

# Prevalence and Factors Associated With HIV in Homeless People

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## Research

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# Abstract

## Background

Infection with the human immunodeficiency virus (HIV) compromises the immune system of infected people. Homeless people are more vulnerable to HIV infection due to behavioral and sexual factors. The main objective of this study was to estimate the prevalence of infection by the Human Immunodeficiency Virus (HIV) in homeless people in a capital of Northeastern Brazil.

## Methods

Cross-sectional study carried out at the Reference Center for the homeless population (Centro Pop), in a capital of Northeastern Brazil, from September/2017 to September/2018. Data collected through a semi-structured form including socio-demographic data, risk and sexual behaviors and anti-HIV serology. Data were analyzed using Person's Chi-square test. The study was approved by the Research Ethics Committee (CEP) of the Federal University of Piauí.

## Results

A prevalence of 3.9% was detected among the 204 homeless people investigated,, that is, 8-204 of anti-HIV reagent, with statistical significance in relation to sexual practice with people of the same sex  $p \leq 0.012$  and previous sexually transmitted infection (STI)  $p \leq 0.002$ . There was a predominance of males 87.3%, 66.0% were over thirty years of age, 58.3% had less than 12 years of schooling, 84.8% declared they were non-white, 57.3% had no fixed income, 67.0% professed religion, 89.7% declared to be heterosexual, 71.5% did not use a condom during the first sexual intercourse, 28.4% had had sexual intercourse with people of the same sex, and 41.0% had a history of STI.

## Conclusions

HIV prevalence was higher than in people in the general population. Results show an association between history of any STI and more time on the streets. And also risk behaviors such as high consumption of alcohol and other drugs, low frequency of condom use, increased number of sexual partners.

## Introduction

Infection with the human immunodeficiency virus (HIV) compromises the immune system of infected people and is responsible for the development of the Acquired Immunodeficiency Syndrome (AIDS), representing a great challenge, a matter of concern for public health worldwide<sup>1</sup>. According to the Joint United Nations Program on HIV (UNAIDS), in 2018, 37.9 million people worldwide were living with HIV, with 1.7 million new infections<sup>2</sup>.

Given the magnitude of the problem, homeless people are more vulnerable to HIV infection, considering sexual risk behaviors and substance use<sup>3</sup>. Worldwide, the prevalence of HIV is different in relation to the

population and risk behavior.

An international study carried out in Jamaica found an HIV prevalence of 13.8%, with a gender difference (men 11.6%, women 26.7%,  $P = 0.007$ )<sup>4</sup>. Another study carried out with a homeless child in Iran showed an HIV prevalence of 4.5%<sup>5</sup>. In homeless people, the prevalence was 4.1% for HIV in Kenya, with factors associated with both anal insertion sex and receptive anal sex<sup>6</sup>.

In Brazil, 43,941 new cases of HIV and 37,161 cases of AIDS were diagnosed in 2018. Between the years 2007 to June 2019, with regard to age groups, it was observed that the majority of cases of HIV infection were found in people with 20 to 34 years old, with a percentage of 52.7% of cases<sup>7</sup>. In the Brazilian scenario, there are also differences in prevalence in different regions in the general population and in homeless people.

Still, Brazilian regions in 2018, presented variable rates of HIV infection with 5,084 (11.6%) in the North region, 10,808 (24.6%) cases in the Northeast region, 16,586 (37.7%) in the region Southeast, 7,838 (17.8%) in the South and 3,625 (8.2%) in the Midwest<sup>7</sup>. In the central-western region of Brazil, an HIV prevalence of 1.24% was detected, with a significant association in relation to previous HIV tests and years of schooling<sup>3</sup>. In the southeastern region, in a similar population, the prevalence was 4.9%, with the majority being male (85.6%), non-white (71.5%), with a mean age of 40.9 years and low education (72.0%)<sup>8</sup>.

In this sense, authors emphasize that homelessness is a substantial barrier to consistent and recommended care for HIV, access to and adherence to antiretroviral therapy (ART) and sustained viral suppression, thus increasing the risk of morbidity and transmission<sup>9</sup>.

