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Evaluating the Prevalence of Non-Communicable Diseases Among HIV Positive Individuals in Chingola District, Zambia

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Abstract

The study was aimed at evaluating the prevalence of non-communicable diseases among HIV positive individuals in Chingola District, Zambia. The widespread success of antiretroviral therapy (ART) has caused HIV to change from an acute to a chronic illness. Although the life expectancy of people living with HIV (PLHIV) has increased dramatically as a result of this advancement, new health issues have also emerged, most notably the increased prevalence of non-communicable diseases (NCDs) in this population. HIV-positive people are increasingly being diagnosed with noncommunicable diseases (NCDs), including diabetes, hypertension, cardiovascular disease, and chronic respiratory conditions. The study was carried out in Zambia's Copperbelt Province's Chingola District. Purposively, five of the district's largest antiretroviral therapy (ART) clinics were chosen based on patient volume and accessibility. Between January and May of 2025, a descriptive cross-sectional study was carried out involving 500 participants. The results show that most prevalent non-communicable disease among the 500 HIV-positive people was hypertension, which affected 268 participants i.e. 53.58% of the sample. The analysis identified predictors of non-communicable diseases (NCDs) include age which had the odds of having an NCD increased by 5% for every year, indicating that age was a significant factor (OR = 1.05, 95% CI: 1.03–1.08, $p < 0.001$). The study concludes that there is a significant burden of non-communicable diseases (NCDs) among people living with HIV (PLHIV) in the district.

Keywords: *Antiretroviral Therapy (ART), HIV Positive Individuals, Non-Communicable Diseases, Prevalence.*

Introduction

Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) remain a major public health concern that disproportionately affects sub-Saharan Africa (SSA). Of the 36.9 million people living with HIV worldwide, it is estimated that nearly 70% live in sub-Saharan Africa [1]. Eastern Africa is the second most affected region in Africa after southern Africa, which together are estimated to have over 17.7 million people living with HIV. In Zambia, the prevalence of HIV is estimated to be 11% [2].

In the early 80s and 90s, HIV/ AIDS was a mysterious, feared, untreatable, and often fatal condition. However, the advent of antiretroviral therapy (ART) has changed the course of the disease, giving patients and scientists new hope for fighting it and living longer [3].

Conversely, the ageing cohort of people living with HIV (PLHIV) raises concern about the coexistence of HIV with other chronic illnesses, notably the non-communicable diseases (NCDs). According to UNAIDS [4], it is estimated that NCDs are the cause of death of 38 million people each year, and three-quarters

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of these occur in low- and middle-income countries (LMICs), which are already burdened by HIV.

Furthermore, individuals living with HIV have been identified as having an increased risk of developing non-communicable diseases [5]. This outcome stems from the HIV infection, antiretroviral therapy, immunosuppression related to HIV, the advancing age of people living with HIV, HIV-related inflammation, along with conventional risk factors for non-communicable diseases, including tobacco smoking, alcohol consumption, lack of physical activity, poor dietary habits, and shifts in demographics and epidemiology [6].

The way medical professionals treat HIV patients has drastically changed since the introduction of antiretroviral treatment (ART) in the mid-1990s. Shah's study [7] examined the transformation of HIV from a fatal acute illness to a manageable chronic condition. Antiretroviral therapy's increased life expectancy created new challenges for HIV patients' long-term care. The healthcare difficulty that arises as a result of patients living longer due to higher survival rates among HIV-positive persons was detailed by Triant [8].

The application of recent epidemiological data provides consistent evidence showing NCDs are more prevalent among people living with HIV. The study of Mudenda, Mukosha, and Fwoloshi [9] shows that individuals with HIV disease have a 1.5 to 2 times greater probability of developing various NCDs compared to the normal population groups. The escalated NCD prevalence pattern is observed throughout all geographical areas and demographic segments, implying that biological elements precede conventional risk factors.

