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FACTORS ASSOCIATED WITH ADVANCED HIV DISEASE AMONG RECIPIENTS OF CARE NEWLY ENROLLING IN MUTARE CITY COUNCIL HEALTH FACILITIES, ZIMBABWE IN 2024

BY

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A RESEARCH DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN THE COLLEGE OF HEALTH, AGRICULTURE AND NATURAL SCIENCES

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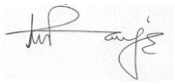
Abstract

Despite a significant increase in anti-retroviral therapy (ART) access in sub-Saharan Africa (SSA), between 15% and 30% of people living with HIV initiating ART had Advanced HIV Disease (AHD). According to routine program data from Zimbabwe, in 2023, 36% of individuals newly enrolled in ART had AHD. AHD is the biggest contributor of mortality among people living with HIV and needs to be identified early and managed appropriately. Mutare City is equally affected by a high proportion of AHD on enrolment, with a prevalence of 34% among those screened in 2023. Understanding the factors associated with having AHD at ART enrolment could assist in identifying interventions to reduce the proportion of individuals enrolling with AHD. A case control study was conducted in all 9 Mutare City health facilities to determine the prevalence of and the factors associated with AHD and assess the management of individuals with AHD. Cases were individuals enrolling with CD4 less than 200 or World Health Organization's (WHO) clinical stage 3 or 4 condition while controls were those enrolling with CD4 above 200 or WHO stage 1 or 2. Demographic, behavioral, clinical and health system factors' data was collected from 99 cases and 99 controls through virtual telephone interviews using a structured questionnaire and a data abstraction tool from facility patient records and registers. Data was analyzed using EpiInfo version 7.2.6.0 generating frequencies and averages. Association between individual risk factors and AHD was analyzed using Odds ratios while logistic regression analysis was used for multivariate analysis, identifying confounders. Based on Chi-square test, AHD was associated with being male ($p=0.002$), delayed linkage to treatment after HIV diagnosis ($p<0.001$)) and having a low HIV risk perception ($p=0.003$). There was a significant age difference between cases (mean = 38 years) and controls (mean = 33 years), $p<0.001$. Age, sex and HIV risk assessment were confounders of the association between ART linkage delay and AHD. Low HIV risk perception and delays in initiating lifelong ART after HIV diagnosis were significant risk factors for AHD, especially among males and older individuals. It is recommended that programs should strengthen interventions to improve HIV awareness, early testing and invest in robust mechanisms for tracking and early linking of individuals diagnosed with HIV to treatment. These interventions must target men and older individuals, who are at greatest risk of AHD.

Key words: mortality; case control study; confounders; prevalence; regression analysis

Declaration

I declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree.

Pardon Maringe	
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Dedication

This study is dedicated to the Almighty God who has given me strength and determination to undertake it and to my professional supervisors Dr Farai Charasika and Dr Tichaona Nyamundaya whose encouragement contributed to my success.

List of Abbreviations and Acronyms

ACCE	Accelerated and Comprehensive HIV care for Epidemic Control in Zimbabwe
AHD	Advanced HIV Disease
AIDS	Acquired Immuno-Deficiency Syndrome
ART	Antiretroviral Therapy
CATS	Community Adolescent Treatment Supporters
CD4	Cluster of Differentiation 4
CDC	Centers for Disease Control
HIV	Human Immuno-Deficiency Virus
HTS	HIV Testing Services
IRIS	Immune Reconstitution Inflammatory Syndrome
MOHCC	Ministry of Health and Child Care of Zimbabwe
MTCT	Mother to Child Transmission
OI	Opportunistic Infections
PLHIV	People Living with HIV
RoC	Recipient of Care
STI	Sexually Transmitted Infection
TB	Tuberculosis
TB	Tuberculosis
VHW	Village Health Worker
WHO	World Health Organization
ZHI	Zimbabwe Health Interventions

Definition of terms

Advanced HIV Disease is defined as having a CD4 count of less than 200 or a WHO stage 3 or 4 condition (WHO, 2021).

IRIS is used to describe a phenomenon where individuals with AHD have worsening symptoms after initiation of ART due to immune mediated response that takes place when a recovering immune system unmasks occult opportunistic infections.

ART linkage delay in this study refers to initiating antiretroviral therapy after 3 months of HIV diagnosis.

Intensified adherence support in this study refers to at least one post-discharge or post-diagnosis phone call or visit made to an individual diagnosed with AHD by a health care worker.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

Despite huge milestones achieved in the fight against the Human Immuno-Deficiency (HIV) globally, HIV remains a public health threat with an estimated 39 million people living with the condition by December 2022 of which 53% were women and young girls (World Health Organization [WHO], 2023). Approximately 630,000 people living with HIV (PLHIV) died from HIV-related illnesses, 49% of which were men (15+ years) (WHO, 2024). Sub-Saharan Africa is heavily burdened by the HIV pandemic, with 20.8 million PLHIV and 260,000 HIV-related deaths (WHO, 2024). While the introduction and scale-up of Antiretroviral Therapy (ART) reduced overall mortality at the global level, a significant proportion of deaths among PLHIV are due to HIV-related sequalae especially in Sub-Saharan Africa. Opportunistic infections (OIs) like Tuberculosis (TB), cryptococcal meningitis, and cancers are responsible for 90% of HIV-related morbidity and mortality (Solomon, 2018). Most OIs that cause death among PLHIV are preventable including TB which remains a leading cause of hospitalization and in-hospital deaths among adults and children living with HIV worldwide (Ford, 2016).

According to the Joint United Nations Program on HIV/AIDS (UNAIDS) there is an estimated 1.3 million PLHIV in Zimbabwe of which 60% are women (UNAIDS, 2024). The government of Zimbabwe's annual HIV estimates for 2023 showed an HIV prevalence estimate of 11.01%, while the incidence was 0.17%. There were 17 337 new HIV infections, and an estimated 20 465 AIDS-related deaths occurred in the country. Zimbabwe has achieved the UNAIDS 95-95-95 targets for HIV epidemic control, standing at 96-99-96 for all ages. However, clients continue to enroll into HIV

care and initiate ART late with advanced stages of HIV infection, termed advanced HIV Disease (AHD).

1.1.1 Advanced HIV Disease (AHD) Definition

The WHO defines AHD as having a CD4 cell count of less than 200 cells/ml or a WHO clinical stage 3 or 4 for an adult, adolescent, or child older than 5 years (WHO, 2021); all HIV positive children less than 5 years of age are regarded as having advanced HIV disease unless they have been on antiretroviral therapy (ART) for at least one year with evidence of viral suppression and are aged above 2 years. These definitions of AHD characteristically point to severely compromised immune function, which is the hallmark of AHD, which manifests as AIDS.

1.1.2 Burden of AHD

Globally, a significant number of deaths occur every year from AIDS-related complications with approximately 680,000 deaths in 2021 (Rangaraj et al., 2023). AHD is a significant contributor to AIDS-related deaths with varying percentages across regions. In Sub-Saharan Africa (SSA), several studies reported AHD prevalence of between 32% and 71% among patients initiating care and up to 60% among patients presenting for care after disengagement (Kitenge et al., 2023). In Zimbabwe, latest program data of 2024 show that about 36% of PLHIV newly enrolling or re-engaging in HIV care had AHD. When the ART program started in Zimbabwe during the early to mid-2000s, the health system was significantly burdened with AHD due to limited ARVs and strict criteria to initiate individuals on ARVs. Only PLHIV with AHD (CD4 <200) would be initiated on ART then, with the CD4 threshold for ART initiation raised to 350 around 2011. This was a response to better

availability of ARVs and to emerging research showing that early initiation of ART had more benefits including reducing morbidity and mortality.

1.1.3 Pathogenesis of AHD disease

HIV is transmitted via several routes, with the most common one being through sexual contact involving body fluids exchange. Other common transmission routes are through mother to child transmission and through needle sharing among people who inject drugs. Once infected, HIV infects cells through several receptors and has high affinity for cells that express the CD4 receptor, and these mostly happen to be immune cells. It rapidly multiplies inside the human cells, producing copies of itself that further infect new cells inflicting damage to these cells. HIV infection compromises the body's defense system by attacking and killing the CD4 cells and impairing their function, predisposing the body to opportunistic infections (OI).

Clinically, HIV infection progresses in four stages which are seroconversion illness, asymptomatic stage, symptomatic stage and lastly the late-stage HIV (Centers for Disease Control and Prevention, 2022). Seroconversion illness occurs within the first few weeks after contracting HIV and is characterized by a flu-like illness and other nonspecific constitutional symptoms. Without HIV treatment, infection progresses to an asymptomatic stage which may last a decade or longer or may progress faster (Centers for Disease Control and Prevention, 2022) to symptomatic stage characterized by OIs depending with a number of factors including host factors and pathogen characteristics such as virulence of the pathogen. OIs are infections and infection-related cancers that occur more frequently or are more severe in people with weakened immune systems than in people with healthy immune systems (National Institutes of Health, 2021). Individuals in which HIV has progressed to severely compromise the immune system, signified by a low CD4 count of less than 200 cells

per milliliter of blood are referred to as having advanced HIV disease, whether they have OIs or not.

1.1.4 AHD Management

AHD is associated with an increased risk of Opportunistic Infections (OIs), high morbidity, and mortality rates. The WHO recommends multiple interventions for reducing OIs in HIV patients including screening, treatment, or prophylaxis for major opportunistic infections such as TB, same day or rapid ART initiation, and intensified adherence support for everyone presenting with AHD (WHO, 2017). Since 2021, the Government of Zimbabwe (GoZ) has been implementing the "Screen, Treat, Optimize, and Prevent AIDS" (STOP AIDS) strategy, aimed at reducing morbidity and mortality in PLHIV (Ministry of Health and Child Care of Zimbabwe, 2022). This approach includes screening, prevention, and management of key OIs such as cryptococcal meningitis and TB, particularly in those clients with AHD disease.

1.2 Background of Study

The Zimbabwe Health Interventions (ZHI), where the researcher is attached, is a locally registered non-governmental organization supporting the country in its HIV response. Through its Accelerated and Comprehensive HIV Care and Treatment for Epidemic Control (ACCE) project, the organization has been supporting the Government of Zimbabwe’s response to HIV, including managing clients presenting with AHD in Mutare district, Manicaland province since October 2021. The project also supports Mutare City council administered health facilities. Mutare district is resident to 141, 320 PLHIV (Ministry of Health and Child Care, 2023). ZHI provide technical support to five high HIV burdened districts, out of the seven districts of Manicaland and these are Mutare, Makoni, Chipinge, Buhera and Mutasa. The 2023

routine HIV prevention, care and treatment program data showed that 5, 888 individuals tested HIV positive across the 5 ACCE project supported districts, 3 652 (3%) out 105, 887 on ART were investigated for HIV treatment failure[1] with 276 subsequently confirmed as treatment failure cases. In 2023, 769 (32%) out of 2385 individuals who experienced antiretroviral treatment interruption returned to care. Among the 5888 individuals who tested newly HIV positive, 2, 678 (45%) were screened for AHD using a CD4 test and 791 (29.5%) had a CD4 less than 200cells/ml (Figure 1). This was consistent with the MOHCC data of 2021 where 30% of recipients of care (RoCs) diagnosed with HIV had AHD. The 791 recipients of care who had a CD4 count of less than 200 cells/ml confirmed by a standard CD4 count test, were all enrolled into the AHD package of care.

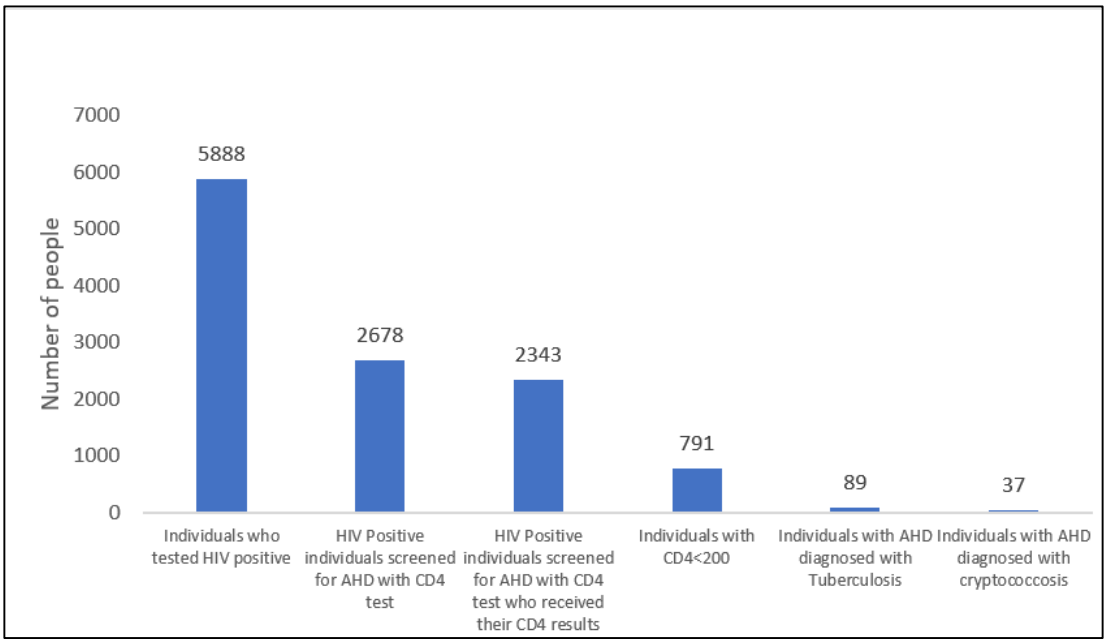

Figure 1. Manicaland AHD cascade, 2023

[1] HIV treatment failure is defined as having two consecutive viral load test results above 1000copies per milliliter of blood taken at least three months apart with good adherence to ART in between them or having recurrent WHO stage 3 or 4 condition.

Of the 791 RoCs diagnosed with Advanced HIV, 79 (11.2%) were subsequently diagnosed with Tuberculosis using the urine TB Lipoarabinomannan (TB LAM) test while 10 were diagnosed with TB through other means. All the 89 RoCs diagnosed with TB were initiated on TB treatment (Figure 2).

