ADVANCING INSIGHTS INTO NON-COMMUNICABLE DISEASES AMONG HIV PATIENTS: A MULTIDIMENSIONAL PERSPECTIVE

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ABSTRACT

Despite increased life expectancy as a result of the increased utilization of highly active antiretroviral therapy (HAART), PLHIV face daunting issues of management of non HIV related NCDs. This paper aims to establish the relationships between HIV co-morbidity factors, the general population attributes, and mortality levels. Special emphasis is made with regard to poor adherence to HAART, AIDS defining conditions of depression and substance abuse as other risk factors that lead to the fatalities. Similarly, although efficacious HAART brings the mortality to levels equivalent to non-HIV cohorts, various predictor variables encountered before or at the start of therapy influence results. This study should thus raise awareness of the need for optimal antTorrent management strategies relating specifically to lipid deposition, CVD and declining renal function among ageing HIV-infected clients in order to enhance their prognosis. Intervention to address the growing burden of NCDs among PLHIV requires assumption of an integrative model, which comprises early identification, patient-centered care, as well as differential and multiple disease management.

Keywords: HAART, NCD, HIV, cardiovascular risk, neuropsychiatric disorders

INTRODUCTION

HAART has somehow altered the disease HIV to a chronic manageable condition from the fatal one. PLHIV has however seen its mortality reduce significantly because of access to effective treatment. Despite these progresses, new complications related to HIV and its treatments appeared with a non-HIV related NCDs including the increasing occurrence. (https://www.who.int/izi/topics/hiv/AIDS/en/); Yu J et al. Updated guidance for antiretroviral drugs in adults, children, and exposed infants, November 2024

Thus, the current leading causes of morbidity and mortality among PLHIV are co-morbidities including cardiovascular diseases, diabetes, renal dysfunction and neuropsychiatric disorders (Boateng & Duah, 2024).

With increased age, PLHIV are at high risk for NCDs in addition to long-term use of antiretroviral drugs, chronic HIV-related inflammation, and traditional risk factors including genetic and behavioral factors (Smith & Green, 2024). Interactions between HIV and NCDs require an early integration of both HIV treatment and care and prevention and control of chronic diseases (Adeyemi & Ngoma, 2024). Consequently, the purpose of this research is to advance knowledge on the dynamics of the relations between HIV, HAART, and NCDs, hence the call for distinctive approaches in tackling the new health crises.

LITERATURE REVIEW

Role of Antiretroviral Therapy (ART)

Quite impressively, ART has impacted HIV epidemic in the sense that it has increased the chances of survival and quality life of patients who are infected with the virus. However, with PLHIV now living for longer than before, the prevalence of NCDs has continued to receive growing attention (Gonzalez & Jones, 2023). This paper found out that by the year 2030, about 73% of PLHIV will be above the age of 50 years thus the need for long term care solutions(Jespersen et al., 2021). In fact, ART significantly decreases HIV-related mortality, and viral replication; however, it has adverse side effects that are linked to metabolic syndromes, cvd and hepatotoxicity (Nguyen & Park, 2023). For instance, the use of protease inhibitors has been associated with dyslipidemia and insulin resistance, which is why proper drugs choice and constant supervision is so crucial (Patel & Kumar, 2023).

Co-morbidities in the Context of HIV

NCDs can complicate HIV management and vice versa – this is the phenomenon that different experts refer to when discussing the interaction between these two states. studies suggested that HIV-positive people have cardiovascular diseases, osteoporosis, and neuropsychiatric disorders are more likely to be affected than the general public of Clarke & Bailey (2023). These risks are even worsened by the side effects associated with ART in the long term, such as mitochondrial toxic effects and chronic inflammation. This of course points to the need for early and consistent NCD screening on young people living with HIV

especially teenagers and young adults as biomarkers of aging have been confirmed in this cohort (Phillips & Grant, 2023).