The widespread success of antiretroviral therapy (ART) has caused HIV to change from an acute to a chronic illness. Although the life expectancy of people living with HIV (PLHIV) has increased dramatically as a result of this advancement, new health issues have also emerged, most notably the increased prevalence of non-communicable diseases (NCDs) in this population. HIV-positive people are increasingly being diagnosed with noncommunicable diseases (NCDs), including diabetes, hypertension, cardiovascular disease, and chronic respiratory conditions [5, 10]. Although ART coverage has increased in Zambia, there is still insufficient integration of NCD services into HIV care [12].

To enhance the management of chronic diseases among people living with HIV, some nations have started incorporating NCD screening into ART programs, implementing task-shifting techniques, and utilising mobile health technologies. Integration is possible and can lead to better patient outcomes, according to pilot projects in Kenya, South Africa, and Uganda [6]. Despite Zambia's efforts to promote integrated care through policy reforms, implementation remains uneven, particularly at the district level [9].

The most effective and patient-centered strategy is integrated service delivery, in which ART clinics incorporate NCD screening, diagnosis, and management [11]. This model enhances adherence and retention, lowers travel expenses, and lessens stigma.

Despite evidence from around the world that integrated care is beneficial, Zambia still faces obstacles such as a lack of funding, a shortage of skilled workers, fragmented medical records, and ineffective monitoring systems [13]. Furthermore, local adaptation and prioritisation are hampered by a lack of district-level data.

Zambia has made significant strides towards reaching the 95-95-95 goals for HIV, reaching 91-98-96 in 2021, and has achieved significant ART coverage, with 1.2 million people receiving antiretroviral therapy in 2021 [4]. To encourage NCD screening in HIV clinics, national guidelines have been updated. However, inadequate data collection and underreporting of comorbidities limit district-specific accomplishments [14].

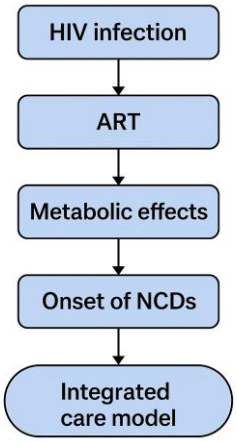

Figure 1. Schematic Diagram

As shown in Figure 1, the flow diagram shows the interaction between HIV infection, ART, metabolic effects, and the onset of NCDs, leading to an integrated care model. The graphic highlights the necessity of an integrated care model by showing the progression from HIV infection to the emergence of non-communicable diseases (NCDs). It starts with HIV infection, which is treated with antiretroviral therapy (ART). ART is frequently linked to metabolic side effects like insulin resistance, dyslipidaemia, and fat redistribution, even though it successfully suppresses the virus and extends life. Particularly as people age and continue long-term ART, these metabolic alterations may contribute to the development of noncommunicable diseases (NCDs), such as obesity, cardiovascular disease, type II diabetes, and hypertension. The diagram ends by promoting an integrated care model that incorporates HIV treatment with NCD prevention, screening, and management in order to address this dual burden [15].

The purpose of this study is to assess the pattern and prevalence of non-communicable diseases among people living with HIV in Zambia's Chingola District. Additionally, it identifies clinical and demographic factors that predict NCDs in this population and proposes methods for integrating NCD management into HIV care services. The specific objectives are:

1. To determine the prevalence of selected NCDs among HIV-positive individuals in Chingola District.
2. To identify demographic and clinical factors associated with NCD comorbidity.
3. To provide recommendations for integrated HIV/NCD healthcare services.

To the best of our knowledge, this is the first district-level study to measure the prevalence of NCDs among people living with HIV in Chingola District. In contrast to previous national evaluations, this study uses a descriptive cross-sectional survey.

Materials and Methods

Description of the Site

The study was carried out in Zambia's Copperbelt Province's Chingola District, which is known for its industrial mining activity and high HIV prevalence. Five of the district's largest antiretroviral therapy (ART) clinics were purposively selected based on patient volume and accessibility. Both urban and peri-urban populations are served by these clinics.

