

Sexual Behavior, Self-declaration of Sexual Orientation, and Violence Experience: National Health Survey, Brazil, 2019

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Abstract

Background

Population surveys involving the monitoring of high-risk sexual behavior have been recognized as important public health tools to control the HIV epidemic and other sexually transmitted infections (STIs).

Methods

Using data from the Knowledge, Attitudes, and Practices survey (PCAP-2013) and from the National Health Survey (PNS), indicators of sexual behavior were compared according to sociodemographic characteristics, including size (%) estimates of men who have sex with men (MSM) and women who have sex with women (WSW). To compare PCAP and PNS proportional distributions, the Pearson's chi-square test, adjusted by the Rao-Scott's correction, was applied. Using data from the PNS-2019, experience of violence (verbal, physical, and sexual) was analyzed according to sexual orientation. Odds ratios (OR) were estimated by logistic regression models using each type of violence as the response variable and sexual orientation (heterosexual, homosexual/bisexual) as the independent variable.

Results

Size (%) estimates of MSM and WSW, obtained by direct questions from the PCAP-2013, showed lower homosexuality prevalence estimates than those resulting from the PNS-2019 self-declared sexual orientation. Significant differences were found between the MSM proportions according to the PCAP-2013 (3.7%; 95% CI 3.1–4.4%) and to the PNS-2019 (2.2%; 95% CI 1.9–2.5), and between the WSW proportions (4.6%; 95% CI 4.0–5.4%) and (2.1%; 95% CI 1.8–2.4), respectively. Regarding condom use at last sexual intercourse, no differences between the PCAP-2013 and the PNS-2019 estimates were found at the national level, but significant improvements were found for MSM, people aged 18–24 and 25–34 years, and individuals not living with a partner. Violence-related indicators showed that over 40% of homosexual/bisexual men and women have suffered some type of violence in the past 12 months. Regarding sexual violence, at least once in a lifetime, prevalence was 18.1% among MSM, with 10-fold greater odds (9.9; 95% CI 6.7–14.8) than that of heterosexual men. Among WSW, prevalence was 25.6%, with an estimated OR of 3.3 (95% CI 2.4–4.3).

Conclusions

The findings emphasize the importance of monitoring HIV/STI risk-related practices and violence experienced by sexual minorities at subnational levels in order to strengthen public policies focused on overcoming the persistent homophobic prejudice in the Brazilian society.

1. Introduction

Population surveys involving the monitoring of risky sexual behavior have been recognized as important public health tools to control the HIV epidemic and other sexually transmitted infections (STIs). These studies help inform preventive measures by increasing the effectiveness of public health interventions (1–2).

In Brazil, several initiatives were undertaken in the 2000s to monitor risky behaviors related to HIV infection. In 2004, the Division of AIDS, STI, and Viral Hepatitis of the Ministry of Health (MoH) with the support of the Centers of Disease Control Global Aids Program in Brazil (CDC GAP-Brazil) conducted a national survey on Knowledge, Attitude, and Practices related to HIV infection and other sexually transmitted infections, called PCAP - "Pesquisa de Comportamentos, Atitudes e Práticas", in Portuguese (3).

The PCAP is a Behavioral Surveillance Survey (BSS) that enables the tracking of temporal and spatial trends in HIV knowledge, attitudes, and risk behaviors in selected groups within the Brazilian population. Periodic rounds of this survey (2008, 2013) provided an opportunity to supply information to develop specific indicators for the monitoring and evaluation of measures and prevention strategies (4–6).

Among the main survey objectives were those intended to describe STI risk practices according to sociodemographic characteristics, estimating the size of key populations and coverage of periodic HIV testing both in the general population and among high-risk groups for HIV infection (5). Specifically, the PCAP aimed to monitor risk practices for sexually transmitted infections, analyze how health policies influence attitudes and practices, and collect information to support HIV prevention and control actions (7–9).

Another important behavioral survey in Brazil, with broader objectives than the PCAP, is the National Health Survey (PNS - “Pesquisa Nacional de Saúde” – in Portuguese). The PNS was carried out for the first time in 2013, based on three fundamental axes: the national health system’s performance, health conditions, and self-reported morbidity and associated risk factors. Given the significant growth of chronic non communicable diseases (NCDs) in the country, NCDs deserved specific attention in the survey, as did the associated risk factors, including tobacco and alcohol use, physical activity, and eating habits (10). Complementarily, in its first edition, the PNS-2013 included anthropometric and blood pressure measurements, as well as blood and urine collection, to further knowledge on some key biological markers in the Brazilian population (11–12).

