

# Pre-exposure Prophylaxis and Post-exposure Prophylaxis Awareness among Men Who Have Sex with Men in Brazil: A National Survey



Artur Acelino Francisco Luz Nunes Queiroz<sup>1</sup>, Alvaro Francisco Lopes de Sousa<sup>2,\*</sup>, Layze Braz de Oliveira<sup>3</sup>, Odineá Maria Amorim Batista<sup>4</sup>, Sônia Dias<sup>5</sup> and Isabel Amélia Costa Mendes<sup>6</sup>

<sup>1</sup>Institute of Sexual and Gender Minority Health, Northwestern University, Chicago, IL, United States

<sup>2</sup>Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Brazil

<sup>3</sup>Ribeirão Preto College of Nursing, Universidade de São Paulo, Ribeirão Preto, SP, Brazil

<sup>4</sup>Federal University of Piauí Teresina, Brazil

<sup>5</sup>Escola Nacional de Saúde Pública, Centro de Investigação em Saúde Pública, Universidade NOVA de Lisboa, Lisboa, Portugal, Brazil

<sup>6</sup>Ribeirão Preto College of Nursing, Universidade de São Paulo, Ribeirão Preto, SP, Brazil

## Abstract:

**Background:** Post-Exposure Prophylaxis (PEP) and Pre-Exposure Prophylaxis (PrEP) have been demonstrated to be crucial strategies in preventing HIV transmission. However, there is variability in the adoption of these measures within the population of men who have sex with men (MSM) in Brazil. Considering the Brazilian context of HIV prevention strategies, it is evident that the lack of awareness of these strategies is a primary and significant barrier to their dissemination. Our objective is to examine the factors associated with awareness of PEP and PrEP in a sample of Brazilian MSM.

**Methods:** We conducted a nationwide cross-sectional study, exclusively online, with a sample of 2,250 MSM. To assess the factors linked to higher or lower awareness, we employed adjusted odds ratios (ORs).

**Results:** The awareness of PEP and PrEP was reported by 1,228 (54.5%) and 1,044 (46.4%) MSM, respectively. Several factors were associated with awareness of both measures, including income, self-identification as heterosexual or bisexual, knowledge of one's HIV status, and more frequent utilization of healthcare services.

**Conclusion:** The barriers associated with personal, social, and structural determinants influence the awareness of PEP and PrEP among Brazilian MSM.

**Keywords:** Post-exposure Prophylaxis (PEP), Pre-exposure prophylaxis (PrEP), Men who have sex with men, Geolocation-based dating applications, National survey, HIV.

© 2024 The Author(s). Published by Bentham Open.

This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International Public License (CC-BY 4.0), a copy of which is available at: <https://creativecommons.org/licenses/by/4.0/legalcode>. This license permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

\*Address correspondence to this author at the Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Brazil; E-mail: [sousa.alvaromd@gmail.com](mailto:sousa.alvaromd@gmail.com)

Cite as: Queiroz A, de Sousa A, de Oliveira L, Batista O, Dias S, Mendes I. Pre-exposure Prophylaxis and Post-exposure Prophylaxis Awareness among Men Who Have Sex with Men in Brazil: A National Survey. Open AIDS J, 2024; 18: e18746136283427. <http://dx.doi.org/10.2174/0118746136283427240221105218>



Received: October 13, 2023

Revised: January 11, 2024

Accepted: January 17, 2024

Published: March 04, 2024



Send Orders for Reprints to [reprints@benthamscience.net](mailto:reprints@benthamscience.net)

## 1. INTRODUCTION

Men who have sex with men (MSM) remain a vulnerable population to HIV/AIDS, facing a dis-

proportionately high risk of virus infection worldwide. In Latin America and the Caribbean, data reveal that approximately 2.5 million people were living with HIV in 2019, and during the same year, over 133,000 new

infections were identified on the continent, indicating a significant concentrated epidemic [1, 2]. While the HIV prevalence in the general adult population stands at approximately 0.4% in Latin America and 1.1% in the Caribbean, these rates are estimated to be as high as 12.6% in Latin America and 4.5% in the Caribbean among the MSM population [1-3].

Several factors contribute to this heightened vulnerability in this population in the region, including behavioral factors (such as engaging in multiple and casual partners, unprotected anal sex, and complex sexual practices) [1, 4-6], as well as social and structural factors (such as the presence of homophobia, discrimination, difficulties in accessing healthcare services, among others) [1, 5-8].

The fight against HIV/AIDS has gained significant support in recent decades, with measures, such as prevention through post-exposure prophylaxis (PEP), pre-exposure prophylaxis (PrEP), and the availability of HIV self-testing. In the Latin American and Caribbean context, Brazil has been the leading country in investing in HIV prevention. Nevertheless, the number of new infections has only marginally decreased in the past decade and is increasing among key young populations in the country [6, 8].