Description of the Experiments Done

Between January and May of 2025, a descriptive cross-sectional study was carried out. Five hundred (500) HIV-positive people who were at least eighteen years old were enrolled. To ensure representativeness, stratified random sampling was used to select participants, with strata defined by clinic size

and geographic location. Three primary methods were used to collect the data: structured interviews, physical examinations, and reviews of medical records. Demographic information, ART history, lifestyle choices (such as drinking and smoking), and self-reported health status were all recorded during the interviews. To determine BMI, physical examinations included measurements of height, weight, and blood pressure. Documented diagnoses of diabetes, hypertension, cardiovascular disorders, and chronic respiratory conditions were examined in medical records.

Description of the Laboratory Methods

Although the majority of the clinical diagnoses used in this study were already in place, standard laboratory procedures used in clinics helped to verify certain non-communicable diseases. In situations where recent lab data were unavailable, blood glucose levels were measured using glucometers to confirm diabetes. Calibrated sphygmomanometers were used to measure blood pressure. Based on diagnoses made by clinical officers and doctors using standardised diagnostic procedures, other chronic conditions like cardiovascular disease and chronic respiratory illness were found in patient files.

Description of Statistical Methods Used

SPSS version 26 was used to enter and analyse the data. To summarise participant characteristics and disease prevalence, descriptive statistics such as means, standard deviations, frequencies, and proportions were computed. To evaluate relationships between categorical variables, chi-square tests were employed. The predictors of having at least one NCD were identified using binary logistic regression models. A p-value of less than 0.05 was considered statistically significant. To make sure the multivariate analyses were robust, model fit and collinearity diagnostics were carried out.

Results

SPSS version 26 was used to analyse the data. Baseline characteristics were summarised using descriptive statistics, such as means, standard deviations, frequencies, and proportions. Factors linked to the prevalence of NCDs were found using logistic regression models and chi-square tests.

Participant Characteristics

The mean age of participants was 43.7 years (SD = 11.2). Females constituted 61.2% of the sample.

Table 1. Socio-Demographic Characteristics of Participants (n = 500)

Characteristic	Frequency (%)
Age (mean = 43.7)	
18–29	60 (12.0%)
30–44	220 (44.0%)
45–59	170 (34.0%)
60+	50 (10.0%)
Gender	
Male	194 (38.8%)
Female	306 (61.2%)
ART years	40 (8%)
< 1 year	100 (20%)
1-3 years	150 (30%)
4-6 years	110 (22%)

7-9 years	100 (20%)
≥ 10 years	40 (8%)

Table 1 shows the Socio-demographic Characteristics of the 500 Participants. Important information about the study population can be gleaned from the respondents' demographics. As indicated in Table 1, the group had an average age of 43.7 years and was primarily middle-aged. When participants were broken down by age, the largest percentage (44.0%) belonged to the 30–44 age group, followed by the 45–59 age group (34.0%). 12.0% of participants were younger (aged 18 to 29), and 10.0% were older (aged 60 and over). According to this distribution, the majority of respondents were middle-aged and economically active, which may affect the burden of disease and the need for health services, particularly for non-communicable diseases.

Regarding the distribution of respondents by gender, women made up the majority (61.2%), followed by men (38.8%). Given that women may be more likely than men to seek medical attention or take part in community-based research, this gender disparity may be a reflection of trends in healthcare-seeking behaviour. Given the biological and social disparities in disease exposure and response between men and women, these disparities may also affect how results are interpreted, particularly those related to health outcomes.

The distribution of years on antiretroviral therapy (ART) among the 500 respondents reveals a range of treatment durations. A sizable portion of people were in the mid-phase of long-term HIV management, as the largest percentage (30.0%) had been on ART for four to six years. Next in line were 20.0% who had been on treatment for one to three years and 22.0% who had been on ART for seven to nine years. Furthermore, 20.0% of respondents said they had been on ART for ten years or longer, indicating a sizable population of long-term survivors. Only 8.0% had started treatment in the previous 12 months. According to this distribution, the majority of respondents had a significant amount of ART experience, which could have an impact on treatment results, adverse effects, and the development of non-communicable diseases as a result of extended drug exposure.

