

The behavioural risk factors that contribute to HIV morbidity among men who have sex with men (msm) in Imo state, South East Nigeria during the period of January 2018-2023

Njoku, Emereuwaonu C. A^{1*}, Ozims S. J², Adogu P. U³, and Eberendu IF⁴

¹Department of Public Health, Imo State University, Owerri, Nigeria

Corresponding Author: Njoku, Emereuwaonu C. A^{1*}, Department of Public Health, Imo State University, Owerri, Nigeria

Received date: October 14, 2024; **Accepted date:** October 18, 2024; **Published date:** November 23, 2024

Citation: Njoku, Emereuwaonu C. A^{1*}, The behavioural risk factors that contribute to HIV morbidity among men who have sex with men (msm) in Imo state, South East Nigeria during the period of January 2018-2023, Global Journal of Infectious Diseases and Health Insights, vol 1(2). DOI: 10.9567/ISSN.2024/WSJ.99

Copyright: © 2024, Njoku, Emereuwaonu C. A^{1*}, Vitus, this is an open-access article distributed under the terms of The Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

The rising rate of HIV morbidity among the MSM is a result of their social marginalization. Thus, in Imo State, South East Nigeria, this study looked at risk factors linked to high HIV morbidity among MSM. With 300 respondents who were purposefully chosen from among 100 respondents from each of Imo State's three senatorial zones, a cross-sectional descriptive survey design was used to examine factors such as age and highest level of education. The QHMMSM questionnaire, which had a reliability rating of 0.84 and was evaluated by three specialists at Imo State University in Owerri, served as the study tool. The instrument was mailed, and chi-square and descriptive mean statistics were used to analyze the results. The age at which a woman had her first sexual experience with a man, the number of men she had sex with in the previous six months, having regular sex with a man, the status of her male partner, and having anal intercourse with a condom as the insertive partner, receptive partner, or without a condom do not impact the rate of HIV infection among MSM. These are examples of behavioral risk factors. On the other hand, anal intercourse as the receptive partner without the use of a condom greatly increases HIV morbidity. MSM concurred that when they play a receptive role during anal intercourse, they are more likely to transmit HIV than when they play an insertive position. This led to the deduction that MSM who participate in high-risk sexual behaviors are susceptible to HIV/AIDS infection. The results indicate that age plays a significant role in HIV morbidity, but education level also plays a significant role in HIV morbidity among MSM, with tertiary educated individuals having the highest propensity for HIV/AIDS morbidity. Thus, among other things, it was suggested that the current HIV and Aids policies be urgently reviewed in order to support MSM-friendly health care services, with an emphasis on HIV prevention initiatives. It is necessary to update the risk assessment and screening instruments currently utilized by clinics to incorporate inquiries on MSM behavior, anal STIs, and penile-anal sex.

Keywords: Behavioural risk factors, HIV morbidity, men, sex with men (msm), Imo state, South East Nigeria

Introduction

Acquired Immunodeficiency Syndrome (AIDS), a disease caused by the Human Immunodeficiency Virus (HIV), is widely acknowledged as a serious global health hazard. The number of people who are afflicted with the disease and at risk of getting it is rising, especially

for those who engage in unprotected sex, sex workers, and same-sex relationships such as men having sex with men [MSM] [1]. The HIV/AIDS epidemic has been blamed for almost 35 million fatalities globally since it was first discovered in the early 1980s. With South Africa and

Nigeria having the highest and third highest infection rates in the globe, respectively, this illness has spread pandemic proportions throughout Africa. According to statistics, there are more than four million (4,000,000) HIV-positive Nigerians [2].