However, studies indicate that the availability of these strategies, such as PEP and PrEP, may not necessarily translate into increased demand or good adherence [6, 9, 10]. For instance, Brazilian data on PrEP usage reveal a significant drop in follow-up over the years, influenced by factors like the concentration of these measures in urban centers, dispensing focused on hospital services, stigma and prejudice associated with their use, and unawareness of PrEP as a valid and effective prevention method [6, 9, 10].

Hence, understanding the levels of awareness of these preventive strategies is crucial to boost their demand, develop more effective interventions, enhance acceptability, and improve the overall quality of life for Brazilian MSM. Therefore, the aim of this study is to evaluate the knowledge about PEP and PrEP within a sample of MSM in Brazil. The results of this study could serve as the foundation for the development of public policies and health programs geared towards reducing HIV transmission in this vulnerable population.

## 2. METHODS

This is a cross-sectional analytical study that utilized a national online survey conducted among Brazilian MSM in the five administrative regions of the country from September to December 2019. This manuscript was constructed following the STROBE checklist for observational studies.

### 2.1. Participants

To enhance the generalizability of this study, we calculated the sample size based on population estimates of 3.5% for MSM, as recommended by the Ministry of Health of Brazil. The sample size calculation was

performed using G\*Power software (version 3.1.9.7; Heinrich Heine University Düsseldorf, Düsseldorf, Germany), considering a 5% maximum allowable error and a 5% significance level.

For this research, the inclusion criteria were as follows: 1) Self-identifying as a cisgender man; 2) being 18 years of age or older; 3) residing in Brazil; and 4) having engaged in at least one sexual relationship with another man in the past 12 months. Tourists in Brazil at the time of data collection and Brazilian residents abroad who had access to the questionnaire were excluded.

### 2.2. Data Collection Procedures

Data collection was conducted entirely online. To gather the data, a dedicated Facebook® page (<https://www.facebook.com/taafimdeque/>) was created, featuring a pinned post with survey details and an invitation to participate. This post was boosted to reach online participants across all regions of Brazil. Simultaneously, it was shared within popular Facebook® groups previously identified in research as having a high number of MSM participants [11, 12].

The post included a link providing access to the survey questionnaire. Additionally, participants were encouraged to share the survey link within their social networks. In total, 2,512 participants accessed the questionnaire; however, 262 were excluded for not answering at least 50% of the survey questions.

### 2.3. Data Collection Instruments

The survey questionnaire was hosted on a proprietary research platform and divided into four sections to gather information about the social, demographic, and health characteristics of the participants, including (1) personal details (age, income, education, region of residence in Brazil); (2) sociocultural attributes (relationship status, sexual orientation); (3) health-related information (HIV status, HIV testing, frequency of healthcare service utilization); and (4) sexual behaviors and practices. Knowledge about PEP was assessed using the following question: "Post-exposure prophylaxis (PEP) involves taking pills for a specific period (28 days) after unprotected sexual exposure, which can prevent HIV infection. Were you aware of this information?"

To assess knowledge about PrEP, the following question was posed: "Did you know that it is possible to prevent HIV infection by taking a daily pill (PrEP)?"

To understand the factors associated with knowledge, we investigated social and demographic characteristics, as well as variables related to sexual and affective relationships and recent sexual behaviors and practices.

### 2.4. Data Analysis

The data were analyzed using IBM SPSS Statistics 26.0 (SPSS Inc., Chicago, IL, USA). We conducted data analysis at three levels: univariate analysis, bivariate analysis, and multivariate analysis. Univariate descriptive statistics were employed when summarizing the distribution of a single variable, while bivariate or

Multivariate statistics were used to describe associations between two or more variables. In the first level, descriptive analysis included absolute and relative frequencies.

For the bivariate analysis of variables related to PEP/PrEP awareness, we used chi-square tests. The binary logistic regression model was employed to calculate the Adjusted Odds Ratio, with the aim of assessing factors associated with the likelihood of knowing these prevention strategies. Given the vast geographic diversity in Brazil and the variations in healthcare services due to demographic, economic, cultural, and political factors, we included the Brazilian regions as a control variable in the final logistic model.

This means that we incorporated this variable into the statistical model to control for its effects when examining the relationship between other independent (or predictor) variables and the dependent variable. In this context, including the “region of Brazil” variable as a control allowed us to account for variations or differences in observed responses due to different geographic regions. In other words, we controlled for the effect of the region of Brazil to examine the impact of other independent variables on the variable of interest without bias caused by regional differences.

