

Probing the Seroprevalence of HIV infection Among Persons Attending Healthcare Facilities in Port Harcourt, Rivers State, Nigeria during 2022–2023

Abstract

Background

This study was aimed at determining the seroprevalence of HIV infection among persons attending healthcare facilities in Port Harcourt, Rivers State, Nigeria. The ascertainment of prevalence of HIV infections is important in the formulation of policies and strategies, aimed at the protection of healthcare workers from HIV and other infections due to occupational hazards. This study will contribute in filling the gap created by inadequacy of Data on HIV in Nigeria and sub-Saharan Africa.

Methodology

This study involved a review of the medical laboratory records of 345 persons including 167 males and 178 females who attended public and private healthcare facilities in Port Harcourt between January 2022 to December, 2023. The inclusion criteria provided for the review of the records of only persons who reside within Port Harcourt metropolis, and within the study period, conducted serological laboratory investigations for HIV 1/2 antibodies at Diagnostix and Scientifique Laboratories, Port Harcourt. Included in the study were records of persons who conducted HIV tests within the study period and have complete records of the results and relevant sociodemographic parameters. Persons who were not resident in Port Harcourt or did not perform the HIV tests and those with incomplete records were excluded.

Results

The overall prevalence of HIV in this study was 14.5%. Within the age brackets, the highest prevalence of 26.0% was found with the 26-30 age bracket, while the least was 7.0% among the 41–45-year-old age brackets. The males had a prevalence of 12.6%; and the females (16.3%). The residents of low-density areas recorded a prevalence of 12.1%, while those living in high density areas had 15.7%; the persons who attended public healthcare facilities had a prevalence of 14.8%, while those who went to private healthcare facilities had 14.4%.

Conclusion

The high prevalence of HIV among persons attending healthcare facilities makes imperative the implementation of stringent measures for prevention and control measures to safeguard the lives of healthcare workers.

Keywords: Seroprevalence, HIV infection, HIV epidemiology, Public health, Healthcare facilities

Introduction

The human immunodeficiency virus (HIV) has remained a major global public health threat, since 1983 when it was discovered among men having sex with men (MSM) in Los Angeles, United States of America.¹ The virus has claimed an estimated 42.3 million lives across the world; and by the end of 2023, about 39.9 million people are living with HIV, worldwide, with 65% of them residing in the WHO African Region. Within the same year, about 630 000 people died from HIV-related causes, while 1.3 million people were infected with the virus.¹

HIV is a retrovirus, belonging to the *Retroviridae* family of viruses; which is transmitted through the exchange of certain bodily fluids, destroys various immune cells and contributes to an overall weakened immune system. If left untreated, HIV progresses to acquired

immunodeficiency syndrome (AIDS) - a chronic, life-threatening condition that puts patients at risk for opportunistic infections.²

The spread of HIV infection is multifactorial, dominated by an interplay of multifarious social factors HIV testing had to contend with ethical principles of having to protect the patient's confidentiality given the stigma and discrimination trails the disease in many societies which is still subsisting in many places. Handling the issue of HIV was not an easy task for many developing countries particularly in Africa where the healthcare systems were already overburdened. Efforts at curtailing the virus including the use of condoms, prevention of mother-to-child transmission, voluntary male medical circumcision and community awareness campaigns have been less successful than anticipated perhaps due to underlying systemic issues³

The global burden of HIV remains a major concern with millions of persons affected globally. Though significant progress has been made in understanding the mechanisms of the infection, diagnosis, treatment, and prevention. HIV/AIDS continues to put extensive pressure on healthcare policies, budgets and infrastructures at local and global levels, particularly in sub-Saharan Africa, with the highest prevalence of the infection. The infection also directly affects the well-being of individuals and societies, thereby creating and expanding social and economic inequities and disruptions.^{4,23}