The second edition of the PNS was carried out in 2019 and gave continuity to most of the modules covered in the first edition, involving an even larger sample of households (13). New modules required by technical areas of the Ministry of Health (MoH) were included in the PNS-2019. Among these was a module focused on sexual activity and behavior (14). One of the main questions was the self-declaration of sexual orientation.

In the present study, information on sexual behavior and the self-declaration of sexual orientation obtained in the PNS-2019 was compared to that obtained in the PCAP-2013. Using data from both surveys, the indicators of sexual behavior were compared according to sociodemographic characteristics. The analysis of the results was carried out in light of the differences in the elaboration of the questions and in the sampling designs of the two surveys. Finally, using data from the PNS-2019, experience of violence (verbal, physical, and sexual) was analyzed according to sexual orientation.

2. Methods

2.1. PCAP-2013

The PCAP is a cross-sectional study, conducted in a nationwide population-based household survey. The population surveyed consisted of residents in permanent private households (PPH) in Brazil, not including those located in special census tracts (quarters, military bases, accommodations, camps, vessels, penitentiaries, penal colonies, prisons, jails, asylums, orphanages, convents, and hospitals) (5). The project was approved by the MoH Ethics Committee in February 2013 (logged under protocol number 194,434).

Sampling Design

The sample size of the PCAP-2013 was set at 12,000 individuals, aged 15–64 years. The sample size was calculated to estimate the proportion of HIV testing over the 12 months prior to the survey (12%) with a two-sided error of 1.3% and a 95% confidence interval (CI).

The PCAP-2013 sample was selected using a 3-stage cluster sampling with stratification of the primary sampling units. The census tracts were considered the primary sampling units (PSU). The sampling design consisted of stratifying the primary sampling units by: Major Region (North, Northeast, Southeast, South, Center-West); population size of the municipality of residence (< 50,000; 50,001-200,000; >200,000 inhabitants); and type of household situation (rural/urban). Using these variables, 30 strata were created.

In each of the 30 strata, the PCAP sample was selected in 3 stages. In the first stage, a systematic sample of census tracts was selected from the Geographic Operational Base of the 2010 Demographic Census, using implicit stratification according to the educational level of the head of the household. Approximately 60 tracts were selected in the North Region, 200 in the Northeast Region, 320 in the Southeast Region, 110 in the South Region, and 60 in the Center-West Region. In the second stage, 16 households were randomly selected in each census tract.

In the third stage, in each household, only one resident, aged 15–64 years, was chosen for the interview. To represent all population subgroups of specific interest for the HIV epidemic (especially young people and men who have sex with men (MSM)), the selection of the household resident sought to complete the quotas of the 3 variables: gender (Male/Female), age range (15–24; 25–34; 35–49; 50–64 years) and living with a partner or not.

Data weighing

Due to the oversampling of some population groups, the sample was calibrated according to the 2010 census distribution by Major Region, age group, living with a partner or not, and educational level.

2.2. PNS-2013 and PNS-2019

The PNS is a nationwide population-based household survey conducted by the Brazilian Institute of Geography and Statistics (IBGE) in partnership with the MoH.

The PNS was carried out in 2013 and in PNS 2019. In the two PNS editions, the surveyed population includes Brazilian residents of private households, except those located in special census tracts.

The PNS-2013 was approved by the National Commission of Ethics in Research (CONEP) in June 2013 (Protocol No. 328,159) and the PNS-2019 in August 2019 (Protocol No. 3,529,376).

Sampling Design

As part of the Integrated Household Survey System of the IBGE, the PNS sample is a subsample of the IBGE Master Sample. The PNS sample is selected with a 3-stage cluster sampling (census tracts, households, household residents) from the IBGE Master sample. In the three stages, the subsample is selected by simple random sampling, so the selection of primary sampling units (PSU) follows the same PSU stratification of the IBGE Master Sample. Further details of the PNS sampling process are available in a previous publication (13).

In 2013, the total sample was composed by 60,202 people aged 18 years or over, and in 2019, by 90,846 people aged 15 years or older.

Data weighing

The expansion factors were calculated by the inverse product of the selection probabilities in each stage. The expansion factors were calibrated, considering the population projection by Federation Units, sex, and age for 2010–2060 and an adjustment factor for losses.