HIV/AIDS is still a major health issue in Nigeria, where it is still unclear which sex or group of people—referred to as the Key Population (KP)—has the greatest acquisition rate. Despite this, a sizable portion of the disease's population resides in Nigeria [3]. The term Key Population (KP) refers to the population with the highest incidence of

HIV-AIDS infection as well as the highest risk of developing the illness. These include People who Inject Drugs (PWID), Men who have Sex with Men (MSM), and Female Sex Workers (FSW) in Nigeria [4]. Although they make up only 3.4% of the population, they are responsible for at least 32% of HIV infections. A few decades ago, it was socially taboo to even mention homosexuality, much less engage in it [5]. With the influence of modernity and the West, all that has changed dramatically. One of the most popular socio-political and theological debate issues of the twenty-first century is homosexuality, or being gay. It can be characterized as a sexual or romantic attraction or as sexual behavior between people of the same sex or gender. Gay is defined as "an enduring pattern of emotional, romantic, and/or sexual attractions" to people of the same sex, according to the Human Rights Education Association [5]. Within the heterosexual - homosexual continuum, homosexuality is one of the three primary categories of sexual orientations, along with bisexuality and heterosexuality. Although the term "homosexual" also typically applies to both homosexual men and women, lesbianism is the term used most frequently to describe persons who identify as gay or lesbian [6]. For a variety of reasons, including the fact that many gay and lesbian people do not openly identify as such due to prejudice or discrimination, such as homophobia and heterosexism, it is difficult for researchers to reliably estimate the percentage of people who are gay or lesbian, the proportion of people who are in same-sex relationships, or the proportion of people who have had same-sex experiences. [7]

As it is, some Nigerians are glad to identify as gay and even support this by saying that it is who they are by nature. It is currently recognized as a valid sexual orientation and way of life. These days, hearing about gay couples or marriages is hardly shocking. The MSM was listed as one of the five (5) primary Key Populations (KPs) linked to HIV-AIDS infections in the UNAIDS study. Regardless of whether they have sex with women or identify as gay or bisexual on a personal or societal level, men (15 years and older) who have sex with men are referred to as "Men who have sex with men" (MSM) [8].

The attention that the disease received when it was announced in Nigeria has actually decreased with the advent of the corona virus pandemic combined with improved healthcare for people living with HIV/AIDS in terms of its nature, infection dynamics, fatality, and preventive measures [9]. Nigeria's HIV prevalence rate has been declining, according to a recent Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS) report, from 5.8 percent, 3.4 percent, and 1.4 percent in 2010, 2014, and 2019, respectively [10]. Improved surveillance and coordinated efforts by domestic (government and CSOs) and foreign (donor partners) entities have been credited with recent declines in the nation's prevalence estimations. The MSM are the only group in Nigeria, according to reports,

whose HIV prevalence is still rising. The prevalence rate for MSM was 23% in 2017, which was far higher than the next largest prevalence group, which was sex workers at 14.4%. This suggests that the MSM group continues to be the primary source of HIV/AIDS transmission. Because of this, the organization poses a threat to the public as well as to themselves. HIV/AIDS cases among MSM have kept rising at an exponential rate. During his fieldwork, the researcher saw a startling rise in the prevalence of HIV/AIDS among MSM. There are a few causes linked to this ongoing rise. These variables, in general, include the behavioral situations that put MSM at risk for HIV/AIDS [11].

It was mentioned that drug misuse, drunkenness, smoking, and unprotected intercourse are examples of behavioral risk factors. Additionally, there are certain sociodemographic aspects to the frequency of HIV risk factors among MSM. These consist of location, age, and educational attainment [12]. It has been determined that MSM who are 18 years of age and older are exposed to HIV risk factors. It has been specifically noted that the permeable morality of cities makes people living there more susceptible to HIV risk factors than people living in rural places. Studies of this kind have not sufficiently captured the behavioral aspects in the research area. This is a concerning scenario because there is a significant literature gap and such variables are known to exist based on common experience. Therefore, the present study determined the risk factors of HIV morbidity among men who have sex with men (MSM) in Imo State, South East Nigeria, against the backdrop of behavioral characteristics that have not been well addressed in empirical investigations. Despite unrelenting efforts, the epidemic of HIV/AIDS continues to worsen, especially among the MSM.

Thus, in Imo State, South East Nigeria, this study looked into the risk variables of HIV morbidity among men who have sex with men (MSM).