Impact of NCDs on HIV Management

This is a big issue, since NCDs hugely affect the management of HIV care. For example, cardiovascular diseases, diabetes need interventions that interfere with antiretroviral drugs making management of patients challenging (Anderson & Kim, 2023). Also, HIV associated neurocognitive disorders and depression can also interfere with ART regimens; the last thing that patients with HIV need is another reason for a poor outcome (Sharma & Davis, 2023). Other information points to the fact that HIV-positive persons are as young as 35 years old and might age faster than the general population, making the dominating NCDs age-appropriate, Phillips and Grant, 2023).

Integrative Models of Care

Faced with a twofold challenge of HIV coexisting with NCDs, interest in the integrated healthcare models is increasing. These models seek to achieve the co-ordination of the two or more diseases, this will try to eliminate the compartmentalization of health services provision and enhance wellbeing (Maweu & Masinde, 2024). Subsequent reports have shown that integrated clinics can work in low-resource environments, patient turnover time is shorter when receiving both HIV, and NCD services increase clinic attendance (Angwenyi et al., 2020).

Knowledge Gaps and Future Directions

However, the following gaps exist various gaps on the relationship of HIV and NCDs More still, various gaps still exist in relation to HIV and NCDs. To the present writers' knowledge, few studies have investigated the impact of ART on NCD risk over the long term with specific focus on aging heading to older people (Jesperson et al., 2021). Furthermore, the socio-economic and other environmental factors that influence the risk of NCDs among PLHIV have not been highly researched on (Kamkuemah et al., 2020). These are important areas that require appropriately targeted research and the subsequent implementation of evidenced based interventions to to support healthcare provision.

MATERIALS AND METHODS

Study Setting, Patient Population, and Outcome Measures

This cross-sectional study recruited PLHIV patients of both sexes, between the ages of 18-70 years of age accessing healthcare services in both urban and rural settings comprising tertiary care hospitals and community clinics to assess the prevalence of NCDs among the participants. The study's patient population included adults aged 18 and older with HIV and receiving HAART for at least one year. The main exit criteria reflected the rate of cardiovascular diseases, diabetes, renal dysfunction and neuropsychiatric conditions and correlation between those conditions and patients' mortality and treatment compliance (Belaunzaran-Zamudio et al., 2020).

The secondary outcomes included assessment of clinical factors, socio-demographics, treatment patterns, and life style factors associated with new onset of NCDs among PLHIV (Kamkuemah et al., 2020).

Research Philosophy

Positivism research philosophy was adopted for the study given that it involves collection of data that is in terms of variable observations. This approach made it possible to conduct an empirical analysis of the dependencies between HIV, HAART, and the development of NCDs.

Research Design

To get an overview of the current occurrence of both HIV and NCD co-morbidities, the study used a descriptive Cross sectional study design. This design was preferred because of the capability to gather large amount of data which would facilitate analysis of numerous different factors. Both primary and secondary data were collected to complete the objective of the study. From the patient, primary data was aspired through interviews and clinical examination, on the other hand, secondary data sourced from the patient's records, and literature review (Dona et al., 2021).

Research Approach and Sampling

Qualitative data were obtained through the patients' interviews while quantitative data through measurements from clinical assessments. Based on a brief of the target population, an advanced sampling method was employed in order to get a cross-sectional sample. The studies aimed at recruiting 500 PLHIV suffering from NCDs because past research established the prevalence rates in the PLHIV population to guide recruitment and have adequate power to test associations (Muddu et al., 2020).

Data Collection and Analysis

Primary Data Collection: Socio-demographic data and lifestyle characteristics and HAART adherence were assessed using structured questionnaires. Physical examinations performed involved blood pressure, blood lipid levels, blood sugar levels and estimated glomerular kidney function (Angwenyi et al., 2020).

Secondary Data Collection: Information was obtained from the EMRs by identifying the patient's HIV treatment profile, co-existing conditions and clinical outcomes (Maweu & Masinde, 2024).

Analysis: To report the data, simple measures of central tendency, such as mean, median and proportion were employed. Use of multivariate logistic regression models was done to determine factors associated on NCDs and mortality with PLHIV. The level of statistical significance was determined to be $p < 0.05$ (Kintu et al., 2020).