2.3. Study Variables

- a. Population size (%) of homosexual, bisexual, heterosexual men and women: these indicators were estimated from the PCAP question “Do you currently have sexual intercourse: i) only with men? ii) with men and women? iii) only with women? Affirmative answers to items i) and ii) defined the proportion (%) of men who have sex with men (MSM) and item 3 established the proportion of heterosexual men. The same questions were used for women to establish the population size (%) of women who have sex with women (WSW). From the PNS, these indicators were based on the self-declaration of sexual orientation: (homosexual, bisexual, heterosexual, other, do not know, refused to answer) for both males and females. Due to the small number of respondents, the category “other” was omitted from the analysis. The categories “do not know” and “refused to answer” were considered missing values.
- b. Condom use at last sexual intercourse: From the PCAP, this indicator was estimated as the use of a condom at last sexual intercourse in the past 12 months with fixed or casual partners. From the PNS-2019, prevalence of the use of a condom at last sexual intercourse was based on a unique question: In the past twelve months, did you use a male or female condom at last sexual intercourse?
- c. Experience of violence: From the PNS-2019 data, the violence indicators were estimated by the following questions: In the last 12 months before the survey, did you experience verbal violence? or physical? or some other kind of violence? and have you ever suffered sexual violence in your life?
- d. Sociodemographic variables: Major Regions (North, Northeast, Southeast, South, Center-West); gender (Male/Female); age group (18-24, 25-34, 35-49, 50-64 years); educational level (up to complete elementary school, up to complete middle school, incomplete secondary school or higher); race/color (white/nonwhite); living with a partner (yes/no); and household situation (rural/urban).

2.4. Statistical Analysis

First, the PCAP-2013, PNS-2013, and PNS-2019 proportional distributions of individuals by sociodemographic variables (gender, age group, educational level, race/skin color, living with a partner or not, Major Region of residence, and household situation rural or urban) were compared. To test differences between the PCAP-2013 and PNS-2013 proportional distributions, at the 5% level of significance, we used the Pearson’s chi-square test, adjusted by the Rao-Scott correction to account for the survey design effects.

Using data from the PCAP-2013 and the PNS-2019, prevalence of sexual behavior indicators and the corresponding 95% Confidence Intervals (95% CI) were estimated by the sociodemographic variables. Specifically, the PNS-2019 prevalence estimates of homosexual, bisexual, heterosexual males and females were compared with those from the PCAP- 2013. As the PCAP’s MSM size (%) estimate is similar to that of the Joint United Nations Program on HIV/AIDS, UNAIDS for Latin America (15), and is in line with the international standard in countries that do not prohibit homosexuality (16, 17), the size estimates (%) of the PCAP sexual minorities were taken as the references to PNS-2019 estimates based on the self-declaration of sexual orientation. The Pearson’s chi-square test, adjusted by the Rao-Scott correction, was used to test prevalence differences at the 5% level of significance.

Proportions (%) of individuals who suffered some type of violence (verbal, physical, sexual) due to gender and sexual orientation were estimated. The Odds Ratio (OR) was estimated by logistic regression models, using each type of violence as the response variable and sexual orientation (heterosexual, homosexual/bisexual) as the independent variable.

As the PCAP and the PNS use stratification of census tracts and multistage cluster selection, the complex sample designs of both surveys were considered in all statistical analyses. Data were analyzed using the Software for Statistics and Data Science (Stata) version 14.0, “survey” module.

3. Results

The PCAP-2013, PNS-2013, and PNS-2019 proportional distributions of individuals by sociodemographic characteristics are shown in Table 1. In the comparison of the two surveys conducted in 2013, minor differences were found for most variables, except for the distributions by age-group, skin color, and educational level. Comparison of the two PNS editions showed significant differences for the same sociodemographic characteristics.

Table 1

Proportional (%) distributions by sociodemographic characteristics using data from PCAP¹-2013, PNS²-2013, and PNS²-2019