Materials And Methods

Study Area

The study was carried out in Imo State. Imo state is one of the 36 States of Nigeria and is in the South East region of Nigeria. Owerri is the capital of Imo State and among the largest towns in the State. Its other notable towns are Orlu, Obowo, Oguta, Mbaise and Okigwe. It has three Senatorial Zones: Orlu, Owerri and Okigwe respectively.

Research Design

A cross-sectional descriptive survey design, using a respondent driven sampling technique was used in carrying the study in the three senatorial zones in Imo State.

Potential participants were required to be at least 18 years of age living in Imo State, able to provide informed consent in either English or Igbo language. Primary data were collected from the three senatorial zones in the state. In each

of the senatorial zones, a portion of 100 MSM was selected for the study.

Population of the Study

The accessible population for the study consisted of three hundred (300) Men who have Sex with Men (MSM) from the three (3) Senatorial Zones of Imo State. Accessible population represented the elements in the group within the reach of the researcher

Sample Size/Sampling Technique

Sample size answers basic questions, such as how large or small must the sample be for it to be representative. This study adopted Cochran’s formula for determining sample size.

The formula is given as $N=$

d^2 Where N = the desired sample size (when the population is greater than 10,000)

Z = the standard normal deviate, usually set as 1.96 which corresponds to 95 percent confident level.

P = the proportion in the target population estimated to have particular characteristics. (0.5percent)

Q = 1.0 - p and

D = degree of accuracy desired, usually set at 0.05

This study employed purposive sampling to identify the initial sample after which snowball sampling technique was used to identify and select 300 participants for the study: 100 participants from each of Senatorial Zones in Imo State (Orlu, Okigwe and Owerri). This is a sampling procedure in which the initial respondents are chosen by probability (random) or non-probability (non-random) methods, and then additional respondents are obtained by information provided by the initial respondent.

Ethical Consideration

Ethical approval was obtained from the Health Research and Ethical committee of The Imo State University, Owerri. The participants were fully informed about the nature of the study, and the research objectives. The names of respondents were not included and information obtained remained confidential and was used only for the purpose of this research.

Instrument for data collection

The main instrument used for data collection was a self-developed structured questionnaire titled: Questionnaire on HIV Morbidity among Men who have Sex with Men (QHMMSM). The Questionnaire was developed by the researcher after critical review of various research works relevant to the topic: contained twelve (12) questions on behavioural risk assessment. All the questions were structured using the 4-scale Likert of strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD). The instrument was scaled thus: SA (4 points), A (3 points), D (2 points) and SD (1 point).

Validity of Instrument for Data Collection

The instrument for data collection was subjected to validity test to ascertain its suitability for the study. It was prepared under the guidance of the research Supervisor and was given to two experts in Measurement and Evaluation in the Faculty of Education, Imo State University and a lecturer in the School of Medicine, Imo State University to ascertain the face and content validity of the instrument. Their corrections were effected and reflected in the final draft of the instrument.

Method of Data Collection

The structured questionnaire was administered to the respondents across the study area with the help of research trained assistants using the mailing approach whereby copies of the instrument were sent to the respondents through the trained assistants. After a week interval, the filled copies were returned via the assistants in the various senatorial zones in the state. The reason is that the study covers a large area.

Statistical Analysis

All questions on the questionnaire were coded before capturing on an excel spreadsheet and the actual data analysis were done using the latest 2014 Statistical Package for Social Sciences (SPSS). This provided descriptive statistics (descriptive mean and inferential statistics [chi-square]) for the study based on which results and conclusions emerged for the study.

Results

Table 1 the behavioural risk factors that contribute to HIV morbidity among MSM in Imo State..

