estimated based on the question "In the last 6 months, how frequently have you had sex with a client without a condom because you used alcohol or drugs?", asked of women who reported use of alcohol or drugs at least once a week.

The statistical analysis took into consideration the complex design of RDS recruitment, including observation dependence, different selection probabilities and the effect of homophily.[10] Sample weighting was inversely proportional to the size of each participant's network.[14] The seeds were excluded from the analysis as recommended by Salganik & Heckathorn.[20]

HIV prevalence was calculated based on cases that had a reactive confirmatory laboratory test, after the confirmatory tests were performed in June 2017. The prevalence calculation, as proposed by Szwarcwald et al.,[10] took into consideration the effects of chain recruitment and unequal selection probabilities to estimate prevalence and confidence intervals with a 95% significance level (95%CI).

In order to analyze differences in FSW characteristics, chi-square homogeneity tests were performed on the distributions of the variables considered in the study with a 5% significance level. All the analyses were performed using SPSS version 21.0.

The 'Health Chain Project II" [Projeto Corrente da Saúde II] biological and behavioral surveillance study was approved by the Research Ethics Committee of the Joaquim Venâncio Health Polytechnic School, Oswaldo Cruz Foundation: Protocol No. 1.338.989, dated November 26th 2015. All participants signed a Free and Informed Consent form and a data confidentiality form.

Results

In the 12 cities comprising the study, 4,328 FSW were recruited: 83 seeds and 4,245 peer referrals. The number of seeds varied between 5 and 10; while the average number of peer referrals ranged from 2 in Belo Horizonte, to 3 in Fortaleza and Porto Alegre, always varying between 1 and 3 peer referrals (Table 1).

Estimated HIV prevalence in the total sample was 5.3%, (95%CI 4.5;6.3), with large variation amplitude being found between the cities: lowest prevalence was 0.2% (95%CI 0.0;1.2), in Campo Grande; while highest prevalence was 18.2% (95%CI 13.2;24.7), in Salvador.

Half of the city samples had prevalence greater than 5.0%: Belém, Recife, Salvador, São Paulo, Curitiba and Porto Alegre. Prevalence was below 1% in the Campo Grande, Brasília and Belo Horizonte samples (Table 1).

With regard to sociodemographic characteristics, in the total sample there was predominance of young non-White women, with incomplete middle school education and monthly income of up to R$ 500. Significant differences were found in the distributions of all the sociodemographic variables per city: in both Recife and Salvador more than 70.0% of the FSW reported having only middle school education, and more than 50.0% reported having monthly income less than or equal to R$ 500. The highest proportions of young women (65.1% – 95%CI 58.2;71.4) and FSW with complete high school education or above (48.4% – 95%CI 48.9;55.1) were found in Campo Grande. The highest proportion of White women was found in Curitiba, 52.8% (95%CI 45.7;59.7), while highest monthly income was found in Belo Horizonte, with more than half the FSWs earning more than R$ 2,000 a month (Table 2).

Likewise, characteristics related to the profession also differed significantly between cities (Table 3). The highest proportions of FSWs who worked in the street were found in Recife, São Paulo and Salvador, i.e. 84.4% (95%CI 78.4;89.0), 75.3% (95%CI 67.5;81.7) and 61.0% (95%CI 53.0;68.4), respectively. Belo Horizonte was the only city where fewer than 10% of FSWs worked in street points (7.4%, 95%CI 3.4;15.7). In São Paulo and Belo Horizonte, more than 70% of FSWs charged less than R$50 per sexual encounter, while in Campo Grande, 44.2% (95%CI 36.9;51.8) charged more than R$ 100.

A total of 8.0% (95%CI 6.9;9.1) of FSWs started prostitution before the age of 14 years old. In all the cities of the North and Northeast region, with the exception of Manaus, this percentage was higher than the estimate for the sample as a whole. In Recife, more than a quarter (26.0% – 95%CI 19.6;33.5) began working as sex workers before they were 14 years old. In Salvador, half the participants began being sex workers before they were 18 years old (Table 3).

