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Understanding Advanced Human Immunodeficiency Virus Disease (AHD) Risks Factors and Socio-economic Indicators Influencing It: A Case Study of Low-resource Health System

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Abstract: -

Background: Advanced Human Immunodeficiency Virus Disease (AHD) is an important public health issue, especially in resource-constrained settings like Western Nigeria. Understanding the socio-demographic and clinical factors influencing AHD is essential for developing targeted interventions to mitigate its impact.

Objective: To identify socio-demographic and clinical predictors of AHD in HIV-positive patients and explore their implications for disease management in a low-resource healthcare setting.

Methods: A cross-sectional study was conducted using archived clinical and laboratory data from the Public Health Laboratory, State of Osun Hospitals Management Board, Ede, Nigeria. Data included socio-demographics, clinical characteristics, CD4 counts, and viral loads of HIV-positive patients between February 2023 and March 2024. Descriptive statistics summarized key variables, and chi-squared tests analyzed associations between socio-demographic factors and AHD.

Results: The study included 110 participants, 55.5% of whom had AHD. Significant predictors of

AHD included age (p=0.007), duration of illness (p=0.002), transmission route (p=0.026), daily income (p<0.001), and educational status (p=0.001). Notably, lower income (<$1 daily) and lack of formal education were strongly associated with AHD prevalence. The predominant transmission route was heterosexual contact (68.2%), and long-term illness significantly increased AHD risk.

Conclusion: Socio-economic and clinical disparities play pivotal roles in the progression to AHD in Western Nigeria. Addressing these factors through comprehensive medical, educational, and socio-economic interventions is vital for improving health outcomes among people living with HIV. Further research should explore longitudinal trends and intervention efficacy.

Keywords: Advanced HIV Disease, socio-demographics, clinical predictors, low-resource settings, Western Nigeria.

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Introduction

The World Health Organization (WHO) estimates that by 2023, HIV/AIDS will have killed roughly 40.4 million people and infected approximately 39 million people worldwide [1]. Prevalence burden in the Africa Region was estimated to be 1.1 million in 2018 [2]. The African region accounts for two-thirds of HIV disease burden worldwide [3] with Sub-Saharan Africa being the most impacted by HIV. In 2018, this area was responsible for an estimated 61% of new HIV infections [4], and by 2020, Africa would be home to more than two-thirds of individuals living with HIV [5]. HIV rates in the region have declined between 2010 and 2020, new infections in Eastern and Southern Africa declined by 38% [6]. Still, South Africa has the world's largest HIV population, at 8.45 million, (13.9% of the population as of 2022). Nigeria, being one of Africa's most populous countries, has a daunting burden of HIV/AIDS in the globe, with 4.4% of people living with HIV/AIDS with the second highest of HIV/AIDS victims [7]. HIV/AIDS has a detrimental influence on Nigeria's economic growth and development due to its fast spread and growing prevalence, as well as on affected persons' savings and way of life. Furthermore, in Nigeria, PLHIV are discriminated against by their communities, creating stigma that has a detrimental influence on seeking medical treatment, resulting in a higher chance of acquiring Advanced HIV Disease [8,9,10] and diminished efficacy of antiretroviral medication (ART) generating not only a larger health burden for PLHIV, but also an increased financial cost on both patients and the government [10].

There are certain risk predictors that are associated with the progression of HIV/AIDS to an advanced stage known as Advanced HIV Disease (AHD) which are peculiar to western Nigeria and they include: HIV vertical transmission (men who have sex with men (MSM)), heterosexual contact, long-term HIV infections and injection drug users, with about one in three PLHIV developing AHD [8, 11, 12]. Approximately one-third of HIV patients begin therapy with advanced illness and significant immune suppression (CD4 < 200), putting them at high risk for opportunistic infections such as tuberculosis, Cryptococcal meningitis, Pneumocystis jirovecci pneumonia histoplasmosis etc. and mortality. However, relatively little emphasis has been given to the identification and care of persons with advanced HIV resulting in late diagnosis and sub-optimal treatments, high prices leading to limited access to treatment of opportunistic infections, and late diagnosis of advanced disease [13] . Various structural variables influence HIV acquisition and transition risk. Some research showed that criminalization of sex work, forced drug treatment, and homosexuality may diminish the likelihood of access to HIV care among critical populations [14, 15, 16].