West Africa has a low HIV prevalence, estimated at 2% or less for adults within the general population, which is a low prevalence, while the adult population in Nigeria has an estimated prevalence of 1.4% for persons within the ages of 15–49 years in the 2018 Nigeria AIDS indicator and Impact Survey (NAIIS). NAIIS is population-based survey conducted to track key national HIV-related indicators, such as progress toward the UNAIDS 95-95-95 targets as well as to guide policy and funding priorities.⁵ Nigeria is reputed with having the heaviest HIV burden in Sub-Saharan Africa,⁶ and about 49 000 across all age groups died as a result AIDS-related causes in 2020.^{7,8} About 80% of new HIV infections in Nigeria are due to unprotected heterosexual intercourse, while most of the other 20% HIV infections are contributed by high-risk populations like female sex workers, men who have sex with men, injectable drug abusers and transgender persons.⁹ It is important to have accurate estimates of HIV prevalence for effective tracking of the HIV epidemic, planning, developing, implementing, and assessing preventive and treatment programs, and projecting resource demands^{5,10} There are two types of HIV, known as HIV-1 and HIV-2, and they have various subtypes. The HIV epidemic in Nigeria is mostly caused by HIV-1, which have subtypes A and G as the dominant subtypes in Southern and Northern Nigeria, respectively.⁸ The HIV epidemic in Nigeria is the second highest across the world, with over 1.9 million people currently living with HIV, with current evidence revealing incidence as 8.0 per 10 000 persons across both genders and age groups, and a current prevalence of 1.4% among adults aged 15–49 years.^{6,8}

This study was aimed at determining the prevalence of HIV among persons seeking medical attention for purposes of checkups and treatment in healthcare facilities as potential sources of infection for healthcare workers . This is justified by the premise that healthcare workers are exposed to occupational hazards which put them at the risk of being infected with HIV. The retroviral-seropositive individuals attending healthcare facilities are potential sources of workplace infections for healthcare workers (HCWs). The knowledge of prevalence rates among them is thus required in formulation of strategies aimed at curtailing work place hazards in healthcare facilities.

Materials and Methods

Study Area

The study area Port Harcourt is the capital and major city of Rivers state, Nigeria, located on Latitude: 4°46'38" N Longitude: 7°00'48" E on an elevation of 16mm above sea level, lying along the Bonny River. It is the hub of the oil rich Niger Delta region, the economy of the state revolves primarily around petroleum and gas industry, with much of the urbanization and modernization in the town proceeding from its associations with the oil industry.

Study Design

This cross-sectional retrospective study was a review of the medical laboratory records of 345 persons including 167 males and 178 females who attended public and private healthcare facilities in Port Harcourt between January 2022 to December, 2023. The inclusion criteria provided for the review of the records of only persons who reside within Port Harcourt metropolis, and within the study period, conducted serological laboratory investigations for HIV 1/2 antibodies at Diagnostix and Scientifique Laboratories, Port Harcourt. Persons who were not resident in Port Harcourt or did not perform the HIV tests and those with incomplete records were excluded.

Records of HIV Screening Tests

The procedure for screening tests were contained in the standard operating procedure (SOP) manual of the laboratory and World Health Organization recommendations. The serological analyses for the detection of HIV 1 /2 were conducted using Determine (Abbott Diagnostics Medical Company, Japan). Positive samples were retested with STAT-PAK and if also positive, were recorded as confirmed positive; but if the positive determine test was negative on STAT-PAK, then Uni-Gold (Trinity Biotech) tests were used as tiebreaker. Whichever results were corroborated by Uni-Gold were recorded as the confirmed results.

Data Analysis

Data were clarified using Excel spreadsheet 2016, and analyzed using IBM SPSS Statistics version 25. Descriptive and inferential statistics were employed in results presentation and interpretation. Associations between possible risk factors namely, gender, age residence and HIV results were determined using Pearson's Chi-Square test of independence and Fisher exact test at significance level below 0.05.