Variables on the behavioural risk factors in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)
Oral without condom sex	Disagree			9.728	2	.008	
	Strongly agree	-17.950	7093.617	.000	1	.998	.000
	Agree	-1.493	.479	9.728	1	.002	.225

Control to decide whether to use condom	Disagree			28.653	2	.000	
	Strongly agree	20.128	12086.920	.000	1	.999	551505347.285
	Agree	17.917	12086.920	.000	1	.999	60439858.624
Use lubricants with condom	Strongly agree	-1.290	.396	10.596	1	.001	.275
Easy access to health care	Disagree			.000	2	1.000	
	Strongly agree	1.999	17148.342	.000	1	1.000	7.381
	Agree	21.635	16408.695	.000	1	.999	2488018136.75
	Constant	-39.838	20379.850	.000	1	.998	.000

Based on the result, having a high risk of contracting HIV when having oral sex without using condom contributes significantly to the HIV morbidity among the MSM in Imo State since the p-value (0.008) is less than the level of significance (0.05). The odds (relative risk) of those that agreed that there is a high risk of contracting HIV when having oral sex without using condom having a positive HIV status is 0.225 that of those that disagreed. This means that those that agreed are 77.5% $[(1 - 0.225) \times 100 = 77.5\%]$ less likely to have a positive HIV status when compared to those that disagreed. There is no significant difference in the HIV status of those that disagreed and strongly agreed since the p-value (0.998) is greater than the level of significance (0.05).

Having total control in deciding whether to use condoms when having oral sex without using condoms contributes significantly to the HIV morbidity among the MSM in Imo State since the p-value (0.000) is less than the level of significance (0.05). The odds (relative risk) of those that agreed and strongly agreed having a positive HIV status do not differ significantly from those that disagreed since the p-values (0.999 for both) are greater than the level of significance (0.05).

The use of lubricants with condom regularly during sexual intercourse contributes significantly to the HIV morbidity among the MSM in Imo State since the p-value (0.001) is less than the level of significance (0.05). The odds (relative risk) of those that strongly agreed having a positive HIV status is 0.275 that of those that agreed. This means that those that strongly agreed are 72.5% less likely to have a positive HIV status when compared to those that agreed.

Having an easy access to health care does not contribute significantly to the HIV morbidity among the MSM in Imo State since the p-value (1.00) is greater than the level of significance (0.05).

The Chi-square test was used to test for the significance of the coefficients of the binary logistic model that was fitted to determine the behavioural risk factors that contribute significantly to the HIV morbidity among the MSM in Imo State. The hypotheses for the test are given below.

H_0 : The coefficients of the model are not significant

H_1 : The coefficients of the model are significant

$\alpha = 0.05$

		Chi-square	Df	Sig.
	Step	217.717	8	.000
	Block	217.717	8	.000
	Model	217.717	8	.000

Decision Rule: Reject the null hypothesis if p-value < $\alpha = 0.05$

The null hypothesis was rejected. Therefore, it was concluded that the coefficients of the model are significant since the p-value (0.000) in Table 2 is less than $\alpha = 0.05$

at 0.05 level of significance.

Discussions

The goal of this study's findings was to comprehend the independent variables that intersected HIV morbidity

among men in Imo State who had sex with men. Thus, having trustworthy knowledge and data concerning the risk variables connected to males who have sex with men is crucial for avoiding and managing HIV morbidity. The HIV epidemic has been exacerbated by morbidity in general, which has also led to an increase in the resources needed to treat the illness [13].

Based on quantitative research, the behavioral risk variables that related to HIV morbidity among the MSM in Imo State were investigated. The HIV morbidity among the MSM in Imo is not significantly influenced by factors such as age at first sexual encounter, number of male partners in the previous six months, regular male partner sex, status of the male partner, or anal sex as the insertive partner wearing a condom, receptive partner wearing a condom, or insertive partner wearing a condom without one. There is broad consensus that hazardous behaviors contribute to the HIV epidemic among MSM populations worldwide, both in high- and low-burden nations [14].

