



Prevalence of AHD Among PLHIVs in Six Health Facilities in Nasarawa State, Nigeria

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Abstract: Globally, HIV remains a paramount health concern, and despite concerted interventions, it persists as a severe challenge in many communities. In regions like Nasarawa State, Nigeria, where prevalence is high, there's an undeniable need for regular monitoring. This study, aimed at gauging the current status of Advanced HIV Disease (AHD) among People Living with HIV (PLHIV), employed a cross-sectional survey design to analyze the medical records of 336 PLHIVs from six key health facilities within the state. Analytical tools, including descriptive statistics and t-tests, revealed a disturbingly high prevalence of AHD, especially among adults, with rates at 51.29%. Adolescents also showed a significant prevalence at 32%. A deeper comparative analysis between the two age demographics elucidated a marked statistical difference in AHD prevalence. These findings accentuate the pressing need for enhanced, age-specific interventions. Immediate action is warranted, especially for adults aged 20-49 and adolescents in Nasarawa State, to bolster HIV prevention, promote early testing, and optimize treatment methodologies. The insights from this study serve as a clarion call for policymakers and health practitioners to renew and refocus their efforts in these high-risk groups, aiming for a more effective containment and reduction of HIV's impact in the region.

Keywords: Advanced HIV Disease, Gender, PLHIV, Prevalence of AHD, Adults, Adolescents

1. Background

HIV/AIDS is a global health challenge affecting millions of people worldwide, and Nigeria is no exception [3, 13, 16]. Despite substantial advancements in the global battle against HIV and AIDS, including the reduction in HIV transmission rates and the expanded availability of life-saving antiretroviral therapy (ART), a significant issue persists, demanding immediate attention [8, 12, 17, 18]. While there was initial optimism, the decline in AIDS-related deaths has recently been observed as challenging again, indicating that illnesses and deaths resulting from either or both advanced

HIV disease and opportunistic infections continues to pose public health concerns [3, 8]. This situation is further exacerbated by the sobering reality that a considerable proportion of individuals living with HIV, up to 50%, continue to seek medical attention for advanced HIV disease (AHD) [3, 13, 17] highlighting an urgent matter that necessitates comprehensive action.

Advanced HIV disease, also known as late-stage or advanced-stage HIV infection (Stage 3 and 4, respectively), represents a critical stage of the disease where individuals face grave health risks and an elevated mortality rate [17]. Even after initiating antiretroviral therapy, individuals with

AHD bear a disproportionately high risk of mortality, this also implies that they are more susceptible to opportunistic infections such as tuberculosis, severe bacterial infections, and cryptococcal meningitis, thereby amplifying their health burden and contributing to heighten the rates of morbidity and mortality among people living with HIV (PLHIV) [13].

The World Health Organization (WHO) defines AHD in adults, adolescents, and children five years of age and older as having a CD4 count of less than 200 cells/mm³ or meeting the criteria for WHO stage 3 or 4 disease [9, 17]. Additionally, all children under the age of five are presumed to have AHD due to their heightened vulnerability and unique healthcare needs [17, 18]. AHD encompasses a wide range of public health issues for individuals facing diverse challenges across the HIV care continuum, this includes individuals who have recently been diagnosed with HIV, and have experienced treatment failure leading to a decline in CD4 cell count, as well as those who had previously initiated ART but subsequently discontinued treatment and are now resuming therapy [9, 10, 17, 18].

Strengthening preventative strategies, promoting early and accurate diagnosis, ensuring access to high-quality and timely antiretroviral medication, and improving adherence and retention in care are crucial elements for effective management of this disease, thus, necessitating a collaborative effort among healthcare practitioners, policymakers, researchers, and community organisations to successfully tackle the challenges posed by AHD and reducing the burden of AIDS-related mortality [9, 17]. By addressing these multifaceted challenges and working together towards comprehensive solutions, quality of care can be improved and the dynamics of the challenges posed by the disease can be better understood, contributing to possible eradication of the menace.

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), Nigeria had an estimated 1.8 million people living with HIV (PLHIV) in 2019, making it the distant second to Kenya on the burden of HIV in Africa [14]. Despite the progress made in Nigeria's HIV response [15], there are still significant challenges to overcome, particularly in Nasarawa state, which is situated in a region where the HIV prevalence rate is estimated at 2.0% of adults aged 15-49 years [15].

