

# Knowledge, practices and behaviours related to HIV transmission among the Brazilian population in the 15–54 years age group, 2004

Célia Landmann Szwarcwald<sup>a</sup>, Aristides Barbosa-Júnior<sup>b</sup>,  
Ana Roberta Pascom<sup>b</sup> and Paulo Roberto de Souza-Júnior<sup>a</sup>

**Objective:** To describe transmission vulnerability for acquiring HIV infection among the Brazilian population aged 15–54 years.

**Design:** A population-based survey.

**Methods:** Sampling was stratified by geographical region. A total of 6006 interviews were conducted. Indicators of knowledge and sexual practices and the relative sizes of the vulnerable subgroups were estimated. Logistic regression analysis was used to determine the main factors associated with safe sex practices.

**Results:** Regarding knowledge indicators in the age group 15–24 years, a high percentage (91%) spontaneously cited sexual intercourse as a form of HIV transmission, and 62% had correct knowledge of the modes of HIV transmission (five correct items). The proportion of consistent condom use with casual partners was 52%, increasing to 59% in the youngest age group. Higher proportions of inconsistent condom use with any kind of partner were found among women and among the poorest. A multiplicity of sexual partners, low socio-economic status and cocaine use were important predictors of unprotected sex among men living without a companion. Among individuals aged 15–49 years, 0.2% currently inject cocaine, 4.6% of the men paid for sex at least once over the past year and 1.0% of the women were paid in exchange for sex. Among sexually active men of the same age group, 3.5% reported sexual relations with other men.

**Conclusion:** Besides the need to establish the role exercised by the vulnerable subgroups in the HIV transmission dynamics, results indicate that it is necessary to investigate unsafe sexual practices further among the poorer sectors of society.

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**Keywords:** Brazil, HIV risk practices, knowledge, nationwide survey, socio-economic inequalities, vulnerable groups

## Introduction

The HIV/AIDS epidemic began in Brazil in the early 1980s. Throughout these years, the epidemic has been concentrated, with an HIV infection prevalence rate among the general population of less than 1% [1]. Higher prevalence rates were recorded among the most vulnerable subgroups for HIV infection, including men who have sex with men (MSM) and injection drug users (IDU), who appear to be among the earliest to be affected [2].

Currently, heterosexual transmission is playing an important role in the spread of the epidemic. Over the past few years, AIDS incidence has evolved more slowly among MSM and IDU, but has increased steeply among the heterosexual population, especially among individuals with low educational levels [3] and of lesser socio-economic status [4].

The various measures that are being adopted to prevent the spread of HIV in Brazil are based upon the natural history of the infection, on the experience of

From the <sup>a</sup>Department of Information on Health (DIS/CICT), Oswaldo Cruz Foundation, Brazil, and the <sup>b</sup>National STD/AIDS Program, Brazilian Ministry of Health, Brazil.

Correspondence to Célia Landmann Szwarcwald, DIS/CICT/FIOCRUZ, Av Brazil, 4365, RJ 21045-900, Brazil.

E-mail: celials@cict.fiocruz.br

international AIDS programmes, and on the results of data analyses seeking to explain the dynamic of the transmission of the disease [5].

Studies describing sexual risk behaviours and levels of vulnerability provide valuable information in designing the best strategies for controlling the spread of HIV. Early monitoring initiatives were undertaken in Brazil during the 1990s, which provide sources of data of targeted HIV infection risk behaviours. Pioneering research conducted among Brazilian Army conscripts began in 1996 as part of a technical co-operation project between the Ministry of Health and the Brazilian Army. This partnership resulted in a number of behavioural and seroprevalence studies among military conscripts at the time of enlistment. Conducted on an annual basis from 1996 to 2000, and followed through in 2002, these surveys focused on different themes each year, with the aim of improving knowledge about the sexual practices of young Brazilian men [6].

The National Demography and Health Survey [7], carried out in 1996, involving a module on sexual behaviour and knowledge about HIV transmission, constituted a further example of this type of research. In 1998, another nationwide survey was carried out by the Brazilian Center of Analysis and Planning [8] with the objective of identifying representations, behaviour, attitudes and sexual practices of the Brazilian population.