Thus, homeless people have multiple factors and conditions of risk of HIV infection. There is still a shortage of data in the literature regarding the prevalence of this infection in the national and local scenario, and it is necessary to obtain more information about this population in order to implement interventions, aiming at preventing HIV and reducing diseases.

Given this, the study aimed to estimate the prevalence of infection by the Human Immunodeficiency Virus (HIV) in homeless people, in a capital of Northeastern Brazil.

## **Methods**

### **Type of study**

Cross-sectional, analytical research carried out with homeless people attended at the Specialized Reference Center for the Homeless Population (POP Center), in the municipality of Teresina, Piauí, between September 2017 and September 2018.

### **Population and sample calculation**

Convenience sampling refers to the selection of participants available at the time and place of the survey<sup>10</sup>. In this process, the following inclusion criteria were adopted: being 18 years old or older; being registered at the Pop Center and with at least one service in the Pop Center, being homeless people, or receiving support from hostels, and not showing aggressive behavior at the time of the interview.

Thus, participants who did not accept rapid HIV testing were excluded. According to information from the Pop Center, an average of 500 homeless people sought some type of assistance at the Pop Center. In the year prior to the data collection, a sample calculation was performed and an estimate of 200 participants was obtained.

## **Data collection and study variables**

Data were collected using a semi-structured form, previously validated in terms of form and content, by researchers specialized in the subject. The independent variables were: sociodemographic (age, time as homeless people, sex, years of schooling, self-reported color, religion, if he/she has a partner, region of birth, profession, income, if he/she was in a support home, if he/she suffered discrimination, experience in prison, reason why you are homeless people, where you were homeless people, type of homeless experience), risky behavior (use of alcohol, use of cigarettes, use of marijuana, use of crack, time using drugs, sharing injection syringe) and sexual behavior (sexual orientation, already had sexual intercourse, age at first sexual intercourse, condom use at first sexual intercourse, fixed partner, eventual partner, relationship with people of the same sex, coerced sexual intercourse, sexual intercourse with people who use drugs, sexual intercourse with a sex worker, he/she paid in exchange for sex, received money in exchange for sex, had previous sexually transmitted infection - STI), as a dependent variable, the anti-HIV reagent.

In this study, a case of HIV was considered by means of a rapid reagent test, one in which two lines/bars of purple/pink color, one in the control area (C) and another in the test area (T), appear on the device after 15 minutes of the test. It should be noted that all the guidelines of the Ministry of Health were followed for rapid testing by the method of immunochromatography, with a view to the detection of antibodies to HIV<sup>11</sup>.

Data collection took place in a specific room at the POP Center to ensure the confidentiality and anonymity of the information obtained. It is also noteworthy that it occurred in two stages, with the first application of the form and, subsequently, rapid HIV testing. It is noteworthy that participants were properly explained about each stage and, after their consent, proceeded with data collection.

In this context, it is important to note that all participants were informed about the results of the exams. During the delivery of results, guidance on harm reduction measures was carried out. The HIV-positive serological results were sent to the Specialized Assistance Service (SAS), of the municipality, previously agreed with the local health management.

## **Statistical data processing and analysis**

Data were entered twice in a Microsoft Office Excel for Windows 2007 spreadsheet and after validation they were exported to the IBM® Statistical Package for the Social Sciences (SPSS) 21.0 software. To check relationships between variables, Person's chi-square test was used, in which  $p < 0.005$  was considered statistically significant.

## **Ethical and legal aspects**

The study was carried out following the rules that regulate research with human beings, contained in Resolution 466/12 of the National Health Council and Operational rule 001/2013.

Thus, the research was conducted with individuals who agreed to participate voluntarily after reading, explaining and signing the Informed Consent Form.

The present study was submitted to the Research Ethics Committee of the Federal University of Piauí (UFPI), with authorization: 1,755,893.

## **Results**

Of the 204 homeless people who participated in the study, 178 (87.2%) were male, 135 (66.0%) were over thirty years of age, 119 (58.3%) had less than twelve years of schooling, 173 (84.8%) declared themselves non-white, 117 (57.3%) had no income, 137 (67.0%) professed religion, as shown in Table 1.