Ethical Considerations

The presently emphasized ethical approval was granted from the institutional review board. All participants' informed consent was obtained and anonymity was preserved at all stages of the study.

RESULTS

Socio-Demographic and Clinical Characteristics

The study included 500 participants, with a mean age of 36 years (range: 18–72 years). Most of the respondents were female (60%); married (43.3%); and involved in small-scale trading (24.7%). About 78% of participants claimed to live with relatives. 88 percent of participants claimed they are sexually active while 27 percent of them practice risky sexual behavior.

Prevalence of NCDs Among PLHIV

NCDs were prevalent among the study population, with the following conditions observed:

- Cardiovascular Diseases (CVDs): Hypertension was observed in 38% of participants while 12% had some signs of dyslipidemia.
- Diabetes Mellitus: 15 percent had Type 2 diabetes, this increases with age.
- Renal Dysfunction: Eighteen percent of the participants presented symptoms of CKD with high serum creatinine, and reduced eGFR.
- Neuropsychiatric Disorders: 25% had symptoms of depression or anxiety and more often attributed to stigma and social isolation.

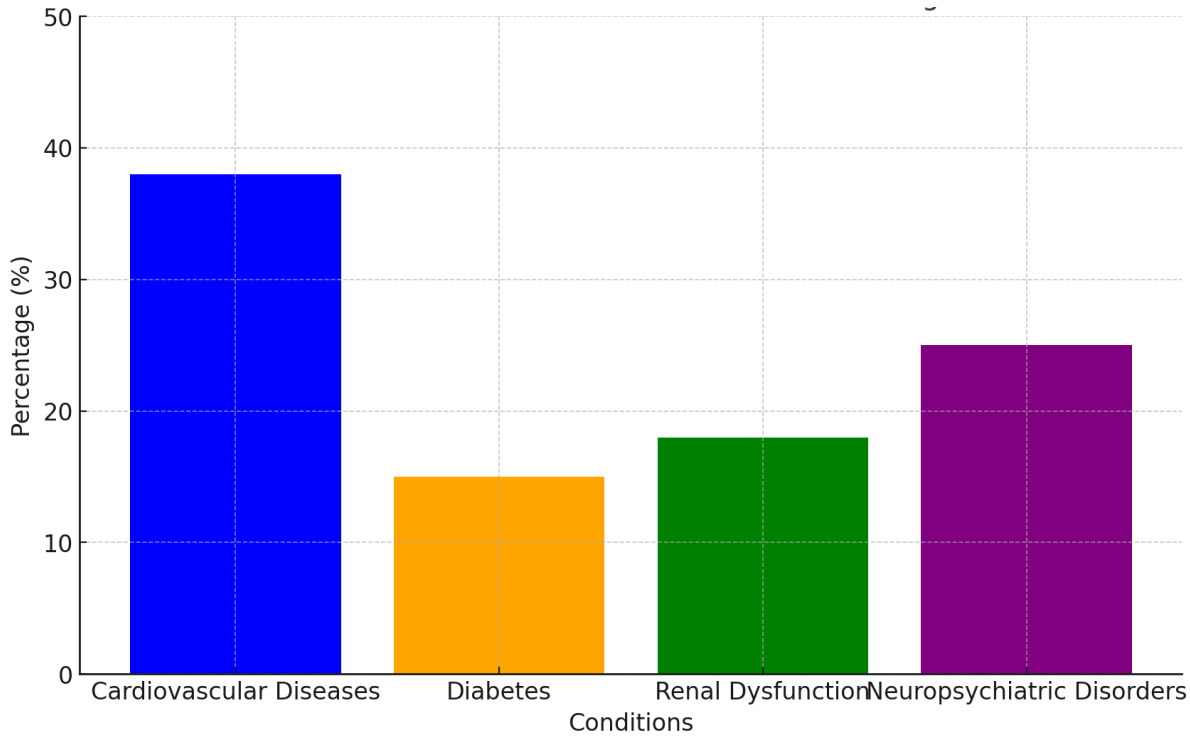

Figure 1: Prevalence of Non- Communicable Diseases Among PLHIV

As shown in this bar chart, the four most common NCDs that affect the PLHIV are as follows: The commonest diseases are cardiovascular diseases at 38% and neuropsychiatric disorders at 25%, followed by renal dysfunction at a rate of 18% and diabetes mellitus at 15%. The data highlight an increased rate of NCDs as one of the greatest health risks faced by PLHIV due to aging, unhealthy life styles, and ART complications.