Before conducting the analysis, all variables were assessed for multicollinearity, examining tolerance coefficients and Variance Inflation Factor (VIF) values. The threshold for considering multicollinearity present was a  $VIF \geq 4$ .

In the multivariate logistic regression model, we performed the analysis using the “enter method,” including variables that were significant in the bivariate analyses, as well as those deemed important in the literature. In other words, the selection of variables for the multivariate model was based on the results of the bivariate analyses, with a significance criterion of p-value

$\leq 0.05$ , theoretical relevance, and better adjustment conditions taken into account. The performance of the model was evaluated using sensitivity and specificity tests, considering the Receiver Operating Characteristic (ROC) curve, to determine the best statistical performance.

Bivariate and multivariate logistic regression generated Odds Ratio (OR) and adjusted OR (aOR), presented with a 95% confidence interval, indicating the likelihood of PEP and PrEP awareness, categorized as Yes or No.

## 2.5. Ethical Considerations

All procedures conducted in this human subjects research study were in compliance with the ethical standards of Brazilian and international regulations for research involving human subjects. The study received approval from the Research Ethics Committee of the Federal University of Piauí (Opinion 1.523.003).

## 3. RESULTS

In the sample of 2,250 MSM participants, there was a noticeable predominance of young adults, with a mean age of 25.74 years. The most represented age group was 21 to 25 years old, accounting for 37.1% of the participants. Notably, the majority of participants had attained a college education or higher, comprising 57.8% of the sample. There was also a higher concentration of participants hailing from the Southeast region of Brazil, making up 50.3% of the total, with a median income of 2,154.5 reais.

Regarding partnership characteristics, a significant portion, 75.2%, was in stable relationships, while 75.7% identified as homosexual. Self-reported HIV prevalence stood at 7.1%, and 31.1% of participants visited healthcare services every 6 months (Table 1). Knowledge about PEP was reported by 1,228 (54.5%) participants, while PrEP was known by 1,044 (46.4%) MSM (Table 1).

**Table 1. Social and demographic characterization of men who have sex with men using geolocation-based dating apps, Brazil n=2250.**

Variables	n (%)	Mean	SD	Min-Max
<b>Age in years</b>	-	25.74	7.76	18-90
18 to 20	522(23.2)	-	-	-
21 to 25	836(37.1)	-	-	-
26 to 30	488(21.7)	-	-	-
More than 30	376(16.7)	-	-	-
<b>Education</b>	-	-	-	-
Elementary School	57(2.5)	-	-	-
High school	445(19.7)	-	-	-
Higher education/College degree	1.303(57.8)	-	-	-
Graduate	445(19.7)	-	-	-
<b>Brazil's region</b>	-	-	-	-
North	108(4.8)	-	-	-
Northeast	336(14.9)	-	-	-
Midwest	202(9.0)	-	-	-
Southeast	1.133(50.3)	-	-	-

(Table 1) contd....

Variables	n (%)	Mean	SD	Min-Max
South	424(18.8)	-	-	-
<b>Type of relationship</b>	-	-	-	-
Single	1.696(75.2)	-	-	-
Stable relationship	516(22.9)	-	-	-
Divorced/Widow	38(1.7)	-	-	-
<b>Sexual orientation</b>	-	-	-	-
Heterosexual	214(9.5)	-	-	-
Bisexual	320(14.2)	-	-	-
Homosexual	1707(75.7)	-	-	-
<b>HIV status</b>	-	-	-	-
Positive	159 (7.1)	-	-	-
Negative	1452 (64.5)	-	-	-
Does not know	639 (28.4)	-	-	-
<b>Frequency of health service utilization</b>	-	-	-	-
2 times or more per year	1214 (53,9)	-	-	-
At least once a year	445 (19.8)	-	-	-
Rarely	591 (26.3)	-	-	-
<b>Income*</b>	-	2154.5	2734	0-30000

Note: \* In Brazilian currency. It is worth noting that at that time, the minimum wage was 937 Brazilian reais or 191.51 U.S. dollars.

Next, we conducted a multivariate analysis to examine the primary factors associated with knowledge about post-exposure prophylaxis (PEP) among MSM users of geolocation-based dating apps in Brazil (n=2250). The crude odds ratios were adjusted for the regions of the country.

According to the multivariate analysis, having an

income below the minimum wage increased the likelihood of having a better understanding of PEP by 1.43 times. Identifying as heterosexual or bisexual increased the likelihood of having better knowledge about PEP by 3.83 and 1.89 times, respectively. Knowing one's HIV status increased the likelihood by 2.23 times, and more frequent utilization of healthcare services (twice a year or more) increased the likelihood by 1.80 times (Table 2).