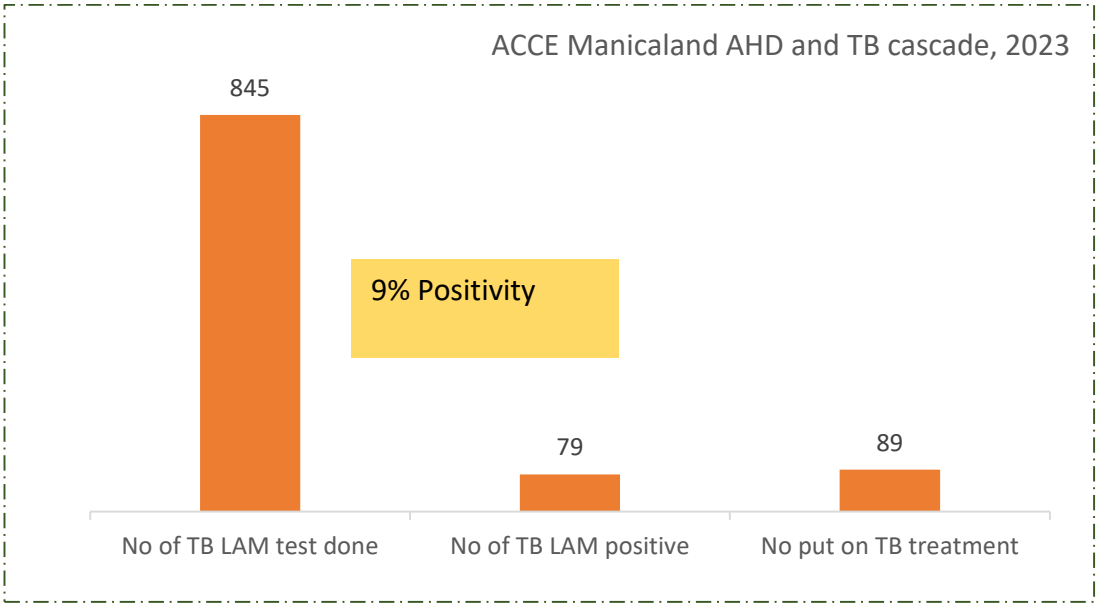

Figure 2. Manicaland AHD and TB cascade, 2023

In 2023, 792 RoCs with CD4 less than 200 and with stage 3 or 4 conditions were screened for cryptococcosis, an antifungal OI that significantly contributes to morbidity and mortality among AHD patients. Of these, 37 tested positives with 15 of them confirmed meningitis and all were commenced on treatment (Figure3)

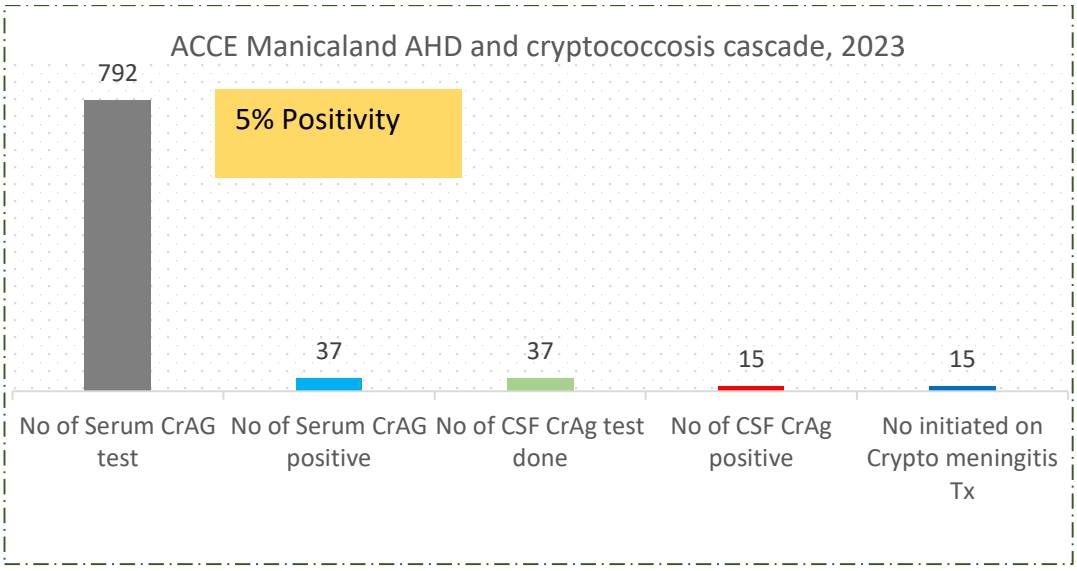

Figure 3. Manicaland AHD and Cryptococcosis cascade, 2023

Mutare district, which is one of the ACCE supported districts, also has a similar AHD cascade (Figure 4) with 34% of RoCs tested for CD4 being diagnosed with AHD. Having a bigger urban population compared to the other districts, and housing big referral health facilities, Mutare districts had a higher proportion of individuals with AHD.

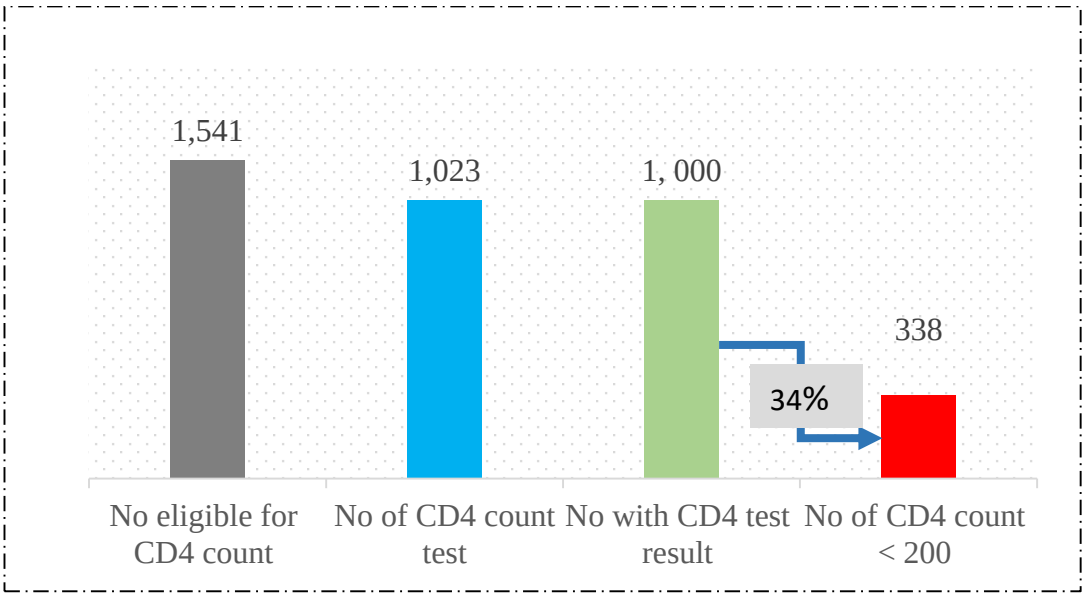

Figure 4. Mutare AHD cascade

If not identified early before ART initiation, RoCs with occult OIs such as TB are at risk of developing life-threatening Immune Reconstitution Inflammatory Syndrome (IRIS). Active screening of these individuals through a programmatic approach which adopts the WHO recommendations is thus crucial to avert deaths associated with IRIS. A rapid assessment conducted by the ACCE project in Manicaland and Midlands provinces showed that 31% of all PLHIV deaths that occurred in the two provinces were attributed to TB (Zimbabwe Health Interventions, 2022). To avert deaths due to TB and other AHD-related conditions, it is crucial to understand why recipients of care present with these conditions.

1.3 Statement of the Problem

Despite efforts to ensure HIV testing services are widely available and accessible, 30% of individuals enrolling into HIV care had AHD in 2021 (Minitry of Health and Child Care of Zimbabwe, 2022). This national AHD prevalence rose to 36% according to 2023 program data. In 2023, 791 PLHIV in Manicaland were reported to have enrolled in care with AHD among the 2 678 who were screened for AHD. Despite the steady decline in HIV related mortality since 2016 when universal ART initiation was started, Manicaland province recorded 2, 053 deaths of PLHIV out of 20 465 deaths recorded nationally in 2022. Table 1 below shows distribution by district of RoCs who enrolled in care with AHD in 2023. Mutare district recorded 338 AHD cases (34%) among newly enrolled PLHIV. AHD results in high morbidity with suboptimal immune recovery after ART, high mortality even after ART initiation, increased burden to the health system, hence it is crucial to understand factors associated with AHD to combat all these negative outcomes.

Table 1. Number of PLHIV who first present with AHD in Manicaland, 2023

	Number screened for CD4	Number screened for CD4 and received their results	Number with CD4<200
Buhera	479	421	149
Chipinge	449	386	173
Makoni	459	363	86
Mutare	1023	1000	338
Mutasa	268	173	45
Total	2678	2343	791

Source: ZHI DHIS2

1.4 Research Objectives

The research objectives were to:

1. Describe socio-demographic and clinical characteristics of recipients of care presenting with AHD in Mutare City facilities in 2024.
2. Determine the prevalence of AHD among RoCs newly diagnosed with HIV in Mutare City facilities in 2024.
3. Assess clinical management of clients diagnosed with advanced HIV disease in Mutare City facilities in 2024.
4. Determine factors associated with Advanced HIV disease among recipients of care enrolling for the first time in Mutare City facilities between January to June 2024.

1.5 Research Questions

The research was guided by the following questions:

1. What are the characteristics of people presenting with AHD in Mutare City health facilities in 2024?
2. What proportion of RoCs newly enrolled PLHIV have AHD in Mutare City health facilities in 2024?

3. How are clients diagnosed with advanced HIV disease being managed clinically within Mutare City health facilities in 2024?
4. What are the determinants of AHD among PLHIV newly enrolled in care in Mutare City health facilities in 2024?

1.6 Research Hypothesis

The researcher used the following hypothesis to assess the factors associated with AHD among newly enrolled RoCs in Mutare City:

Ho: There are no risk factors associated with AHD among newly enrolled RoCs in Mutare City in 2024

H1: There are risk factors associated AHD among newly enrolled RoCs in Mutare City in 2024

1.7 Significance of the Study

Advanced HIV Disease (AHD) remains a common presentation and cause of morbidity and mortality among PLHIV even after initiation on life saving ART. The 2021 MOHCC Electronic Patient Monitoring System (EPMS) data showed that about 30% of individuals newly enrolled in HIV care had AHD. ACCE program data showed that 791 out of 2 678 (29,5%) people newly tested HIV positive and had CD4 test done in Manicaland province had a CD4<200 cells/ml in 2023. In Mutare district, 34% (338/1000) of people newly enrolled on ART had AHD.

Several studies to determine factors associated with AHD among RoCs enrolling in HIV care and treatment services have been conducted in Asia, Europe, and several African countries such as Tanzania, Kenya, South Africa, Sierra Leone, and Zimbabwe. In Zimbabwe, such studies have been done in Harare City, one in Epworth and the other at the city's two referral hospitals which are Beatrice Road and Wilkins

infectious hospitals. However, findings from these studies cannot be generalized or applied to Manicaland due to the difference in settings geographically and demographically. Besides, several of these studies were conducted in an era when a lot of systemic issues affected ART initiation for example, before the year 2016, ART was recommended to be initiated based on CD4 count and not universally for all PLHIV. Even in this era of universal ART for all PLHIV, a significant proportion of PLHIV still enrolls in care with AHD thus this study is important to understand possible reasons why PLHIV still present with AHD despite less structural barriers to accessing HTS and ART.

After thorough review of literature, data on determinants of AHD in Mutare district and Manicaland was not readily available. This study was conducted to understand factors associated with AHD among ART naïve persons diagnosed with AHD in Mutare urban areas which are covered by Mutare City council health facilities. This research was significant as the study findings were used to inform recommendations made to the local authorities, the Ministry of Health and Child Care, and HIV care and treatment programs on strategies that can be employed or scaled up to minimize the percentage of RoCs enrolled into HIV care with AHD in Mutare City, and nationwide.

The study was also significant to the researcher as it was part of the study requirements by the College of Health and Natural Sciences of Africa University to qualify for the academic award of the degree of Master of Public Health. This study equipped the researcher with and enhanced their research skills and prepared them to effectively respond to public health threats. It built the researcher's capacity to critically analyze and investigate emerging health concerns and formulate evidence informed public health responses. The study was also significant to health care funders and donors as

the findings could be used to direct adequate resources to areas of priority to lessen the burden of Advanced HIV disease.

1.8 Delimitation of the study

The study enrolled participants who presented to public health institutions in Mutare City, excluding those seeking services in private health facilities whose data was not readily available. Those who reside in Mutare City but seek health care services outside the city will be excluded and this might have a bearing on the implementation of recommendations from the study on a section of the population that did not inform of these recommendations. The scope of the research was limited to adult RoCs who were enrolled in HIV care for the first time between January and June 2024.

1.9 Limitation of the study

The study was a retrospective case control study which required participants to recall individual behaviors and events that happened to them in the past, potentially introducing recall bias. Only participants that enrolled in 2024 were recruited to minimize recall bias. An interviewer administered questionnaire was used to collect data and there was potential for respondents to give socially desirable responses, introducing bias. This was minimized by using trained facility nurses and primary care counsellors, cadres who serve the RoCs daily and have gained their trust to collect the data.

The researcher also had strict time limitations to conduct the study which, together with the feedback from the pre-test interviews, informed the decision of using a telephone administered interview to reach out to the participants instead of an in-person interview. The recipients of care had review dates outside the 3-month period allocated for the research hence had no other reasons to visit their health facilities when

contacted to come for the interviews. Due to financial constraints to support the study, no transport incentives were available for the participants hence telephone interviews were used.

Another limitation for the study was that not all recipients of care had given their consent to be contacted by health care workers in relation to their health condition thus only those who consented were included in the study. Even those who gave their consent to be contacted were not all reachable to participate in the study. The resource constraints also limited the researcher's ability to visit recipients of care who were not reachable per phone to conduct interviews. In this study, the researcher also limited the participants' age group to those 18 years and above, guided by the national age of consent. Considering the limited time and financial resources, including children in the study would require consent from their parents while the sociodemographic factors for AHD that were under study do not apply to children. Furthermore, the definitions of AHD in children are different from those of adults. Children are also dependent on their caregivers for accessing health services, hence the health behaviors and other factors that influence health on the caregivers affect AHD status in children.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

In this chapter, literature relevant to factors associated with AHD is reviewed including discussing findings from studies conducted elsewhere.

2.2 Conceptual Framework

Conceptual frameworks provide an understanding of the fundamental constructs in which a study is grounded in. Conceptual frameworks also explain why the study is critical and how the researcher expects to fill up the gaps in the literature, and a research plan that contains a theoretical framework does allow the study report to be robust and structured with an organized coherent flow from one chapter to the next (Grant and Osanloo, 2014).

Figure 5 shows the conceptual framework used to understand determinants of AHD, using the socio-ecological model described by Dahlgren and Whitehead in 1991. The model explores determinants of any health condition using a concept of concentric factors starting from the individual intrinsic factors being at the core and structural factors being at the outer core. Intrinsic factors comprise of determinants which the individual has no control over including genetic makeup, sex, race and age. Individual factors also include behaviours that influences health outcomes and individual lifestyle choices such as use of recreational drugs, HIV risk perception, uptake of health services etc.

As we move out of the sphere, determinants from the social organization hierarchy influences the individual's health outcomes; immediate family and community determinants such as availability of social support plays an important role in determining an individual's health. Social services availability such as education,

housing, health facilities, transport etc coupled with employment status and greater macro-environment all influence the health of individuals and the community at large.