In 2004, this national population-based study was designed to investigate knowledge and vulnerability behaviours related to HIV infection among Brazilians aged 15–54 years. Taking into account that the last survey providing national data on practices and behaviours related to HIV transmission was carried out in 1998, this investigation provided recent data at the national level to determine programme effectiveness and a description of the current sociobehavioural trends driving the epidemic in Brazil.

## Methods

The project was submitted to the Research Ethics Committee of the Oswaldo Cruz Foundation and was approved in July 2004 (protocol 243/04).

Brazil has an area of 8.5 million square kilometres, with a population of approximately 170 million inhabitants. The country is politically and geographically divided into five distinct macroregions; each has its own physical, demographic and socio-economic aspects. The north and the north-east have the lowest socio-economic development. The south-east region is the most important region economically and concentrates 44% of the total Brazilian population.

The sample size was established at 6000 individuals between 15 and 54 years of age. The sample was stratified by geographical macroregion: 900 interviews were conducted in the north, 1100 in the north-east, 2200 in the south-east, 900 in the south and 900 in the centre west. In each of the geographical regions, a three-stage sampling was used by state, census tract and household.

All Brazilian states were included in the sample. The number of interviews in each state was established by the total number of interviews in each geographical region, proportional to the number of inhabitants in each state in relation to the total region population.

In each state, tracts were selected by systematic sampling with a probability proportional to size. In each census tract, seven households were chosen so that the number of tracts in each state was determined by the total number of interviews in the state divided by seven. In each household only one person was selected for interview.

The questionnaire was modular, consisted of the following sections: sociodemographic conditions; knowledge about HIV transmission; prevention and control of sexually transmitted diseases; HIV testing; use of licit and illicit drugs; and sexual practices. Considering that some questions and topics approached could cause embarrassment or lead to refusals or false information, the modules relating to the use of drugs and sexual practices were self-completed by the interviewees in order to ensure reliable responses. The self-reported part was done on a separate sheet, and deposited directly in an urn, as a way of guaranteeing confidentiality for the interviewee.

This analysis focused on knowledge of HIV transmission, sexual practices, and vulnerable subgroups. The data were weighted in accordance with the sample design and SUDAAN software [9] was used to perform the statistical analysis.

For knowledge indicators, we considered the percentage of individuals spontaneously citing sexual intercourse as a form of HIV transmission and three other indicators that are monitored internationally in order to achieve the 'millennium goals' in the fight against HIV and AIDS [10], including: (i) the percentage that knows that consistent condom use is a way of protection from HIV infection; (ii) the percentage that agrees that an apparently healthy individual can be infected with HIV; and (iii) the percentage with correct knowledge about the forms of HIV transmission, established by answering five questions correctly (not transmitted by insect bites; not transmitted by the use of public toilets; not transmitted by sharing cutlery, glasses or meals; can be transmitted during intercourse without a condom; can be transmitted by needle-sharing).

Sexual activity was measured using the following indicators: the percentage of sexually active individuals (over

lifetime and over the past 12 months); the percentage of individuals with a sexual debut at under 15 years old; the percentage of individuals with 10 or more partners over their lifetime; the percentage of individuals with five or more casual partners over the past 12 months.

Regarding protected sexual practices, the following indicators were used: condom use at last intercourse (with any type of partner and with a casual partner) and consistent condom use (with a fixed partner, with a casual partner, and with any type of partner). The latter was established on the basis of the reporting of condom use in all sexual intercourses.

To measure socio-economic status and test for socio-economic inequalities, a combination of educational level (did not complete high school; completed high school) and the number of household assets (television, video player/recorder, radio, refrigerator, freezer, washing machine, dish-washing machine, fixed telephone, cellular phone and automobile) was used. Three socio-economic status categories were established: A, individuals with six or more household assets who had completed high school; C, individuals with less than six household assets and incomplete high school; and B, composed from all the other individuals.

Furthermore, the survey data provided an opportunity to determine subpopulation sizes of the following vulnerable groups: MSM; IDU; female commercial sex workers; and male clients of female sex workers. These responses were obtained in the self-completed part of the questionnaire.

In order to obtain data about sexual orientation, the participants were asked if they normally have sexual intercourse: only with men; only with women; more frequently with men but sometimes with women; more frequently with women but occasionally with men. The group of female commercial sex workers was defined by a positive response to the question 'During the last twelve months has a casual partner paid you or given you presents in exchange for sex?' among women. The group of clients

of sex workers was established by a positive response to the question 'During the last twelve months have you paid a casual partner to have sex?' among men.