Characteristics		PCAP ¹ -2013		PNS ² -2013		PNS ² -2019	
		%	CI (95%)	%	CI (95%)	%	CI (95%)
Region	North	7.7	6.9–8.6	7.8	7.6-8.0	8.2	7.9–8.5
	Northeast	26.7	24.2–29.4	26.6	26.0-27.2	26.5	25.9–27.2
	Southeast	43.4	41.0–46.0	43.3	42.5–44.1	42.9	42.0-43.9
	South	14.8	13.5–16.1	14.7	14.2–15.2	14.5	14.1–15.0
	Center-West	7.4	6.5–8.3	7.6	7.4–7.8	7.8	7.5–8.2
Gender^a	Male	49.2	48.8–49.5	47.6	46.8–48.4	47.5	46.9–48.2
	Female	50.8	50.5–51.2	52.4	51.6–53.2	52.5	51.8–53.1
Age Group^{a,b}	18–24	18.5	18.0-19.1	18.2	17.5–18.8	16.3	15.7–16.9
	25–34	27.7	27.4–28.1	24.7	24.1–25.3	21.3	20.7–21.8
	35–49	32.7	32.3–33.1	32.2	31.5–32.9	34.4	33.8–35.1
	50–64	21.0	20.8–21.3	25.0	24.3–25.7	28.0	27.5–28.6
Race/skin color^{a,b}	White	39.1	37.2–41.0	46.5	45.7–47.4	41.8	41.1–42.6
	Nonwhite	60.9	59.0-62.8	53.5	52.6–54.3	58.2	57.4–58.9
Live with partner	Yes	61.7	61.2–62.2	62.3	61.5–63.1	62.9	62.1–63.6
	No	38.3	37.8–38.8	37.7	36.9–38.5	37.1	36.4–37.9
Educational level^{a,b}	Up to complete elementary school	33.8	32.3–35.3	33.8	33.0-34.7	28.9	28.2–29.6
	Up to complete middle school	22.6	21.5–23.8	16.7	16.1–17.2	15.6	15.1–16.1
	Secondary school or higher	43.6	42.0-45.2	49.5	48.6–50.4	55.5	54.7–56.3

¹ Knowledge, Attitudes, and Practices Survey; ² National Health Survey^aSignificant difference (p < 5%) between the PCAP-2013 and PNS-2013 proportional distributions^bSignificant difference (p < 5%) between the PNS-2013 and PNS-2019 proportional distributions

Household situation	Urban	85.1	83.1–86.8	86.3	85.9–86.8	86.4	85.9–86.8
	Rural	14.9	13.2–16.9	13.6	13.2–14.1	13.6	13.2–14.1
¹ Knowledge, Attitudes, and Practices Survey; ² National Health Survey							
^a Significant difference (p < 5%) between the PCAP-2013 and PNS-2013 proportional distributions							
^b Significant difference (p < 5%) between the PNS-2013 and PNS-2019 proportional distributions							

Regarding the age distributions, the larger differences were found for the oldest age group (50–64 years), with proportions reaching 21% (PCAP-2013), 25% (PNS-2013), and 28% (PNS-2019). Significant differences in the educational level distributions were also found. The PCAP-2013 showed a proportion of 43.6% of people with a secondary education or higher. The PNS-2013 and PNS-2019 showed proportions of 49.5% and 55.0%, indicating improvements in the Brazilians' educational level. As to race/skin color, the PCAP-2013 proportion found for white skin color seems to be underestimated, most likely because this variable was not considered in the PCAP calibration process. Variations in PNS skin color proportions from 2013 to 2019 may be attributed to changes in skin color self-identification, with a higher percentage of people declaring a black skin color (18) (Table 1).

Table 2 presents the population sizes (%) of homosexual/bisexual males and females, obtained by direct questions from the PCAP-2013 and from the PNS-2019 self-declared sexual orientation. Significant differences were found between the MSM proportions according to the PCAP (3.7%; 95% CI 3.1–4.4%) and to the PNS (2.2%; 95% CI 1.9–2.5), as well as between the WSW proportions: (4.6%; 95% CI 4.0-5.4%) and (2.1%; 95% CI 1.8–2.4), respectively.

Table 2
Proportion (%) of homosexual and bisexual people by sex. PCAP-2013 and PNS-2019

Category		PCAP-2013¹		PNS-2019²	
		%	95% CI	%	95% CI
Male	Sex with men and women	1.3	0.9–1.5	0.6	0.4–0.7
	Sex only with men	2.4	1.9-3.0	1.6	1.4–1.9
	MSM*	3.7	3.1–4.4	2.2	1.9–2.5
Female	Sex with men and women	3.4	3.1–3.8	1.0	0.8–1.2
	Sex only with women	1.2	0.9–1.7	1.1	0.9–1.3
	WSW*	4.6	4.0-5.4	2.1	1.8–2.4
¹ Knowledge, Attitudes, and Practices Survey: Based on the direct question: “Do you currently have sexual intercourse: i) only with men? ii) with men and women? iii) only with women?”					
² National Health Survey: Based on self-declaration of sexual orientation.					
MSM – men who have sex with men.					
WSW – women who have sex with women.					
*Significant difference (p < 5%) between the PCAP-2013 and PNS-2013 proportions					