Addressing these peculiar risk predictors associated with Advanced HIV Disease among patients in western region of Nigeria is of utmost importance. The burden of HIV/AIDS in Nigeria is not only a health issue but also a social and economic concern. The impact of the epidemic on individuals, families, communities, and the country as a whole is profound, affecting productivity, economic growth, and overall development.

This study aims to examine Advanced HIV Disease (AHD) risk predictors in order to develop targeted interventions and strategies for the prevention and control of HIV/AIDS in low resource health settings. Understanding the factors contributing to the progression of HIV infection to an advanced stage and implementing effective prevention and treatment measures, the burden of advanced HIV Disease can be reduced, and the overall impact of the epidemic on individuals and the society.

Methods

Study Design

This research employed a cross-sectional design to analyze recorded clinical and laboratory data at Public Health Laboratory, State of Osun Hospitals Management Board State Hospital, Ede. HIV seropositive patient data, CD4 count, and viral load was retrieved from the archive.

Data Collection

The study utilized medical records as primary source of data from 1st of February 2023, to 1st of March 2024, where clinical characteristics (closest CD4 count to study enrolment, presence of an AIDS defining illness, and patients on HAART (Highly Active Antiretroviral Therapy), number of HIV related symptoms, (including loss of appetite, night sweat, diarrhoea, dysphagia, new cough, dyspnoea, and some demographic and socioeconomic characteristics (gender, age, duration of illness, presence/absence of tuberculosis, transmission route (heterosexual, mother to child transmission, men to men transmission) daily income and education) were extracted to answer the research questions

Statistical Analysis

Descriptive statistics was used to summarize socio-demographic characteristics, prevalence of AHD and illness status. Chi-squared tests were employed to examine the association between the socio-demographic, illness status and AHD.

Ethical Consideration

This study utilized archived data from Public Health Laboratory, State of Osun Hospitals Management Board State Hospital, Ede. Since the data was anonymized and de-identified, no direct consent was obtained from the participants. However, the following ethical considerations were taken into account:

- The data was accessed and used in accordance with the archive's repository terms and conditions
- All personal identifiers were removed from the data to protect participants' privacy and maintain confidentiality.
- The study adhered to the principle of the declaration of Helsinki and the International Committee of Journal Editors (ICJME) guidelines for the archived data.
- The findings of this study were reported in a manner that respects the privacy and dignity of the participants.

Result

Table 1: Socio-demographic characteristics and illness status

Variable	**Frequency**	**Percentage**
Age group		
Infant	20	18.2
Elderly	90	81.8
Sex		
Male	52	47.3
Female	58	52.7
Duration of illness		
Long term	56	50.9
Recent	38	34.5
NA	16	14.5
TB		
Yes	24	21.8
No	83	75.5
NA	3	2.7
CrAg		
Yes	6	5.5
No	100	90.9
NA	4	3.6
Transmission route		
Heterosexual	75	68.2
MSM	14	12.7
McT	18	16.4
Others	3	2.7
Daily income		
<$1	52	47.3
1	25	22.7
2-5	22	20.0
>5	11	10.0
Education		
No formal education	44	40.0
Primary	2	1.8
Secondary	21	19.1
Tertiary	43	39.1

Table 1 shows that the majority of the participants are elderly (81.2%), more than half were female, about half (50.9%) had long term duration of the illness, majority of them were not down with TB nor CrAg (75.5% and 90.9%) respectively. Higher proportion of them are heterosexual (68.2%) and 47.3% of them earned <$1 daily.