**Table 2. Multivariate analysis of factors associated with knowledge about post-exposure prophylaxis (PEP) among MSM users of geolocation-based dating apps in Brazil (n=2250).**

Analyzed Factor	OR	CI 95%	aOR	CI 95%
<b>Age</b>	-	-	-	-
Between 18 to 24	<b>1</b>	-	1	-
25 years or more	1.42	1.16 - 1.76	0.62	0.52 - 0.74
<b>Income</b>	-	-	-	-
Less than one minimum wage	1.46	1.15 - 1.86	<b>1.43</b>	1.12 - 1.83
Equal or more than one minimum wage	1.0	-	1.0	-
<b>Sexual orientation</b>	-	-	-	-
Homosexual	1.0	-	1.0	-
Heterosexual	3.89	2.81-5.25	<b>3.83</b>	2.81 - 5.25
Bisexual	1.90	1.49-2.42	<b>1.89</b>	1.49 - 2.41
<b>Relationship</b>	-	-	-	-
Single	1.0	-	1.0	-
In a relationship	1.07	0.88-1.30	1.06	0.87-1.30
<b>Education</b>	-	-	-	-
Elementary School	1.0	-	1.0	-
High school	0.64	0.35-1.19	0.65	0.35-1.22
University education	0.27	0.15-0.49	0.27	0.15-0.49
Postgraduate studies	0.16	0.08-0.29	0.15	0.08-0.30
<b>Knows your HIV status?</b>	-	-	-	-
No	1.0	-	1.0	-
Yes	2.18	1.83-2.60	<b>2.22</b>	1.86-2.65
<b>Have you ever been diagnosed with STIs?</b>	-	-	-	-
Yes	1	-	1	-

(Table 2) contd....

Analyzed Factor	OR	CI 95%	aOR	CI 95%
No	1.85	1.36-2.38	0.45	0.33-0.74
Do not know	1.96	1.31-2.91	0.94	0.69-1.28
<b>Partner's HIV status</b>	-	-	-	-
Positive	1	-	1	-
Negative	0.140	0.71-0.273	0.116	0.06-0.23
Do not know	0.64	0.52-0.78	0.664	0.55-0.80
<b>Frequency of health service utilization</b>	-	-	-	-
Annually or less	1.0	-	1.0	-
Twice a year or more	1.80	1.60-2.12	<b>1.80</b>	1.51-2.12

In the analysis of factors associated with PrEP awareness (Table 3), adjustments were also made for the region of Brazil. In this instance, the final model of factors that increased the likelihood of being aware of PrEP resembled the case of PEP, and identifying as

heterosexual or bisexual increased the likelihood of having better knowledge about PrEP by 5.08 and 1.93 times, respectively. Knowing one's HIV status increased the likelihood by 2.21 times, and more frequent utilization of healthcare services (twice a year or more) increased the likelihood by 2.02 times (Table 3).

**Table 3. Multivariate analysis of factors associated with knowledge about pre-exposure prophylaxis (PrEP) among MSM users of geolocation-based dating apps in Brazil (n=2250).**

Analyzed Factor	OR	CI 95%	aOR	CI 95%
<b>Age</b>	-	-	-	-
Between 18 to 24	<b>1</b>	-	1	-
25 years or more	0.682	0.57-0.81	0.67	0.57-0.80
<b>Income</b>	-	-	-	-
Less than one minimum wage	1.0	-	1.0	-
Equal or more than one minimum wage	0.69	0.54-0.88	0.73	0.56-0.93
<b>Sexual orientation</b>	-	-	-	-
Homosexual	1.0	-	1.00	-
Heterosexual	5.04	3.51-7.25	<b>5.08</b>	3.51-7.34
Bisexual	1.968	1.54-2.52	<b>1.93</b>	1.51-2.47
<b>Relationship</b>	-	-	-	-
Single	<b>1.0</b>	-	1.0	-
In a relationship	0.83	0.68-1.01	0.83	0.68-1.01
<b>Education</b>	-	-	-	-
Elementary School	<b>1.0</b>	-	1.0	-
High school	0.51	0.25-1.03	0.51	0.25-1.05
University education	0.23	0.11-0.45	0.23	0.11-0.45
Postgraduate studies	0.14	0.69-0.28	0.14	0.07-0.28
<b>Knows your HIV status?</b>	-	-	-	-
No	1.0	-	1.00	-
Yes	2.19	1.83-2.61	<b>2.21</b>	1.85-2.64
<b>Have you ever been diagnosed with STIs?</b>	-	-	-	-
Yes	1	-	1	-
No	1.59	1.22-2.09	0.85	0.40-0.95
Do not know	1.58	1.07-2.35	1.05	0.75-1.94
<b>Partner's HIV status</b>	-	-	-	-
Positive	1	-	1	-
Negative	0.19	0.12-0.23	0.58	0.39-0.86
Do not know	0.69	0.54-0.75	1.01	0.75-1.39
<b>Receptive anal sex without a condom</b>	-	-	-	-
Yes	1	-	1	-
No	0.74	0.61-0.91	0.745	0.61-0.91
<b>Busca por servicios de saude</b>	-	-	-	-
Annually or less	1.0	-	1.00	-
Twice a year or more	2.008	1.69-2.37	<b>2.02</b>	1.71-2.39