**Table 1 Prevalence and sociodemographic factors associated with HIV in homeless people.**

Variables	HIV prevalence		p*
	N	%	
Age			
18 to 30 years	3/69	4.3%	
Over 30 years	5/135	3.7%	0.823
Time as homeless person			
Up to 1 year	1/66	1.5%	
More than 1 year	7/138	5.1%	0.221
Sex			
Male	7/178	3.9%	
Female	1/26	3.8%	0.983
Years of schooling			
Over 12 years	1/64	1.6%	
From 1 to 12 years	7/119	5.9%	0.221
Illiterate	0/21	0.0%	
Self-reported color			
Non-white	8/173	4.6%	
White	0/31	0.0%	0.222
Religion			
Do you have a religion	4/137	2.9%	
I have no religion	4/67	6.0%	0.292
Do you have Companion			
No	8/179	4.5%	
Yes	0/25	0.0%	0.281
Place of birth			
Northeast region	8/181	4.4%	
Other region	0/23	0.0%	0.304

Variables	HIV prevalence		p*
	N	%	
You have profession			
Yes	6/166	3.6%	
No	2/38	5.3%	0.637
You have income			
Yes	4/87	4.6%	
No	4/117	3.4%	0.668
You were in Shelter home			
Yes	7/148	4.7%	
No	1/56	1.8%	0.334
Have you ever suffered discrimination			
Yes	6/127	4.7%	
No	2/77	2.6%	0.448
Prison experience			
No	2/94	2.1%	
Yes	6/110	5.5%	0.222
Reason why you are homeless people			
Alcohol and drugs	2/55	3.6%	
Family conflict	6/97	6.2%	0.178
Another motive	0/52	0.0%	
Where have you been a homeless person			
Northeast region	8/154	5.2%	
Other regions	0/50	0.0%	0.100
Type of experience on the streets			
Stays all day, but doesn't sleep on the street	2/104	1.9%	
Stays all day and sleeps on the street	6/100	6.0%	0.134

Source: Direct research.

\*p-value of Pearson's chi-square test.

As for sexual behavior, 183 (89.7%) declared to be heterosexual, 186 (91.0%) stated to have had first sexual intercourse up to eighteen years of age, 146 (71.5%) did not use a condom in the first sexual intercourse, 155 (75.9%) had no fixed partner, and 58 (28.4%) had already had sexual intercourse with people of the same sex, as it can be seen in Table 2.

**Table 2 Prevalence and behavioral factors associated with HIV in homeless people.**

Variables	HIV prevalence		p*
	N	%	
Sexual orientation			
Heterosexual	7/183	3.8%	
Homosexual	1/21	4.8%	0.834
Already had sex			
Yes	8/202	4.0%	
No	0/2	0.0%	0.774
Age of 1st sexual intercourse			
Up to 18 years	8/186	4.3%	
Over 18 years	0/18	0.0%	0.369
Condom use in the 1st sexual intercourse			
Yes	4/56	7.1%	
No	4/146	2.7%	0.339
Not applicable	0/2	0.0%	
Fixed partner			
Yes	1/49	2.0	
No	7/155	4.5%	0.437
Eventual partner			
Yes	2/67	3.0%	
No	6/137	4.4%	0.630
Already had homosexual relationships			
No	2/144	1.4%	
Yes	6/58	10.3%	0.012
Not applicable	0/2	0.0%	

Source: Direct research.

\*p-value of Pearson's chi-square test.

Variables	HIV prevalence		p*
	N	%	
Coerced intercourse			
No	5/172	2.9%	
Yes	3/30	10.0%	0.174
Not applicable	0/2	0.0%	
Already had sex with people who use drugs			
No	3/73	4.1%	
Yes	5/129	3.9%	0.956
Not applicable	0/2	0.0%	
Already had sex with a sex worker			
No	1/67	1.5%	
Yes	7/135	5.2%	0.427
Not applicable	0/2	0.0%	
Already paid in exchange for sex			
No	2/76	2.6%	
Yes	6/126	4.8%	0.721
Not applicable	0/2	0.0%	
Already received money in exchange for sex			
No	5/130	3.8%	
Yes	3/72	4.2%	0.954
Not applicable	0/2	0.0%	
Already had any STIs			
No	1/117	0.9%	
Yes	6/84	7.1%	0.002
Doesn't know	1/3	33.3%	
Already participated in educational activity on STI			
Source: Direct research.			
*p-value of Pearson's chi-square test.			