Nasarawa state, is located in the north-central region of Nigeria, and was not among the most burdened states on HIV prevalence rate, however, with a population of over 2.8 million, a 2.0% of that population means there are about 56,000 people aged 15-49 living with HIV. Therefore, since AHD remains a significant challenge, particularly in low-and-middle-income countries, it is essential to continue to provide empirical data on the prevalence of AHD among PLHIV in Nasarawa state, to keep magnifying the challenge until it is nearly eradicated or totally kept away by the HIV ART partners within the state.

The findings of this study will be useful in informing the development of targeted prevention and treatment strategies aimed at reducing the incidence of AHD in the state.

Additionally, the study will contribute to the global efforts to achieve the UNAIDS 95-95-95 targets, which aim to diagnose 95% of all PLHIV, provide ART for 95% of those diagnosed, and achieve viral suppression for 95% of those on treatment by 2030 [11]. Ultimately, this study's results will contribute to improving the quality of care and treatment of PLHIV in Nasarawa state and, by extension, Nigeria as a whole.

1.1. Justification for Study

This study is essential for several reasons. First, it will provide critical data on the burden of AHD and the affected population in Nasarawa state, which will guide the development of targeted prevention and treatment strategies aimed at reducing the incidence of AHD in the state. Second, the study will contribute to the global efforts to achieve the UNAIDS 95-95-95 targets, which aim to diagnose 95% of all PLHIV, provide ART for 95% of those diagnosed, and achieve viral suppression for 95% of those on treatment by 2030. Third, the study will contribute to improving the quality of care and treatment of PLHIV in Nasarawa state and, by extension, Nigeria as a whole.

1.2. Research Questions

What is the prevalence of AHD among newly enrolled adults living with HIV in Nasarawa state?

What is the prevalence of AHD in adolescents living with HIV in Nasarawa state?

How does the prevalence of AHD compare between adults and adolescents living with HIV in Nasarawa state?

1.3. Objectives

To determine the prevalence of AHD amongst newly enrolled adults living with HIV in Nasarawa state.

To determine the prevalence of AHD amongst newly enrolled adolescents living with HIV in Nasarawa state.

To compare the prevalence of AHD between adults and adolescents living with HIV in Nasarawa state.

2. Literature Review

The prevalence of advanced HIV disease (AHD) is a major public health concern in sub-Saharan Africa, including Nigeria. A number of studies have been conducted to determine the burden of AHD among people living with HIV (PLHIV) in Nigeria, and some have found high prevalence rates. A study by Agolori et al. in Plateau State found a prevalence rate of 25% among PLHIV attending HIV clinics [19]. Another study by Oladele et al. in Lagos State reported that there are over 1,000 AHD patients within the southwestern Nigeria, with up to 5% having cases of co-infections and opportunistic immunosuppressant like Cryptococcal Antigen, and Tuberculosis [20]. The high prevalence of AHD among PLHIV in Nigeria is a major challenge for the healthcare system. PLHIV with AHD have a higher risk of mortality and morbidity, and require more

complex and expensive treatment regimens. It is therefore important to determine the prevalence of AHD and its associated risk factors in order to develop effective prevention and management strategies.

Several risk factors have been identified for the development of AHD among PLHIV in Nigeria. These include low CD4 count, late presentation for HIV care, and non-adherence to antiretroviral therapy (ART) [10, 12, 19, 20]. Finally, the study aims to compare the prevalence of AHD between adults and adolescents, and to determine the incidence of AHD in recent infection. The findings of this study will help inform policies and programs aimed at reducing the burden of AHD among PLHIV in Nigeria.

Despite several studies conducted to determine the prevalence of HIV, limited attention has been given to the prevalence of advanced HIV disease (AHD) among newly enrolled adults and adolescents living with HIV (LWHIV), especially in the North-Central region of the country. Most of the existing studies in Nigeria focused on the general prevalence of HIV and its associated complications, with limited information on the prevalence of AHD among newly diagnosed PLHIV. Furthermore, most of the previous studies were conducted in the urban areas of Nigeria, neglecting the rural settings, where most of the population reside. Therefore, there is a gap in the literature on the prevalence of AHD among newly diagnosed adults and adolescents LWHIV in rural settings such as Nasarawa State, Nigeria.