#### 4. DISCUSSION

In this study, we identified a convergence of factors associated with higher knowledge of both PEP and PrEP among a sample of Brazilian MSM. These factors encompassed social characteristics (income), personal characteristics (sexual orientation), serological status (HIV status), and structural/social factors (healthcare service utilization).

Interestingly, in our sample, individuals with incomes below the minimum wage had a greater likelihood of being aware of PEP and PrEP, which contradicts findings from other studies conducted in Brazil [13, 14] and other countries [15-18]. There could be several reasons for this unexpected finding. Firstly, some studies suggest that lower income levels may be associated with a higher risk of HIV/AIDS exposure, motivating individuals in such circumstances to seek more information about preventive measures [19, 20].

In Brazil, all HIV/AIDS prevention services are provided free of charge through the Unified Health System (SUS). Therefore, individuals with lower incomes may have more access to healthcare services that are part of community-based HIV/AIDS prevention programs, such as basic health units and public health initiatives. These programs can serve as vital sources of information for individuals with lower incomes, compensating for the expected lack of knowledge [21-23].

Furthermore, our data collection predominantly targeted groups within a social network that are particularly popular among students, young adults, and young individuals. These groups tend to attract and bring together individuals who are often unemployed or financially dependent on their parents/guardians [24-26]. This factor may have significantly influenced the observed result.

Identifying as heterosexual or bisexual was also associated with a higher likelihood of possessing greater knowledge about both PEP and PrEP. This finding contradicts the increased investments of the government in Brazil, typically targeting prevention strategies towards LGBTQ+ populations [6, 25]. However, it may reflect significant social and structural issues, such as the stigma and prejudice surrounding HIV/AIDS as a "gay disease" and internalized homophobia. These factors create barriers that distance non-heterosexual populations from accessing healthcare services and other prevention initiatives [8, 27-29].

Stigmatizing beliefs and attitudes towards HIV/AIDS and sexual orientation can contribute to misconceptions and a lack of accurate information about preventive measures like PEP and PrEP. Individuals facing stigma or discrimination may be less likely to seek or receive comprehensive education on HIV prevention, including knowledge about PEP and PrEP [27-31]. Discrimination against LGBTQ+ individuals in healthcare settings can restrict their opportunities to receive proper education and information about HIV prevention methods. Furthermore, concerns related to disclosing one's sexual orientation can impact the willingness of individuals to engage in discussions about sexual health and preventive measures [8, 12, 25-31]. This scenario is not limited to HIV/AIDS [32] but is also observed in other stigmatizing diseases and conditions affecting non-heterosexual populations. It underscores the need for concerted efforts to promote inclusion, combat

discrimination, and provide comprehensive sexual health education that is sensitive to diverse identities and experiences.

Moreover, our study underscores the importance of healthcare services in raising awareness about PEP and PrEP. MSM who sought healthcare services more frequently (2 or 3 times a year, compared to those who sought services only annually) had a higher likelihood of knowing about both PEP and PrEP. This finding aligns with previous studies conducted in Brazil and other countries [6, 8, 13, 17, 33]. Consistency in the frequency of healthcare service utilization can be attributed to various factors contributing to greater knowledge about HIV prevention methods. Frequent access to healthcare services provides more opportunities to receive updated and detailed information about additional HIV prevention strategies. Healthcare professionals can also offer specific counseling and guidance on PEP and PrEP, explaining their benefits, usage, limitations, and effectiveness in HIV prevention. This helps to alleviate fears and barriers associated with their use [6, 8-13].

Furthermore, by seeking healthcare services more diligently, MSM have a higher likelihood of participating in regular HIV testing programs. Awareness of one's serological status is crucial for HIV prevention and can motivate individuals to seek other specialized healthcare resources and services. These settings are more likely to provide detailed information about PEP and PrEP [6, 8, 34].

These findings underscore the importance of pre-test counseling for HIV, which occurs during serological testing. It serves as a crucial opportunity to provide information about prevention strategies, including PEP and PrEP. Therefore, investing in engaging MSM in specialized healthcare services that offer appropriate counseling and guidance can contribute to increasing knowledge and adoption of PEP and PrEP as HIV prevention measures.