Behavioral modification is therefore required for the decrease in the number of new infections among MSM, as some researchers have argued [15]. The decrease in new HIV infections in various sub-Saharan African nations has been linked to behavior modification initiatives that heavily promoted condom use, faithfulness, and partner reduction [16]. Therefore, behavior modification must be the main focus of HIV campaigns [17]. In the 2012 European Survey of Lesbian, Gay, Bisexual, and Transgender Persons, 38% of MSM in Europe reported that they had not disclosed their sexual orientation to any healthcare provider; for men, this number was as high as 70% in a number of EU countries, including Lithuania, Slovakia, Romania, Poland, and Latvia [18]. This might be taken as a warning that previous study could not have been enough to fully understand the principles of MSM and could lead to the adoption of policies that, upon evaluation, would not accurately reflect the state of affairs now. A culture of openness where MSM feel comfortable disclosing their sexual practices and signing up for preventative and treatment programs could arise from structural initiatives intended to lessen stigma and discrimination against MSM. The results of this study demonstrate that a major contributing factor to the HIV morbidity among MSM in Imo State is anal intercourse as the receptive partner without a condom. According to his study's findings, participants believed they were at risk for HIV because the disease is widespread in the nation and has impacted most people either directly or indirectly [19].

The results of his study demonstrate that when individuals took on a receptive position during anal intercourse, they believed that their risk of acquiring HIV had increased. The individuals who solely embraced an insertive role during sexual activity did not think of themselves as being similar to the receptive MSM. Therefore, these individuals thought that getting a medical male circumcision was a good way to protect themselves, whereas some of the participants who

only played the receptive role did not think it was. The study found that MSM engage in hazardous sexual behaviors despite believing they are at risk for HIV. The development of the theoretical framework for understanding sexual behavior revolved around the topic of why individuals persist in engaging in risky sexual behavior in spite of the systematic efforts of education and HIV prevention programs to change their behavior [20]. Only 26.0% of MSM, according to the study's findings, are unaware of their sexual partner's status, which could enlighten them about whether or not to take protection. Additionally, MSM has a propensity to have been both a receptive and an insertive partner at the very least. The choice to wear a condom for MSM may vary depending on whether one is the receptive or insertive partner; according to the study's findings, 61.7% of receptive partners and 53.3% of insertive partners engage in unprotected anal intercourse (UAI). Similar reports have stated that while most study participants did not routinely use condoms, they all had negative sentiments toward them. Having a primary regular partner was the top reason for not wearing condoms on a regular basis. However, the results of this study support the possibility that MSM have several casual partners with whom they have a sexual history of intimacy (UAI), since 42.3%, 20.3%, and 12.0%, respectively, have had casual sex with an HIV-negative partner 2-4 times, 5-9 times, and 10 times or more. This research of [20] is comparable in that it also mentioned MSM having several sexual partners. Lack of sexual satisfaction in the primary relationship was found to be the primary cause of multiple sexual relations. Promiscuity may have increased as a result of the numerous HIV interventions that the state has implemented, which tend to educate MSM more and provide them with access to specialized healthcare providers who oversee the Key Population. Additionally, PrEP and PEP can suppress MSM's viral load and inhibit HIV contraction. Nevertheless, despite its concentration on MSM and the HIV pandemic, this study was carried out outside of Imo State. This result is in line with earlier studies conducted outside of the current study location, which shown a relationship between the readiness to use PrEP and markers of sexual risk, self-perceived risk of HIV acquisition, and anxiety about side effects and long-term PrEP use [21].

Whether or whether a partner is a primary partner or a casual partner determined whether or not to wear condoms. The participants said they never used condoms when they were with their regular partners because they felt safer that way. However, they always used condoms when they were with their casual partners. The aforementioned conclusion is likewise in line with [22] who found that many MSM acquire HIV from their primary male partners while in a relationship, as they do not use condoms with their primary partners. 68.3% of MSM in the research also stated that they had not had intercourse with a female partner in the previous six months. But the research was not done in Nigeria's South East, in Imo State.