Results

The review of the laboratory records focused on the data of 345 persons including 167 (48.4%) males and 178 (51.6%) females who met the research criteria. The ages ranged from 6 years to 68 years, the mean age was 34.6 ± 1.882 , the median age was 33 years while the least modal age was 27. Their records of residential area show that 116 (33.6%) live in low density areas while 229 (66.4%) lived in high-density areas of Port Harcourt; also 108 (15.7%) had attended public healthcare facilities, while 237 (14.4%) had been to private healthcare facilities. (Fig. 1; Table 1)

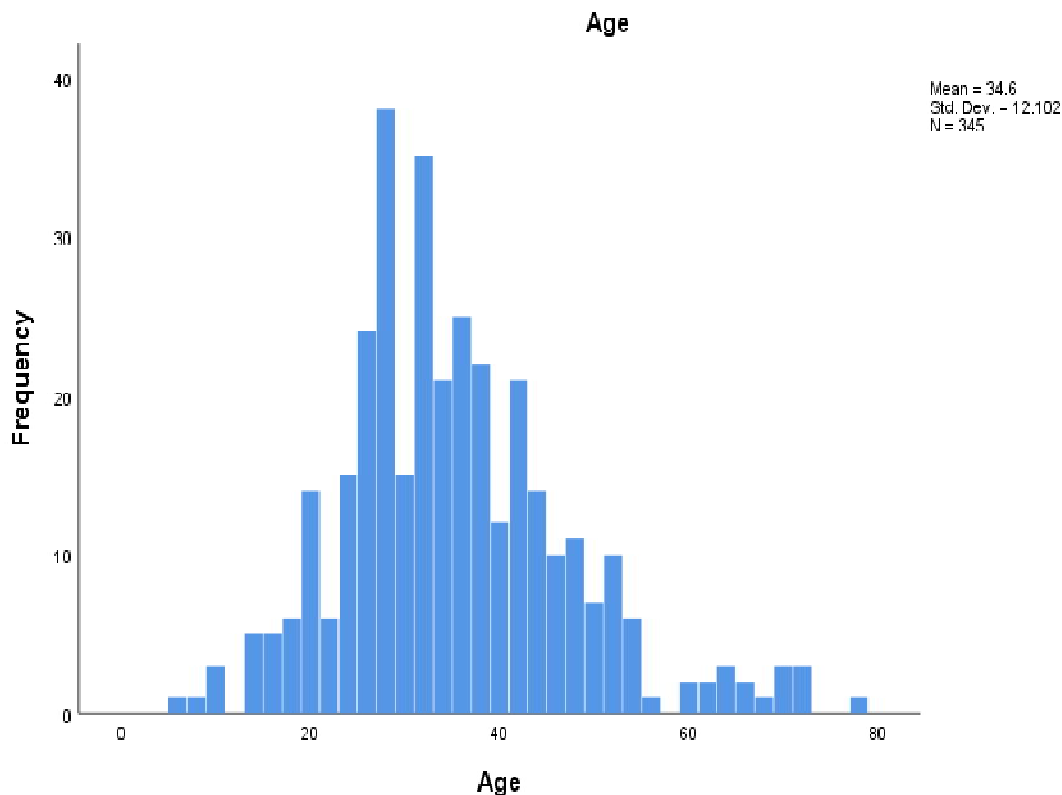


Figure1: The distribution of Ages among Persons attending public and Private Healthcare Facilities

Prevalence of HIV among Persons Attending Public and Private Healthcare Facilities

The overall prevalence of HIV in this study was 14.5%. Within the age brackets, the highest prevalence of 26.0% was found with the 26-30 age bracket, while the least was 7.0% among the 41–45-year-old age brackets. The males had a prevalence of 12.6%; and the females (16.3%). The residents of low-density areas recorded a prevalence of 12.1%, while those living in high density areas had 15.7%; the persons who attended public healthcare facilities had a prevalence of 14.8%, while those who went to private healthcare facilities had 14.4% (Table 1)

The associations between HIV infection and age, gender, residence, and healthcare facility were found not be statistically significant, given that the p values were not less than 0.05, we therefore fail to reject the null hypothesis which states that the variables are independent. In other words, there was insufficient statistical evidence to link the high prevalence of HIV among attendees of healthcare facilities in Port Harcourt, Nigeria to any of the above factors.