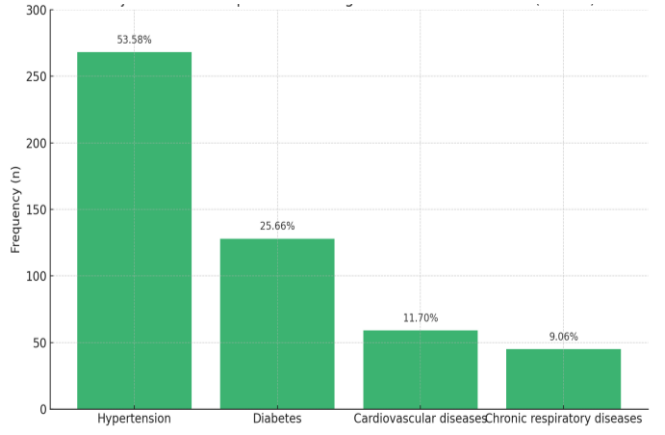

Figure 2. Prevalence of NCDs Among Participants

Source: Field data (2025)

The Prevalence of NCDs Among Participants are shown in Figure 2. The most prevalent non-communicable disease among the 500 HIV-positive people in Chingola District was hypertension, which affected 268 participants, i.e., 53.58% of the sample. With 128 cases, or 25.66% of the total, diabetes was the second most common condition. Also, 59

respondents, or 11.70% of the total, had cardiovascular diseases, and 45, or 9.06%, had chronic respiratory diseases. With over half having hypertension and almost one in four having diabetes, these statistics demonstrate the significant burden of NCDs among HIV-positive individuals. The results highlight how crucial it is to incorporate regular NCD screening and management into HIV care services to address this dual disease burden successfully.

Table 2. Logistic Regression Analysis of Factors Associated with NCDs

Variable	Odds Ratio	95% CI	p-value
Age (per year)	1.05	1.03 – 1.08	<0.001
BMI > 25	1.65	1.20 – 2.26	0.002
Smoking	2.10	1.40 – 3.15	<0.001

The Logistic Regression Analysis of Factors Associated with NCDs is illustrated in table 2. Among people with HIV, the analysis identified several important predictors of non-communicable diseases (NCDs). The odds of having an NCD increased by 5% for every year of age, indicating that age was a significant factor (OR = 1.05, 95% CI: 1.03–1.08, $p < 0.001$). Individuals with a BMI above 25 were 65% more likely to have an NCD than those with a normal BMI (OR = 1.65, 95% CI: 1.20–2.26, $p = 0.002$). The most significant risk factor was smoking; smokers had a greater than twofold increased risk of developing an NCD compared to non-smokers (OR = 2.10, 95% CI: 1.40–3.15, $p < 0.001$). These findings highlight how lifestyle choices and ageing all contribute to the development of chronic illnesses in HIV-positive populations.

Associated Factors

Older age, longer duration on ART, higher BMI, and smoking were significantly associated with higher odds of having at least one NCD ($p < 0.05$). No significant difference was found based on sex.

Discussion

The participants' demographic profile offers crucial background information for comprehending the prevalence of non-communicable diseases (NCDs) among Chingola District's HIV-positive population. The respondents' average age was 43.7 years (SD = 11.2), indicating that middle-aged individuals comprised the majority of the study population. In low- and middle-income nations, where health systems are frequently ill-prepared to handle the combined burden of communicable and non-communicable diseases, this age group is generally more susceptible to chronic conditions like hypertension, diabetes, and cardiovascular disease [7, 9, 18].

The age distribution further emphasises that most participants were in their most economically productive years, with 44.0% in the 30-44 age group and 34.0% in the 45-59 age group. This has implications for household productivity, national economic development, and individual health outcomes.

With 61.2% of respondents being female, the sample was primarily female. Given that women are more likely to use healthcare services and participate in health-related research, this gender gap may reflect long-standing trends in healthcare-seeking behaviour [13, 18]. Moreover, the development and experience of HIV and NCDs may be influenced by the biological and social distinctions between men and women. For instance, antiretroviral therapy (ART)-related metabolic problems are more common in women with HIV, potentially making them more vulnerable to diseases like diabetes and hypertension [4, 17].