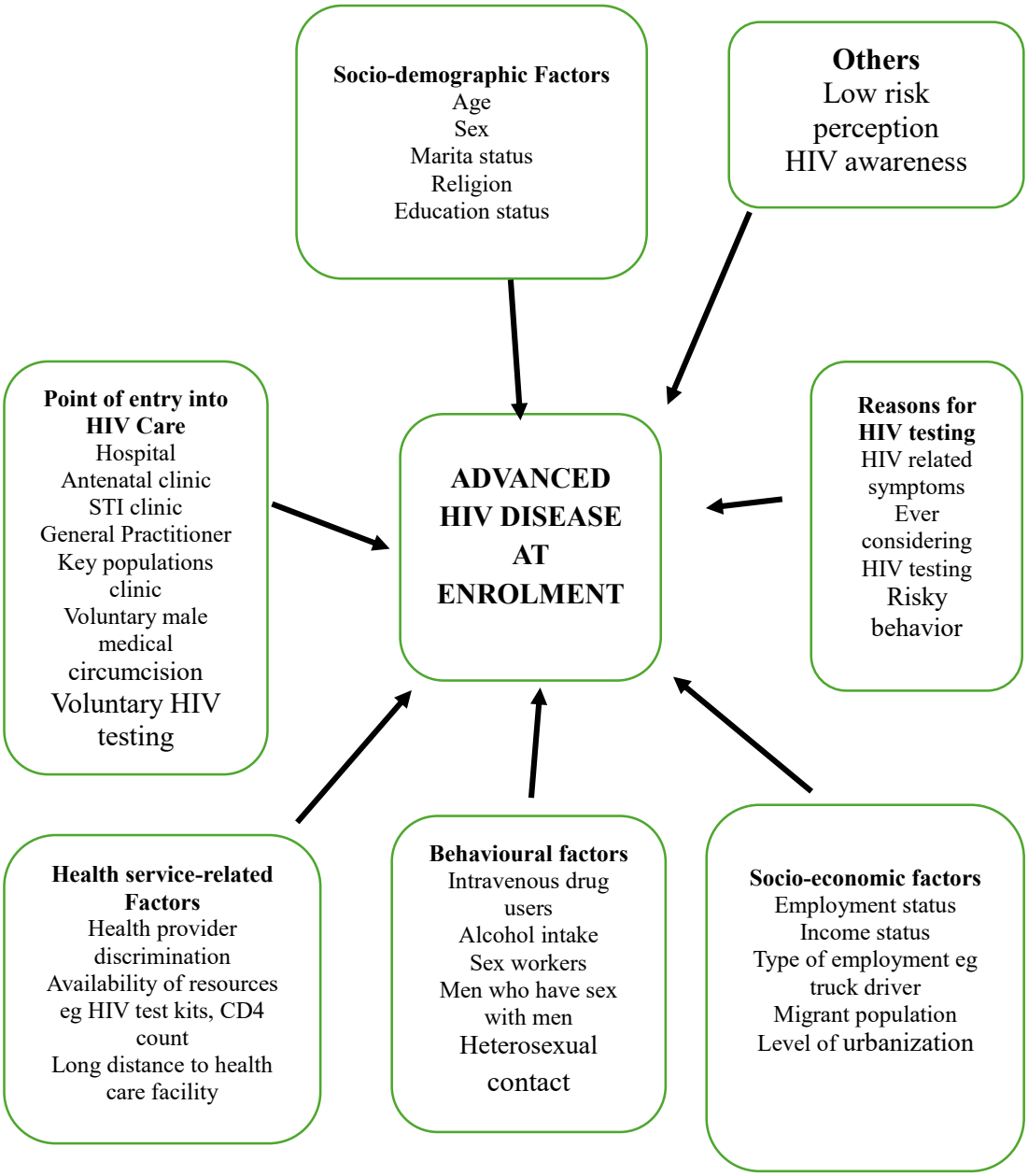

Figure 5. Factors Associated with Advanced HIV Disease

(Adapted from Dahlgren and Whitehead's socioecological rainbow model, 1991)

2.3 Relevance of the conceptual framework to the study

The socio-ecological model helped the researcher to identify and understand, at various social levels, the determinants of Advanced HIV Disease among the study population. It also acts as basis for identifying and developing comprehensive interventions to address each of identified factors. The framework lays bare how each social component contributes to the having or not having AHD.

2.4 AHD and Health System

Although there is a theoretical probability of RoCs having AHD due to health system related factors, such cases have not been adequately studied to validate this claim, more so in local Zimbabwean setting. One such documented study was conducted by Levy et al. (2016) who noted that RoCs enrolling in care had opportunities for having HIV test in the past 5 years, after presenting with HIV associated clinical conditions, but were not offered HIV testing. Fear of stigma from HCWs can also be a reason for not seeking HIV testing or ART early, resulting in AHD. Individuals who live far from health facilities may also fail to get HTS due to the distance barrier. Though rare in the local setting, stock ruptures of key HIV commodities like test kits may cause delays in HIV diagnosis. More research is needed to understand the impact, if any, of health service-related factors on AHD.

2.5 AHD Prevalence

Since the scale up of HIV testing services and the recommendation of universal ART in 2016, the number of RoCs enrolled with AHD has been steadily declining along with new HIV cases. However, the proportion of people presenting with AHD has remained relatively unchanged in the past few years (Kitenge et al., 2023). A study conducted in the Netherlands in 2016 showed that 35% of PLHIV were still presenting

with AHD (Eline, 2016). Another study conducted in Guangdong, China by Jiang et al, (2020) noted a higher proportion of 40,1% among people newly diagnosed with HIV enrolling into care with AHD.

In a systematic review by Kitenge et al. (2023) in South Africa, the pooled prevalence of AHD among ART-naive and ART-experienced patients was 43.45% and 58.6% respectively. In a study done at a large referral center in Sierra Leone, Baldeh et al. (2023) found that the overall prevalence of advanced HIV Disease among young people aged 15 to 24 was 42.9% and was more (51,5%) among inpatients compared to outpatients (39.3%). A similar study conducted in Kenya do determine if individuals enrolled with AHD because of delayed diagnosis or late presentation, noted that 33% of HIV-infected patients were initiating care with AHD (van der Kop, 2016). At Zimbabwe's Harare Epworth polyclinic which serves a community characterized by high population density, poverty, and other high HIV risk factors, 47.4% of PLHIV presented with AHD (Blankley et al., 2019). In a study conducted at six HIV clinics in Kenya, 31.2% of participants enrolled on ART late, of whom 85.1% already had advanced HIV disease at enrollment (Nash et al., 2016).

Studies conducted in Ethiopia, Kenya and Harare, similar settings to Manicaland were done at large health care facilities and mainly in urban settings. They reflect prevalence of AHD at referral centers mainly in urban settings and the RoCs in those studies might have different factors associated with a diagnosis of AHD. These studies focused on recipients of care referred to the large centers with symptomatic HIV diseases and the studies excluded those managed at smaller primary health facilities. This study focused on the entire Mutare urban area with clients who served in the study health facilities coming from different areas including urban, peri-urban, rural, farming and mining communities.

2.6 Late Diagnosis Versus Late Presentation

It is well recognized that if PLHIV do not initiate treatment, the disease progresses with time to an end stage characterized by severe immune dysfunction leading to OIs, incapacity and death. Individuals who test positive for HIV within the early stages of the disease but delay linkage to treatment progress to have AHD (late presentation). Late diagnosis refers to PLHIV who were not aware of their HIV status and have their first HIV diagnostic test already with AHD. In Nairobi, Kenya, Van der Kop et al. (2016) found that late presentation to care with AHD was primarily due to delayed diagnosis, rather than delayed linkage to care after diagnosis. In a cross-sectional hospital study in Ethiopia, 34% of PLHIV enrolled in care late (Bayisa et al., 2021). In a study done in Ethiopia, Nash et al (2016) found that delayed presentation with a gap in linkage to care of six months or more prior to ART initiation was associated with higher odds of AHD. The timing of ART initiation was significantly affected by respondents' perceived threat, perceived net benefit and self-efficacy to start ART (Nash et al., 2016). This study aimed to determine if RoCs with AHD were enrolled in care in Mutare City with late diagnosis or late presentation.

2.7 Socio-Demographic Factors Associated with AHD

Various individual, social, and economic factors determine the health seeking behavior of individuals, families and communities at large (Dahlgren & Whitehead, 1991). Several studies have shown that males are more likely to be enrolled with AHD compared to females. It is also well documented that generally males have poor health seeking behavior when compared to females. A multicenter study conducted in Italy showed that 73.4% of recipients of care who presented late with AHD were males (Girardi et al., 2004). In a similar study conducted in the Netherlands and France, it

was also noted that males were likely to present late with AHD compared to females (Ndiaye et al., 2011).

In a study conducted at two major hospitals in Harare, Zimbabwe's capital city which is predominantly urban it was found that males were more likely to present with AHD than females (Nyika, 2015). A nationwide laboratory cohort study in South Africa also demonstrated that men were almost twice as likely as women (23.1% vs 12.6%) to enter care with AHD (Carmona et al., 2018). This could be linked to the poor health seeking behavior associated with men.

Findings from two separate studies in China and Netherlands noted that socio-demographic risk factors for presentation to care with AHD were older age ranging from 30-50 years, sub-Saharan African origin and male gender (Jiang et al., 2020; Op de Coul, 2015). Risks for presentation with AHD increased with an increasing age from 30 to 50+ years. Bayisa et al. (2021) noted in a study that poor literacy status was significantly associated with presentation with AHD. A study done in China by Hu et al. (2019) found lower level of education and being divorced or widowed were also associated with presenting with AHD.

2.8 AHD and Socio-Economic Factors

Several socio-economic factors were noted to be associated with AHD in several studies. Unemployment was positively associated with presentation with AHD (Bayisa et al., 2021; Girardi et al., 2004). Earning more than US$250 per month and receiving information on HIV were found to be protective factors against presentation with AHD in Harare (Nyika et al., 2015). In Ethiopia, Bayisa et al. (2021) found that more than 75% of the PLHIV with AHD were urban dwellers and attended formal education. These findings are however contrary to those of a study in Netherlands where no

association was found between socioeconomic status or level of urbanization with presenting with AHD (Op de Coul., 2015).

2.9 Risk perception, Behavior, HIV testing and AHD

Without intervention, HIV infection progresses in almost all infected people from a clinically silent stage to a severely damaged immunologic function resulting in AIDS (Anish, Vijaykumar, & Simi, 2011a; Anish, 2011). It is well recognized that there is variation between individuals in disease progression from time of infection to development of AHD or AIDS. Some of the recognized categories are fast progressors who typically develop AIDS within 3 years of infection and slow progressors who may take up to 10 years to develop AIDS (Anish, Vijaykumar & Simi, 2011b).

Individuals may be present with AHD because of late HIV diagnosis or because of delays in linkage to care. Delays in linkage to care may be due to individual factors such poor disease understanding after testing HIV positive, self-stigma, denial, lack of understanding perceived benefits of linking to care and lack of perceived threat or consequences of not linking to care after HIV diagnosis. Delays in getting HIV test may be due to low-risk perception by the clients or "fear of the unknown" phenomenon where individuals deem themselves to be in a better state not knowing their HIV status than knowing it. Likewise, low index of suspicion by consulting clinicians also results in missed HIV testing opportunities resulting in delayed diagnosis, potentially leading to AHD. In their study at a tertiary central hospital in Israel, Levy et al. (2016) noted that all patients with advanced disease had at least one clinical indicator disease that did not lead to an HIV test in the 5 years prior to AIDS diagnosis.

Sexual behaviors noted to be associated with higher prevalence of late presentation and advanced HIV disease were being a heterosexual male and female (Hu et al.,

2019). In a study across 6 HIV clinics in Ethiopia, Nash et al. (2016) found that RoCs diagnosed through provider-initiated HIV testing have higher odds of AHD compared to those diagnosed through voluntary HIV testing. In a study on people presenting with AHD in England, fifteen per cent of Africans and 29% of non-Africans had HIV tests because of contact with someone known to be HIV positive (Burns, Fakoya, Copas & French, 2001). This demonstrated the importance of contact tracing and partner notification strategies in HIV testing.

In a Chinese study, intravenous drug use was noted to be associated with AHD at enrolment (Jiang et al., 2020). In this same study, it was found that low-risk perception and a lack of awareness of HIV-related symptoms resulted in a high proportion of AHD in China, especially among the elderly, those diagnosed at medical facilities and those with low social support. A previous HIV test was associated with a reduced risk of presentation with AHD. Africans presented with AHD compared to non-Africans in a London study due to a lack of the perceived risk of HIV, a lack of perceived benefit in the knowledge of their HIV status and potential interventions, or an inability to access appropriate services (Burns et al., 2001).

In Harare City, AHD was found to be associated with the reason for getting an HIV test and receiving HIV related information and experiencing stigma (Nyika et al., 2015). High levels of psychological stress were also associated with higher odds of AHD in a multicenter study in Ethiopia (Nash et al., 2016).

2.10 Chapter summary

In this chapter, various studies and papers were reviewed to understand the relationship between various factors and AHD. To comprehensively explore and understand these determinants of AHD, the socio-ecological model outlined by Dahlgren and

Whitehead was used to come up with a conceptual framework for the research. AHD determinants, like any other disease, ranged from individual intrinsic factors and behavioral factors to environmental factors. Despite the various findings from different scholars, generally AHD was associated with male sex, older age group, low socio-economic status and delayed HIV diagnosis.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter outlines the study design, population as well as the data collection tools and methods used to conduct the study. An outline of how data was analyzed and study findings disseminated is also presented. Ethical considerations upheld in this study are also presented.

3.2 Research Design

An analytical 1:1 unmatched case control study design was used.

- A case was a RoC enrolling in care with a CD4 of less than 200cells/ml or WHO clinical stage 3 or 4 disease.
- A control was a RoC enrolling in HIV care with a CD4 above 200cells/ml or WHO clinical stage 1 or 2.

Individual and socioeconomic factors were assessed for RoCs who enrolled on ART for the first time with AHD and those who enrolled without AHD from January to June 2024. A case control study design allowed us to assess how multiple factors are associated with the single outcome of AHD.

3.3 Population and Sampling

The study population were RoCs who enrolled into HIV care for the first time in Mutare City health facilities between January and June in 2024.

3.3.1 Study Setting

The study was conducted in Mutare urban defined by area under the administration of Mutare City council, the local authority. According to the national census conducted in 2022, Mutare district had a population of 531 564 with 42% of this population (224

804) residing in the urban part of the district. Mutare district has an HIV prevalence of 8.56%, which is lower than the national prevalence of 11.1% while the district has an incidence of 0,13 which is also lower than the national incidence of 0,17 (MOHCC, 2023). According to program data, in 2023 there were 28 639 PLHIV in the district with 1 767 individuals being diagnosed with newly HIV positive. A total of 388 individuals were diagnosed with AHD in 2023. Mutare urban is served by nine health facilities, eight of which are under the administration of Mutare City council while one is run by the Roman Catholic church. The district shares a porous border with neighboring Mozambique and harbors one of the countries busiest border posts, the Forbes border post. One of the health facilities, the Forbes border clinic specifically serves the migrant population and other key populations at the border. Mutare urban is a hub to various industries and is surrounded by vibrant artisanal mining and commercial farming activities. Both urban and rural parts of the district are strongholds of apostolic religious sects which openly defy formal health systems thus influencing the health seeking behaviors of members.

3.3.2 Study Sites

All the nine health facilities in Mutare City were purposively selected to participate in the study. Of the nine facilities, 2 (Florida and Fern Valley clinics) are low volume sites which serve the affluent suburbs while one (Forbes clinic) is a border clinic that mainly focuses on providing health services to migrant and key populations.

3.3.3 Study Participants

The study population were RoCs who newly enrolled in HIV care between January and December of 2024 at health facilities in Mutare urban who 18 years (current age of HIV testing consent) of age were or above. AHD was defined as having a CD4 less

than 200cells/ml or a WHO stage 3 or 4 condition. RoCs with a new HIV diagnosis and those who were previously diagnosed but not enrolled into HIV care were eligible to participate in the study. A data abstraction tool was used to assess health system factors that could affect AHD including reasons for services not offered.

3.3.4 Inclusion and Exclusion Criteria

3.3.4.1 Inclusion Criteria

RoCs > 18 years who enrolled into HIV care for the first time in Mutare urban health facilities between January and June 2024 and who were willing to participate in the study. Only RoCs who consented to health care worker follow ups were enrolled in the study.