Table 1: Distribution of Frequency and Prevalence of HIV among Persons Attending Public and Private Healthcare Facilities

Characteristics	Number Tested	Positive	Prevalence %
Age Bracket			
<20	35	4	11.4
21-25	38	6	15.8
26-30	50	13	26.0
31-35	75	10	13.3
36-40	40	9	22.5
41-45	43	3	7.0
>45	54	5	9.3
Gender			
Males	167	21	12.6
Females	178	29	16.3
Residence			
Low Density Area	116	14	12.1
High Density Area	229	36	15.7
Healthcare Facility			
Public Facility	108	16	14.8
Private Facility	237	34	14.4
Total	345	50	14.5

Prevalences of HIV among Persons Attending Public Healthcare Facilities

The prevalence of HIV among persons attending public hospitals was 14.8%, the highest prevalence among age brackets was 26.0% found within the 26-30 years age brackets, and zero prevalence was observed in the 40-45 and >40 year brackets. The prevalence rates for men was 14.3% and women, 15.1%; residents of low density urban areas had a prevalence of 17.2%, while those in high density areas was 13.9%.

Table 2: Distribution of Frequencies and Prevalences of HIV among Persons Attending Public Healthcare Facilities

Characteristics	Number Tested	Positive	Prevalence %
Age Bracket			
<20	24	4	16.7
21-25	29	5	17.2
26-30	25	6	24.0
31-35	6	0	0.0
36-40	6	1	16.7
41-45	8	0	0
>45	10	0	0
Gender			
Males	35	5	14.3
Females	73	11	15.1
Residence			
Low Density Area	29	5	17.2
High Density Area	79	11	13.9
Total	108	16	14.8

Prevalences of HIV among Persons Attending Private Healthcare Facilities

The prevalence rates for persons attending private healthcare facilities were found to be 14.4%; the 36-40 years age bracket had the highest prevalence of 25.7% among the age brackets, while the <20 and 21-25 age brackets recorded zero prevalence rates. The males had prevalence of 11.5% and females, 17.9%; attendees from low density areas recorded prevalence rates of 10.3%, while those from high density areas had 16.7%.

Table 3: Distribution of Frequencies and Prevalences of HIV among Persons Attending Private Healthcare Facilities

Characteristics	Number Tested	Positive	Prevalence %
Age Bracket			
<20	11	0	0.0
21-25	8	0	0.0
26-30	35	7	20.0
31-35	69	10	14.5
36-40	35	9	25.7
41-45	35	3	8.6
>45	44	5	11.4
Gender			
Males	131	15	11.5
Females	106	19	17.9
Residence			
Low Density Area	9	9	10.3
High Density Area	25	25	16.7
Total	237	34	14.3

Discussion

This study focused the population of persons who attended healthcare facilities within the study period and conducted HIV investigations, either by recommendation of their healthcare practitioner, or based on complaints or on personal volition. While prevalence of HIV among the

general population in Rivers state is 3.6%, and the nationwide prevalence for Nigeria is 1.4%.¹¹ the prevalence of 14.5% found in this study is much higher than those in the general population.