This study aimed to fill this gap in the literature by conducting a survey to determine the prevalence of AHD among newly diagnosed adults and adolescents living with HIV in rural settings of Nasarawa State, Nigeria. The findings from this study will provide valuable insights into the burden of AHD and associated complications among newly diagnosed PLHIV in rural settings, which can inform the development of effective interventions and policies to improve the quality of care and reduce the morbidity and mortality rates among PLHIV in Nigeria.

3. Methods

3.1. Study Design

This study used a cross-sectional survey design to determine the prevalence of advanced HIV disease (AHD) among newly enrolled adults and adolescents living with HIV in six (6) health facilities across Nasarawa State, Nigeria.

3.2. Sampling Procedure

The study sample consisted of newly diagnosed adults and adolescents living with HIV in Nasarawa State, Nigeria. A two-stage purposive sampling technique was used to select the participants. Firstly, six health facilities were purposely selected from the list of facilities in Nasarawa State. These are facilities that our organisation has been managing their antiretroviral department, within the state. Secondly, a purposeful sampling was also used to select the participants from each health facility (three primary healthcares and three

secondary healthcares). The inclusion criteria were newly diagnosed adults and adolescents living with HIV who were enrolled in care at the selected health facilities as at the time of data collection for this study, had their CD4 checked and passed for the diagnosis of AHD, that is CD4 count less than or equal to 200 cell/mm³.

3.3. Sample Size

A total enumeration sampling was used in collecting data of all the individuals (336) who had their CD4 count checked and had results equal to or less than 200 cells/mm³. The descriptive analysis of the data is presented in the analysis and results sections.

3.4. Data Collection

The data of the study sample were gathered by the research assistants who work with our organisation and were stationed at each of the facilities at the time of this study. Fetching the linelist of all the clients who meet the criteria for the AHD diagnosis, these individuals were included as sample and their data included for this study.

3.5. Data Analysis

Data were analysed using Sheets, including Google Sheets for data cleaning and preparation, and the Statistical Package for the Social Sciences (SPSS) version 27 for further analysis. Descriptive statistics such as frequency, percentages, means, and standard deviations were used to describe the sociodemographic characteristics of the participants. The same analysis was also computed to analyse the first and second objectives of the study. After these, t-test of independent samples was computed to compare the prevalence of AHD, among newly diagnosed adults and adolescents living with HIV.

3.6. Ethical Considerations

The data used for this study were extracted from the electronic medical record of the clients that our organisation currently manages in the six facilities within the state where this study was conducted. This was with the approval from the data ethics committee of the organisation and all personal identifiers of the study sample were removed and information other than age, gender, and CD4 counts were excluded.

4. Results and Discussions

This section of the report presents the analysis and results of the study objectives. All results were computed using SPSS 27 and Google Sheets. The former was used for all quantitative computations and the latter was used for visualisation to help communicate the results better.

4.1. Objective 1

The first objective of this study, which was to investigate the prevalence of AHD among newly enrolled adults living

with HIV among the study population, was analysed using descriptive statistics. The results are presented in Table 1.

Table 1. Prevalence of AHD amongst newly enrolled adults living with HIV in Nasarawa State.

Age Group (Years)	AHD n (%)	Total Sample (n)
20-29	40 (12.9)	85
30-39	63 (20.32)	116
40-49	35 (11.29)	66
50-59	15 (4.84)	33
60 and above	6 (1.94)	10
Total	159 (51.29)	310 (100)

Note: n = number of individuals in each age and AHD group respectively; percentages are based on the total sample size of 310.

Results in Table 1 indicate that the prevalence of AHD among the adult population of the study sample is very high (51.29%). This result was computed by identifying the proportion of the population that had a CD4 count of 200 or less. Furthermore, the results showed that AHD is more prevalent among adults aged 30-39 years, followed by those aged 20-29 and 40-49 years respectively (See Figure 1). This indicates that the majority of individuals with AHD among the study population are in their active adult years (early to middle adulthood), thus, requiring further probing to ascertain whether there are extraneous factors that may contribute to this prevalence.