Based on our data, we believe that our study has illuminated several key factors associated with knowledge about post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP) among Brazilian MSM, with special emphasis on lower income levels and sexual orientation (identifying as heterosexual or bisexual). Additionally, our study underscores the crucial role of healthcare services in increasing awareness.

In light of our findings, it is of paramount importance to develop targeted interventions that address knowledge gaps and improve access to PEP and PrEP among MSM. Investing in comprehensive sexual health education initiatives, tailored to diverse identities and experiences, can help combat stigma and discrimination. Furthermore, healthcare providers should prioritize the dissemination of accurate information about PEP and PrEP during serological testing, ensuring that individuals are equipped with the knowledge and resources necessary to make informed choices regarding HIV prevention measures.

#### 5. LIMITATIONS

This research has several limitations that should be considered. Firstly, the absence of sampling diversification strategies limits our ability to generalize the findings. Secondly, important information was based on self-reported data, which is subject to memory bias without verification

through health records. Additionally, our sample is limited to men with internet access and smartphones, which may exclude men with limited resources. Moreover, the use of Facebook may have influenced important characteristics of our sample, such as income and age. However, the study allowed for national coverage, including participants from both major cities and smaller towns, which is crucial for increasing awareness and knowledge about PEP and PrEP.

## CONCLUSION

Our study elucidates the multifaceted factors influencing knowledge about post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP) among Brazilian MSM. While surprising associations with income and sexual orientation emerged, these underscore the need for more targeted and inclusive HIV prevention efforts.

Knowledge of both measures is influenced by personal, social, and structural barriers. These findings emphasize the importance of personalized approaches for each prevention strategy, considering the individual and social characteristics of MSM.

To improve knowledge and access to PEP and PrEP, it is imperative to combat stigma and discrimination, provide comprehensive sexual health education, and prioritize pre-test counseling during HIV testing. By promoting collaborative efforts among public health initiatives, healthcare providers, and community organizations, we can increase awareness and adoption of PEP and PrEP as crucial HIV prevention measures, ultimately contributing to the well-being of the MSM population in Brazil.

To advance the dissemination and adoption of PEP and PrEP as effective HIV prevention measures among MSM, massive and targeted investments are needed in awareness campaigns, healthcare professional training, and improved access to these technologies. Additionally, it is crucial to consider the personal, social, and structural determinants influencing knowledge and adherence to these strategies in order to develop comprehensive and culturally adapted approaches for Brazilian MSM.

## LIST OF ABBREVIATIONS

PEP	=	Post-Exposure Prophylaxis
PrEP	=	Pre-Exposure Prophylaxis
ORs	=	Odds Ratios

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Research Ethics Committee (Opinion No. 1523003) and strictly complied with all the ethical precepts in Resolution 466/12, with guidelines for research with human subjects in Brazil.

## HUMAN AND ANIMAL RIGHTS

No animal were used that are the basis of this study. All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committee and with the 1975 Declaration of Helsinki, as revised in 2013.

## CONSENT FOR PUBLICATION

To participate in the research, the participants had to read the Informed Consent Form (ICF) and indicate that they agreed with the proposed objectives and participation in the study. The ICF was applied, and the consent was obtained online.

## STANDARDS OF REPORTING

STROBE guidelines were followed.

## AVAILABILITY OF DATA AND MATERIALS

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

## FUNDING

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

## ACKNOWLEDGEMENTS

Declared none.