3.3.4.2 Exclusion Criteria

The following were excluded from the study:

- HIV positive RoCs enrolled for the for the first time but who were below 18 years.
- RoCs with an unknown CD4 or who had no WHO staging done at enrolment.
- RoCs who were enrolled before 2024 (minimize recall bias).
- RoCs who did not consent to health care follow up.

3.3.5 Sample Size

The determine the appropriate minimum sample size for the study, Fleiss formula for sample size calculation was used which states that

$$n= [z_\alpha *\sqrt{} (2 * P0 * (1-P0) + P1 * (1-P1) * r) + z_\beta * \sqrt{} (P0 * (1-P0) + P1 * (1-P1) * r)]^2 / (P1 - P0)^2$$

Where:

N = sample size

P0 is the proportion of the unexposed group with the disease.

P1 is the proportion of the exposed group with the disease

r is the ratio of unexposed to exposed.

z_β is the z-score for the desired beta level

z_α is the z-score for the desired alpha level

The assumptions used were derived from findings of a similar study conducted in China by Jiang (2021) who noted that 50% (P1) of participants with AHD had low HIV risk perception while 30% (P0) of participants with no AHD had low HIV risk perception. Using these proportions and an odds ratio of 2.34 from this study and 95% (α=0,05) confidence level, power of 80% (β=0,2), and assuming a refusal rate of 10%, a total sample size of 186 was calculated; at least 93 cases and 93 controls will be recruited.

3.3.6 Sampling Procedure

3.3.6.1 Selection of Health facilities

All the nine health facilities in Mutare urban district were purposively selected to participate in the study.

3.3.6.2 Recipients of Care

Recipients of care who enrolled in care for the first time from January 2024 to June 2024 were identified in the OI/ART registers and these formed the sampling frame. A

total of 302 individuals were newly enrolled on ART among the 9 health facilities within the study period. OI/ART and cohort numbers were extracted from the registers, and these were used to identify the patient care booklets of the potential participants. Each booklet was checked on the section where RoC signs to provide consent to be followed up by health care workers. We identified 230 (Out of 302) individuals from the 9 sites who consented to being followed up and were eligible for the study and a line list of these was made. The line list consisted of home addresses and phone numbers of the RoCs and those of their next of kin. Cases, therefore, were those who consented to be followed up and had a CD4 count less than 200cells/ml or stage 3 or 4 HIV disease at enrolment. Controls were those who consented to tracking and had a CD4 above 200 cells/ml or stage 1or 2 HIV disease at enrolment.

The study aimed to enroll all RoCs eligible to participate in the study who would be reachable during the study period. Convenience sampling was therefore used as RoCs identified as eligible and were reached were included in the study. Participants were reached individually through phone calls following the line list and as they came for health services at their respective clinics. A total of 198 respondents were interviewed, giving a response rate of 86%.

3.4 Data Collection Instruments

3.4.1 Methods and Tools

A pre-tested data abstraction tool was used to extract information from the respondent's OI/ART booklets which are the facility records (Appendix III). This was complemented by a questionnaire which was administered to participants to obtain information regarding their behaviors and perceptions, information that could not be found in the facility patient records (Appendix IV). A vernacular (Shona)

language copy of the questionnaire was created for administration to participants who did not comprehend English well.

3.4.2 Measurement of Variables:

3.4.2.1 Socio- Demographic Factors

Socio-demographic variables in the study included age, sex, level of education, marital status, religion number of children, country of origin.

3.4.2.2 Socio- Economic Factors

Socio-economic variables included employment status, income status per month, place of residence and social support.

3.4.2.3 Health service-related factors

Health service-related variables included HIV testing entry point, health provider discrimination, distance to health facility, HIV test kits and AHD test kits availability, reception of HIV related information and level of satisfaction with health care services.

3.4.2.4 Behavioral factors

Behavioral variables will include HIV risk perception, sexual orientation, injecting drug use, non-injection drug use, experiencing stigma, reasons for getting tested and if the participant ever thought of getting tested for HIV in the past.

3.5 Pre-testing of Tools

The questionnaire used for the study was pretested at Zimunya clinic, a peri-urban clinic which was not part of the participating health facilities. Despite being located outside Mutare City urban area, Zimunya clinic serves a township with an urban setting. 20 participants were interviewed using the questionnaire. Of the 20

participants, 16 were invited through phone calls or visits by community health workers while 4 were interviewed after they had come for their routine clinic visits. Of the 16 who were invited, only 5 turned up for face-to-face interviews with 11 participants opting for the interview to be done by phone citing busy schedules, need for transport fares considering that their next review dates were way ahead of the invitation.

Time taken to complete the questionnaire was between 9-15 minutes depending on network connectivity. Feedback on the clarity of the questions by interviewers was used to refine the questionnaire checking for appropriateness and structure of questions. The majority (11/16) of the respondents who participated in the pilot expressed that it was more convenient to conduct a telephone interview versus visiting the health facility solely for the interview. Since there were no provisions for transport allowances for the participants to come for interviews, it was convenient and faster to use telephone interviews to administer the research questionnaire.

3.6 Data Collection Procedure

An interviewer administered questionnaire was used to collect data on socio-demographic characteristics, health service-related factors, socio-economic factors, knowledge of HIV symptoms and risk perception from cases and controls. A data abstraction tool was used to collect data from health facility records of those who would have been interviewed. The data abstraction tool was used to obtain the respondents' clinical information. Using the line list of eligible RoCs generated at the facility, RoCs were called and invited to participate in the study per phone. The study was explained to them as well as the contents of the consent form. Those who agreed had their verbal consent documented on the consent form with the date and time they were called and the name of the interviewer.

Nurses and primary care counsellors who have been trained on AHD were sensitized on the data collection tools and they conducted the data collection at their respective sites. Interviewers conducted the telephone interviews in the health facility counselling rooms and in private offices which are private spaces to ensure conversations with participants remained confidential. Interviewees were asked if they were in a safe space for the interview and were informed that they were free to reschedule or cancel their participation any time during the interviews.

The telephone interviews took between 8 to 15 minutes for each respondent. Data collection process took 3 months to be completed.

All participants enrolled had their verbal consent sought and this was documented on the consent forms. Physical copies of the consent forms, data abstraction tools and the questionnaires were kept confidential in a project file kept in a locked cabinet in a lockable room where facility files and registers, which are also confidential documents, are kept. ACCE project staff transported the documents to the researcher's office where all the documents were safely kept in a lockable office. The forms were created in EpiInfo software, and the electronic database stored on a password protected project laptop thus ensuring confidentiality since only the researcher has access to the data.

3.7 Analysis and Organization of Data

Questionnaires were checked for completeness and errors that may have occurred in the collection, coding, or entry of data. Missing or incorrectly entered data was verified using the corresponding hard copies of questionnaires and calling the facilities back to verify with the source documents where applicable. The questionnaires were created in Epi Info version 7 and a database was created. Means, frequencies, proportions,

odds ratios (OR), and their 95 % confidence intervals (CI), were generated using Epi Info. Frequency tables, graphs and pie charts were used to analyze different study variables. Odds ratios (OR) with their corresponding p-values and confidence intervals were generated and used to determine associations between independent variables and AHD. Logistic regression analysis was used to determine the relationships between multiple factors with AHD and confounding. Hypothesis testing was done on the association between HIV risk perception and AHD.

3.8 Ethical Considerations

Permission to conduct the study was obtained from Mutare City Health Director and the MOHCC through the Provincial Medical Director for Manicaland. The medical Superintendent and Roman Catholic authorities of St Joseph's hospital were also asked for permission to proceed with the study. All study participants had the study explained to them and were asked to provide written and verbally informed consent (appendix I) before administration of the questionnaire.

Participants were informed that their participation in the study is voluntary and that they were free to withdraw their participation at any time during the study without any consequences on the care they receive at their respective facilities. Participants were informed that there were no personal benefits offered for their participation, but the findings of the study will be used by the local authorities and ministry of health to improve health care of individuals living with HIV. Interviews were conducted by telephone using mobile numbers provided by the RoCs to the health facility. To ensure confidentiality, participants were asked if they were alone and able to take the interview at the time of calling. Those who were not ready for the interviews were given options to reschedule the interviews. Telephone calls were made in counselling rooms or in interviewer offices to ensure confidentiality.

For individuals who came to the health facility, the physical interviews were conducted in the usual designated counselling rooms, ensuring conversations with participants remained private and confidential. To ensure anonymity, participant names or identity numbers were not used on the data collection tools. No identifying information, including the OI/ART number, was used in the database, analysis and reporting of the study thus ensuring anonymity. The study information was not shared with any parties not responsible for the study and it was highlighted that under exceptional circumstances on request, research data could be shared with the MOHCC, ZHI and Africa University. The research proposal was reviewed and cleared AUREC, the body mandated to assess research compliance with ethical standards by Africa University.

3.9 Chapter Summary

In this chapter, an outline of how the study was conducted was given; a 1:1 unmatched case control study requiring a sample size of 186 participants. The study was conducted at 9 facilities in Mutare urban area under Mutare City council. Data was collected through a data abstraction tool and an interviewer administered questionnaire which was administered through telephone and physical interviews. All ethical clearances were obtained prior to the study and ethical considerations were upheld. Data was analyzed using EpiInfo software.

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

In this chapter, an analysis and interpretation of the data collected during the study is presented. The data collection process was conducted over a period of three months, spanning from August to November 2022. Upon review of each facility records, a total of 302 new HIV-positive individuals were identified across nine health facilities in Mutare City for the period January to June 2024. However, only 230 newly enrolled ROCs had their consent for follow up by health care workers documented in their patient files, making them eligible for the study.

A total of 105 records (35%) had CD4 less than 200 or documented stage 3 or 4 condition. The highest number of new HIV-positive cases was reported at St. Joseph's Hospital (76), followed by Sakubva Clinic (66), while Florida Clinic reported the least (2) number of cases. A total of 198 RoCs were enrolled in the study with 99 being cases and 99 being controls according the 1:1 case control study design. The required sample size was 186 RoCs comprising of 93 cases and 93 controls. A total of 32 RoCs who did not participate in the study were those who were not reachable both physically and on their mobile phones during the study duration even though their patient files were reviewed.

4.2 Data presentation and analysis

4.2.1 Health Facility Characteristics and AHD

Among the health facilities involved in the study, the proportion of individuals presenting with Advanced HIV Disease (AHD) varied significantly. Dangamvura had most of RoCs transferring out after HIV diagnosis and had few AHD cases compared to controls thus proportion of RoCs enrolled was the least. Chikanga clinic, St Joseph’s

hospital and Sakubva clinic had the bulk of participants, accounting for 73% of total participants.

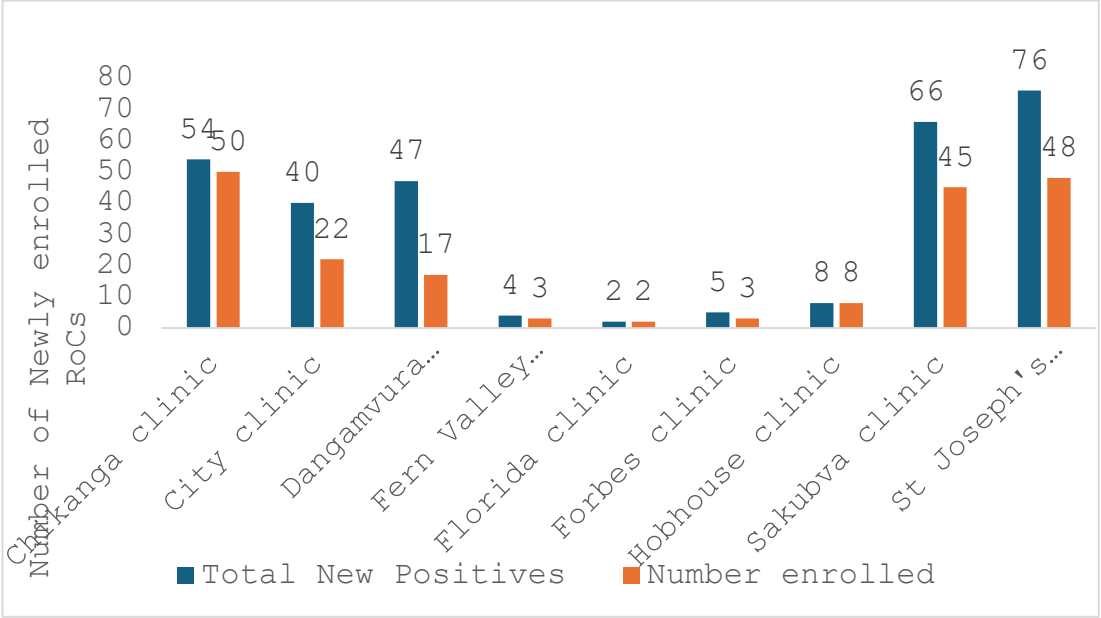

Figure 6. Participant enrolment per facility

4.2.2 Sociodemographic factors and AHD Status

4.2.2.1 Age Distribution

The mean age of participants with AHD was 38 years (SD = 10.4), compared to 33 years (SD = 11.1) for those without AHD. The median ages were 38 (IQR=12) and 31 years (IQR=13) respectively (Table 2). The range spanned from 17 to 65 years for both groups, highlighting that new HIV infections are still a concern across all age groups. The mean age of individuals with AHD was significantly higher (38 years) compared to those without AHD (33 years) ($p<0.001$).

Table 2. Age and AHD status

		Age						
AHD status	**Number of participants**	**Mean**	**Std Dev**	**Median**	**Q1-Q3**	**Range**	**Mode**	**P-value**
No AHD	99	33	11.0895	31	24-36	17-66	28	0,0007

AHD	99	38	10.3951	38	31-44	17-65	32

The table below shows the key sociodemographic characteristics of the study participants and the distribution by cases and controls.

Table 3. Sociodemographic characteristics and AHD

	Frequency (n)	AHD	No AHD	Percent (cases)
Employment status				
employed	106	55	51	53.54%
unemployed	92	44	48	46.46%
Income				
<USD100	79	37	42	44.38%
>USD300	21	6	15	11.80%
USD100-300	1	42	36	0.56%
USD100-300	77	42	36	43.82%
Level of education				
none	1	1	0	0.51%
primary	19	13	6	9.60%
secondary	157	81	76	79.29%
tertiary	21	4	17	10.61%
Marital Status				
married	132	59	73	66.67%
separated	30	21	9	15.15%
single	25	11	14	12.63%
widowed	11	8	3	5.56%
Sex				
Female	119	41	70	60.10%
Male	79	50	29	39.90%
Religion				
Apostolic	70	27	43	35.35%
Muslim	4	4	0	2.02%

None	16	9	7	8.08%
Pentecostal	93	53	40	46.97%
Protestant	12	4	8	6.06%
Traditional	3	2	1	1.52%

4.2.2.2 Sex and AHD

A significantly higher proportion of males (63%) had AHD compared to females (34%) (OR = 2.46, 95% CI: 1.37-4.42, p = 0.0023) as per table 4 below. This indicates that men were more than twice as likely as women to enrol in care with AHD. This could reflect gender disparities in health-seeking behaviour, late diagnosis, or adherence to treatment.