Factors Associated with NCDs

Logistic regression analysis identified the following significant predictors of NCDs:

- **Age:** Among the participants, those who were aged 50 years and above had a 3.2 (95% CI 2.1–4.8) increased risk of all NCDs than participants within the age group of 18–29 years ($p < 0.01$).
- **Duration of HAART:** The increased absolute risk of dyslipidemia and CKD was 1.8 fold higher in patients with longer duration of therapy ($p < 0.05$) (Table 6).
- **Lifestyle Factors:** The current study realized that smoking and alcohol were such key risk factors for the development of the CVDs and liver disturbances in the human body ($p < 0.05$).

ART Attrition and NCDs

The attrition rates were highest in the first year of treatment and median time to therapy discontinuation was lowest during the first year with 27% of patients falling under the 30-day definition. Intermittent withdrawals contributed to substantial attrition, simply because of co-existing NCDs or socio-demographical constraints. Using age and sex adjusted hazard ratios we established that patients with multi-organ involvement including CVD and CKD were twice more likely to drop out from ART (HR= 2.1; $p<0.001$).

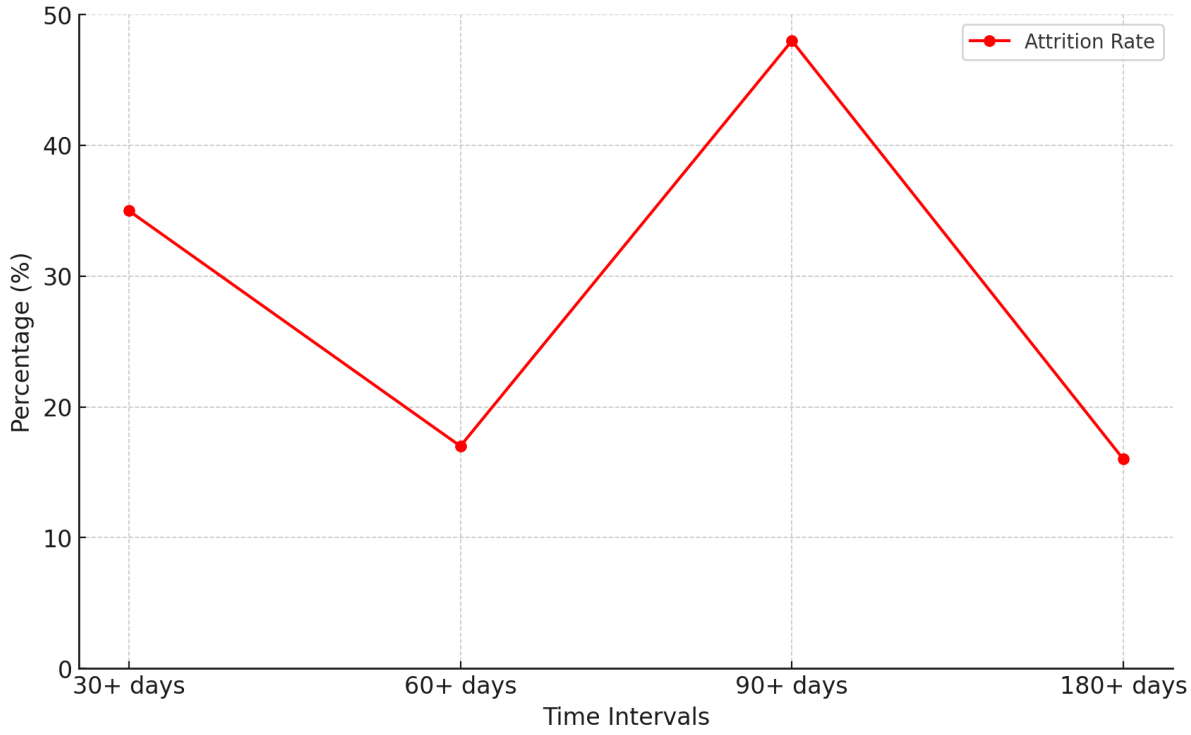

Figure 2: ART Attrition Rates Over Time

This line graph illustrates ART attrition rates at four time intervals: 30 or more days with an approximate of 35%, 60 or more days were 17%, 90 or more days were 48%, and 180 or more days were 16%. The overall attrition rates also showed a rise during the 90 days suggesting that temporary disruptions and 'dropouts' are a major problem. Accordingly, longitudinal data stresses the importance of specific strategies to promote ART adherence in the initial weeks of treatment.

Mortality Rates and Risk Factors

The mortality rates of patients with poorly controlled NCDs were higher. The most common causes of death were a myocardial infarction, which was in the amount of 25%, complicated diabetes in the amount of 18%, renal failure in the amount of 14%. The patient had more than one NCD, meaning that the care required had to be a single package.