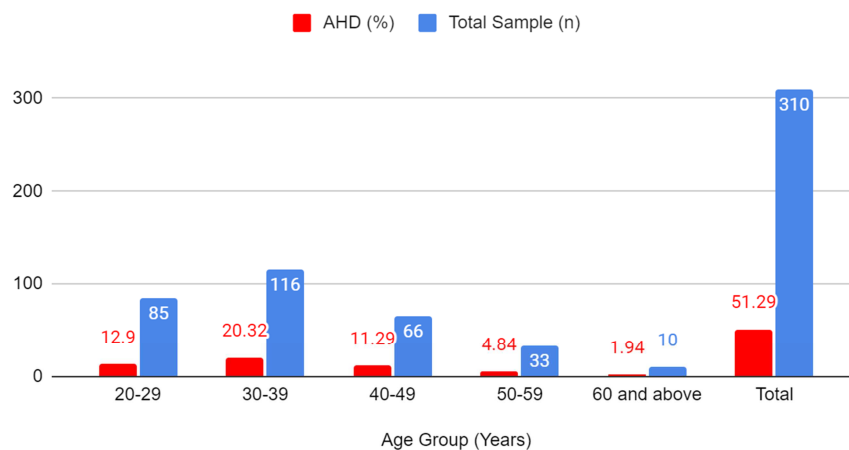


Figure 1. Prevalence of AHD among Adults living with HIV in Nasarawa State, Nigeria.

Prevalence of AHD among Adolescents LWHIV Population

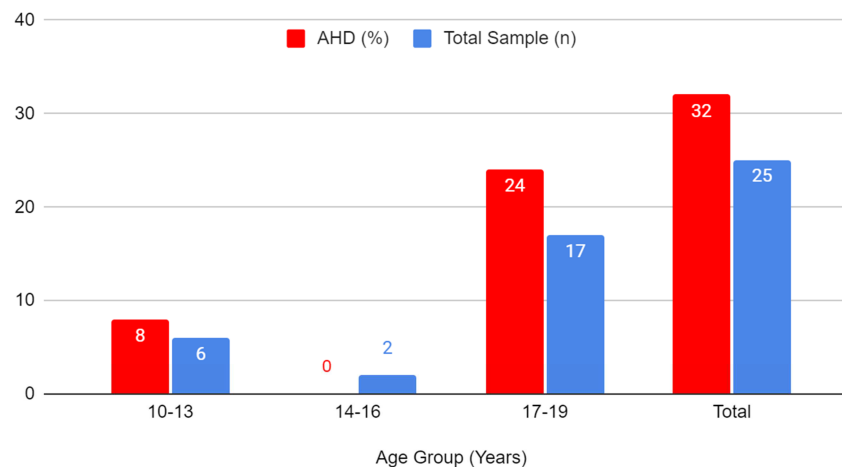


Figure 2. Showing the prevalence of AHD among Adolescents living with HIV Population.

4.2. Objective 2

The second objective of the study was to determine the prevalence of AHD in adolescents living with HIV among the population sample. A descriptive analysis was computed to ascertain this objective. The results are presented in Table 2.

Table 2 shows the prevalence of AHD among the adolescent population of the six sampled government-owned

health care centres in Nasarawa State, Nigeria. The Table shows that AHD is relatively high among the study population (32%). This result was computed by identifying the proportion of the population that had a CD4 count of 200 or less. In addition to this, Table 2 also showed that AHD is higher among adolescents aged 17-19 years (See Table 2 above). This implies that AHD is more prevalent in later years of the adolescence stage.

Table 2. Prevalence of AHD amongst newly enrolled adolescents living with HIV in Nasarawa State.

Age Group (Years)	AHD n (%)	Total Sample (n)
10-13	2 (8)	6
14-16	0 (0)	2
17-19	6 (24)	17
Total	8 (32)	25 (100)

Note: n = number of individuals in each age and AHD group respectively; percentages are based on the total sample size of 25.