Table 4. Sex association with AHD status

Sex	n=198	AHD	No AHD	OR	CI	p-value
Male	79	50	70	2.46	1.37 – 4.42	0.0023
Female	119	49	29			

4.2.2.3 Marital Status and AHD

Of all the 198 participants, 132 (67%) were married (Figure 8). Among married individuals, 59 had AHD, and 73 did not. A total of 30 RoCs (15%) reported having separated from their spouses. A higher proportion of separated individuals had AHD (21) compared to those without AHD (9). Amongst the widowed, who comprised of 6% of the participants, a higher proportion also had AHD (8) compared to those without AHD (3). Individuals who reported being single comprised of 13% of the participants. Among these, 11 had AHD while 14 did not. Being married appears to be protective against AHD, possibly due to better social support or stability. Separated

and widowed individuals show a higher prevalence of AHD, which may reflect vulnerabilities due to social or economic factors.

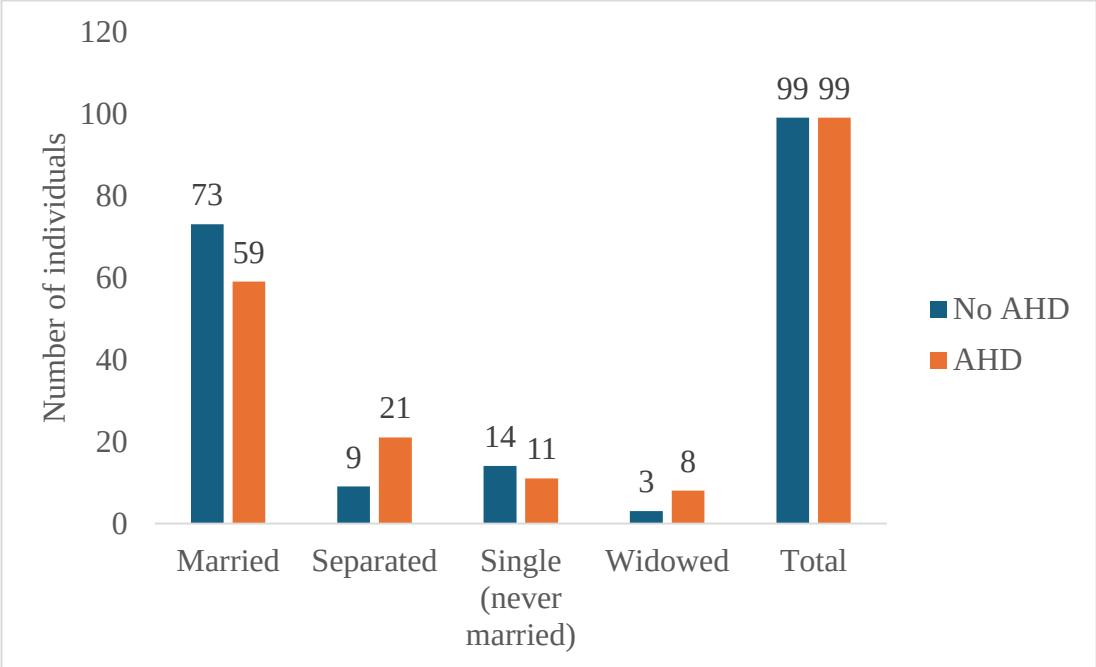

Figure 7. Participants' marital status and AHD

4.2.2.4 AHD status by religion

The bulk of the participants (82%) reported being members of the Pentecostal (47%) and apostolic (35%) religious sects. This probably reflects the dominance these two religious sects in Mutare's population. The Pentecostal group had the largest proportion with AHD (53) and a significant number without AHD (40) as shown in figure 9 below. Among apostolic individuals, 27 have AHD, and 43 do not. Pentecostal and apostolic groups have the highest number of AHD cases, which could reflect cultural or religious beliefs affecting healthcare access or existence of potential

barriers to access to health care. Muslim individuals, though a small group, show 100% prevalence of AHD, suggesting potential vulnerability in this population.

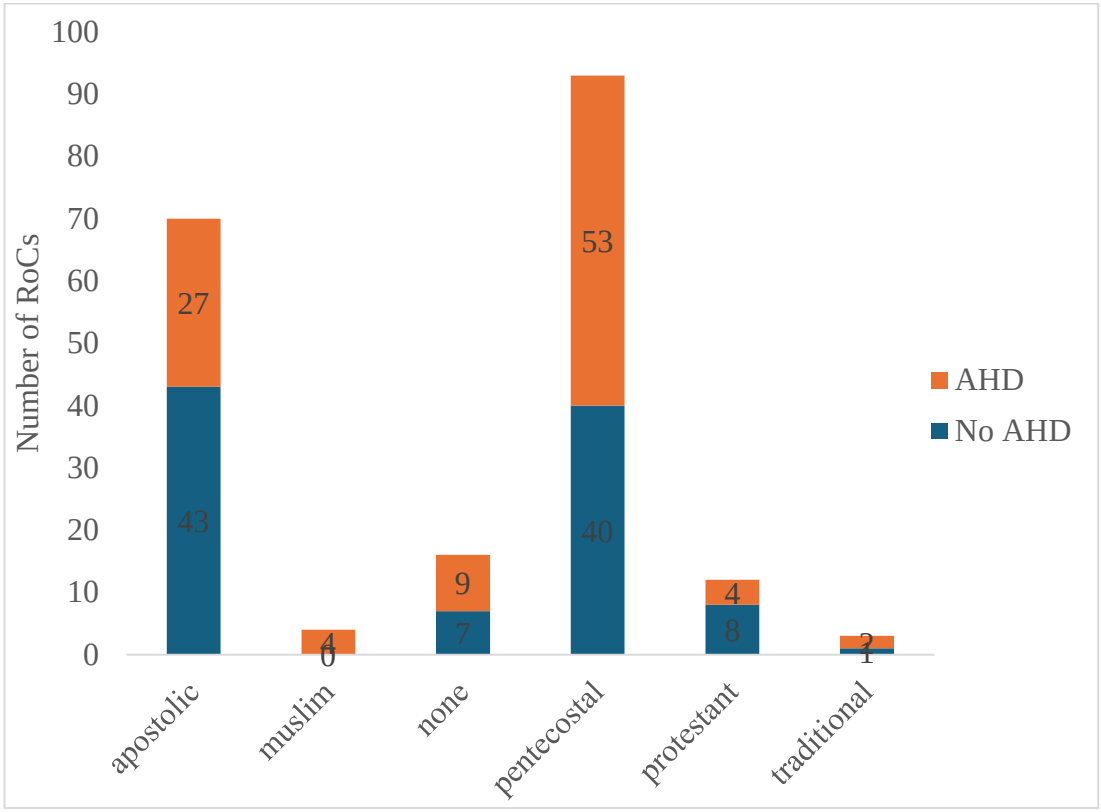

Figure 8. Participants disaggregate by religion.

4.2.2.5 AHD and employment status

Of all the participants, 54% were employed and among these, 55 individuals had AHD, while 51 did not. The unemployed comprised of 46% and among these, 44 individuals had AHD while 48 did not. There was not statistically significant association between employment status and AHD.

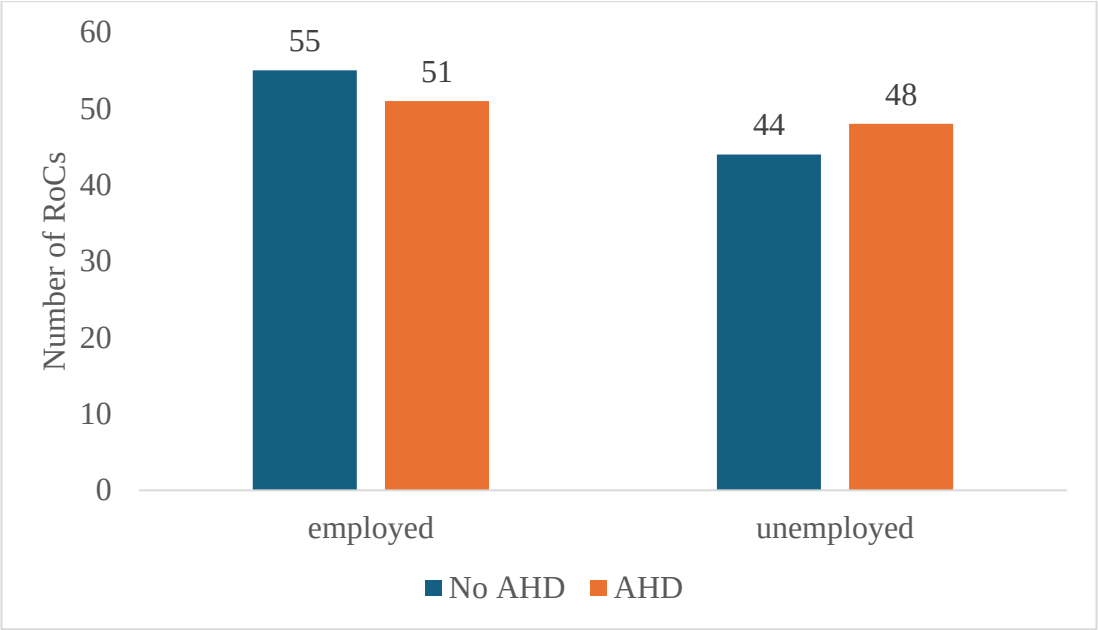

Figure 9. Distribution of participants by employment status

4.2.2.6 Income and AHD status

About 44% of the participants reported an income of less than USD100. The majority (37) of individuals in this income bracket had AHD, while 42 had no AHD, Figure 11 below. Again, 44% of the participants reported an income between USD100 to USD300. Of these, 42 had AHD and 36 had no AHD. Few participants (21) earned more than USD300 (12%) and only 6 of them had AHD while 15 had no AHD. Low income (<USD100) showed a potential association with AHD, as individuals with higher income (>USD300) were less likely to have AHD. Financial resources may influence access to healthcare.

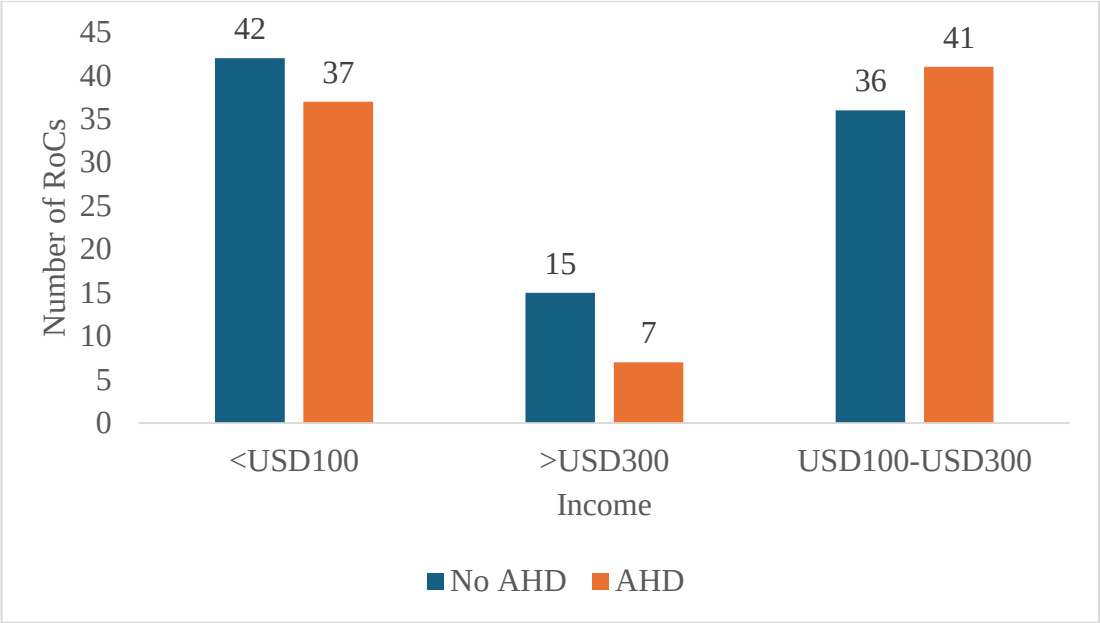

Figure 10. AHD status by income.

4.2.2.7 Level of Education

The majority (79%) of participants reached secondary education level with 81 of these having AHD and 76 had no AHD. Only 1 participant reported not being educated and they had AHD. Of those who reached primary level education. 13 had AHD and 6 did not. Only 4 of the 21 participants who reached tertiary level education had AHD. Higher education (secondary and tertiary) seems to be protective against AHD, with tertiary education showing the strongest protective effect. This may relate to better health literacy, healthcare access, or socioeconomic

4.2.3 Behavioural factors of study participants

Table 5 shows the behavioral factors and the AHD status of all the 196 study participants.

Table 5. Behavioral characteristics of study participants (N=196*)*

Characteristic	Variable	Frequency, n	Cases	Controls	OR	CI	p-value
HIV entry point	ANC	12	0	12			
	KPs	2	1	1			

	PITC	31	23	8			
	STI	9	3	6			
	TB	5	5	0			
	ICT	18	6	12			
	VCT	119	60	59			
HIV risk perception	Yes	115	46	73	0.42	0.23-0.76	0.0039
	No	83	46	31			
HIV transmission route	Transactional sex	2	1	1			
	Tattooed with unsterilized instruments	1	1	0			
	Unprotected sex	192	96	96			
Sexual orientation	Heterogenous	196	98	98			
Sexual partners	less than 3	106	49	57	1.4	0.80-2.49	0.22
	equal or greater than 3	91	50	41			
Social support (staying with)	Alone	21	10	11			
	family	156	74	82			
	parents/siblings	18	13	5			

Participants had their HIV tests done from various service delivery entry points. A total of 119 participants, which formed bulk of the study population (61%) were tested through VCT (Voluntary Counselling and Testing) with an almost equal distribution between cases and controls (Figure 12). PITC (Provider-Initiated Testing and Counselling) accounted for 31 cases (16%) of the participants with 23 cases and 8 controls. Only 2 participants were tested through key populations clinic with one having AHD while the other did not. A total of 5 RoCs were tested through TB clinic in line with the national guidance for all TB cases to be offered an HIV test due to the HIV HIV/TB burden in Zimbabwe. All the 5 met criteria for AHD, since TB is a WHO stage 3 Disease. Of the 12 participants (6%) who enrolled into HIV care through ANC,

none of them had AHD thus enrolling in ANC was less likely to be associated with AHD.

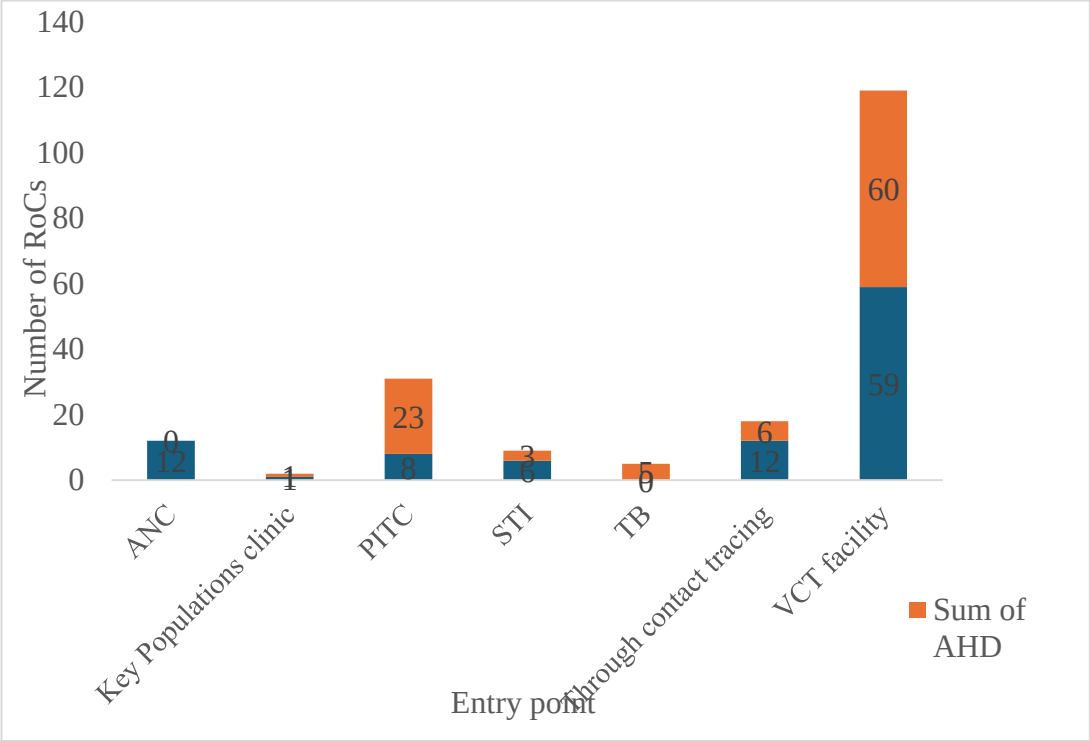

Figure 11. HIV test entry points of participants

Of the 196 participants, 18 (9%) were tested as partners of index HIV cases and interestingly 6 (33%) of these already had AHD. This indicates that individuals infected with HIV might have no indication for HIV testing and could progress to AHD, if routine HIV testing is not offered to them.