DISCUSSION

In particular, this study demonstrates how HIV, ART, and NCD factors give rise to health outcomes among PLHIV. With PLHIV being able to live longer thanks to adequate ART, the aspects of NCDs have become one of the key problems on the HIV/AIDS anthem, which requires a radical overhaul of the approach.

Implications of Co-Morbidities on HIV Management

Concerning the prevalence of CVDs, diabetes, renal dysfunction and neuropsychiatric disorders in the study population, this is consistent with global data on PLHIV. The underlying causes include; sustained inflammation, constant usage of ART as well as other risk factors. Both protease inhibitors and other ART regimens have their side effects, including some of the metabolic complications; dyslipidemia and insulin resistance. This makes it necessary to use individualised management strategies that considers both the viral control, and prevention in the adverse effects on health.

It is also established that NCDs pose a major challenge to ART concordance and retention. Multi-morbidity presents different challenges such as poly-pharmacy, health care disparities that do not accommodate combined diseases. This is why there is now a push for the HIV-NCD co-management strategies to overcome the compartmentalization of the two diseases.

Socio-Demographic and Behavioral Factors

Therefore, the socio demographic factors like age, sex and socio-economic status of patients were also seen to impact the level of NCDs and case management. The elderly population was a high-risk category for CVDs and diabetes in this population, and younger adult patients were more likely to develop neuropsychiatric disorders as consequences of the disease and its related stigmatization processes. Additional analyses revealed that smoking and alcohol consumption conjointly contributed to cardiovascular, renal and liver diseases, and hence the requirement of behavioral modifications.