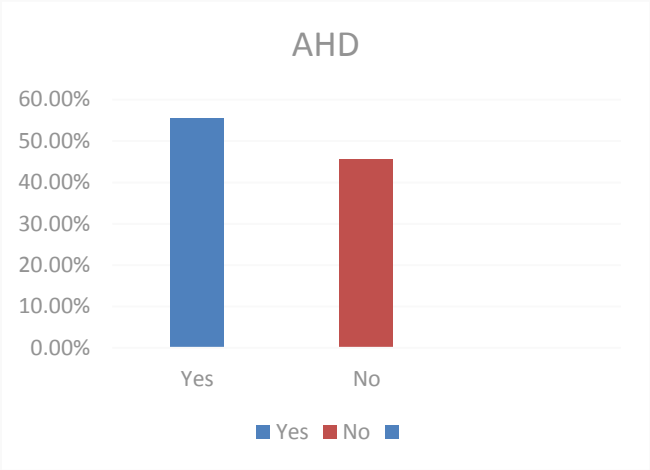

Fig.1: Prevalence of AHD

Fig. 1 above shows the prevalence of AHD among respondents. More than half (55.5%) of the respondents had advanced HIV disease while 45.5% did not progress to AHD.

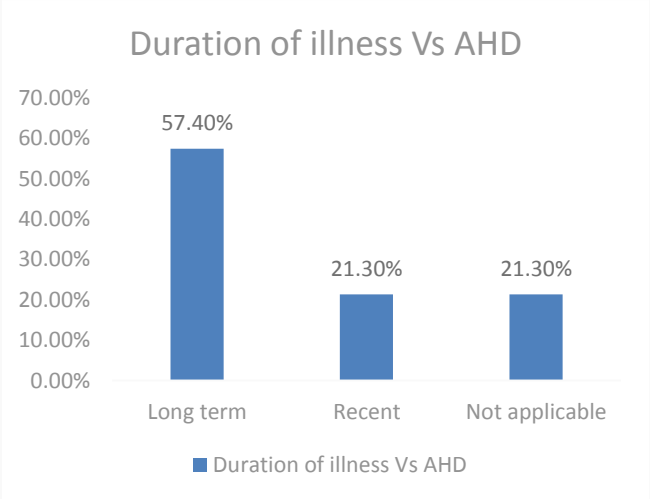

Fig. 2: Duration of illness vs Prevalence of AHD

Table 2: Association between sociodemographic, illness status and AHD

Variable	AHD		Statistics
	Yes	No	
Age group			
Children	17(85)	3(15)	X^2= 7.238
Elderly	44(48.9)	46(51.1)	P=0.007
Gender			
Male	28(53.8)	24(46.2)	X^2=0.103
Female	33(56.9)	25(43.1)	P=0.748
Duration of illness			
Long term	35(62.1)	21(37.5)	X^2=12.819
Recent	13(34.2)	25(65.8)	P=0.002
NA	13(81.2)	3(18.8)	
Transmission route			
Heterosexual	40(53.3)	35(46.7)	X^2=9.254
MSM	5(35.7)	9(64.3)	P=0.026
McT	15(83.3)	3(16.7)	
Others	1(33.3)	2(66.7)	
Daily income			
<$1	37(71.2)	15(28.8)	X^2=44.264
$1	2(8)	23(92)	P<0.001
$2-$5	11(50)	11(50)	
>$5	11(100)	0(0)	
Education			
No formal education	35(79.5)	9(20.5)	X^2=20.201
Primary	0(0)	2(100)	P=0.001
Secondary	9(42.9)	12(57.1)	
Tertiary	17(39.5)	26(60.5)	

Table 2 above shows the association between socio-demographic characteristics and AHD. There was statistically significant association between age group and AHD (X^2= 7.238, P=0.007), duration of illness (X^2= 12.819, P=0.002), Transmission route ((X^2= 9.254, P=0.026), daily income (X^2= 44.264, P<0.001), and educational status (X^2= 20.201, P=0.001)

Discussion

The data presented in Table 1 provides a comprehensive overview of the socio-demographic characteristics and illness status of the study participants, with percentages further elucidating the distribution within each variable. Among the participants, a significant majority (81.8%) belonged to the elderly age group, indicating the shifting demographics of HIV/AIDS towards older populations. Additionally, there was a slight majority of females (52.7%) compared to males, highlighting the gender distribution within the study cohort.