4.2.3.1 HIV Risk Perception association with AHD

Individuals with HIV risk perception comprised of 58% (115/196) of the respondents with 49 RoCs of these being cases and 66 RoCs being controls. Among the 42% who did not deem themselves to be at risk of HIV infection, 50 were cases while 33 were controls. Those who perceived themselves to be at risk of HIV were significantly less likely to have AHD (OR 0.40 (95% CI; 0.2-0.8)) compared to those with no perceived

risk of HIV infection (p value 0.004). This suggests a protective effect of risk perception, possibly due to earlier HIV testing.

4.2.3.2 Sexual behaviour association with AHD

All the 196 participants reported being heterosexual individuals. A total of 192 (98%) RoCs reported acquiring HIV through unprotected sex. Only 2 RoCs reported exchanging sex for money or material goods and one reported acquiring HIV through use of unsterilised instruments during tattooing. There was no significant association between transmission route and AHD as the number of cases was the same as controls. A total of 106 (54%) participants reported having less than 3 sexual partners while 96 reported more than 3 sexual partners. While having fewer than 3 lifetime sexual partners appears to reduce the likelihood of AHD (OR 1.4 (95% CI; 0.8-2.5)), this finding was not statistically significant (p = 0.220).

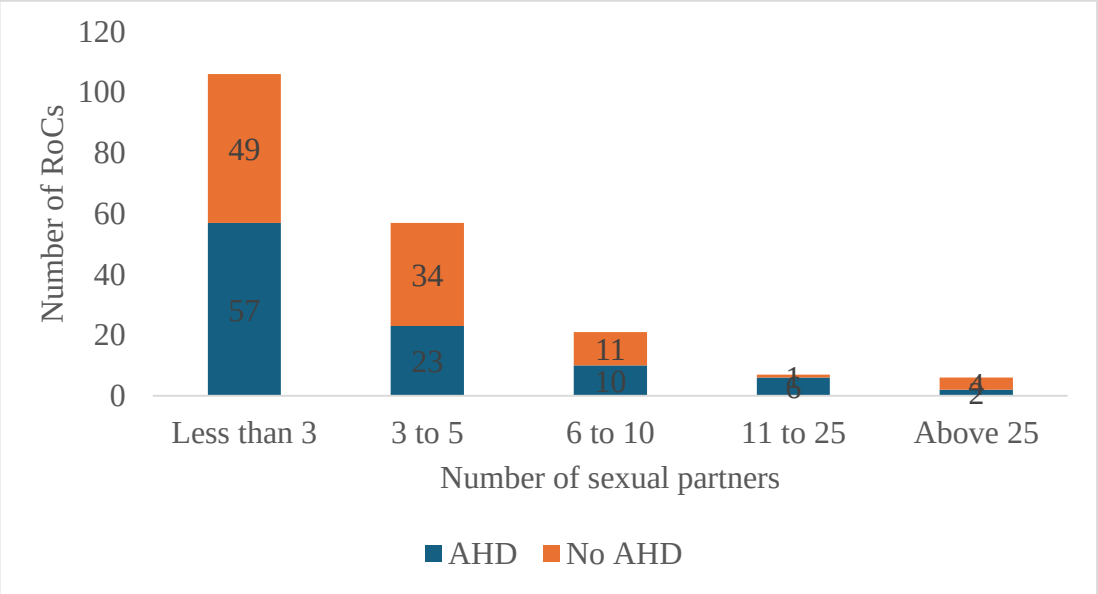

Figure 12. Sexual partners of participants

4.2.4 Social Support (Living Arrangement)

A total of 195 respondents indicated who they were staying with when the interviews were done. Of these, 80% which is the majority were staying with their families (Figure 14). Only 18% stayed with their parents or siblings and 13 (72%) of these had AHD. No significant association was noted between living arrangement and AHD.

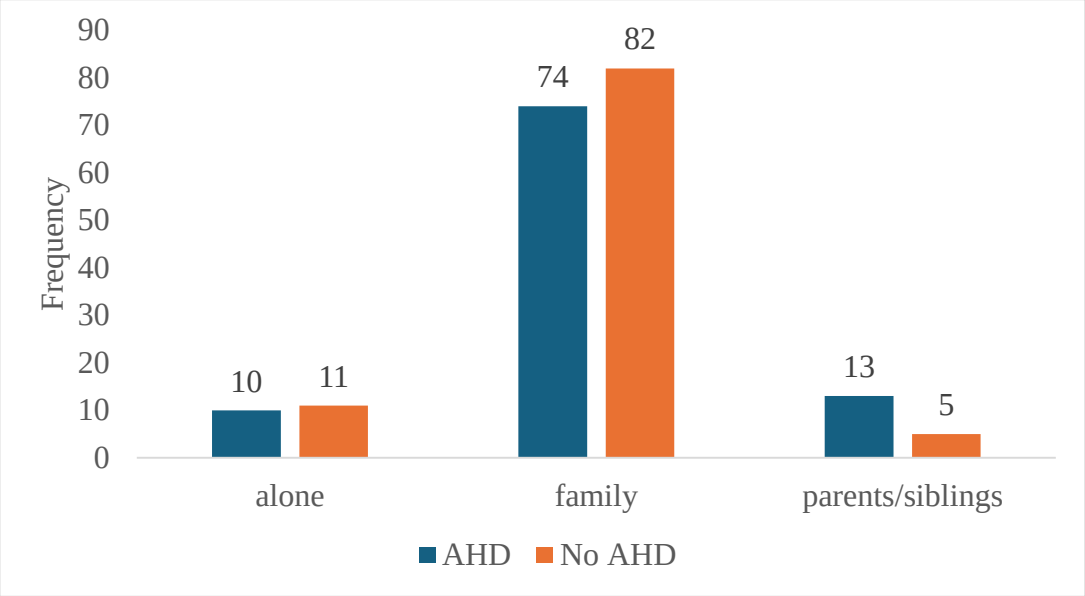

Figure 13. Living arrangements of participants

4.2.5 Access and Linkage to Care

Of the 198 participants, 196 responded on distance from their residence to the nearest health facility. The majority (82%) of participants, regardless of AHD status, lived within 10 km of a healthcare facility (Table 6). There was no significant association between distance from health facility and AHD (p-value 0.035). Duration between date of HIV diagnosis and date of enrolment on life saving ART was calculated for the 197 individuals who have been linked to ART. Only one RoC responded being enrolled into HIV care but had not yet been initiated on ART by the time data collection ended.

Table 6. Access and linkage to care analysis.

Factor	Variable	Frequency (n)	%age	AHD	No AHD	OR	CI	p value
Distance from facility	>10km	35	18	18	17	0.93	0.45-1.94	0.035
	<10km	161	82	80	81			
Linkage delay	delay	13	7	12	1	15.3	1.9-119.8	<0.001
	No delay	184	93	81	103			

Out of the 197 individuals linked to ART, 13 (7%) delayed ART linkage, defined as initiating ART at least 3 months after HIV diagnosis. Linkage delays were more common among individuals with AHD (12/13) and linkage delay was significantly associated with AHD (p<0,001) as shown in table 6 above. There were no significant differences by sex in the proportion of those delaying linkage to care in both cases and controls.

4.2.6 Logistic regression analysis of sociodemographic and behavioural factors associated with AHD

Data was coded using the numeric figures 1 and 2 for variables with binary responses such as sex, linkage delay and risk perception. Independent factors that were significantly associated with AHD were analyzed using multivariate logistic regression analysis to determine if confounding was present (Table 7). The analysis showed that the relationship between age, sex, HIV risk perception and AHD remained significant when all the other factors were held constant. Age, sex and HIV risk perception were confounders of the association between AHD and delay in linkage to treatment as the adjusted odds ratio changed by more than 10%.

Table 7. Logistic Regression analysis for sociodemographic and behavioral factors

Factor	OR	Adjusted OR	95%CI	P value
Age	1.04	1.04	1.01-1.07	0.0055
Sex	2.28	2.17	1.22 -4.26	0.0096
HIV risk perception	0.45	0.41	0.24-0.83	0.0104
Linkage delay	0.23	0.75	0.06-0.88	0.0311

4.2.7 Health system related factors

4.2.7.1 Distance from health facility

A total of 186 participants responded on how far they reside from their health facility. Of these respondents, 161 (87%) resided within 10km of their health facility (Figure 15). There was no significant difference between cases and controls on the distance from health facility thus there was no association between AHD and one's distance from the health facility.

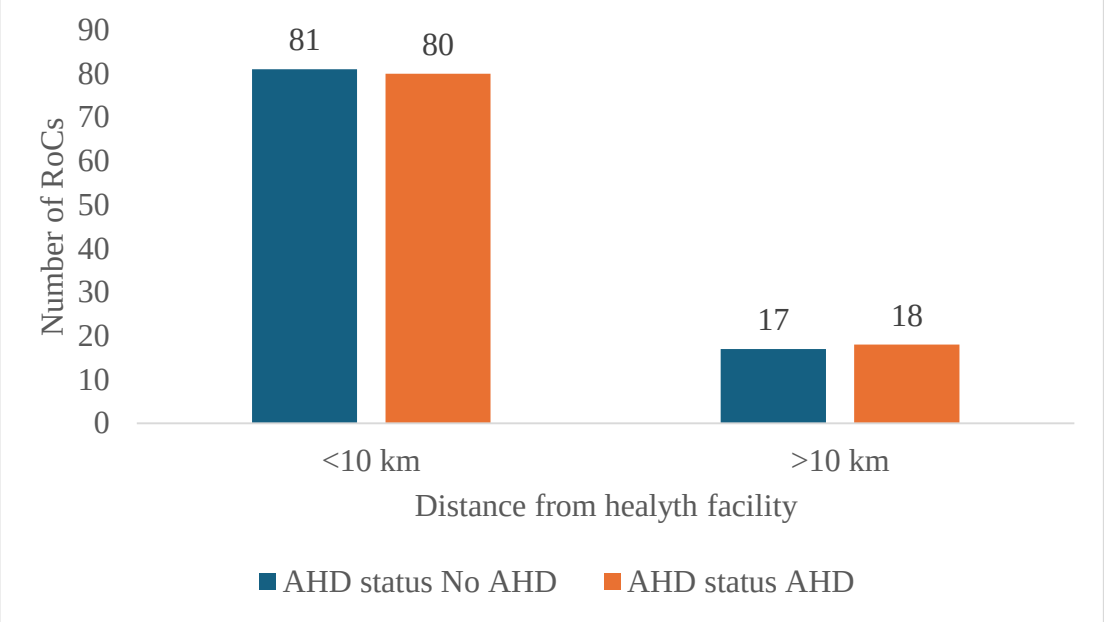

Figure 14. Participants' distance from health facility.

4.2.7.2 Management of AHD

A total of 197 participants responded on whether they experienced stigma from health care workers at their respective health facilities. Of these, only 2 controls experienced HCW stigma. Participants were also asked about their lifetime experience of HIV related stigma and a total of 187 responded. Out of these, only 23 (12%) reported having experienced any kind of HIV related stigma in their lifetime. Of these 23 respondents, 12 had no AHD while 11 had AHD on enrolment. There was no significant association between experiencing stigma and AHD (OR=0.90 CI=0.38-2.14 p value 0.06).

An assessment of how the 99 respondents with AHD were clinically managed was carried out. Variables used for the assessment were derived from the WHO's service package for management of AHD. Of the 99 cases 86% (85/99) were screened for cryptococcal meningitis using the serum CrAg test while only 65% (64/99) were screened for TB using the urine TB LAM test as per national guidelines (Figure 16). This highlights existing testing gaps for individuals with AHD posing challenges in their management by clinicians due to undiagnosed opportunistic infections, risking serious illnesses and death. Identified gaps were test kits shortages and inadequate trained testers leading to missed opportunities or referrals for the tests in cases where the trained cadres were not on duty.

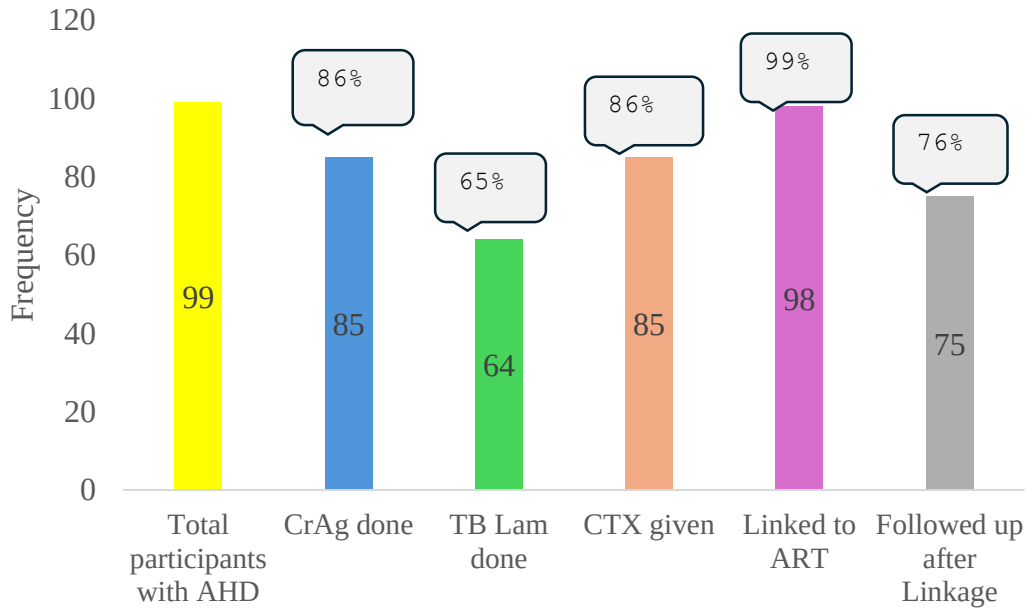

Figure 15. AHD Management assessment

By the end of the study, only 1 of the 99 (1%) individuals with AHD had not initiated on ART as per national guidelines. A total of 85 of the 99 (86%) cases were commenced on cotrimoxazole prophylaxis, despite the drug being available at all sites. All individuals with AHD require intensified follow up to ensure they remain engaged in HIV care and achieve optimal outcomes, according to the WHO recommended package of AHD care. Only 76% (75/99) of the respondents with AHD reported being followed up by the health facility after enrolment on ART. In contrast, 90% (89/99) of respondents without AHD were followed up after enrolment on ART. This indicates there is a gap in follow up of RoCs with AHD, who are the ones in greatest need of this service due to their high risk of death and disengagement in care. The common modes of follow-up for cases were through phone calls (57%) and through expert clients (27%).