In relation to the use of illicit drugs, the uses of snorted and injected cocaine were considered (currently and over lifetime). The participants were asked if they: 'have never used'; 'have tried but have not continued to do so'; 'use it occasionally'; or 'frequently use'.

In order to establish the main factors associated with protected sex, a multivariate logistic regression analysis was performed among sexually active individuals, stratifying by sex and conjugal status. Stepwise logistic regression models were used considering consistent condom use with any type of partner as the response variable and the indicators of sexual activity, age, socio-economic class and cocaine use as the independent variables.

## Results

Of a total of 6700 visited households, 6006 questionnaires were analysed. Despite repeated visits, 8.4% were not at home and 2.1% refused to participate. In each geographical region, the sample distribution by age and sex was compared with the 2000 Demographic Census population distribution and very small percentage differences (less than 1%) were found. In what follows, we present the main results organized by the topic considered in the analysis.

### Knowledge about HIV transmission

The results concerning knowledge about HIV transmission in the age group 15–24 years (presented in Table 1) showed that a high percentage (91%) spontaneously cited sexual intercourse as a form of HIV transmission; 95% knew that regular condom use is a way of protection against HIV; and 91% agreed that an apparently healthy individual can be infected with HIV. Of those individuals who had completed elementary education the percentages were greater than 95%.

Table 1. Indicators of knowledge about HIV transmission by educational level among individuals aged 15–24 years, Brazil, 2004.

Indicator	Educational level		Total
	Incomplete high school	Complete high school	
Percentage			
Spontaneously citing sexual intercourse as a form of HIV transmission	87.3	96.4	91.0
That knows that condom use is a form of protection against HIV	93.1	97.9	95.0
That agrees that an apparently healthy person can be infected with HIV	88.6	95.5	91.4
With correct knowledge about HIV transmission (correct answers in all items below)	51.3	78.8	62.3
That knows that HIV is not transmitted by insect bites	94.1	97.1	95.3
That knows that HIV is not transmitted by the use of public toilets	80.0	90.7	84.3
That knows that HIV is not transmitted by sharing cutlery, glasses and meals	78.1	92.8	84.0
That knows that HIV can be transmitted by needle-sharing	81.0	96.7	87.3
That knows that HIV can be transmitted by sexual intercourse without a condom	96.1	96.7	96.4

Table 2. Indicators of sexual behaviour by sex and age group, Brazil, 2004.

Group	Indicator	Sex	Age group (years)				
			15-24	25-39	40-54	Total	
Total sample	Sexually active individuals over lifetime (%)	M	81.0	98.0	99.0	92.3	
		F	66.8	96.5	97.2	86.7	
		T	73.9	97.2	98.1	89.5	
	Sexually active individuals over past year (%)	M	71.0	92.9	93.5	85.4	
		F	61.8	89.3	80.4	77.7	
		T	66.4	91.1	86.7	81.4	
Sexually active over lifetime	Mean age of sexual debut	M	14.8	15.8	16.0	15.5	
		F	15.9	17.9	19.2	17.8	
		T	15.3	16.9	17.7	16.7	
	With 10 or more partners over lifetime (%)	M	26.0	35.2	41.6	34.2	
		F	4.6	5.0	2.8	4.2	
		T	16.2	19.8	21.4	19.3	
Sexually active during year before survey	With five or more casual partners over past year (%)	M	11.3	5.4	5.0	7.0	
		F	1.7	0.6	0.7	0.9	
		T	6.7	3.0	2.9	4.0	
	Condom use (%)	At last intercourse	M	67.2	38.9	24.1	42.8
			F	43.7	32.3	20.0	32.0
			T	56.2	35.6	22.2	37.6
		At last intercourse with casual partner	M	78.6	72.4	52.3	71.3
			F	63.9	56.1	48.8	58.1
			T	74.1	66.5	51.2	67.0
	Always with fixed partners	M	46.3	22.7	17.2	27.6	
		F	31.5	21.1	14.9	22.2	
		T	38.8	21.9	16.2	24.9	
	Always with casual partners	M	64.3	52.8	46.0	56.6	
		F	45.1	41.5	32.2	41.3	
		T	58.4	48.7	41.5	51.5	
	Always with any type of partner	M	46.8	23.4	18.4	28.9	
		F	30.0	20.6	13.5	21.4	
		T	39.0	22.0	16.1	25.3	

Regarding the indicator of correct knowledge monitored internationally by the United Nations Special Assembly Session on HIV/AIDS (UNGASS) and established on the basis of five correct answers about HIV transmission, 62% of the participants demonstrated correct knowledge. A large variation was also found by the level of educational attainment: the percentage with correct knowledge ranged from 51% in the group with incomplete education to 79% among those who had completed high school.