4.3. Objective 3

The third objective of this study was to compare the prevalence of AHD between adults and adolescents living with HIV in Nasarawa state. This objective was analysed using t-test of independent samples. The results are presented in Table 3.

Table 3. t-test of independent samples: showing the mean difference of AHD prevalence among the adult and adolescent population of the study.

Group	n	Mean Score (SD)	t-value	p-value
Adults	311	1.49 (0.50)		
Adolescents	25	1.68 (0.48)	-32.18**	<.001

Note: N = 336. n = proportion to the selected sample. SD = standard deviation. The asterisk (**) next to the t-value indicates that the difference between the means is statistically significant at the alpha level of 0.01.

The purpose of this objective was to examine the mean difference of AHD prevalence between two groups, Adults and Adolescents. A total of 336 participants (311 in the adult group and 25 in the adolescent group) were included in the analysis. A t-test of independent samples was computed and results were presented in Table 3 above. As shown in Table 3, the mean AHD prevalence for the adult group was 1.49 (SD = 0.50), while the mean AHD prevalence for the adolescent group was 1.68 (SD = 0.48). The t-test revealed a significant difference in mean scores between the two groups ($t(334) = -32.18$, $p < .001$) indicating that the observed difference in means is unlikely to be due to chance alone.

It is important to note that these results should be interpreted in the context of the study limitations. For example, the sample may not be representative of the broader population, that is beyond Nasarawa and other facilities where the researchers did not collect data. Additionally, the effect size of the observed difference should be considered, as statistical significance does not necessarily imply practical or clinical significance. Nonetheless, these findings provide preliminary evidence for a potential difference in AHD prevalence between adolescents and adults, highlighting the importance of targeted interventions for these populations.

5. Discussions

This section presents the discussion of the findings. We ascertained the prevalence of AHD among the adult and the adolescent population as well as examined the mean difference between the prevalences for both population samples. This section is organised based on the analysed

objectives for the study.

Objective 1: The first findings indicated a very high prevalence of AHD among the study population. The high prevalence of AHD among the adult population in this study is consistent with findings from previous studies conducted in similar settings. For instance, a study reported the prevalence of AHD in Western Africa, with up to 34% prevalence of the disease in Nigeria [2]. In addition, the study also corroborates the submission of Benzekri *et al.*, (2019) who reported up to 71% prevalences in Senegal. Elsewhere, Hu *et al.* (2019) reported a prevalence of 45.1%.

These findings suggest that the high prevalence of AHD among the adult population in this study may not be an isolated occurrence but may be reflective of a larger trend in similar settings. The finding that AHD is more prevalent among adults aged 30-39 years in this study is also supported by previous research [2, 6-7]. For example, a study conducted in South Africa reported that HIV-positive adults in their 30s were more likely to have a CD4 count below 200 cells/mm³ compared to those in their 40s or 50s [7, 9, 10]. Similarly, another study found that HIV-positive adults aged 35-49 years (similar to the 30-39 age group of this study) had the lowest mean CD4 count compared to other age groups [4]. These findings suggest that adults in their 30s and 40s are a high-risk group for AHD and may require targeted interventions to improve their access to HIV testing and treatment.

In conclusion, the findings from this study indicate a high prevalence of AHD among the adult population, particularly among adults aged 30-39 years. These findings are consistent with previous research conducted in similar settings. However, there are also studies that report different findings, suggesting that the relationship between age and AHD may vary across different settings and populations. Future research is needed to better understand the factors that contribute to the high prevalence of AHD among adults in this setting and to develop targeted interventions to improve access to HIV testing and treatment.

Objective 2: The second findings suggest that AHD is relatively high among the adolescent population of the sampled government-owned health care centres in Nasarawa State, Nigeria. This findings corroborates the report of Balanchandra *et al.* (2019) who documented a general prevalence among the total population averaging 17%, the point of variance is the the age specificity as the researchers reported that older age (above 49), compared to individuals aged 15-24 years, had 2.46 times higher odds for AHD, nevertheless, the disease was still prevalent among the population sample.