4.3 Discussion and interpretation

The finding that the mean age among cases was higher (38 years) compared to controls (33 years) is consistent with the natural progression of HIV disease. HIV is characterized by an asymptomatic stage which may last up to a decade in individuals called slow progressors. Older age groups having AHD may also indicate the low-risk perception by individuals as well as low index of suspicion by clinicians among these individuals thus HIV diagnosis is often delayed. This behaviour phenomenon was described in the Health Belief Model, which focuses on how individuals perceive health threats and their severity and decide to act or not act based on the perceived benefits of that particular action (Kirscht J., 1974). Individuals with low HIV risk perception are less likely to take up services such as HIV testing or even treatment after diagnosis compared to those who perceive themselves to be at risk.

In Mutare district, bulk of new HIV positive individuals were tested through voluntary (n=119) and PITC (n=31) entry points. Among those tested through PITC, 72% (23/31) had AHD suggesting their clinical presentation warranted investigations for HIV infection by the attending clinicians. While PITC is crucial and must be continued, more efforts must be directed to voluntary testing and counselling with emphasis on encouraging all individuals to know their HIV status. A total of 173 out of the 198 respondents (87%) were religious with 81% (80/99) of cases subscribing to the Apostolic or Pentecostal religious sects. These sects are generally viewed as reserved; issues to do with sexuality are generally not openly discussed despite high risky practices such as multiple sexual relationships being practiced. This calls for more targeted interventions that promote HIV awareness through testing among these sects, capitalizing on their usual gatherings.

All respondents were of heterosexual orientation with the majority (106/199) having had less than 3 lifetime sexual partners. This may also reflect the values of a highly religious society with all the practiced religions except African tradition and apostolic upholding heterosexual relationships.

4.4 Chapter Summary

A total of 198 individuals were interviewed comprising of 99 cases and 99 controls from 9 Mutare City health facilities. Review of facility records showed that the prevalence of AHD among newly enrolled individuals was 35%, majority being females. AHD was significantly more in older individuals with mean age of 38 years compared to those with no AHD with mean age of 33 years. Being male, having low HIV risk perception and delay in HIV linkage after HIV diagnosis were significantly associated with AHD. However, age, sex and HIV risk perception were confounders to the association between linkage delay and AHD. Individuals with low health seeking behavior such as men are often diagnosed HIV late and tend to delay treatment thus are likely to be diagnosed with AHD at an older age.

CHAPTER 5 DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter will discuss the findings of the study on factors associated with AHD among recipients of care newly enrolled in HIV care in Mutare City facilities. Comparisons with findings from related studies elsewhere will be made in the discussion section. We will also give recommendations that can assist Mutare City health authorities to reduce prevalence of AHD among newly enrolling RoCs and to improve health outcomes of those with AHD.

5.2 Discussion

5.2.1 Prevalence of AHD in Mutare City

The study was conducted using quantitative methods utilizing a structured questionnaire and a data abstraction tool as data collection tools. A case control design was employed to compare characteristics of individuals enrolling with AHD and those without AHD. Reviews of health facility registers revealed that 35% of all individuals newly enrolled in HIV care had AHD. This resonates with the national AHD prevalence of 36% reported in 2024, according to routine MOHCC HIV program data from the year 2023. This also tallies with findings in other African regions with a study conducted by Lerango et al. (2024) in Southern Ethiopia demonstrating an AHD prevalence of 34.4%. These findings also confirmed WHO's assertion that the proportion of individuals initiating ART with AHD remains between 15-30% or higher in Africa (WHO, 2024). Globally, the proportion of individuals enrolling in HIV care with AHD has been declining since the introduction of universal access to HIV testing and ART for all HIV infected people. A study conducted in Harare's Epworth clinic

by Blankey et al. (2019) showed that the prevalence of AHD among those enrolling in HIV care was 47.4%.

5.2.2 Sociodemographic factors

Significant age differences were noted between individuals with AHD (mean age 38 years) and those with no AHD (mean age 32 years). These findings tally with those of a Chinese study conducted by Jiang H. et al. (2020) that looked at the age groups of individuals newly enrolling in HIV care where they noted that AHD was more prevalent in individuals aged 30-39 years compared to those 18-29 years. This finding aligns with literature that delayed HIV diagnosis and HIV comorbidities are more prevalent in elderly individuals due to their compromised ability to replenish HIV T-helper cells destroyed by HIV to restore immune function. Hu et al. (2019) also reported older age as being an independent factor to AHD in Guangxi, Southwest China. Even though new HIV cases are mainly among adolescent girls and young people, according to national program data, those enrolled with AHD are older individuals with mean age of 38 years in this study. Considering this finding, HIV programs must be deliberate in their efforts to both improve HIV case finding and linkage of cases to ART in older people.

In this study, 60% of the participants were female which reflects the gender disparities among PLHIV in Zimbabwe where the HIV prevalence is higher in females (13%) compared to males (7.9%). Even though there were more females with AHD compared to males, the proportion of males with AHD was significantly higher thus being a male was an independent risk factor for AHD. In a similar study done in Harare City, Nyika et al. (2016) also found that being male was associated with late presentation for HIV/AIDS care. In a study done in Sierra Leone by Balde et al. (2024), similar findings were noted where being female had significantly lower odds of AHD.

The study also found that recipients of care who developed AHD were significantly older (mean age of 380 compared to those with no AHD (mean age of 33). Similar findings were noted in a Chinese study where older individuals aged 30-50 years had increased risk of AHD (Jiang et al., 2020; Op de Coul, 2015). In this study, there was no significant association between level of education and having AHD. This is contrary to findings from other scholars who researched on AHD. In a South African study conducted by Bayisa and friends (2021), poor literacy status was significantly associated with presentation with AHD. A study done in China by Hu et al (2019) also found that lower level of education was associated with presenting with AHD.

The study findings suggested that in Mutare City, there was no association between employment status, amount of income and AHD. Similar findings in Netherlands were reported where no association was found between socioeconomic status or level of urbanization with presenting with AHD (Op de Coul, 2015). However, in Ethiopia, a study done by Bayisa and friends (2021) found out that unemployment was positively associated with presentation with AHD. In Harare, closer to home, a similar study reported that earning more than US$250 per month was found to be protective against presentation with AHD (Nyika et al., 2015).

5.2.3 Behavioural factors

Having a low HIV risk perception was significantly associated with AHD in Mutare City. In Harare, Zimbabwe a study done by Nyika et al., (2016) it was found that individuals who had received information on HIV were less likely to present with AHD compared to those without. Individuals who are aware of their risk of contracting HIV and knows the potential consequences of not getting tested or linked to treatment after HIV diagnosis are less likely to have AHD. This is presumably due to early health seeking behaviour, preventing HIV infection to progress to severe forms of the disease

(AHD). These findings are in support of another study done in London where it was noted that Africans presented more with AHD compared to non-Africans due to lack of perceived risk of HIV, a lack of perceived benefits in the knowledge of their HIV status and potential interventions, or an inability to access appropriate services (Burns et al., 2001).

All the study participants were of heterosexual orientation hence it cannot be safely concluded that AHD is associated with that sexual orientation since there were not respondents of other sexual orientation. However, a Chinese study on AHD found that being heterosexual had higher odds of having AHD compared to other sexual orientations. Among the respondents none indicated use on intravenous drugs while 58 (29%) responded that they use non-injecting drugs. There was however no association between using non-injecting drugs and AHD. Although there is limited data on use of intravenous drugs in Mutare and in Zimbabwe, in China, newly enrolled recipients of care with AHD had higher odds of using intravenous drugs compared to those who did not use intravenous drugs.

Other behavioral factors studied in this study had no significant association with AHD. The number of lifetime sexual partners or having previously tested for HIV were not significantly associated with AHD. Of all the respondents, 67% (132/198) were married with the rest being unmarried. Among those who were divorced or separated, 69% had AHD. This calls for programs to deliberately target such high-risk individuals with HIV testing and other support services that identify and address their potential risks.

Both delays in HIV diagnosis and delays in accessing lifelong HIV treatment predisposes one to AHD. Majority (82%) recipients of care in Mutare City who

responded to the question on distance from health facility resided within 10km of the health facility. There was no association between distance from facility and AHD (p value 0.035). Of 197 participants who provided dates of HIV testing, only 13 had delayed ART linkage for nonclinical reasons. This shows Mutare City health facilities generally follow the national HIV guidelines and protocols which recommends same day ART initiation or at most initiation of ART within seven days, called rapid ART initiation. Of the 13 who delayed ART initiation, 12 developed AHD before enrolment. There was a significant association between AHD and delayed linkage to ART with odds ratio of 15 (CI 1.9-119.8) and p value <0,001. Reasons for the delays in linkage were, however, not explored in this study and further study is recommended to understand this behavior.

In this study, assessment of management of AHD at the 9 health facilities showed that generally, RoCs with AHD accessed required tests that include CD4 testing, screening for TB and Cryptococcosis and other opportunistic infections. There was however a gap in post treatment follow up of individuals with AHD as recommended by the national and WHO guidelines as only 76% of these had at least one follow-up visit after enrolment. Individuals with AHD are at risk of experiencing adverse events to treatment, most would have a high pill burden affecting tolerance, may experience worsening symptoms despite treatment initiation due to IRIS and thus have an overall risk of defaulting treatment especially within the first 4 weeks.

It is recommended that individuals with AHD are followed up after discharge using community structures. This enables identification of treatment barriers early minimizing risk of dropping out of treatment thus averting morbidity and mortality. In Lesotho, Tukei (2020) recommends at least five visits in the first six months scheduled at week 2, week 4, week 8, week 12 and week 24 to assess OIs, ART adherence, and

toxicity. Weekly phone calls made to the patients by facility staff or expert patients for the first four weeks is an additional intervention that clinicians can consider using (Tukei, 2020).

5.3 Conclusion

The study revealed that the prevalence of AHD among recipients of care testing HIV positive and enrolling on ART was at 35%, which is generally the same with the country prevalence of 36% for the same category of patients. In Mutare City, the main factors associated with AHD were being male, being in the age group 31 -44 years, having a low HIV risk perception and delaying initiation of ART after a positive HIV diagnosis. After factoring the effect of age, sex and HIV risk perception, the association between ART linkage delay and AHD was noted to be insignificant. Among those enrolling on ART, there was no significant association between level of education, employment status, income, and religion with AHD. Determinants of AHD among individuals enrolling on ART in Mutare health facilities are mainly individual factors including behaviour factors.

Mutare City health facilities are generally providing services free of stigma and discrimination to recipients of HIV care, as noted from the study findings where only one out of 197 respondents experienced discrimination. Generally, the management of AHD was according to standard national guidelines. Gaps noted were on TB screening using TB Lam and screening for cryptococcal meningitis using CRAG test. Follow up of RoCs with AHD after enrolment in care was also sub-optimal and it is an area which requires the city health authorities to work on.

5.4 Implications

Having noted that the main determinants of AHD in Mutare City are mainly individual behavioural factors, it implies there might be inadequate health education programs targeting behaviour change in relation to HIV risks. Mutare City health authorities should respond by coming up with behaviour change programs and target men and religious sects, mainly Pentecostal and apostolic sects where the bulk of RoCs with AHD subscribe to. Mutare City also must come up with strategies to find HIV cases among men and to screen elderly individuals for AHD.

The finding of delays in HIV treatment initiation demands robust tracking mechanisms to ensure all individuals who test HIV positive are timely initiated on appropriate care before progressing to AHD. These client tracking mechanisms include mobile tracking by health care workers, assigning expert clients or other community health workers as treatment and support buddies to each diagnosed RoC, and investing in electronic health records which flags those individuals due for ART initiation.

5.5 Recommendations

Based on the findings from the study, several recommendations have been put forward to reduce the number and proportion of individuals enrolling in HIV care with AHD in Mutare City. These include short term, medium term and long-term recommendations to the entire hierarchy of the organisation's health structure. The recommendations comprise mainly of programmatic and then organizational or structural recommendations to Mutare City.

Table 8. Recommendations from the study

Recommendation	Time frame	Responsible person/entity

To carry out HIV and AHD awareness campaigns targeting mainly Pentecostal and apostolic sects	1 year	Health promotion officer, MOHCC and Mutare City council
Use media campaigns to spread awareness on Advanced HIV Disease	1 year	Health promotions officer
Target men and older adults for HIV testing in workplaces and social gatherings	1 year	Senior nursing officer Mutare City
Promote male involvement and participation in family and reproductive health where their spouses or children are being attended	3 months	Community health nurse
Target older populations for early HIV testing by reinforcing HIV risk assessment and testing yearly guidance and integrating this into routine care for noncommunicable diseases and sexual and reproductive health clinics.	6 months	Health Promotions Officer and Communications officer
Promote early linkage to ART by robust follow up mechanisms to RoCs who test HIV positive such as use of cohort tracker with adequate and correct contact details with phone number and address of RoC and their next of kin.	Ongoing, to start immediately	Facility nurses in charge and PCCs
To engage more expert patients to provide health education on HIV, including AHD, to RoCs attending facilities	3 months	Senior nursing officer
To mobilize adequate resources for AHD commodities to be	3 months	City Health Director

available at all facilities all the time. Council to consider partnerships with private players.		
Promote use of targeted and more user-friendly HIV self-testing kits in churches and for at risk individuals such as men, individuals who are single by way of spouse's death or separation.	Ongoing	Sister in charge community

PCC: Primary Care Counsellor

5.6 Suggestions for further research

Although this study demonstrated clearly the association between delayed ART linkage and risk of AHD, it did not delve into the actual factors associated with delayed linkage among individuals who test HIV positive. Further studies are recommended to understand reasons for the delay in linkage to ART. From this study, it is not clear if delays are due to patient or health system factors hence another retrospective study is recommended to understand why those who delayed initiating on ART did so.

Noting that low HIV risk assessment was associated with AHD, further studies are also recommended to assess HIV risk awareness in Mutare and effectiveness of HIV awareness programs done in the city, if any. This include identifying the target audience for such campaigns since it the study findings also suggests that males have greater odds than females of having AHD. Further studies are also recommended to understand barriers resulting in males delaying getting HIV diagnosis and barriers of HIV linkage to treatment among those diagnosed HIV positive. Findings from such studies would the inform strategies to improve HIV case finding in men and timely

linkage to ART which is crucial to prevent avoidable mortality and morbidity due to AHD.

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APPENDICES

Appendix I: Informed consent (English Version)

Topic: Factors associated with Advanced HIV Disease among recipients of care newly enrolling into care in Mutare City health facilities, Zimbabwe, 2024.

Greetings to you. My name is Pardon Maringe, a student at Africa University. I am conducting a study to determine factors associated with Advanced HIV Disease among recipients of care newly enrolling into care in Manicaland province, Zimbabwe in 2024. This form serves to provide you with information about the study and will be used to document your willingness to take part should you choose to do so.

Purpose of the study

The purpose of this study is to determine factors associated with Advanced HIV Disease among recipients of care newly enrolling into care in Manicaland province, Zimbabwe in 2024. The study is for academic purposes. Also, information from this study will assist Ministry of Health and Child Care to note gaps if any and design effective programs that respond to the community needs.