Table 3 shows the MSM size (%) estimates according to sociodemographic characteristics. For all sociodemographic characteristics, the PCAP-2013 MSM size (%) estimates were higher than PNS-2019 estimates, but not always significantly higher. The highest MSM proportions were found among men, aged 18–24 years in both surveys, achieving 6.3% (95% CI: 4.5–8.9%) and 5.2% (95% CI: 4.0-6.7%), respectively, and the difference between the estimates was not statistically significant at the 5% level. Among men who live in a state capital, there was no significant difference in the two survey estimates: 3.6% (95% CI: 3.0-4.3%) by the PNS-2019 and 4.0% (95% CI: 2.7–6.1%) by the PCAP-2013. Regarding differences by Major Region, no significant differences were found in the Northeast, South, and Center-West. In the Southeast Region, the PCAP MSM size (%) was significantly higher than the PNS estimate, but this region showed the highest MSM prevalence in both surveys.

Table 3

Prevalence (%) of MSM by sociodemographic characteristics. PCAP¹- 2013 and PNS²-2019

Characteristics	Category	PCAP-2013 ¹		PNS-2019 ²	
		%	95% CI	%	95% CI
Total	Brazil*	3.7	3.0-4.5	2.2	2.0-2.6
Region	North*	5.6	3.9-8.0	2.4	1.7-3.6
	Northeast	2.3	1.4-3.8	2.0	1.6-2.5
	Southeast*	4.9	3.7-6.6	2.5	2.0-3.2
	South	2.0	1.2-3.5	1.9	1.5-2.5
	Center-West	2.9	1.8-4.8	1.9	1.5-2.5
Age Group	18-24	6.3	4.5-8.9	5.2	4.0-6.7
	25-34*	4.1	3.0-5.5	2.6	2.2-3.2
	35-49*	2.8	2.0-3.9	1.7	1.3-2.2
	50-64*	2.1	1.3-3.2	0.8	0.6-1.2
Race/skin color	White	2.7	2.0-3.8	2.0	1.6-2.5
	Nonwhite*	4.2	3.3-5.3	2.4	2.0-2.9
Live with partner	Yes*	2.2	1.6-2.9	0.8	0.6-1.0
	No	6.1	4.8-7.9	5.3	4.5-6.2
Educational level	Up to complete elementary school*	2.1	1.4-3.1	0.7	0.5-1.0
	Up to complete middle school	4.2	2.9-5.9	2.8	1.9-4.1
	Secondary school or higher*	4.6	3.5-6.0	3.0	2.6-3.4
Household situation	Urban*	3.9	3.2-4.9	2.5	2.1-2.8
	Rural	2.4	1.2-4.5	1.1	0.7-1.7
Live in a state capital	Yes	4.0	2.7-6.1	3.6	3.0-4.3
	No*	3.6	2.8-4.5	1.8	1.5-2.2
¹ Knowledge, Attitudes, and Practices Survey: Based on the direct question: "Do you currently have sexual intercourse: i) only with men? ii) with men and women? iii) only with women?					
² National Health Survey: Based on self-declaration of sexual orientation.					
MSM – men who have sex with men.					
*Significant difference (p < 5%) between the PCAP-2013 and PNS-2019 proportions					

Regarding the educational level, although significant differences were found in the comparison between the two survey results, as the level of education improves, the homosexuality size estimates increased. Based on the PCAP-2013 results,

the MSM size estimate ranged from 2.6–4.1%, and based on PNS, from 0.7–3%, from up to complete elementary school to secondary school or higher. The analysis by skin color also showed significant differences between the two survey estimates, but MSM proportions proved to be higher among non-white males, in both the PCAP-2013 and the PNS-2019. Moreover, significant differences were found for residents of urban areas.

The analysis of the sexual behavior indicator “condom use at last sexual intercourse” by sociodemographic characteristics is presented in Table 4. At the national and regional levels, there were no differences between the PCAP and PNS estimates, meaning there was no increase in condom use at last sexual intercourse from 2013 to 2019. However, improvements were observed in some specific groups: individuals aged 18–24 years (from 58.7 to 67.2%) and 25–34 years (from 41.7 to 46.2%); not living with a partner (from 63.9 to 72.1%); and among MSM (from 67.8 to 80.4%), with the highest proportions of condom use at last sexual intercourse.