The 500 respondents' years on ART showed a broad range of treatment durations, suggesting that the cohort's treatment history was varied. With 30.0% of respondents having been on ART for four to six years and 22.0% for seven to nine years, the majority had significant ART experience. Furthermore, 20.0% had been on ART for more than ten years, indicating that the number of long-term survivors is increasing. Merely 8.0% had been on antiretroviral therapy for less than a year. These results are consistent with national trends in Zambia, where the life expectancy of individuals living with HIV has increased due to the scale-up of ART [12]. Long-term ART use, however, is known to raise the risk of NCDs over time by contributing to metabolic issues like insulin resistance and dyslipidaemia [16].

In this study, the prevalence of NCDs among people with HIV was noticeably high. With 268 cases, or 53.58% of the sample, hypertension was the most frequently reported condition. Cardiovascular diseases and chronic respiratory conditions were reported at 11.70% and 9.06%, respectively, with diabetes coming in second at 25.66%. These rates align with regional studies showing that ageing, lifestyle factors, and metabolic side effects linked to ART are contributing to an increasing burden of noncommunicable diseases (NCDs) among individuals living with HIV in sub-Saharan Africa [18, 19]. There is an urgent need for integrated HIV–NCD care models that offer routine screening, lifestyle counselling, and appropriate medication management, especially given the high prevalence of diabetes and hypertension.

Several important predictors of NCDs in the study population were identified by regression analysis of the data. The odds of having an NCD increased with age, increasing by 5% for every year of age (OR = 1.05, 95% CI: 1.03–1.08, $p < 0.001$). This confirms results from other studies that older HIV-positive people are more likely to develop chronic illnesses [20]. Body mass index (BMI) was another important predictor; those with a BMI over 25 had a 65% increased risk of getting an NCD (OR = 1.65, 95% CI: 1.20–2.26, $p = 0.002$), indicating the part that overweight and obesity play in the aetiology of conditions like diabetes and hypertension.

Smoking was the most powerful risk factor found; smokers had over twice the chance of getting an NCD as opposed to non-smokers (OR = 2.10, 95% CI: 1.40–3.15, $p < 0.001$). This is in line with research from around the world that shows tobacco use is linked to a variety of health problems, especially in people with weakened immune systems [21-23].

Conclusion

The study concludes that the district's people living with HIV (PLHIV) bear a hefty burden of non-communicable diseases (NCDs). The results show that the most common NCDs are diabetes and hypertension, which affect more than half and 25% of the respondents with HIV, respectively. This high prevalence emphasises how difficult it is becoming to manage HIV and co-occurring chronic conditions, particularly in settings with limited resources.

According to demographic data, most respondents were female, middle-aged, and had significant experience with long-term antiretroviral therapy (ART). These variables were found to be significant predictors of the occurrence of NCDs, especially when paired with lifestyle risks like smoking and having an elevated body mass index (BMI). The impact of ageing on HIV-positive populations was highlighted by the strong correlation found between age and an increased risk of developing an NCD.

The study also concludes that urgent health system reforms are necessary to support integrated care models given the co-occurrence of HIV and NCDs. HIV services should include routine NCD screening and management to promote early detection, lower complications, and enhance PLHIV's general health outcomes.

The growing prevalence of NCDs could undo Zambia's progress in HIV care and treatment if intentional policy changes are not made. As a result, this study backs the necessity of improved health infrastructure, community education, and the use of patient-centered, holistic approaches to managing chronic illnesses.

Conflict of Interest

None declared.

Acknowledgements

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Ethical Approval

Permission to carry out the study was obtained from Chingola District Health Office. Before the study, all respondents were clearly informed of the nature and purpose of the study. In addition, participants were clearly informed about their roles, the data being collected, and the usage of this information. Further, the study stressed out voluntary participation, allowing individuals the freedom to join or withdraw from the research at any time.

Data Availability

The datasets that were produced and/or examined in the course of this study can be obtained from the corresponding author upon a reasonable request.

Author Contributions

The author made most of contribution to the development, conceptualization, analysis, and composition of this paper. A research assistant was engaged in data cleaning and proofreading.

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