With regard to condom use with clients, the highest percentage of regular condom use during vaginal sex was found in Campo Grande (96.0%, 95%CI 93.0;97.7) and the lowest in Fortaleza (67.3%, 95%CI 60.0;73.9). In six cities (Belém, Fortaleza, Salvador, Rio de Janeiro, Curitiba and Porto Alegre), percentages were lower than that found for the total sample, i.e. 80.5% (95%CI

78.8;82.1). In Porto Alegre and Curitiba, the percentages of FSWs who reported never having used a condom when having vaginal sex with clients were above 8.0%. With regard to FSWs who would not use condoms with clients for some reason, high proportions were found among women who worked in Porto Alegre (61.2%, 95%CI 54.1;68.0), Salvador (48.8%, 95%CI 41.7;56.2) and Belém (50.3%, 95%CI 43.7;57.2) (Table 4). The most frequently mentioned reason for not using condoms with clients was 'already knowing the client' (27.1%, 95%CI 25.4;28.9). In Salvador and Fortaleza, more than 30% claimed that the reason was 'when they needed money very much'.

The percentage of FSWs who used illicit drugs at least once a week was 15.0% (95%CI 13.6;16.6) for the total sample. The highest percentages were found in São Paulo (29.7%, 95%CI 22.3;38.3), Salvador (22.8%, 95%CI 17.5;29.2) and Rio de Janeiro (22.7%, 95%CI 17.5;28.9), while the lowest was found in Belo Horizonte (5.1%, 95%CI 2.7;9.4). The type of drug varied between cities. In São Paulo, use of crack was predominant (21.5%, 95%CI 15.1;29.6), while in Rio de Janeiro it was inhaled cocaine (19.6%, 95%CI 14.7;25.5); in Salvador the percentages were similar, i.e. 13.9% (95%CI 9.4;19.9) for use of crack and 13.5% (95%CI 9.3;19.1) for cocaine. Use of injected cocaine was only found to be above 1.0% in Porto Alegre (Table 5).

In the total sample, 15.1% (95%CI 13.8;16.5) of FSWs reported frequent use of alcoholic beverages at least 5 days a week; the highest frequency was found in Campo Grande (47.5%, 95%CI 40.9;54.1), although Porto Alegre (24.1%, 95%CI 18.7;30.4), Rio de Janeiro (21.6%, 95%CI 16.5;27.8), Salvador (19.3%, 95%CI 14.1;25.9) and Curitiba (16.7%, 95%CI 12.2;22.4) also had higher percentages than that found for the total sample. Among FSWs who consumed alcohol once a week, the proportion of alcohol use while having sex was 68% (95%CI 60.8;74.5) in Campo Grande and 54.3% (95%CI 47.1;61.3) in Salvador

Table 1 – Human development index (HDI), female population size, female sex worker network characteristics and HIVª prevalence in samples in 12 Brazilian cities, 2016

City	HDIᵇ	General female population (15-49 years old)	Network characteristics			HIVª prevalence	
			Sample size	Number of seeds	Average number of peer referrals		
			No	No	Average	%	95%CI
Manaus	0.737	542,331	358	5	2.7	3.3	1.5;6.9
Belém	0.746	428,290	351	7	2.7	7.4	4.6;11.8
Fortaleza	0.754	764,773	352	6	2.8	1.2	0.5;2.8
Recife	0.772	462,903	354	5	2.7	6.6	3.7;11.4
Salvador	0.759	854,665	350	10	2.6	18.2	13.2;24.7
Belo Horizonte	0.810	710,835	350	7	2.3	0.8	0.3;2.0
Rio de Janeiro	0.799	1,758,145	429	7	2.6	4.6	2.3;9.3
São Paulo	0.805	3,301,784	368	9	2.4	7.3	4.4;11.8
Curitiba	0.823	521,062	350	9	2.5	8.2	4.9;13.4
Porto Alegre	0.805	395,012	353	6	2.8	5.8	3.7;8.9
Campo Grande	0.784	232,733	352	5	2.7	0.2	0.0;1.2
Brasília	0.824	808,799	361	7	2.5	0.8	0.3;2.1
Total		10,781,322	4,328	83	2.6	5.3	4.5;6.3

a) HIV: human immunodeficiency virus.
b) HDI: Human Development Index. Data compiled by the Brazilian Institute of Geography and Statistics – 2010.