### Sexual practices

The results presented in Table 2 showed that approximately 90% of the population between 15 and 54 years of age was sexually active and 81% had been sexually active for the past 12 months. Almost 20% of the participants reported more than 10 partners over their lifetime. The mean age of sexual debut among participants aged 25-39 was 16.9 years, beginning sexual activity approximately 10 months earlier than those in the oldest group. The highest percentage of multiplicity of partners over the past 12 months was found among the youngest age group (15-24 years old): 7% reported five or more casual partners in the previous year (Table 2). The multiplicity of sex partners (over lifetime or past year) is a typical male practice. Among women, the percentage of five and more

casual partners in the previous year was very small, less than 1%.

With regard to self-reported safe sexual practices, individuals aged 15-24 years used condoms more frequently than the other age groups, especially with casual partners: 74% reported condom use in the last sexual intercourse and 59% reported consistent condom use over the past year with this type of partner. In the total sample, the percentage of consistent condom use with casual partners was 52%, varying from 57% among men to 41% among women. The percentage of regular condom use with any type of partner was low, 29%, and there were similar noteworthy sex differentials (Table 2).

The association between indicators related to condom use and socio-economic status was examined in Table 3. Considering all age groups together, statistically significant differences by socio-economic class were evidenced for all indicators, and invariably unfavourable in the poorest class (Table 3). Consistent condom use with a casual partner varied from 61% in the best socio-economic group to 47% among the less well-off, and consistent condom use with any type of partner ranged from 32% (class A) to 19% (class C). The smallest differences were found in the oldest age group (40-54 years old).

Table 3. Indicators of condom use between sexually active individuals over past year by age group and socio-economic class, Brazil, 2004.

Indicator	Age group (years)	Socio-economic class <sup>a</sup>			Total	P value <sup>b</sup>
		A	B	C		
Condom use (%)	15–24	62.0	60.6	52.2	57.3	0.003
	25–39	39.6	39.8	32.3	36.6	0.002
	40–54	32.3	22.7	17.0	22.4	0.000
	T	44.7	39.5	33.7	38.4	0.000
At last intercourse with casual partner	15–24	82.9	73.9	67.7	74.0	0.001
	25–39	71.0	66.2	63.6	66.6	NS
	40–54	50.8	50.0	52.7	51.2	NS
	T	73.4	66.2	63.4	66.9	0.003
Always with fixed partners	15–24	42.8	43.4	33.0	38.8	0.003
	25–39	28.1	25.4	14.8	21.9	0.000
	40–54	23.0	16.3	12.2	16.2	0.001
	T	31.1	27.2	19.1	24.9	0.000
Always with casual partners	15–24	66.3	56.8	54.1	58.5	0.036
	25–39	58.1	48.1	42.8	48.7	0.012
	40–54	52.7	40.9	37.4	41.9	NS
	T	61.1	49.9	46.5	51.5	0.000
Always with any type of partner	15–24	43.4	43.2	32.8	39.0	0.002
	25–39	28.0	26.8	14.5	22.0	0.000
	40–54	24.6	13.9	13.2	16.1	0.000
	T	32.0	27.6	19.4	25.3	0.000

<sup>a</sup>Established by a combination of number of household assets and educational level (A, more than six assets and complete high school; C, less than six assets and incomplete high school; and B, all others).

<sup>b</sup>Significance level of the heterogeneity test of proportions by socio-economic class in each age group.

### Vulnerable subgroups

By means of targeted survey questions, it was possible to estimate the relative size of vulnerable groups (Table 4). Among male respondents aged 15–49 years old, 3.2% reported having had sex with other men (3.5% among sexually active men, 2% with men only, and 1.5% with both men and women).