Variables	HIV prevalence		p*
	N	%	
No	4/90	4.4%	
Yes	4/114	3.5%	0.732
Already made use of Alcohol			
Yes	8/189	4.2%	
No	0/15	0.0%	0.416
Have already used cigarettes			
Yes	8/178	4.5%	
No	0/26	0.0%	0.270
Already used marijuana			
No	1/45	2.2%	
Yes	7/159	4.4%	0.506
Already used crack			
No	2/72	2.8%	
Yes	6/132	4.5%	0.534
Time using drugs			
More than 1 year	0/10	0.0%	
Less than 1 year	7/132	5.3%	0.376
Not applicable	1/62	1.6%	
Already shared injectable drug syringe			
Yes	1/10	10.0%	
No	0/17	0.0%	0.433
Not applicable	7/177	4.0%	
Source: Direct research.			
*p-value of Pearson's chi-square test.			

Regarding risk behavior, 84 (41.0%) had a history of previous STI, 189 (92.6%) had used alcohol, 159 (78.0%) had used marijuana, 132 (64.7%) used crack, 10 (5.0%) claimed to share syringes for injecting drugs, as shown in Table 2.

In this sense, an HIV prevalence of 3.9% (95% CI: 1.93-1.99) was detected in a population of 204 homeless people, with statistical significance in relation to sexual practice with a person of the same gender  $p \leq 0.012$  and previous STI  $p \leq 0.002$ , according to Table 2.

## Discussion

The prevalence of HIV in homeless people was 3.9%, considered high when compared to other studies at an international level. A survey of homeless people in the United States of America found an HIV prevalence of 1.52%<sup>12</sup>. In this context, the HIV prevalence found in homeless people reveals high rates, varying from 9.8–61.1% in different regions of the world: USA (North America), Greece (Europe), Ukraine (Eastern Europe)<sup>13,14,15</sup>. Other studies are in agreement with these findings, with a high prevalence of HIV in a similar population<sup>5,4,6</sup>.

In Brazil (South America), a study carried out with 564 individuals showed that 47.1% were homeless and with an HIV prevalence of 6.8%<sup>16</sup>. A survey carried out in central Brazil found an HIV prevalence of 1.24%, in homeless people.

It is possible to verify, therefore, that this is a worldwide problem, with high magnitude and data related to prevalence, with great variation in accordance with each region and there are still few studies related to the follow-up of homeless people with HIV.

In this study, there was a significant association with the prevalence of HIV in homeless people and sexual practice with people of the same sex  $p \leq 0.012$  and previous STI  $p \leq 0.002$ . In this scenario, a survey carried out in southeastern Brazil, with 1405 homeless people, also concluded that history of STI, the fact that the person is younger and has a homosexual practice were associated with HIV infection<sup>8</sup>.

Some authors in the United States of America have shown that intimate partner violence, the use of injectable and non-injectable substances, a history of incarceration and the severity of homelessness are associated with a higher prevalence of STIs in homeless people<sup>17</sup>. Another national study points out that previous HIV tests and years of schooling were factors associated with HIV infection<sup>3</sup>.

Thus, a survey in Jamaica showed that sex work, multiple partners, incarceration, the use of non-injectable drugs and female rape were associated with HIV among homeless people<sup>4</sup>. Thus, certain authors point out that homelessness was associated with less retention of HIV assistance, adherence to the dose of ART and sustained viral suppression<sup>9</sup>.

In this perspective, it is essential to expand mass testing for STIs, especially in populations at risk. In addition, a contextualized approach of homeless people is necessary in order to detect, treat and decrease the chain of STI transmissibility, as well as providing better health care for this population in need of care networks.

In this context, homeless people are young adults, with little education, mostly male and have no income. In this regard, a survey conducted in Los Angeles, United States, with homeless people, corroborates these findings<sup>19</sup>. In the Brazilian scenario, a study carried out in Ribeirão Preto, southeastern Brazil, with homeless people, showed that the subjects reported being literate, however, all had low education, with the fundamental level of regular education being the period in which occurs school dropout<sup>19</sup>.