According to a study by [23], the vast majority of people were openly gay or bisexual; however, this openness was only displayed by those people in settings where they knew they would not face discrimination, or rather, where they didn't give a damn about what other people thought. Participants who also had sex with women concealed their bisexual behavior from their female partners because MSM partners were not accepted by women. The degree of HIV transmission risk to women who have sexual encounters with HIV-positive bisexually active men may be significantly affected by this discovery. [24]

In fact, MSM students could volunteer to support HIV intervention work, which could help lower the rate of HIV infection in the MSM community. Examples of this work include giving out condoms and health education materials to students participating in community activities, as well as providing voluntary HIV testing and counseling at schools. HIV intervention ought to extend beyond higher education to secondary schools and even non-formal educational settings in order to bridge the knowledge gap and prevent HIV morbidity caused by risky sexual behavior, which is particularly prevalent in the MSM population [25].

It is becoming increasingly concerning that HIV morbidity is rising in Nigerian society. This is true despite the pandemic's fatal nature and the numerous attempts undertaken to eradicate or lessen the spread of HIV by people, governments, and non-governmental groups both domestically and internationally. The fact that the pandemic seems to be spreading among Men who have Sex with Men (MSM), a group of marginalized individuals characterized by their sexual orientation and which is not widely accepted in society, is especially concerning. These individuals typically face prejudice, various forms of societal stigma, and marginalization when it comes to HIV intervention. This circumstance may be among the risk factors contributing to the MSM's increasing rate of HIV morbidity [26].

In light of the aforementioned, the study looked at HIV morbidity risk factors among men in Imo State, South East Nigeria, who had intercourse with men. The risk variables that were specifically addressed included biological, social, cultural, and economic ones. It was further restricted to the independent variables of greatest level of education, age (16 years and older), and structured questionnaire used for data collection. The cross-sectional descriptive survey design was used in the investigation. There were 300 people in the study's accessible population. The sample size was 300 after 100 respondents were selected from each of Imo State's three senatorial zones using the purposive sampling technique. A questionnaire created by the researcher was utilized to collect data, and it was verified by two measurement specialists. Assessment and a lecturer at Imo State University, Owerri, both work in the medical school. Split-half analysis was used to determine the reliability index, and Cronbach Alpha was used to quantify the data, yielding a reliability coefficient of 0.84. Trained research

assistants assisted in distributing copies of the questionnaire by mail. For data analysis, the 2014 version of SPSS was utilized, specifically utilizing chi-square and descriptive mean statistics..

Conclusion

The age at first sex with a man, the number of male partners in the previous six months, having sex with a regular male partner, the status of the male partner, anal sex as the insertive partner wearing a condom, anal sex as the receptive partner wearing a condom, and anal sex as the insertive partner without a condom have all been found to have no significant impact on HIV morbidity among the MSM in Imo State. Nonetheless, a major factor in the HIV morbidity among MSM in Imo State is anal intercourse as the receptive partner without a condom. MSM concurred that assuming a receptive position during anal intercourse puts them at higher risk of HIV infection than those who choose to play an insertive role. This led to the deduction that MSM who participate in high-risk sexual behaviors had a higher chance of acquiring HIV.

References

1. Mimiaga, M. J., Hughto, J. M. W., Biello, K. B., Santostefano, C. M. Kuhns, L. M., Reisner, S. L. & Garofalo, R. (2019). Longitudinal analysis of syndemic psychosocial problems predicting HIV risk behavior among a multicity prospective cohort of sexually active young transgender women in the United States. *Journal of Acquired Immune Deficiency Syndrome*, 81, 184–192.
2. Hessou, P. H. S., Glele-Ahanhanzo, Y. Adekpedjou, R. Ahouada, C., Johnson, R.C. Boko, M., Zomahoun, H. T. V. & Alary, M. (2019). Comparison of the prevalence rates of HIV infection between men who have sex with men (MSM) and men in the general population in sub-Saharan Africa: A systematic review and meta-analysis. *BMC Public Health*, 19, 1634.
3. Alvarado, B., Mueses, H. F., Galindo, J. & Martínez-Cajas, J. L. (2020). Application of the “syndemics” theory to explain unprotected sex and transactional sex: A cross-sectional study in men who have sex with men (MSM), transgender women, and non-MSM in Colombia. *Biomedical*, 40, 391–403.
4. Chen, L., Lian, D., & Wang, B. (2018). Factors associated with disclosing men who have sex with men (MSM) sexual behaviors and HIV-positive status: A study based on a social network analysis in Nanjing, China. *PLoS ONE*, 13(4), e0196116.
5. Habib, O., Ramadhani, M. D., Ndembu, N., Nowak, R. G., Ononaku, U., Gwamna, J., Orazulike, J., Adebajo, S., Crowell, T. A. Liu, H., Baral, S. D., Ake, J. & Charurat, M. E. (2018). Individual and network factors associated with HIV care continuum outcomes among Nigerian MSM accessing healthcare services. *Journal of Acquired Immune*