## REFERENCES

- [1] Coelho LE, Torres TS, Veloso VG, *et al.* The prevalence of HIV among men who have sex with men (MSM) and young MSM in Latin America and the caribbean: A systematic review. *AIDS Behav* 2021; 25(10): 3223-37. <http://dx.doi.org/10.1007/s10461-021-03180-5> PMID: 33587242
- [2] UNAIDS. AIDSinfo. Available from: <https://aidsinfo.unaids.org/>
- [3] UNAIDS. Global AIDS Report. 2020. Available from: [https://www.unaids.org/sites/default/files/media\\_asset/2020\\_global-aids-report\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2020_global-aids-report_en.pdf)
- [4] Santos LAD, Grangeiro A, Couto MT. HIV Pre-Exposure Prophylaxis (PrEP) among men who have sex with men: Peer communication, engagement and social networks. *Cien Saude Colet*. *Cien Saude Colet* 2022; 27(10): 3923-37.
- [5] Queiroz AAFLN, Sousa ÁFL, Matos MCB, Araújo TME, Reis RK, Moura MEB. Knowledge about HIV/AIDS and implications of establishing partnerships among Hornet® users. *Rev Bras Enferm*. *Rev Bras Enferm* 2018; 71(4): 1949-55.
- [6] Sousa AFL, Lima SVM, Ribeiro CJN, *et al.* Adherence to Pre-Exposure Prophylaxis (PrEP) among men who have sex with men (MSM) in portuguese-speaking countries. *Int J Environ Res Public Health* 2023; 20(6): 4881. <http://dx.doi.org/10.3390/ijerph20064881> PMID: 36981792
- [7] Ferreira AM, Rodrigues da Silva CN, de Paula L, Andrade HS. Pre-exposure prophylaxis as prevention strategy in the HIV transmission: Characterization of the user. *Rev Prev Infecç Saude* 2022; 8(1) Available at: 10.26694/repis.v8i.2220
- [8] Felipe da Cruz AX, Berté R, Oliveira ABL, *et al.* Barriers and facilitators to HIV/AIDS testing among latin immigrant men who have sex with men (MSM): A systematic review of the literature. *Open AIDS J* 2023; 17(1): e187461362307030. <http://dx.doi.org/10.2174/18746136-v17-230720-2023-12>
- [9] UNAIDS. Focus in Brazil. 2019. Available from: [https://www.unaids.org/en/20191011\\_country\\_focus\\_Brazil](https://www.unaids.org/en/20191011_country_focus_Brazil)
- [10] Relatório de Monitoramento de Profilaxias do HIV PrEP e PEP. 2022. Available from: <https://www.gov.br/aids/pt-br/centrais-de-conteudo/publicacoes/2>