Table 2 – Proportional distributon and 95% confidence intervals (95%CI) of sociodemographic characteristics of female sex workers in samples in 12 Brazilian cities, 2016

City	Age (years) 18-29 %	95%CI	30-39 %	95%CI	40-49 %	95%CI	>50 %	95%CI	Race/skin color White %	95%CI	Non-White %	95%CI	Schooling A %	95%CI	B %	95%CI	C %	95%CI	D %	95%CI	Monthly income (R$) ≤500 %	95%CI	501-1,000 %	95%CI	1,001-2,000 %	95%CI	>2,000 %	95%CI
Manaus	40.7	34.3;47.4	31.6	26.6;37.0	18.7	14.4;23.8	9.1	6.3;12.9	6.3	4.2;9.4	93.7	90.6;95.8	21.9	16.9;27.8	40.8	35.0;46.9	23.9	19.3;29.2	13.5	10.0;18.0	33.4	26.5;41.0	32.0	25.8;38.8	20.8	15.3;27.6	13.9	9.3;20.3
Belém	54.6	46.5;62.5	26.2	19.5;34.3	12.5	8.7;17.8	6.7	3.6;12.1	12.5	9.0;17.0	87.5	83.0;91.0	13.8	9.5;19.6	27.3	22.0;33.3	45.4	39.2;51.7	13.5	9.6;8.7	32.0	25.9;38.7	41.7	35.6;48.2	22.2	17.1;28.3	4.1	2.1;7.7
Fortaleza	52.8	45.6;59.8	25.6	19.7;32.6	14.7	10.2;20.6	6.9	4.1;11.6	10.7	7.0;16.1	89.3	83.9;93.0	13.4	9.4;18.8	24.6	19.2;30.8	48.4	41.0;55.8	13.6	9.5;19.3	43.2	36.0;50.7	35.1	28.5;42.2	19.2	15.0;24.2	2.6	1.0;6.5
Recife	46.4	38.7;54.3	22.4	17.0;29.0	22.1	16.3;29.3	9.0	6.0;13.5	18.5	14.0;24.1	81.5	75.9;86.0	6.9	4.5;10.6	17.5	13.0;23.3	43.6	36.8;50.7	31.9	25.3;39.3	56.6	49.1;63.8	33.6	27.9;39.9	7.7	4.8;12.0	2.0	0.8;5.20
Salvador	49.0	41.8;56.2	30.1	24.6;36.2	13.1	9.1;18.5	7.9	5.1;11.9	8.9	5.0;15.4	91.1	84.6;95.0	11.6	7.6;17.2	10.8	7.6;15.1	45.0	37.9;52.3	32.7	26.2;39.8	62.6	54.6;69.9	27.0	20.9;34.1	6.7	4.0;11.1	3.7	1.9;7.1
Belo Horizonte	50.8	42.5;59.1	27.9	21.7;35.0	13.5	9.2;19.5	7.8	4.9;12.2	20.4	14.8;27.6	79.6	72.4;85.2	46.7	38.1;55.5	29.0	22.3;36.8	20.1	14.5;27.3	4.2	1.9;9.0	7.5	3.8;14.4	13.2	8.5;19.9	29.6	22.6;37.7	49.7	40.9;58.5
Rio de Janeiro	49.0	41.9;56.2	27.1	21.5;33.5	15.2	11.2;20.3	8.6	5.6;13.2	14.6	10.8;19.4	85.4	80.6;89.2	19.0	14.6;24.4	29.0	23.5;31.5	34.9	28.7;41.6	17.1	12.5;23.0	21.1	15.6;28.0	29.4	23.3;36.3	29.1	23.2;35.7	20.4	15.4;26.5
São Paulo	31.3	24.3;39.2	23.9	18.5;30.4	23.2	17.6;29.9	21.6	16.2;28.2	28.1	22.2;34.8	71.9	65.2;77.8	29.7	23.7;36.4	23.3	17.4;30.5	37.3	30.3;44.9	9.7	6.2;14.8	19.2	13.4;26.8	34.1	27.3;41.7	34.9	27.6;43.0	11.7	8.0;16.9
Curitiba	35.2	28.2;42.8	25.1	19.8;31.2	24.6	18.8;31.4	15.2	10.5;21.4	52.8	45.7;59.7	47.2	40.3;54.3	32.4	26.1;39.6	22.1	17.4;27.6	26.6	20.1;34.2	18.9	13.9;25.3	19.8	14.1;27.0	32.8	25.3;41.3	31.1	24.6;38.4	16.4	11.9;22.1
Porto Alegre	60.1	53.0;66.9	26.5	21.4;32.5	10.5	6.7;16.3	2.8	1.5;5.2	32.5	25.5;40.5	67.5	59.5;74.5	31.0	24.5;38.3	28.3	22.3;35.2	26.1	20.7;32.3	14.6	9.9;21.1	25.5	19.2;33.0	32.1	25.9;38.9	34.6	28.1;41.7	7.9	4.9;12.4
Campo Grande	65.1	58.2;71.4	22.2	17.4;28.0	9.1	6.4;12.9	3.6	1.8;7.0	34.7	28.6;41.4	65.3	58.6;71.4	48.4	48.9;55.1	32.3	26.7;38.4	18.0	13.2;23.9	1.3	0.5;3.2	3.7	1.9;7.1	15.0	10.8;20.5	43.9	38.0;49.9	37.4	31.2;44.2
Brasília	62.2	55.5;68.4	27.3	22.1;33.1	6.5	4.1;10.2	4.1	2.1;7.7	22.2	17.1;28.3	77.8	71.7;82.9	40.6	34.2;47.5	26.1	20.8;32.2	25.5	20.2;31.7	7.7	4.9;12.1	7.6	4.5;12.5	20.8	16.0;26.6	40.2	33.9;46.9	31.3	26.2;37.7
Total	49.7		26.3		15.3		8.6		21.7		78.3		26.2		26.0		32.9		14.9		27.4		28.8		26.9		16.9	
X² p-value[a]	<0.001								<0.001				<0.001								<0.001							