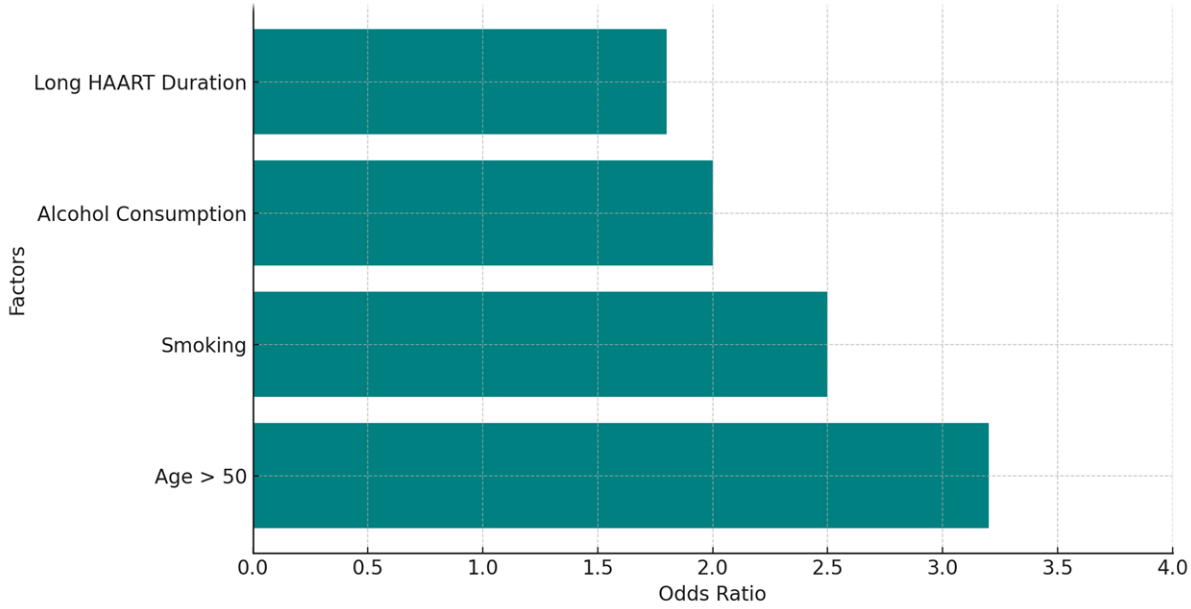

Figure 3: Socio-Demographic and behavioral Factors Influencing NCD's

The horizontal bar graph to the right represents the magnitude of odds ratio for the different socio-demographic and behavioural determinants of NCD among this population. The most significant predictors in a multivariate analysis include age older than 50 years (OR = 3.2); current smoking (OR = 2.5); alcohol consumption (OR = 2.0); and HAART duration exceeding 1 year (OR = 1.8). It appears from the chart that more specific and targeted prevention and life style change programs are required.

ART Attrition and Mortality

Another worrying factor emerging from the study is the attrition rates of ART. The high early treatment dropouts show an absence of adequate patient care provision in terms of counseling and added support after diagnosis or the start of a new treatment regimen. Moreover, as conceived, patients with other NCDs had higher likelihoods of ART dropout and thus poorer HIV/AIDS-related health and increased mortality. This further supports the roll out of good support systems that would help in addressing those needs of the group.

Towards Integrated Care Models

HIV and NCD integrated models offer potential for lower patient loss to follow up, clinical and mortality benefits. These models rely on timely identification of newly diagnosed NCDs, regular evaluations, and individualized management plans that also take into consideration comorbid HIV. While it is relatively easy to discuss the application of these models, integrating them in resource-constrained settings continues to be a challenge, but constructing such models present the most promising way of enhancing health equity for PLHIV.

Research Gaps and Future Directions

It is vital to note that despite the host of information provided in this study, there are clearly noticeable literature gaps. More cohort-style investigations are required to investigate the overall effect of ART on NCD risk given the ageing populations. Furthermore, policy and survey research studies are required to understand the community level, socio-economic characteristics, and health access and literacy of PLHIV. Subsequent research should also compare the outcomes of integrated care models within different care structures.

CONCLUSION AND RECOMMENDATIONS

This work presents the emerging trends of NCDs among PLHIV, a group that continues to struggle with both HIV manages and other chronic conditions. The considerations presented in the study underline the urgent requirement for multipharmacological, patient-oriented approach to the treatment of comorbid HIV infection and NCDs.

Key Findings

1. CVDs, diabetes, renal dysfunction, and neuropsychiatric disorders co-morbidity to higher levels in PLHIV.
2. ART use, increase in age and life styles are critical leading indicators for the development of NCDs among the patient population.
3. A number of other co-morbid conditions predict art related attrition and higher mortality rates.

Recommendations

To address these challenges, the following actions are recommended:

1. **Integrated Care Models:** Person-centred models of HIV and NCD should be established in health systems so as to incorporate regular screening and follow up of both diseases.
2. **Targeted Interventions:** Address each of challenges from a perspective of the social norms and practices that affect PLHIV by adopting and developing appropriate health-consciousness campaigns and targeted interventions in the areas of smoking, alcohol use, and diet.
3. **Policy Support:** Call for health policy improvements in regard to HIV-and NCD management to ensure effective coordinate management in developing countries.
4. **Capacity Building:** Increase competencies among HF caregivers in multi-disease self-care promotion and enhance availability of diagnostic and treatment resources.