- 022/relatorio-de-profilaxias-prep-e-pep-2021.pdf
- [11] Queiroz AAFLN, Matos MCB, Araújo TMED, Reis RK, Sousa AFL. Sexually transmitted infections and factors associated with condom use in dating app users in Brazil. *Acta Paul Enferm* 2019; 32: 546-53.  
<http://dx.doi.org/10.1590/1982-0194201900076>
- [12] Sousa AFL, Queiroz AAFLN, Fronteira I, Lapão L, Mendes IAC, Brignol S. HIV testing among middle-aged and older men who have sex with men (MSM): A blind spot? *Am J Men Health* 2019; 13(4)  
<http://dx.doi.org/10.1177/1557988319863542> PMID: 31288596
- [13] Sousa LRM, Elias HC, Fernandes NM, Gir E, Reis RK. Knowledge of PEP and PrEP among people living with HIV/aids in Brazil. *BMC Public Health* 2021; 21(1): 64.  
<http://dx.doi.org/10.1186/s12889-020-10135-3> PMID: 33413241
- [14] Soares F, Magno L, da Silva LAV, et al. Perceived risk of HIV infection and acceptability of PrEP among men who have sex with men in Brazil. *Arch Sex Behav* 2023; 52(2): 773-82.  
<http://dx.doi.org/10.1007/s10508-022-02342-3> PMID: 36169773
- [15] Simões D, Meireles P, Rocha M, Freitas R, Aguiar A, Barros H. Knowledge and use of PEP and PrEP among key populations tested in community centers in Portugal. *Front Public Health* 2021; 9: 673959.  
<http://dx.doi.org/10.3389/fpubh.2021.673959> PMID: 34368050
- [16] Dolezal C, Frasca T, Giguere R, et al. Awareness of post-exposure prophylaxis (PEP) and Pre-Exposure Prophylaxis (PrEP) is low but interest is high among men engaging in condomless anal sex with men in Boston, Pittsburgh, and San Juan. *AIDS Educ Prev* 2015; 27(4): 289-97.  
<http://dx.doi.org/10.1521/aeap.2015.27.4.289> PMID: 26241380
- [17] Jin J, Sun R, Mu T, et al. Awareness and use of post-exposure prophylaxis for HIV prevention among men who have sex with men: A systematic review and meta-analysis. *Front Med* 2022; 8: 783626.  
<http://dx.doi.org/10.3389/fmed.2021.783626> PMID: 35083243
- [18] Yi S, Tuot S, Mwai GW, et al. Awareness and willingness to use HIV pre-exposure prophylaxis among men who have sex with men in low- and middle-income countries: A systematic review and meta-analysis. *J Int AIDS Soc* 2017; 20(1): 21580.  
<http://dx.doi.org/10.7448/IAS.20.1.21580> PMID: 28691439
- [19] Igulot P, Magadi MA. Socioeconomic status and vulnerability to HIV infection in Uganda: Evidence from multilevel modelling of AIDS indicator survey data. *Aids Res Treat* 2018; 2018: 1-15.  
<http://dx.doi.org/10.1155/2018/7812146> PMID: 29983999
- [20] Alcocer-Bruno C, Ferrer-Cascales R, Ruiz-Robledillo N, Sánchez-SanSegundo M, Zaragoza-Martí A. Personal and lifestyle determinants of HIV transmission risk in Spanish university students. *Int J Environ Res Public Health* 2020; 17(22): 8332.  
<http://dx.doi.org/10.3390/ijerph17228332> PMID: 33187170
- [21] Trindade LNM, Nogueira LMV, Rodrigues ILA, Ferreira AMR, Corrêa GM, Andrade NCO. HIV infection in pregnant women and its challenges for the prenatal care. *Rev Bras Enferm*. *Rev Bras Enferm* 2021; 74(S4): e20190784.
- [22] Moreira AS, Melo GC, Amorim BMFC, et al. Vulnerability of adolescent students in relation to human immunodeficiency virus infection. *Rev Prev Infecç Saúde* 2023; 9(1) Available at: 10.26694/repis.v8i1.3825
- [23] Almeida PD, de Araújo TME, de Sousa AR, et al. Consumption of sexually explicit media and sexual conduct of greater exposure to HIV/AIDS in Brazilians. *Open AIDS J* 2023; 17(1): e187461362306270.  
<http://dx.doi.org/10.2174/1874-6136-v17-e20230711-2023-7>
- [24] Montenegro L, Velasque L, LeGrand S, Whetten K, de Mattos RRR, Malta M. Public Health, HIV care and prevention, human rights and democracy at a crossroad in Brazil. *AIDS Behav* 2020; 24(1): 1-4.  
<http://dx.doi.org/10.1007/s10461-019-02470-3> PMID: 30903450
- [25] Benzaken AS, Pereira GFM, Costa L, Tanuri A, Santos AF, Soares MA. Antiretroviral treatment, government policy and economy of HIV/AIDS in Brazil: Is it time for HIV cure in the country? *AIDS Res Ther* 2019; 16(1): 19.  
<http://dx.doi.org/10.1186/s12981-019-0234-2> PMID: 31412889
- [26] Rahman R, Pinto R, Wall M. HIV education and welfare services in primary care: An empirical model of integration in Brazil's unified health system. *Int J Environ Res Public Health* 2017; 14(3): 294.  
<http://dx.doi.org/10.3390/ijerph14030294> PMID: 28335444
- [27] Berg RC, Ross MW. The second closet: A qualitative study of HIV stigma among seropositive gay men in a Southern U.S. City. *Int J Sex Health* 2014; 26(3): 186-99.  
<http://dx.doi.org/10.1080/19317611.2013.853720> PMID: 25170366
- [28] Stahlman S, Hargreaves JR, Sprague L, Stangl AL, Baral SD. Measuring sexual behavior stigma to inform effective HIV prevention and treatment programs for key populations. *JMIR Public Health Surveill* 2017; 3(2): e23.  
<http://dx.doi.org/10.2196/publichealth.7334> PMID: 28446420
- [29] Brito AM, Kendall C, Kerr L, et al. Factors associated with low levels of HIV testing among men who have sex with men (MSM) in Brazil. *PLoS One* 2015; 10(6): e0130445.  
<http://dx.doi.org/10.1371/journal.pone.0130445> PMID: 26098559
- [30] Sallam M, Alabbadi AM, Abdel-Razeq S, et al. HIV knowledge and stigmatizing attitude towards people living with HIV/AIDS among medical students in Jordan. *Int J Environ Res Public Health* 2022; 19(2): 745.  
<http://dx.doi.org/10.3390/ijerph19020745> PMID: 35055566
- [31] Ferraz D, Couto MT, Zucchi EM, et al. AIDS- and sexuality-related stigmas underlying the use of post-exposure prophylaxis for HIV in Brazil: findings from a multicentric study. *Sex Reprod Health Matters* 2019; 27(3): 107-21.  
<http://dx.doi.org/10.1080/26410397.2019.1650587> PMID: 31533555
- [32] Sousa AFL, Sousa AR, Fronteira I. Monkeypox: between precision public health and stigma risk. *Rev Bras Enferm* 2022; 75(05): e750501.
- [33] Vega-Ramirez H, Torres TS, Guillen-Diaz C, et al. Awareness, knowledge, and attitudes related to HIV pre-exposure prophylaxis and other prevention strategies among physicians from Brazil and Mexico: Cross-sectional web-based survey. *BMC Health Serv Res* 2022; 22(1): 532.  
<http://dx.doi.org/10.1186/s12913-022-07900-y> PMID: 35459177
- [34] Mora C, Brigeiro M, Monteiro S. HIV testing among "MSM": Prevention technologies, sexual moralities and serologic self-surveillance. *Physis* 2018; 28(2): 28.  
<http://dx.doi.org/10.1590/s0103-73312018280204>