A: complete high school education or above.
B: complete middle school education/incomplete high school education.
C: complete elementary education/incomplete middle school education.
D: never studied/incomplete elementary education.

a) Distribution homogeneity Chi-Square test.

Tabela 3 – Proportional distribution and 95% confidence intervals (95%CI) of characteristics related to sex work among female sex workers in 12 Brazilian cities, 2016

City	Workplace		Price per sexual encounter (R$)			Age began sex work (years)		
	Street points	Other places	<50	50-99	≥100	≤13	14-17	≥18
	% 95%CI	% 95%CI	% 95%CI	% 95%CI	% 95%CI	% 95%CI	% 95%CI	% 95%CI
Manaus	58.2 50.9;65.1	41.8 34.9;49.1	37.2 31.4 ;43.4	57.2 51.0;63.2	5.6 3.0;10.0	7.7 5.2;11.1	37.4 31.7;43.5	54.9 48.8;60.9
Belém	54.0 47.1;60.7	46.0 39.3;52.9	28.7 22.3;36.0	59.1 52.2;65.7	12.2 8.6;17.0	12.8 9.2;17.5	47.8 41.0;54.8	39.4 32.1;47.2
Fortaleza	42.6 35.9;49.5	57.4 50.5;64.1	26.4 20.0;33.9	61.9 54.4;68.9	11.7 7.8;17.2	11.9 8.2;16.9	42.7 36.3;49.5	45.4 38.5;52.4
Recife	84.4 78.4;89.0	15.6 11.0;21.6	51.5 44.2;58.7	44.9 37.9;52.2	3.6 1.9;6.6	26.0 19.6;33.5	36.6 29.8;43.9	37.5 30.7;44.8
Salvador	61.0 53.0;68.4	39.0 31.6;47.0	39.9 32.6;47.6	52.4 45.0;59.7	7.7 4.6;12.5	13.7 8.9;20.4	36.9 29.6;44.8	49.5 41.8;57.2
Belo Horizonte	7.4 3.4;15.7	92.6 84.3;96.6	74.2 65.4;81.4	19.2 13.4;26.7	6.6 3.6;11.7	0.4 0.2;1.2	10.9 6.4;17.8	88.7 81.6;93.3
Rio de Janeiro	39.0 32.2;46.2	61.0 53.8;67.8	21.1 15.8;27.6	72.3 65.8;77.9	6.7 4.1;10.8	5.5 3.5;8.5	34.5 28.3;41.3	60.0 53.2;66.5
São Paulo	75.3 67.5;81.7	24.7 18.3;32.5	76.5 69.7;82.2	19.9 14.5;26.70	3.6 1.6;7.9	2.5 1.4;4.4	18.9 14.0;25.0	78.6 72.2;83.9
Curitiba	44.6 36.7;52.9	55.4 47.1;63.3	42.6 35.0;50.6	46.2 38.7;53.8	11.2 7.5;16.3	4.8 2.3;9.6	18.9 13.6;25.6	76.3 69.0;82.4
Porto Alegre	36.0 28.6;44.3	64.0 55.7;71.4	26.1 20.1;33.0	53.5 45.8;61.1	20.4 14.9;27.2	4.6 2.5;8.1	30.4 24.0;37.7	65.0 57.6;71.8
Campo Grande	11.2 6.7;18.1	88.8 81.9;93.3	6.9 3.9;12.0	48.8 41.8;55.9	44.2 36.9;51.8	2.2 0.9;5.6	15.3 11.4;20.2	82.5 77.3;86.7
Brasília	46.0 39.2;52.8	54.0 47.2;60.8	9.0 5.8;13.8	59.4 53.1;65.3	31.7 26.1;37.8	4.4 2.3;8.3	37.1 30.9;43.9	58.5 51.6;65.0
Total	46.6	53.4	36.4	50.0	13.7	8.0	30.7	61.3
X² p-value[a]	<0.001		<0.001			<0.001		