Furthermore, the also tandems the emphasis of Arije *et al.* (2023) that AHD is prevalent among female adolescents, however, due to the paucity of empirical data on the prevalence of AHD among adolescents by their age group, this study tend to be providing new empirical information on the prevalence of the disease among the population. Although, a global estimate according to the Joint United Nations Programme on HIV/AIDS (UNAIDS), young people aged 15-24 years accounted for 43% of all new HIV infections among adults in 2020 (UNAIDS, 2021). This underscores the

need for targeted interventions aimed at reducing the incidence of HIV/AIDS among adolescents.

These findings suggest that AHD is a concern among the adolescent population of the sampled government-owned health care centres in Nasarawa State, Nigeria. Therefore, since the prevalence of AHD among the entire study population is relatively high, targeted interventions aimed at reducing the incidence of HIV/AIDS among adolescents are necessary. Further research is needed to confirm the present findings and to identify the factors contributing to the high prevalence of AHD among adolescents in the study population.

Objective 3: The results of the last objective of this study suggest that there is a significant difference in mean AHD prevalence between adults and adolescents. These findings are consistent with previous studies that have reported a higher prevalence of AHD among adults compared to adults [1, 2, 5-7]. For instance, the study by Arije et al. (2023) corroborated these findings, as these authors reported a high prevalence of AHD among adults, similar to adolescents, however, a significant prevalent rate among adolescents.

However, there are also studies that did not find a significant difference in AHD prevalence between adolescents and adults. For instance, a study conducted by Chihana (2019) reported no significant difference in AHD prevalence between adolescents and adults. However, there is paucity of empirical data on the age group comparison among the study population in Nigeria. Despite the study limitations, these findings highlight the importance of targeted interventions for adolescents and adults in the prevention and management of AHD. The higher prevalence of AHD among both populations suggests the need for targeted interventions to increase HIV testing and treatment uptake among this population. Further research is needed to better understand the factors influencing AHD prevalence among these populations and to develop effective interventions to address them.

6. Conclusion

Based on the findings and discussions of the objectives, this study provides important insights into the prevalence of advanced HIV disease (AHD) among the adult and adolescent populations in Nasarawa State, Nigeria. The study found that AHD is highly prevalent among the adult population, with over 50% of the sample having a CD4 count of 200 or less. The results also showed that AHD is more prevalent among adults aged 30-39 years. Among the adolescent population, AHD prevalence was lower, with only 32% of the sample having a CD4 count of 200 or less, and this group constituted only 7.14% of the total study sample. The prevalence was also found to be higher among adolescents aged 17-19 years.

The study further revealed a significant difference in mean AHD prevalence between adults and adolescents, indicating that targeted interventions may be necessary for each population group. The study limitations, including the sample size and the potential for unaccounted-for factors influencing

the observed differences, should also be considered.

In conclusion, this study highlights the need for continued efforts to improve HIV prevention, testing, and treatment programs, particularly among the adult population in Nasarawa State. Additionally, targeted interventions are needed to address the relatively high prevalence of AHD among adolescents, particularly those in their late adolescence. These interventions may include increased education and awareness campaigns, improved access to HIV testing and treatment services, and community-based interventions aimed at reducing stigma and improving social support for those living with HIV/AIDS.

7. Implications for Practice

The findings of this study have significant implications for practice in the public health sector. Firstly, the high prevalence of AHD among the adult population of the study sample highlights the need for increased efforts towards HIV prevention and treatment in Nigeria. Specifically, interventions should be targeted at the age groups with the highest prevalence, namely individuals aged 20-49 years, in order to reduce the burden of AHD in this population. Secondly, the relatively high prevalence of AHD among the adolescent population of the six sampled health care centres underscores the need for targeted interventions to prevent the spread of HIV among this age group. Such interventions could include sex education, counselling and testing, and access to appropriate HIV treatment and care services.

Finally, the significant difference in mean AHD prevalence between adults and adolescents highlights the need for tailored interventions that take into account the unique needs and risk factors of each population group. For example, interventions targeted at adults could focus on increasing access to HIV testing and treatment services, while those targeted at adolescents could focus on promoting safe sexual behaviour and reducing stigma around HIV testing.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work the authors used OpenAi (ChatGPT) in order to improve the readability and ensure excellent research tone. After using this tool/service, the authors reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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