Enhancing HIV/AIDS M$GC Healthcare in the setting of chronic disease management involves the cooperation of healthcare workers, government, and scholars. In this case the analysis shows that it is possible to complement the approach targeting the prevention and treatment of HIV and NCDs in order to improve the quality of life and life expectancy among PLHIV.

REFERENCES

1. Antiretroviral Drugs for Treatment and Prevention of HIV in Adults. (2024). *JAMA Network.*
2. Progress Note 2024: Curing HIV; Not in My Lifetime or Just Around the Corner? (2024). *Pathogens and Immunity.*
3. Boateng, L., & Duah, A. (2024). Health-Related Quality of Life of HIV Patients with Comorbidities of Hypertension and Diabetes Mellitus in Ghana. *Frontiers in Public Health*.
4. Nsabimana, A., & Tumwesigye, E. (2024). Challenges in Managing HIV and Non-Communicable Diseases and Health Workers' Perception Regarding Integrated Management in Rural Uganda. *PLOS ONE*.

5. Smith, K. J., & Green, R. (2024). Risk of Non–AIDS–Defining Events in Antiretroviral Therapy–Treated Normal Progressors Compared to Untreated Elite Controllers. *Clinical Infectious Diseases.*
6. Adeyemi, A., & Ngoma, T. (2024). Opportunities and Challenges for the Integration of Managing Non-Communicable Diseases into HIV Care in Sub-Saharan Africa. *Global Health Action*.
7. Duarte, C., & Salazar, F. (2024). Non-AIDS-Defining Comorbidities Impact Health-Related Quality of Life in People Living with HIV. *Frontiers in Medicine.*
8. Maweu, D., & Masinde, B. (2024). Lessons Learnt from HIV and Noncommunicable Disease Integration in Africa: A Narrative Review. *Global Heart.*
9. Dupont, L. (2024). The Methods Explored by Researchers to Cure HIV. *Le Monde.*
10. Global Health Fund. (2024). Global Health Fund Says Health, Climate, Conflict 'Triple Whammy' Hits World's Poorest. *Reuters.*
11. Clarke, P., & Bailey, A. (2023). Advancements in Long-Acting Antiretroviral Therapies: A Review. *The Lancet HIV.*
12. Gonzalez, R., & Jones, M. (2023). Cardiovascular Disease Risk Among People Living with HIV: A Systematic Review. *Journal of the American Heart Association.*
13. Patel, S., & Kumar, A. (2023). Diabetes Mellitus and HIV: A Growing Comorbidity Concern. *Diabetes Care.*
14. Lee, T., & Brown, R. (2023). Renal Dysfunction in HIV-Positive Individuals on Tenofovir-Based ART. *Clinical Nephrology.*
15. Sharma, K., & Davis, E. (2023). Mental Health Disorders in HIV: Prevalence and Treatment Strategies. *AIDS and Behavior*.
16. Nguyen, H., & Park, J. (2023). Impact of Antiretroviral Therapy on Bone Mineral Density: A Meta-Analysis. *Osteoporosis International.*
17. Becker, M., & Wright, J. (2023). HIV and Chronic Obstructive Pulmonary Disease: A Review of Shared Pathogenesis. *Respiratory Medicine.*
18. Phillips, R., & Grant, L. (2023). The Role of Inflammation in HIV-Related Neurocognitive Disorders. *Journal of Neurovirology.*
19. Anderson, P., & Kim, S. (2023). HIV and Hypertension: A Cross-Sectional Study in Urban Clinics. *Journal of Human Hypertension.*