Men are generally more vulnerable, as they are more likely to suffer injuries related to violence and accidents when compared to women, and are less likely to seek health services. These results suggest that the male population is more exposed to various injuries, considering the street situation, as well as the imperative need for educational qualification and social programs for income-generating activity.

Homeless people have a long period of stay in this situation. A survey carried out in Tehran corroborates these data by finding that the average number of homeless people was 24 months<sup>21</sup>. Another study in Kenya corroborates these findings<sup>6</sup>. A survey conducted in six Brazilian capitals showed that the subjects surveyed lived on the street, during their lives, at least once for less than six months, with less time of 30 days. In Greece, the minimum time was 12 months<sup>14,16</sup>.

Authors point out that the high risk of homelessness among HIV-positive homeless people is largely attributed to multi-morbid risk factors common to HIV and homelessness, rather than to an HIV-independent effect. In addition, it requires multidimensional preventive psychosocial interventions<sup>22</sup>.

The risk of HIV diagnosis has decreased with the placement of longer-term support homes. Supportive housing can help with primary HIV prevention<sup>23</sup>. Thus, there is an urgent need for the creation and expansion of social houses, shelters and social support networks to assist this population, a victim of social exclusion and homelessness.

The consumption of alcohol and other illicit drugs, as well as the sharing of syringes for drug use, were common practices among homeless people. Research in Kenya with homeless youth showed that 49% consumed alcohol at least weekly and 32% consumed marijuana<sup>6</sup>. Another study pointed out that of the homeless people in Tehran who abused intravenous drugs, 48.25% had a history of needle sharing<sup>21</sup>.

In Greece, the probability of infection was found to be 2.3 times higher in homeless people who inject drugs, and among users who injected drugs 2 years ago or less, the estimated incidence was 23.4 new cases of HIV<sup>14</sup>. Thus, it is necessary to mitigate public policies for harm reduction in this population and the strengthening of support networks, such as the psychosocial care centers for alcohol and drugs, with an emphasis on the reception, screening, diagnosis and treatment of this public.

In this context, homelessness significantly affects health and well-being. Homeless adults generally experience co-occurring and debilitating physical, psychological and social conditions. These determinants are associated with disproportionate rates of infectious diseases among homeless adults, including HIV, viral hepatitis, as well as tuberculosis<sup>17</sup>.

As a limitation of this study, it is highlighted that for the recruitment of participants, the method adopted was the selection of a non-probabilistic sample for convenience, except the aspect that the results obtained had restrictions, since they were collected in a single capital of the northeast and, therefore, do not show a broad generalization.

## Conclusion

Homeless people have a high prevalence of HIV infection, with a significant association regarding sexual intercourse with people of the same sex and previous STI history. They are young adults, with low education, without fixed income, long time on the street, who generally experience risky behaviors, such as high consumption of alcohol and other drugs, low frequency of condom use, in addition to an increased number of partners sexual.

These findings suggest better investment in prevention activities, early detection of HIV and health promotion, with a view to improving access for monitoring detected cases and reducing a late diagnosis.

## Declarations

### Additional Information

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### Availability of data and materials

The raw data used in this study can be accessed with the corresponding author upon reasonable request.

### Ethics approval and consent to participate

The ethical authorization letter was obtained from the Municipal Health Foundation of Teresina to obtain permission to conduct the research. This study was developed in accordance with the established legislation and meets the standards of good clinical practice, with no need for informed consent, since personally identifiable information was kept separate from the research data. Finally, the study protocol was approved by the ethics committee of the Federal University of Piauí, opinion: 1,755,893.

## Authors' contributions

RLBM contributes to the conception and design, analysis and interpretation of data;

RLBM, GMIB, BVSB, MSMC and RKR contributed to the writing of the article or relevant critical review of the intellectual content;

MTGG, EG, FLSJ, RKR, ARMCV and RLBM, contributed to the final ordeal of the version to be published;

## Consent for publication

Not applicable.

## Competing interests

The authors declare that they have no competing interests.

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