Table 4

Condom use at last sexual intercourse by sociodemographic characteristics. PCAP¹-2013 and PNS²-2019

Characteristics		Condom use at last intercourse			
		PCAP-2013 ¹		PNS-2019 ²	
		%	95%CI	%	95%CI
Brazil		37.7	36.3–39.0	38.7	37.9–39.5
Region	North	43.6	39.4–47.8	47.0	45.2–48.7
	Northeast*	35.8	33.5–38.1	39.5	38.4–40.7
	Southeast	37.7	35.3–40.3	38.1	36.7–39.6
	South	36.7	34.0–39.5	35.7	34.1–37.4
	Center-West	39.7	36.5–43.0	36.4	34.6–38.4
Gender	Male	42.9	41.2–44.6	41.0	40.0–42.1
	MSM*	66.3	57.3–74.3	80.4	74.5–85.1
	Heterosexual*	42.0	40.3–43.8	39.7	38.7–40.8
	Female*	32.1	30.2–34.1	36.3	35.3–37.4
Age Group	18–24*	58.7	55.7–61.6	67.2	65.1–69.3
	25–34*	41.7	39.4–44.0	46.2	44.6–47.8
	35–49	31.8	29.7–34.0	33.0	31.9–34.1
	50–64	20.4	18.3–22.6	21.6	20.5–22.8
Race/skin color	White	37.2	35.1–39.4	36.9	35.8–38.0
	Nonwhite*	37.9	36.3–39.6	40.1	39.1–41.0
Live with partner	Yes	25.8	24.3–27.3	25.5	24.8–26.3
	No*	62.5	60.1–64.7	72.1	70.8–73.5
Educational level	Up to complete elementary school	27.7	25.7–29.8	29.7	28.6–30.9
	Up to complete middle school	40.3	37.5–43.2	41.0	39.2–42.8
	Secondary school or more	43.2	41.2–45.3	42.2	41.1–43.2

¹ Knowledge, Attitudes, and Practices Survey: estimated as the use of condom at last sexual intercourse in the past 12 months with fixed or casual partners.

² National Health Survey: Based on the question: In the past twelve months, at the last sexual intercourse you had, did you use a male or female condom?

MSM – men who have sex with men.

*Significant difference ($p < 5\%$) between the PCAP-2013 and PNS-2019 proportions

Characteristics		Condom use at last intercourse			
		PCAP-2013 ¹		PNS-2019 ²	
		%	95%CI	%	95%CI
Household situation	Urban	38.3	36.8–39.8	39.7	38.8–40.5
	Rural	34.1	30.9–37.6	32.7	31.4–34.0
¹ Knowledge, Attitudes, and Practices Survey: estimated as the use of condom at last sexual intercourse in the past 12 months with fixed or casual partners.					
² National Health Survey: Based on the question: In the past twelve months, at the last sexual intercourse you had, did you use a male or female condom?					
MSM – men who have sex with men.					
*Significant difference (p < 5%) between the PCAP-2013 and PNS-2019 proportions					

Indicators related to having experienced some type of violence in the last 12 months before the survey are presented in Table 5. More than 40% of the homosexual/bisexual men and women have experienced some type of violence (verbal, physical, or sexual) in the last 12 months. Compared to heterosexual men and women, the odds of experiencing any type of violence were 3 times higher. Regarding sexual violence at least once in a lifetime, prevalence was 18.1% among MSM, with an OR (9.94; 95% CI 6.66–14.84) in relation to heterosexual men. Among WSW, the prevalence was 25.6%, with an OR (3.26; 95% CI 2.40–4.33).

Table 5
Proportion (%) of individuals who experienced some type of violence by sexual orientation. PNS-2019

Gender	Sexual Orientation	Type of Violence							
		Verbal ¹		Physical ¹		Sexual ²		Any Type ¹	
		%	OR* 95% CI	%	OR* 95% CI	%	OR* 95% CI	%	OR* 95% CI
Male	Heterosexual	16.7	1.0	4.1	1.0	2.2	1.0	17.8	1.0
	MSM	39.6	3.3 2.5–4.3	13.4	3.6 2.2–5.9	18.1	9.9 6.7–14.8	40.8	3.2 2.4–4.2
Female	Heterosexual	19.6	1.0	4.4	1.0	9.6	1.0	20.5	1.0
	WSW	41.4	2.9 2.2–3.8	16.3	4.2 2.7–6.5	25.6	3.3 2.4–4.3	43.5	3.0 2.3–3.9
Total	Heterosexual	18.2	1.0	4.3	1.0	6.1	1.0	19.2	1.0
	Homo/bisexual	40.5	3.1 2.5–3.7	14.9	3.9 2.8–5.4	22.0	4.3 3.4–5.5	42.2	3.1 2.5–3.7
¹ In the last 12 months previous to the survey.									
² At least once in lifetime.									
*OR- Odds Ratio. Estimated by a logistic regression model using each type of violence as the response variable and sexual orientation (heterosexual, homo/bisexual) as the independent variable.									
MSM – men who have sex with men.									
WSW – women who have sex with women.									