In terms of illness status, approximately half of the participants (50.9%) reported a long-term duration of illness, suggesting the chronic nature of HIV infection among the study population. Furthermore, a substantial proportion of participants were not diagnosed with tuberculosis (TB) or Cryptococcal Antigen (CrAg) infection, with percentages of 75.5% and 90.9%, respectively. This indicates variations in co-morbidity profiles among individuals living with HIV/AIDS.

Regarding transmission routes, heterosexual contact was the most common mode of HIV transmission, accounting for 68.2% of cases. This underscores the importance of targeted prevention efforts aimed at reducing the spread of HIV through heterosexual intercourse. Additionally, the data revealed diverse levels of daily income among participants, with 47.3% earning less than $1 per day. This highlights the socio-economic challenges faced by many individuals living with HIV/AIDS and the potential impact on access to healthcare and treatment adherence.

Moving on to Table 2, the analysis explores the association between socio-demographic characteristics, illness status, and the prevalence of Advanced HIV Disease (AHD) among participants. Significant associations were observed between various factors and the likelihood of developing AHD, as indicated by chi-square tests and corresponding p-values.

The age group showed a statistically significant association with AHD, with elderly individuals exhibiting a higher prevalence compared to children. This underscores the vulnerability of older individuals to disease progression and the importance of targeted interventions for this demographic group. Similarly, the duration of illness was significantly associated with AHD, with individuals experiencing long-term illness showing a higher prevalence compared to those with recent illness.

Furthermore, the transmission route demonstrated a significant association with AHD, with individuals infected through Men who have Sex with Men (MSM) exhibiting a lower prevalence compared to heterosexual individuals. This highlights the need for tailored prevention strategies addressing the specific risk profiles of different population groups.

Socio-economic factors such as daily income and educational status also showed significant associations with AHD. Individuals with lower income levels and educational attainment exhibited a higher prevalence of AHD, emphasizing the role of socio-economic disparities in influencing health outcomes among individuals living with HIV/AIDS.

In summary, the findings presented in this study provide valuable insights into the socio-demographic determinants of AHD among individuals living with HIV/AIDS. These findings have important implications for the design and implementation of targeted interventions aimed at reducing health disparities and improving outcomes among affected populations.

Conclusion

The HIV/AIDS epidemic poses a significant global health challenge, particularly in Sub-Saharan Africa, where its impact on communities, families, and individuals is disproportionate. The World Health Organization (WHO) underscores the alarming burden of HIV/AIDS, highlighting its profound implications for public health, social dynamics, and economic development.

This study focuses on Western Nigeria, revealing risk predictors associated with Advanced HIV Disease (AHD) within marginalized communities. Meticulous analysis identifies socio-demographic factors such as age, duration of illness, transmission route, daily income, and educational status as closely intertwined with AHD prevalence. Tailored interventions addressing these diverse risk factors are emphasized.

Addressing Advanced HIV Disease requires a comprehensive approach integrating medical, social, and economic strategies. Insights from studies like Olawepo et al. and Atuhaire et al. underscore the urgency for targeted interventions, supported by WHO's call for comprehensive strategies [17,18]. Ndembi et al. reinforced the importance of understanding socio-demographic factors and transmission routes, echoed by UNAIDS' emphasis on holistic interventions[19].

However, this study has limitations. Its scope is confined to a specific region, limiting its generalization to a national or global scale. Additionally, the cross-sectional design hinders establishing causal relationships between variables, necessitating further longitudinal research. Limitations include regional specificity, cross-sectional design, and sampling bias. These highlight the need for diverse methodologies, such as longitudinal studies and representative samples, to enhance understanding of AHD risk predictors and develop effective interventions.

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