Of the 2571 women aged 15–49 years, 1.0% reported at least one casual partner who either had paid or had given

her presents in exchange for sex over the past year (1.4% among past year sexually active women). Of the 2486 men aged 15–49 years, 4.6% had paid at least one casual partner for sex within the previous 12 months (5.5% among past year sexually active men).

Regarding the use of illicit drugs among 15–49-year-old respondents, 5.2% had already snorted cocaine at least once in their lives: 8.2% among men and 2.5% among women. As for the use of injected cocaine, 0.9% reported

Table 4. Size estimates (relative and absolute) of vulnerable subgroups in the population aged 15–49 years, Brazil, 2004.

Vulnerable group	Sex	Relative size (%)	95% CI	Estimated size (Brazilian population aged 15–49 years)
Female CSW	F	1.0	0.58–1.42	495 832
Male clients of CSW	M	4.6	3.71–5.49	2 211 768
Men who have sex with men	M	3.2	2.37–4.03	1 538 621
Injected cocaine	M	1.3	0.80–1.80	625 065
		0.5	0.21–0.79	247 916
		0.9	0.62–1.18	878 986
Current use	M	0.3	0.03–0.57	144 246
		0.2	0.01–0.39	99 166
		0.2	0.04–0.36	195 330
Snorted cocaine	M	8.2	7.04–9.36	3 942 716
		2.5	1.88–3.12	1 239 580
		5.2	4.53–5.87	5 078 586
Current use	M	1.7	1.18–2.22	817 392
		0.3	0.10–0.50	148 750
		0.9	0.63–1.17	878 986

CI, Confidence interval; CSW, commercial sex workers.

**Table 5. Factors associated with consistent condom use: results of multivariate logistic regression models according to conjugal status and sex.**

Variables included in the model	OR	95% CI	Adjusted OR	95% CI
Men without companion				
Socio-economic class <sup>a</sup>	1.00	–	1.00	–
A	1.25	0.87–1.79	1.23	0.85–1.78
B	0.68	0.49–0.95	0.63	0.45–0.90
C				
10 or more sexual partners over lifetime	0.53	0.39–0.71	0.55	0.41–0.74
Yes	1.00	–	1.00	–
No				
Snorts or used to snort cocaine	0.38	0.22–0.66	0.42	0.23–0.74
Yes	1.00	–	1.00	–
No				
Men with companion				
Age	0.97	0.96–0.99	0.97	0.95–0.98
Socio-economic class <sup>a</sup>	1.00	–	1.00	–
A	0.66	0.45–0.96	0.66	0.85–1.78
B	0.49	0.34–0.72	0.46	0.31–0.67
C				
Women without companion				
Age	0.98	0.96–0.99	0.98	0.96–0.99
10 or more sexual partners over lifetime	0.46	0.23–0.92	0.49	0.24–0.99
Yes	1.00	–	1.00	–
No				
Women with companion				
Age	0.97	0.96–0.99	0.97	0.95–0.98
Socio-economic class <sup>a</sup>	1.00	–	1.00	–
A	0.84	0.57–1.24	0.86	0.58–1.26
B	0.42	0.28–0.62	0.40	0.27–0.60
C				

CI, Confidence interval; OR, odds ratio.

<sup>a</sup>Established by a combination of number of household assets and educational level (A, more than six assets and complete high school; C, less than six assets and incomplete high school; and B, all others).

having injected cocaine at least once during their lives (1.4% for men and 0.4% for women) whereas 0.2% are currently users.

### Factors associated with consistent condom use

The stepwise logistic regression results were analysed by strata composed by conjugal status and sex (Table 5). Among men without a companion, low socio-economic level, a multiplicity of partners over their lifetime (10 or more partners) and cocaine use were shown to be relevant predictors of unsafe sex. Among women without a companion, the statistical analysis showed that younger women use condoms more frequently than the oldest, and there was a significant association between multiple partners over a lifetime (10 or more) and unsafe sex.

Among men and women living with a companion, through the stepwise logistic regression model, it was shown that the main factors associated with consistent condom use are: to be young and to be from a higher socio-economic level. The variables concerning multiplicity of partners over lifetime (10 or more partners) and cocaine use did not show significant effects (Table 5).

### Discussion

The implementation of programmes and strategies for reducing vulnerability to HIV infection is among the

'Declaration of Commitment' goals subscribed to by the countries at UNGASS, 2001. In order to evaluate the effectiveness of the interventions, a group of indicators was selected for the purpose of the international monitoring of the HIV/AIDS epidemic.