a) Distribution homogeneity Chi-Square test.

Table 4 – Proportional distribution and 95% confidence intervals (95%CI) of indicators of condom use with clients, among female sex workers in samples in 12 Brazilian cities, 2016

City	Condom use in vaginal sex with clients			Would not use condom for some reason
	Never	Sometimes	Always	
	%	%	%	%
	95%CI	95%CI	95%CI	95%CI
Manaus	2.3	6.3	91.4	14.9
	1.0;4.9	4.0;10.0	87.4;94.2	11.1;19.8
Belém	3.1	25.7	71.2	50.3
		20.4;31.9	65.0;76.7	43.7;57.2
Fortaleza	3.3	29.4	67.3	48.7
	1.4;7.8	23.5;36.1	60.0;73.9	40.9;56.5
Recife	3.2	10.1	86.7	36.7
	1.6;6.3	6.8;14.7	81.7;90.5	30.1;43.8
Salvador	0.3	27.6	72.10	48.8
	0.0;2.1	21.5;34.5	65.2;78.2	41.7;56.2
Belo Horizonte	0.7	7.8	91.60	19.1
	0.1;4.6	4.4;13.3	85.9;95.1	13.5;26.2
Rio de Janeiro	4.0	16.8	79.2	36.3
	2.3;7.0	12.2;22.7	73.1;84.2	30.3;42.7
São Paulo	2.5	16.3	81.3	29.4
	0.8;7.0	11.4;22.8	74.5;86.5	23.2;36.6
Curitiba	8.6	17.3	74.0	46.5
	4.9;14.8	12.1;24.2	66.1;80.7	38.6;54.5
Porto Alegre	8.8	29.4	71.8	61.2
	5.2;14.3	23.5;36.1	65.0;77.7	54.1;68.0
Campo Grande	0.7	3.3	96.0	14.5
	0.2;2.8	1.8;6.1	93.0;97.7	10.6;19.5
Brasília	0.7	16.5	82.8	45.4
	0.1;4.2	11.9;22.4	76.8;87.5	38.6;52.5
Total	3.2	16.4	80.5	37.4
X² p-value[a]		<0.001		<0.001

a) Distribution homogeneity Chi-Square test.

Discussion

This article has described the characteristics of FSWs recruited through respondent-driven sampling in 12 Brazilian cities. Significant differences between the cities were found for the distributions of HIV infection prevalence, level of schooling, monthly income, place of work, age at which sex work started and use of illicit drugs.