Deficiency Syndrome, 79(1), 1-23.

6.Eluwa, G. I., Sylvia B. A., Titilope, E., Obinna, O., Oluwafunke, I & Nzelu, C. (2019). Rising HIV prevalence among men who have sex with men in Nigeria: a trend analysis. *BMC Public Health*. 19:1201.

7.Rodriguez-Hart, C., Nowak, R. G., Musci, R., German, D., Orazulike, I., Kayode, B., Gureje, O., Crowell, T. A., Baral, S. & Charurat, M. (2017). Pathways from sexual stigma to incident HIV and sexually transmitted infections among Nigerian MSM. *AIDS*, 31, 2415–2420.

8.Saffier, I. P., Kawa, H. & Harling, G. (2017). A scoping review of prevalence, incidence and risk factors for HIV infection amongst young people in Brazil. *BMC Infectious Diseases*, 17(675), 1-13.

9.Maleke, K., Makhakhe, N., Peters, R. P. H., Jobson, G., Swardt, G., Daniels, J., Lane, T., McIntyre, J. A., Imrie, J & Struthers, H. (2017). HIV risk and prevention among men who have sex with men in rural South Africa, *African Journal of AIDS Research*, 16:1, 31-38.

10.Amorim, L. T. & Schlemper Jr, B. R. (2019). HIV/AIDS in small cities in Midwest Santa Catarina, south of Brazil: clinical and epidemiological aspects, opportunistic infections. *Rev Soc Bras Med Trop.*, 52, e20180430.

11.Babel, R. A., Wang, P., Alessi, E. J., Raymond, H. F. & Wei, C. (2021). Stigma, HIV risk, and access to HIV prevention and treatment services among men who have sex with men (MSM) in the United States: A scoping review. *AIDS Behaviour*, 25, 3574–3604.

12.Chuang, D. M., Newman, P. A., Fang, L. & Lai, M. C. (2021). Syndemic conditions, sexual risk behavior, and HIV infection among men who have sex with men in Taiwan. *AIDS Behaviour*, 25, 3503–3518.

13.Ferreira-Junior, O. C., Guimaraes, M. D. C., Damacena, G. N., Almeida, W. S., Souza-Junior, P. R. B. (2018). Szwarcwald, C. L. Brazilian FSW Group. Prevalence estimates of HIV, syphilis, hepatitis B and C among female sex workers (FSW) in Brazil, 2016. *Medicine (Baltimore)*, 97(1Suppl), S3-8.

14.Pham, M. D., Aung, P. P. Paing, A. K., Pasricha, N., Agius, P. A., Tun, W., Bajracharya, A. & Luchters, S. (2017). Factors associated with HIV testing among young men who have sex with men in Myanmar: a cross-sectional study. *Journal of the International AIDS Society*, 20, 1-12

15.Scheibe, A. P., Duby, Z., Brown, B., Sanders, E. J & Bekker L. G. (2017). Attitude shifts and knowledge gains: Evaluating men who have sex with men sensitisation training for healthcare workers in the Western Cape, South Africa. *South African Journal of HIV Medicine*;18(1), a673.