4. Discussion

In the present study, results on sexual behavior from the PCAP-2013 and the PNS-2019 were compared for two purposes: to check the comparability of the two surveys and to investigate improvements in sexual behavior indicators.

In Brazil, since the PNS is a broad population-based household survey, conducted with a probabilistic sample of the Brazilian population in all stages, it is considered the gold standard of national health surveys (14). Although the PCAP selection of individuals in the final stage (households) obeys a quota system, the comparison of the PCAP-2013 and the PNS-2013 distributions of individuals by sociodemographic characteristics showed minor differences for most of the study variables. Significant differences were found for the distributions by age-group, educational level, and skin color. Comparison of the two PNS editions showed significant differences for the same sociodemographic variables. As the PCAP-2013 was weighted according to the 2010 Demographic Census, and weighting of both PNS databases was based on natural expansion factors, these findings represent the aging of the Brazilian population from 2010 to 2019 and the improvement in Brazilians' educational level (19).

Variations in PNS race/skin color proportions from 2013 to 2019 have been discussed before and have been attributed to changes in the self-identification of skin color (20). However, the underestimation of the proportion of white people in

the PCAP-2013 is most likely due to a statistical estimation problem, as this variable was not included in the survey post-stratification procedure (21).

Estimating the size and understanding diversity of homosexuality are essential for the development of inclusive policies and services (22). To date, research on this topic is still scarce in Brazil. In 2019, the PNS has included the question of sexual orientation by self-declaration for the first time. The comparison with the PCAP-2013 direct questions about who they currently have sex with (men, women, or women and men) showed lower prevalence estimates of homosexuality based on sexual orientation self-declaration, for males and females, even though this questionnaire module is self-completed by the participants in both surveys.

It is well-known that sexual minorities experience stigma and discrimination worldwide (23–25). In Brazil, the underestimation of MSM and WSW size estimates based on the self-declared sexual orientation suggests that gay and bisexual communities experience various psychological challenges related to their sexuality and gender identity disclosure (26). A qualitative study in Fortaleza, Brazil, indicated that MSM avoided seeking health care services due to a fear of being stigmatized and discriminated against. Furthermore, when they sought out health care, they tended to demonstrate masculine behavior so as not to be identified by their sexual orientation (27).

For some specific population groups, the MSM size estimates showed even greater differences between the PNS-2019 and the PCAP-2013 estimates. Findings revealed that men with incomplete fundamental schooling, living with a partner, residents in the North, aged 35 years and over, and living in the rural area or in cities other than state capitals were more likely not to reveal their sexual orientation. These results reinforce the importance of monitoring sexual orientation by self-declaration to continuously improve the quality of this information at subnational levels.

Identifying factors associated with the nondisclosure of sexual orientation is crucial for the development of interventions to strengthen protection from stigma and discrimination, as well as improve healthcare access among MSM. A survey in Germany showed that respondents who had never tested for HIV were more likely to live in a city with less than 100,000 inhabitants and to be less open about their sexual orientation to their primary care provider (28). In addition to less frequently testing for HIV, stigma in healthcare services is a barrier to HIV pre-exposure prophylaxis (PrEP) (29). Interest in PrEP is lower among MSM who are not open about their sexual orientation and opportunities in reducing new HIV infections are therefore lost (30, 31).

The indicator “condom use at last recent sexual intercourse” has the advantage of being questioned in the same way in both surveys. At the national level, no significant difference was found in the PNS-2019 when compared to the PCAP-2013, indicating that there is no general improvement in this behavior. However, the comparative analysis by sociodemographic variables showed significant increases for younger age groups (18–24 and 25–34 years), for MSM, and for those who do not live with a partner. These results show a greater awareness concerning HIV risk exposure in the most at risk population groups, suggesting that prevention actions focused on key populations have been successful (32).

However, although condom use is key to HIV prevention if used consistently and correctly, there are various barriers to regular condom use. The PNS-2019 data showed that the main reason for not having used a condom at last sexual intercourse was trusting the sexual partner. The second reason most cited was the aversion to using a condom, more frequently cited among people with a low educational level. A recent systematic review revealed that the MSM population believes that not using condoms represents mutual trust and loyalty between sexual partners, while condom use is a symbol of distrust or suspicion regarding the partner’s HIV status (33).