With respect to knowledge indicators, Brazil is well placed by comparison with other nations. Regarding the percentage of individuals 15–24 years old who know that condom use is a form of preventing HIV infection, the estimate in Brazil of 95% is greater than the percentage in Cuba (89%) and in Colombia (67%). As far as the indicator of correct knowledge is concerned (five correct answers), the Brazilian percentage among the youngest age group (15–24 years old) was 62%, the highest percentage of all of the countries with available information. For example, in Cuba the percentage answering correctly was 52% and in India only 17% [10].

Regarding protected sex practices, international comparison shows results that are not as satisfactory as those obtained for HIV transmission knowledge. Among young people (15–24 years old), the percentage of consistent condom use in Brazil (59%) is much higher than the percentage found in Colombia (29%), is similar to that of Mexico (57%) and India (59%), but much lower than the percentage in France (72%) [10]. Moreover, previous results from a nationwide survey carried out in 1998 [8] evidence a trend towards stabilization (or even a slight

decrease among the youngest) in the frequency of consistent condom use.

In relation to sex differences in condom use, the findings showed relevant differences in safe sexual practices and in the reported number of partners, which may be a result of the Brazilian female embarrassment at talking about sex. Results of a study carried out in India [11] emphasized the social role of women and the imbalance of power in decision-making with respect to the circumstances in which safe sex is practised. These constraints, particularly found in developing countries, are an important obstacle to the implementation of safe sex strategies and should be faced through interventions targeted at empowering women in negotiating safe sex [12].

Socio-economic differences were evidenced in various aspects of this analysis, corroborating results that have been found previously [13]. Knowledge and sexual practice indicators showed that groups of lower socio-economic status have the least information about forms of HIV transmission and undertake unsafe sexual practices more frequently, especially men and women living without a companion.

However, it is worth noting that the survey design did not allow the exploration of socio-economic inequalities in unsafe sexual practices in depth, mainly those related to social environment, known to influence individual lifestyles and sexual behaviour [14]. A growing body of international research has shown that structural and environmental factors are relevant to promote the spread of the HIV/AIDS epidemic [15], which were not assessed in the present survey.

Among single men, the results of the multivariate statistical model indicated that a multiplicity of partners over the lifetime and cocaine use were significantly associated with unsafe sex. Such findings confirm those described in the specialized literature, such as the study carried out in Thailand [16], which showed that young people who use psychoactive substances systematically incur greater risks of HIV infection, and point out the synergy of risk factors, as discussed in the 1999 Brazilian Army conscript study [17].

The epidemiology of HIV/AIDS has evidenced the disproportionate contribution made by vulnerable groups in the dynamics of the spread of the epidemic [18]. In addition to the increased vulnerability of certain population groups such as MSM, IDU and commercial sex workers, it has been demonstrated that the presence of co-infection with a sexually transmitted disease, inconsistent condom use and sex with multiple partners are key determinants in promoting HIV transmission [19].

Using the survey data, it was possible to estimate the relative sizes of the subgroups vulnerable to HIV

infection. However, particular HIV risk behaviour within the vulnerable groups could not be analysed because of the small number of individuals in each group. Given the population-based survey limitations, sampling procedures specifically aimed at hard-to-reach population groups are being developed or adapted to be used among us over the next few years [20–22].

Information bias constitutes another limitation of this type of study. Although the questionnaire modules relating to the use of drugs and sexual practices were self-completed as a way of reducing embarrassment at answering some topics, low-educated individuals may have been unable to respond coherently to the written questionnaires.

In conclusion, the HIV/AIDS epidemic in Brazil is currently undergoing a transitional phase, disproportionately affecting women and lower socio-economic groups [23,24]. It is plausible to argue that the current dynamic of the Brazilian epidemic depends not only on the role played by the most vulnerable groups, but also on collective vulnerability factors (such as adverse social conditions), which are gradually gaining more importance. Therefore, although there appears to be a need to establish the role exercised by the vulnerable subgroups in HIV transmission dynamics, especially commercial sex workers and their clients who act as bridges for HIV spreading among the heterosexual population [25], it is also necessary to investigate risky practices and behaviours related to HIV transmission further among the poorer sectors of society.

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