With regard to HIV infection, it is noteworthy that in the cities with the highest HIV prevalence there was also a preponderance of the characteristics found to be associated with HIV prevalence in the national sample.[17] The results of this study suggest that these characteristics are also associated with higher HIV prevalence at the municipal level.

The Salvador and Belém networks, for instance, had the highest proportions of FSWs with low schooling levels,

Tabela 5 – Proportional distribution and 95% confidence intervals (95%CI) of alcohol and drug use among female sex workers, recruited by respondent-driven sampling (RDS) in 12 Brazilian cities, 2016

Cidade	Use of crack[a]	Use of cocaine	Use of drugs[b]	Frequent use of alcohol[c]	Use of alcohol during sex	Use of drugs during sex	Sex without condom – alcohol or drugs
	%	%	%	%	%	%	%
	95%CI	95%CI	95%CI	95%CI	95%CI	95%CI	95%CI
Manaus	2.8	5.0	7.6	3.1	13.7	6.7	2.2
	1.4;5.7	3.1;7.9	5.1;11.2	1.7;5.8	10.4;18.0	4.0;10.8	1.1;4.7
Belém	4.6	10.4	18.5	8.6	27.8	18.2	18.4
	2.2;9.3	7.1;15.0	13.2;25.2	5.3;13.7	22.7;33.5	13.2;24.6	13.3;24.9
Fortaleza	8.8	7.9	14.0	5.3	30.8	16.5	20.4
	5.9;13.0	5.1;12.1	10.1;19.1	2.7;10.0	24.8;37.5	12.4;21.7	15.7;26.2
Recife	9.9	3.2	16.3	9.1	28.8	25.9	14.5
	6.5;14.7	1.6;6.3	11.5;22.7	5.5;14.5	23.2;35.1	19.8;33.1	10.8;19.3
Salvador	13.9	13.5	22.8	19.3	54.3	24.6	21.8
	9.4;19.9	9.3;19.1	17.5;29.2	14.1;25.9	47.1;61.3	19.0;31.3	16.1;28.7
Belo Horizonte	0.7	5.1	5.1	5.1	14.1	6.9	4.4
	0.2;2.8	2.7;9.4	2.7;9.4	2.6;9.8	9.7;20.0	4.0;11.5	2.1;9.1
Rio de Janeiro	2.8	19.6	22.7	21.6	45.3	30.0	14.8
	1.3;5.8	14.7;25.5	17.5;28.9	16.5;27.8	38.6;52.1	24.1;36.7	10.8;19.9
São Paulo	21.5	15.2	29.7	12.7	28.9	29.1	11.9
	15.1;29.6	10.4;21.6	22.3;38.3	9.1;17.6	22.4;36.3	22.3;36.9	7.7;17.9
Curitiba	5.1	2.9	6.8	16.7	30.2	7.6	8.7
	2.5;10.2	1.5;5.4	3.8;11.9	12.2;22.4	23.8;37.5	4.9;11.6	5.0;14.6
Porto Alegre	8.8	7.4	16.2	24.1	44.4	17.5	15.4
	5.0;15.1	5.0;10.7	11.4;22.4	18.7;30.4	37.1;52.1	13.3;22.6	11.2;20.9
Campo Grande	3.2	6.8	10.7	47.5	68.0	12.2	9.3
	1.4;6.9	4.2-10.7	7.4;15.3	40.9;54.1	60.8;74.5	8.6;17.0	6.3;13.5
Brasília	3.3	6.6	8.0	7.2	41.9	18.3	22.3
	1.5;7.1	4.0;10.7	5.2;12.3	4.4;11.3	35.8;48.3	13.5;24.4	16.9-28.7
Total	7.1	8.8	15.0	15.1	35.8	18.0	13.7
X² p-value[d]	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

a) Use of *crack*/cocaine/injected cocaine at least once a week.
b) Use of drugs – except cannabis – at least once a week.
c) Use of alcohol as least 5 days a week.
d) Distribution homogeneity Chi-Square test.

monthly income of up to 60% of the minimum wage and predominance of street-based sex workers. In turn, in Campo Grande, Brasília and Belo Horizonte where lower prevalence was identified, FSWs had the highest schooling levels, highest monthly income and did not work in the street. Among the Campo Grande network, proportion of

alcohol use five days a week or more was very high: this practice is related to sex work in indoor places, as a means of attracting and encouraging alcohol consumption and thus gaining clients.[21]