The outcomes of this study are however comparable to reported outcomes from studies of specific populations or persons suspected to be of high risks such as pregnant women, female sex workers (FSW) among others. It aligned with the findings of a study among FSW in Port Harcourt which reported a prevalence of 14.5%.¹² It also aligned with the pooled prevalence of 7.22% reported in a systematic review and meta-analysis among pregnant women, with prevalence ranging from 6.84% to 17.04% across Nigeria.¹³ The prevalence of HIV across populations and across countries and varies remarkably. A study in Nairobi, Kenya found a HIV prevalence was 28.0% among female sex workers,¹⁴ while a continent-wide meta-analysis and systematic review among pregnant women across Africa reported a pooled prevalence of 9.3%, with subgroup prevalences between 0.7% in North Africa and 29.4% in Southern Africa.¹⁵ There is paucity of data on the prevalence of HIV among persons attending healthcare facilities in Nigeria, who were not known to be seropositive for HIV prior to the facility visit. This could be attributable to the fact that these set of people may not be considered as high-risk group; The importance of determining the prevalence rates for this group lies in the fact of being not just potential reservoirs of HIV but also of other existing, emerging and re-emerging infections. A study on occupational exposure of healthcare workers to HIV reported a prevalence of 45.0% in Port Harcourt¹⁶, while a Mexican study reported a prevalence of 0.9% for work related HIV infections.¹⁷ It is therefore pertinent for the healthcare workers and visitors to be conscious of a higher prevalence of HIV in the facilities environment than in the general population; with the implication of higher risks of contracting HIV infections within the healthcare facility workspace

There were no statistically significant difference between the sociodemographic indices (age, gender, residence and healthcare facilities) and HIV infection in this study; the highest prevalence of the infection found among the 26-30 years age bracket aligned with some previous results, including a recent study in port Harcourt where the highest prevalence was found among the 20-29 years age bracket.¹² and another study which reported highest frequencies among ages 18-30 years.¹⁸ A study on HIV among adolescents in South Africa reported a high increase in HIV prevalence among adolescents aged 12–19 years.¹⁹ In North America and Europe highest prevalence rates were found among the 20–39-year-olds group.³ The variations in the age brackets of reported highest prevalences of HIV notwithstanding, they are expectedly, the ages of high sexual activities, with greater disposition for high-risk sexual behaviour's. These are ages where people are more likely to be more adventurous in experimenting with alcohol, drugs and sexual practices. The higher percent in ages above 26 years may be related to the type and the age distribution of population visiting the health care facilities. School age persons may have different line of health services such as school health facilities therefore they are presented in lower percentages here.

The findings of higher prevalence in females than males were also consistent with reports of many previous studies. Females were reported to have accounted for 65.8% of new HIV cases in 2019 across the world.²⁰ A study on HIV control in Africa also found a higher prevalence of 52.35% among females.²¹ The higher prevalence rates in women may be attributable to a number of sociocultural and biological factors, particularly in sub-Saharan Africa. The higher prevalence among FSWs may also be contributory to high female prevalence of HIV. The higher prevalence of HIV among persons living in high density areas and the health facilities attended may be attributable to socioeconomic factors as well as levels awareness, literacy rates and

other such factors. It may also be related to the fact that in high density area, poor people are more likely to afford public healthcare facilities and cheaper private ones.

A major strength of this study is that it focused on a HIV infection from a perspective that may have not been previously considered, but which may have salient implications in reducing the incidence of HIV infections worldwide. The contributions of healthcare workers in combating the HIV scourge cannot be overstressed; while the roles of persons attending healthcare facilities as potential sources of infections to HCWs cannot be ignored. This study has highlighted these factors with the expectations that greater attentions will be paid to them in efforts to protect the HCW in the course of performing their duties.

Most of the limitations of the study are due to its retrospective nature, as the study has to be designed to fit into data provided for laboratory diagnosis of the infection even before the commencement of the study. The sociodemographic data were restricted to the contents in the laboratory records, which are what may be required in a prospective study. There were no personal interactions or communications with the participants, and some information that may enrich the study could thus not be obtained. It is hoped that succeeding studies will be designed to overcome the shortcomings.²²

Conclusion

The overall prevalence of HIV reported in this study was much higher than the prevalence rates of the general population. It is also comparable with the prevalence rates reported among other population segments considered as high-risks. It is recommended that these findings be integrated into preventive measures designed for the protection of HCWs from infections by HIV and other pathogens.

Ethical Considerations

This study was conducted in compliance with the Helsinki protocol.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

- 2.
- 3.

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