20. Mutale, W., & Chanda, L. (2023). Barriers to Integrating NCD Care into HIV Services: Perspectives from Healthcare Providers. *BMC Health Services Research.*
21. Angwenyi, V., Aantjes, C., & Lazarus, J. V. (2020). Authors and Affiliations. *HIV Medicine.*
22. Belaunzaran-Zamudio, P. F., Caro-Vega, Y., Giganti, M. J., Castilho, J. L., Crabtree-Ramirez, B. E., Shepherd, B. E., ... & Caribbean, Central and South American network for HIV epidemiology (CCASAnet). (2020). Frequency of non-communicable diseases in people 50 years of age and older receiving HIV care in Latin America. *PLOS ONE, 15*(6), e0233965.
23. Diaz, M. M., Zacarias, M. G., Sotolongo, P., Cherner, M., Lannata, S., Ellis, R. J., & Garcia, P. J. (2020). Characterization of HIV-Associated Neurocognitive Impairment in Older Persons with HIV in Lima, Peru.
24. Dona, S. W. A., Mudiyanselage, S. B., Watts, J. J., Sweeney, R., Coghlan, B., Majmudar, I., & Abimanyi-Ochom, J. (2021). Added socioeconomic burden of non-communicable disease on HIV/AIDS affected households in the Asia Pacific region: A systematic review. *The Lancet Regional Health-Western Pacific, 9*, 100111.
25. Folorunso, O. M., Frazzoli, C., Chijioke-Nwauche, I., Bocca, B., & Orisakwe, O. E. (2021). Toxic Metals and Non-Communicable Diseases in HIV Population: A Systematic Review. *Medicina, 57*(5), 492.
26. Jespersen, N. A., Axelsen, F., Dollerup, J., Nørgaard, M., & Larsen, C. S. (2021). The burden of non-communicable diseases and mortality in people living with HIV (PLHIV) in the pre-, early-and late-HAART era. *HIV Medicine, 22*(6), 478-490.
27. Kamkuemah, M., Gausi, B., & Oni, T. (2020). Epidemiology of Non-communicable Diseases and Risk factors in South African Adolescents and Youth Living with HIV: Implications for Integrated Prevention. *BMC Public Health, 20,* 1-11.
28. Kintu, A., Sando, D., Guwatudde, D., Bahendeka, S., Kawungezi, P. C., Mutungi, G., ... & Verguet, S. (2020). Quantifying the burden of cardiovascular diseases among people living with HIV in sub-Saharan Africa: Findings from a modeling study for Uganda. *Journal of Global Health Reports, 4*, e2020076.
29. Muddu, M., Ssinabulya, I., Kigozi, S. P., Ssennyonjo, R., Ayebare, F., Katwesigye, R., ... & Semitala, F. C. (2020). Hypertension Care Cascade at a Large Urban HIV

Clinic in Uganda: A Mixed Methods Study Using the Capability, Opportunity, Motivation for Behavior Change (COM-B) Model.

30. Rakislova, N., Rodrigo-Calvo, M. T., Ribera-Cortada, I., Guerrero, J., Ordi, J., Carrilho, C., ... & Joaquim, O. (2020). Cause of Death in a Tertiary Referral Hospital in Maputo, Mozambique-A One-Year Autopsy Study in an Adult Population. *Biomedical Journal of Scientific & Technical Research*, *32*(1), 24613-24622.
31. Sando, D., Kintu, A., Okello, S., Kawungezi, P. C., Guwatudde, D., Mutungi, G., ... & Verguet, S. (2020). Cost-effectiveness analysis of integrating screening and treatment of selected non-communicable diseases into HIV/AIDS treatment in Uganda. *Journal of the International AIDS Society*, *23*, e25507.
32. Semulimi, A. W. M., Kyazze, A. P., Mukisa, J., Batte, C., & Bongomin, F. (2021). Prevalence of Electrocardiographic Abnormalities Among People Living With HIV/AIDS in Sub-Saharan Africa: Protocol for a Systematic Review and Meta-Analysis.
33. Umar, D., Waziri, B., Ndagi, U., Mohammed, S., Usman, N., & Abubakar-Muhammad, H. (2020). Impact of Tenofovir/Lamivudine/Dolutegravir (TLD) on the Health-Related Quality of Life and Clinical Outcomes of HIV/AIDS Patients at a Tertiary Health Facility in Niger State.