Prejudice and stigma against sexual minorities in Brazil are expressed by the excess of violence experienced by people who declare themselves to be homosexual/bisexual. MSM and WSW showed 3-fold greater odds of having suffered at

least one type of violence (verbal, physical, or sexual) in the last 12 months prior to the survey than did heterosexual men and women. The most impressive results were found for sexual violence among MSM and WSW. Prevalence of having ever suffered sexual violence among MSM was 18.1%, with 10-fold greater odds than heterosexual men, while among WSW, this prevalence was 25.6%, with 3-fold greater odds than heterosexual women. In a biological and behavioral surveys among MSM conducted in nine Brazilian cities (2009), prevalence of having experienced sexual violence at least once in lifetime was approximately 16%, with discrimination due to sexual orientation being the strongest determinant of sexual violence (34).

A limitation of the PNS-2019 is the absence of questions about periodic HIV testing. As the current policy in Brazil is to provide antiretroviral therapy to all HIV patients immediately after diagnosis, the PCAP module on HIV testing (When? Where? Why? Why not?) is of utmost importance in tracking spatial and temporal trends of HIV diagnosis and should also be included in the PNS. Moreover, the reasons for having experienced discrimination or having been treated worse in the health services, addressed only in the PNS- 2013 (35), could have further contributed to this discussion (36).

An additional limitation of this study lies in the difficulty to estimate the size of sexual and gender minorities. Although the estimate of MSM size in the PCAP is similar to that of Joint United Nations Program on HIV/AIDS, UNAIDS for Latin America (15), and is in line with the international standards in countries that do not prohibit homosexuality (16, 17), it is possible that the size of the MSM population is still underestimated (37, 38).

5. Conclusions

The results found in this study emphasize the importance of monitoring risk practices associated with HIV infection and other sexually transmitted infections (STIs), as well as discrimination and violence suffered by sexual minorities at subnational levels, in order to provide adequate information to strengthen public policies focused on overcoming the persistent homophobic prejudice in Brazilian society.

List Of Abbreviations

AIDS - Acquired Immuno deficiency Syndrome

BSS - Behavioral Surveillance Survey

CDC GAP-Brazil - Centers of Disease Control Global Aids Program in Brazil

CI - Confidence interval

CNEFE - National Register of Addresses for Statistical Purposes

CONEP - National Commission of Ethics in Research

HIV – Human immunodeficiency virus

IBGE - Brazilian Institute of Geography and Statistics

MoH - Ministry of Health

MSM - Men who have sex with men

NCDs - Chronic noncommunicable diseases

OR - Odds-ratios

PCAP - Knowledge, Attitudes and Practices survey

PNS - National Health Survey

PPH - Permanent private households

PrEP - HIV pre-exposure prophylaxis

PSU - Primary sampling units

Stata - Software for Statistics and Data Science

STIs - Sexually transmitted infections

UNAIDS - Joint United Nations Program on HIV/AIDS

WSW - Women who have sex with women

Declarations

Ethics approval and consent to participate

We confirm that all methods were carried out in accordance with guidelines and regulations approved by the Ministry of Health Ethics Committee and the National Commission of Ethics in Research.

We confirm that PCAP-2013 protocol was approved by the Ministry of Health Ethics Committee in February 2013 (Protocol number 194,434), the PNS-2013 protocol was approved by the National Commission of Ethics in Research (CONEP) in June 2013 (Protocol No. 328,159) and the PNS-2019 protocol in August 2019 (Protocol No. 3,529,376).

We confirm that the informed consent was obtained from all participants of PCAP-2013, PNS-2013 and PNS-2019 surveys.

All documents of ethical approval and informed consents for both surveys (PCAP and PNS) are included in the related files section.

Consent for publication

Not applicable.

Availability of data and materials

The PNS databases are publicly available at the internet (<https://www.pns.icict.fiocruz.br/bases-de-dados/>). The PCAP database is available only upon request to the Departamento de HIV/Aids, Tuberculose, Hepatites Virais e Infecções Sexualmente Transmissíveis, MS (<https://www.gov.br/aids/pt-br>) or to the author Ana Roberta Pati Pascom (ana.roberta@aims.gov.br) on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

CLS, EAC, ARPP participated in the concept of the study, drafting, data analysis, and discussion of results. PRBSJ and GND participated in the statistical analysis and interpretation of results. All authors approved the final version and are responsible for all aspects of the work in ensuring the accuracy and integrity of any part of the article.

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