The results show that the FSW recruitment networks developed in different ways, depending on the city where

the study was conducted. In Belo Horizonte, the majority of FSWs worked in downtown hotels close to the place where the study was conducted. The high proportion of FSWs who worked in the street in Recife, São Paulo and Salvador reflects the development of recruitment networks in poorer areas of these cities. The high HIV prevalence rates found in very poor districts of these cities corroborates the evidence of studies conducted in other countries, such as in Ukraine in 2013-2014[22] and in the Republic of Cameroon in 2016,[23] where working on the streets is indicated as a variable associated with low schooling levels, starting sex work at an early age, greater exposure to risk behaviors and situations, and greater prevalence of sexually transmitted infections.[22,23] The proportion of participants who became sex workers in Recife and Salvador before they were 18 years old is alarming. Submitting a child or adolescent to prostitution or sexual exploitation is a crime Brazil.[24]

Differences in drug use patterns are related not only to the sites where the study was conducted, but also to the cultural practices of each city. As cannabis use is not found to be associated with reduced condom use, this drug was not taken into consideration in our analysis.[25] In São Paulo, the high proportion of crack users found may possibly be due to the location of the health center where the data were collected, close to the region of the city center known as Cracolândia, where there is a concentration of crack users. The highest proportion of injected cocaine use was identified in Porto Alegre, capital of the state of Rio Grande do Sul, which is the Brazilian state with the largest number of HIV cases in the 'injecting drug user' risk exposure category.[26]

With regard to regular condom use during vaginal sex with clients, the low percentages – under 80% – found in 6 of the 12 cities investigated draw attention. The proportion of FSWs who stated they would agree to have sex without a condom for some reason was greater than 50.0% in cities with high HIV prevalence, making evident the need to strengthen prevention measures and measures to raise awareness of risk of HIV infection among FSWs on the municipal level.

RDS is a widely used method in studies with key populations, which are populations more vulnerable to HIV infection.[27] Notwithstanding, the differences found between the cities emphasize the fundamental need to discuss the limitations of RDS in a study with a sample size insufficient to achieve

necessary representativeness.[28] With the aim of minimizing bias arising from non-random selection of participants and possible overrepresentation of those with certain characteristics, the network should reach all the variable categories that are being studied and, for this to happen, at times a very large sample is needed to cover the diversity of population subgroups.[13] In the networks developed in some of the cities studied, concentration of certain FSW groups could be seen, suggesting that the pre-established sample, i.e. 350 participants, was insufficient, whereby women who were more vulnerable were recruited in Salvador and women who were less vulnerable were recruited in Campo Grande. Apart from this, temporal variations in HIV prevalence rates found in subsequent studies in the same city do not necessarily represent gains or losses in controlling the epidemic, but rather distinct network compositions reached by two studies at different times.[29]

The characteristics of the FSWs recruited in 12 Brazilian cities have been described. The recruitment networks, which had a local scope, do not represent the entire FSW population in each city and, therefore, the characteristics found in this key population should be interpreted within these limits of representativeness, especially when recruitment networks experience significant homophily effects and insufficient sample sizes that are incapable of reflecting the diversity of the variables that influence the outcome, such as HIV prevalence. Notwithstanding these limitations, the results presented provide important input for local interventions.

Additional analyses will be performed to assess the sexual and reproductive health of the female sex workers and their exposure to violence, in each of the cities, as well as to investigate other possible reasons for HIV prevalence rates in these places being higher than the national average. It is also our intention to undertake geoprocessing of the networks we reached, based on the addresses of the place where the field work was conducted (public health services and places close to prostitution areas in Rio de Janeiro and Belo Horizonte) and the place where these women work (in the street or in indoor venues).

Authors' contributions

Braga LP, Szwarcwald CL and Damacena GN took part in the concept and design of the study, data analysis and interpretation, drafting the intellectual contents and approving the final version of the manuscript. The three authors take on responsibility for all aspects of this work, including the guarantee of its accuracy and integrity.

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