16.Passaro, R. C., Castañeda-Huaripata, A., Gonzales-Saavedra, W., Chavez-Gomez, S., Segura, E. R., Lake, J. E., Cabello, R. & Clark, J. L. (2019). Contextualizing condoms:

A cross-sectional study mapping intersections of locations of sexual contact, partner type, and substance use as contexts for sexual risk behavior among MSM in Peru. *BMC Infectious Diseases*, 19, 958.

17.Xu, J., Yan-Qiu, Y., Qing-Hai, H., Hong-Jing, Y., Zhe, W., Lin, L., Ming-Hua, Z., Chen, X., Ji-Hua, F., Wei-Ming, T., Wen-Qing, G., Yong-Jun, J & Hong Shang. (2017). Treatment-seeking behaviour and barriers to service access for sexually transmitted diseases among men who have sex with men in China: a multicentre cross-sectional survey. *Infectious Diseases of Poverty*. 6:15.

18.Onovo, A., Kalaiwo, A., Katbi, M., Ogorry, O., Jaquet, A. & Keiser, O. (2021). Geographical disparities in HIV seroprevalence among men who have sex with men and people who inject drugs in Nigeria: Exploratory spatial data analysis. *JMIR Public Health Surveill*, 7(5), 1-15.

20.Serra, M. A. A. O. Milhomem, A. B., Oliveira, S. B., Santos, F. A. A. S. e Silva, R. A., Costa, A. C. P. J., Cunha, M. C. S. O., Silva, A. U. A., Freitas, R. W. J. F. and Araújo, M, F. M. (2020). Sociodemographic and behavioral factors associated with HIV vulnerability according to sexual orientation. *AIDS Research and Treatment*, 7(10), 1-7.

21.Teclessou, J. N., Akakpo, S. A., Ekouevi, K. D., Koumagnanou, G., Singo-Tokofai, A. & Pitche, P. V. (2017). Evolution of HIV prevalence and behavioral factors among MSM in Togo between 2011 and 2015. *Pan African Medical Journal*, 28(10), 191-112.

22.Hojilla, J. C., Marcus, J., Volk, J. E., Leyden, W., Hare, C. B. & Hechter, R. C. (2020). Alcohol and drug use, partner PrEP use and STI prevalence among people with HIV. *Sexually Transmitted Infections*, 96(3), 184-188.Zhang, C., Ren, Q. & Chang, W. (2020). Epidemiological features and risk factors for acquiring hepatitis B, hepatitis C, and syphilis in HIV-infected patients in Shaanxi Province, Northwest China. *International Journal of Environmental Resources and Public Health*, 17(6), 1990.

23.Issema, R., Songster, T., Edgar, M., Davis, B., Lee, T. & Harris, J. (2018). HIV-positive individuals who report being in care are less likely to be co-infected with an STI: An analysis of “Network Testing,” a service program offering HIV and STI testing services to individual at risk for HIV. *Open Forum Infectious Diseases*, 5(Suppl 1:S67), 1-2.

24.Zhou, J., Yang, L., Ma, J., Jiang, S., Liu, Y. & Sun, Z. (2022). Factors associated with hiv testing among MSM in Guilin, China: Results from a cross-sectional study. *International Journal of Public Health*, 67(160), 1-7.Young Men who have Sex with Men: Health, Access, and HIV Findings from the 2012 Global Men’s Health and Rights (GMHR) Study: A Policy Brief. MSMGF, 2013.

25.Hessou, P. S. H., Glele-Ahanhanzo, Y., Ahoussinou, C., Azandjeme, C. S., Dadje, C. D., Bonou, W., Capo-Chichi,

V., Doussouh, B., Boko, M. & Alary, M. (2020). Seroprevalence, Knowledge and Behavioral Factors Associated with HIV Infection Among Men Who have Sex with Men (MSM) in Benin. *Central African Journal of Public Health*, 6(2), 95-105.

26. Zhu, Y., Liu, J., Chen, Y., Zhang, R. & Qu, B. (2018). The relation between mental health, homosexual stigma, childhood abuse, community engagement, and unprotected anal intercourse among MSM in China. *Science Report*, 8, 3984