Procedures and Duration

The eligible participants for this study are individuals newly enrolling into HIV care. You have been selected as a possible participant because you were enrolled into HIV care for the first time at one of the study facilities thus you meet the stated selection criteria. All individuals who enrolled into HIV care for the first time who fit the criteria and are willing to participate will be enrolled, and a minimum of 188 individuals will be enrolled in the study. Should you decide to participate, you will be asked to sign this consent form and to have a face-to-face interview at the health facility. The interview will take between 10 to 15 minutes of your time.

Benefits, Risks and Discomforts

There are no direct benefits to you for participating in this study. I am hoping that findings

from this study will be used to inform strategies the health sector can put in place to minimise Advanced HIV disease. The risks of participating in this study are minimal. It is possible that you may feel uncomfortable with some of the questions I will ask you. You can choose to skip or to discontinue the interview if you feel uncomfortable.

Confidentiality

If you participate in this study, your personal details will not appear on the questionnaire. Any information that is obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission. You will be assigned a study participant identity number which will be used to identify the questionnaire. All study records will be kept in secure, locked filing cabinets, separate from any information that identifies you personally like this consent form. Your name will not be used in any reports or publications that may arise from this study. Your details may be released to authorized individuals if required by the law. Under some circumstances, the University or Medical Research Council of Zimbabwe may need to review records for compliance audits only.

Additional Costs

There will be no additional costs to you because of your participation in this study except those related to the time taken while participating in this study.

Voluntary Participation

Participation in this study is voluntary. If you decide not to participate in this study, your

decision will not affect your future regular health care services in any way. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without any consequences.

Authorization

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

Name of Staff Obtaining Consent: _____

Signature of Participant: _____

Date: _____

For any queries, contact information

1. College of Health, Agriculture and Natural Sciences, Africa University

   Research Supervisor: Prof Eltony Mugomeri +263776167964

   Field Supervisor: Dr E Tachiwenyika +263774804671

   Researcher: Pardon Maringe, maringep@africau.edu, +263 775073413

2. Director of Health Services, Mutare City Council

   Mrs Muyambuki +263776330383, +263713702887

3. Africa University Research Ethics Committee

   Africa University, Fairfield Road, Old Mutare, P.O. Box 1320, Mutare, Phone: 60075/26 Ex 2056/1156

Appendix II : Informed Consent Form (Shona)

Zita retsvakurudzo: Factors associated with Advanced HIV Disease among recipients of care newly enrolling into care in Mutare urban district of Zimbabwe, 2024.

Ndinokukuchingamidzai. Ini ndinoitwa Pardon Maringe, mudzidzi wepaAfrica University. Ndirikuita tsvakurudzo yekutsvaga ruzivo pamusoro pevanhu vakatanga kurapwa HIV vorwara kana kuti masoja emuviri adzika pasi pe 200 cells/ml mumaclinic emuno muguta reMutare mugore ra2024. Fomu rino richakupai zvetsvakurudzo iyi uyezve richashanda kuratidza kuti mapinda mutsvakurudzo iyi nokuda kwesarudzo yenyu.

Chinangwa chetsvakurudzo

Chinangwa chetsvakurudzo ino kutsvaga ruzivo pamusoro pevanhu vakatanga kurapwa HIV vonyanya kurwara kana kuti masoja emuviri adzika pasi pe 200 cells/ml mumaclinic emuno muguta reMutare mugore ra2024. Tsvakurudzo ino ndeyekuitira dzidzo chete. Zvichawanikwa mutsvakurudzo zvichabatsirawo vebazi rezveutano muZimbabwe, nevezveutano maMutare kuti vakwanise kugadzira zvirongwa zvinobatsira sezvinotarisirwa neveruzhinji.

Zvichaitwa nenguva ichashandiswa

Vanhu vachasarudzwa kupinda muongororo ino vanhu vakatanga kurapwa HIV mugore ra2024 kubva muna Ndira kusvika Nyamavhuvhu. Imi masarudzwa kuti mupinde mutsvakurudzo nekuti munoenderana nezvirikutariswa. Vose vanoenderana nezvirikutariswa vachapiwa mukana wekupinda muongororo ino uye tinotarisira kuti vanhu vanopfuura zana nemakumi mapfumbamwe nevasere vachapinda muongororo ino. Kana masarudza kuti munoda kuti mupindewo mutsvakurudzo muchakumbirwa

kuti musaine gwaro rino uye muchadaidzwa kuzopindura mibvunzo kuchipatara. Zvichatora maminitsi angaite gumi kusvika pagumi nemashanu enguva yenyu kuti mupindure mibvunzo.

Zvamuchawana, Njodzi ingavapo, neZvingasakufadzai

Hapana zvamuchawana sedunga munhu patsvakurudzo ino. Ndinovimba zvichabuda mutsvakurudzo zvichabatsira kuiswa kwematanho ekuderedza kurwara zvakanyanya neHIV. Njodzi mutsvakurudzo ino ishoma shoma. Zvinogona kuitika kuti munogona kusafarira mimwe mibvunzo ingabvunzwa. Munokwanisa kusarudza kusapindura mibvunzo isingakuitirei kana kusarudza kubuda musarudzo kana mukaona zvisingakuitirei.

Kuvanzika kwezvichawanikwa mutsvakurudzo

Kana mapinda musarudzo zita renyu hariwanikwe pabepa remibvunzo. Ruzivo rwezvenyu ruchawanikwa patsvakurudzo ino ruchange rwakavanzwa uye runobuditswa kana imi matendera chete. Zvinoshandiswa mutsvakurudzo ino zvichange zvakachengetedzwa zvichivharirwa. Zita renyu hariiswe pane zvichanyorwa zvetsvakurudzo. Zvinechekuita nemi zvinogona kupihwa kune vanobvumirwa nemutemo kana zvadiwa pamutemo. Dzimwe nguva chikoro cheUniversity kana bazi rezvetsvakurudzo dzezveutano vangangoda kutarisa zvakawanikwa nekuona kuti tsvakurudzo ino yafambiswa zvakanaka here.

Mutengo kwamuri

Hapana mutengo kana muripo uchave kwamuri kunze kwenguva yamuchadyirwa pakutaura nemi.

Kupinda nesarudzo yenyu

Kupinda mutsvakurudzo iyi hakumanikidzwe. Kana mukasarudza kuti hamudi kupinda mutsvakurudzo iyi, hazvina chazvichakanganisa pane zvinhu zvose pakurapwa kana kushanda kwenyu. Kana masarudza kupinda munokwanisa kusarudza kuti hamuchada chero nguva pasina kurangwa kunovepo.

Kubvumidza

Musati masaina bepa rino bvunzai mubvunzo wamungada pane zvamusina kunzwisisa. Munokwanisa kutora nguva yamunoda kana muchida kumbofunga. Kusaina kunoratidza kuti maverenga mukanzwisisa zvataurwa uye mibvunzo yenyu yese yapindurwa mukasarudza kupinda mutsvakurudzo.

Signature/fingerprint yenyu/yemumiriri Zuva

Ukama wemumiriri

Zita revachapindura mumubvunzo

Kana paine zvamusina kunzwisisa batai vanotevera:

1. College of Health, Agriculture and Natural Sciences, Africa University

   Research Supervisor: Prof Eltony Mugomeri +263776167964

   Field Supervisor: Dr E Tachiwenyika +263774804671

   Arikuita ongororo: Pardon Maringe, maringep@africau.edu, +263 775073413
2. Mukuru wezveutano mukanzuru yeguta reMutare (Director of Health Services, Mutare City Council)

   Mrs Muyambuki +263776330383, +263713702887

3. Africa University Research Ethics Committee (Vanoongorora maitirwo etsvakurudzo kuAfrica University)

   Africa University, Fairfield Road, Old Mutare, P.O. Box 1320, Mutare, Phone: 60075/26 Ex 2056/1156

Appendix III: Data Abstraction Tool for RoCs Newly Enrolled in HIV Care (English)

District…… Facility…….

Name of data collector/ interviewer …… Designation……Date of interview….

Sex: M…../F…...

Age (in completed years): ……

	Section A: Demographics		
1	Question	Options	Response
2	OI/ART number		
3	AHD criteria	CD4<200 Stage 3/4 condition	
4	Age in completed years		
5	Sex	1.Male 2. Female	
6	Country of birth	Zimbabwe Other African country Non-African	
7	Religion	1.Pentecostal 2. Apostolic 3. Traditional 4. Protestant 5. Muslim 6. None	

8	Geographic location of residence	Urban Peri-urban Rural Mining Commercial farming	
9	Level of education	1.None 2. Primary 3.Secondary 4.Tertiary 5.Unknown	
10	Marital Status	1.Single 2.Married 3.Separated or divorced 4.widowed	
11	Employment status	1.Employed 2.Unemloyed	
12	Income	<USD100, USD100-300 >USD300	
13	Have children	1.Yes 2.No	
14	Lives with	1.Alone 2.With family 3.With parents/siblings	
	Section B: HIV testing and clinical history		
15	HIV testing entry point	1.VCT facility 2.ANC 3.STI 4.TB 5. Through Contact tracing 6.PITC 7.VMMC	

		8.PrEP 9.VCT community 10.Key population clinic 11.PEP	
16	Date tested positive (latest test)		
	Section C: AHD Management (STOP strategy)		
17	Was CRAG test done?	Yes No	
18	Was TB LAM done?	Yes No	
19	Was client linked on ART	Yes No	
20	Was client given cotrimoxazole?	Yes No	
22	If client was eligible for TPT or fluconazole pre-emptive therapy, were they given?	Yes No	
23	Was client treated for any OI identified?	Yes No	
24	If the answer to 20,22,23 is No, what were the reasons?	1. Stocks out 2. No qualified health worker 3. Client refused	

		4. Omission by health worker 5. Referred for service 6. Other (Specify)	
25	After enrolment, was client followed up in community by any of the means listed?	1. Phone call 2. Expert client 3. CATS 4. VHW 5. Other (specify)	

Appendix IV: Questionnaire (English)

District……Facility…….

Name of data collector/ interviewer…… Designation……Date of interview….

Client OI/ART number: Sex: M…../F…...

Age (in completed years): ……

1	Have you ever been tested for HIV before the test done at diagnosis?	No Yes	
2	If no to (1), have you ever thought of having an HIV test before the diagnostic test?	No Yes	
3	If yes to (1), what was the result?	Negative Positive	
4	What was your reason for last HIV test? Choose at least one.	1.Illness 2. Risky behaviour 3. As a contact of index client 4. Referral/ recommendation by health worker 5. Routine check-up 6. None	
5	Did you deem yourself to be at risk of HIV before you tested HIV positive?	No Yes	

6	Did you receive HIV related information after your first HIV positive test?	Yes No	
7	In your opinion, was this information (above) adequate?	No Yes	
8	Did you experience any stigma after your HIV positive diagnosis?	No Yes	
9	I yes to above, did this effect in any way your decision to take ARVS early?	No Yes	
	Section C. Behaviour.		
10	Do you use injectable drugs for any purpose other than medical use?		
11	Do you use non-injecting drugs (including alcohol) for any reasons that are not medical?		
12	What is your sexual orientation?	1.Heterosexual 2. MSM 3.WSW 4.Bisexual	
131	From the following list, what do you think was/ were the	1.victim of sexual abuse 2.Unprotected sex (without	

	potential mode of transmission in your case?	condom) 3.Had sex with a sex worker 4.Exchanged sex for money or material goods 5.Injected recreational drugs 6.oral sex 7.Anal sex 8.Tattooed with unsterilised instruments	
14	From the choices below, choose the number of your lifetime sexual partners.	<3, 3-5, 6-10, 11-25, >25	
	Health System		
15	Did you, at any point during your care, experience health worker discrimination?	No Yes	
16	Have you ever been denied or failed to receive HIV testing service due to unavailability of testing commodities?	No Yes	
17	How long is it from your home to the nearest health facility	<10km >10 km	
18	Do you have any other services you were uncomfortable with	No Yes	

	at your health facility? If yes, clarify.	Clarify	

Appendix V: Shona Questionnaire

District……Kiriniki…….

Zita reachabvunza mibvunzo …… Chigaro……Zuva….

Client OI/ART number: Sex: Munhurume…../Munhukadzi…...

Zera reachapindura (makore) ……

1	Makamboongororwa ropa here kumashure kweongororo yazoita kuti mupinde pamushhonga we ART ?	Hongu Kwete	
2	Kana mati kwete pamubvunzo uri pamusoro, makambofungawo here nezvekuongororwa ropa kumashure kweongororo yazokupinzai pamushonga we ART?	Hongu Kwete	
3	Kana makamboongorowa, ropa renyu rakabuda sei?	Negative Positive	
4	Chii chakaita kuti muongororwe ropa pamapedzisira kuongororwa? Sarudzai chikonzero chimwe kana zvakawanda.	1.Kurwara2. Mafambiro ane njodzi 3. Somunhu aisangana nevane HIV 4. Kukurudzirwa nemushandi wezveutano. Kuongororwa kuti ndizive	

		pandimire 6. Hapana sarudzo inoenderana neni	
5	Musati maongororwa HIV, maiona semuri panjodzi yekubatira neHIV here?	Hongu Kwete	
6	Pamakaonekwa utachiona hweHIV, makapiwa dzidziso yakakwana here maringe neHIV?	Hongu Kwete	
7	Sokuona kwenyu dzidziso iyi yanga yakakukwanirai here?	Hongu Kwete	
8	Makambosangana nedambudziko rekuzvidzwa nekuti mune HIV here?	Hongu Kwete	
9	Kana makambosangana nekuzvidzwa, zvakakukanganisai kupinda pachirongwa cheART nokukasika here?	Hongu Kwete	
	Section C. Behaviour.		

10	Munoshandisa mishonga inoiswa mutsinga here isiri yekurapa zvirwere mumuviri?	Hongu Kwete	
11	Munoshandisa zvinodhaka here zvisingaiswi mutsinga kusanganisira doro?	Hongu Kwete	
12	Munozviona semunhu rudzii?	1.Heterosexual 2. MSM 3.WSW 4.Bisexual	
13	Pane nzira dzinotevera, munofunga kuti HIV makaitapurirwa sei?	1.kubatwa chibharo 2. Bonde risina kudzivirirwa 3. bonde nevanotengesa bonde 4. kuchinjanisa bonde nemari kana zvimwe zvinhu 5. muchibaira zvinodhaka mutsinga 6.Bonde rinoitwa nemuromo 7.Bonde rinoitwa kumanyowa 8.Pakuiswa tattoo pachishanda zvinhu zvine utachiona hweHI	
14	Sarudzai kuti shamwari dzose dzamakaita dzepabonde ingani.	<3, 3-5, 6-10, 11-25, >25	
	Health System		

15	Mukurapwa kwenyu, pane pamakambosangana nedambudiko rekusarudzwa nevashandi vezveutano nekuti murikurarama ne HIV here?	Hongu Kwete	
16	Makambotadza kuongororwa ropa chirwere cheHIV nekuda kwekushaikwa kwezvinoshandiswa pachipatara kana kiriniki here?	Hongu Kwete	
17	Sarudzai kuti kwamunogara kure zvakadii nechipatara/ kiriniki	<10km >10 km	
18	Pakurapwa kwenyu zve HIV, mune rumwe rubatsiro rwamusina kufara narwo here rwamungadaro makasangana narwo pachipatara/ kiriniki.? Kana kuripo, tsanangurai.	Hongu Kwete Tsananguro	

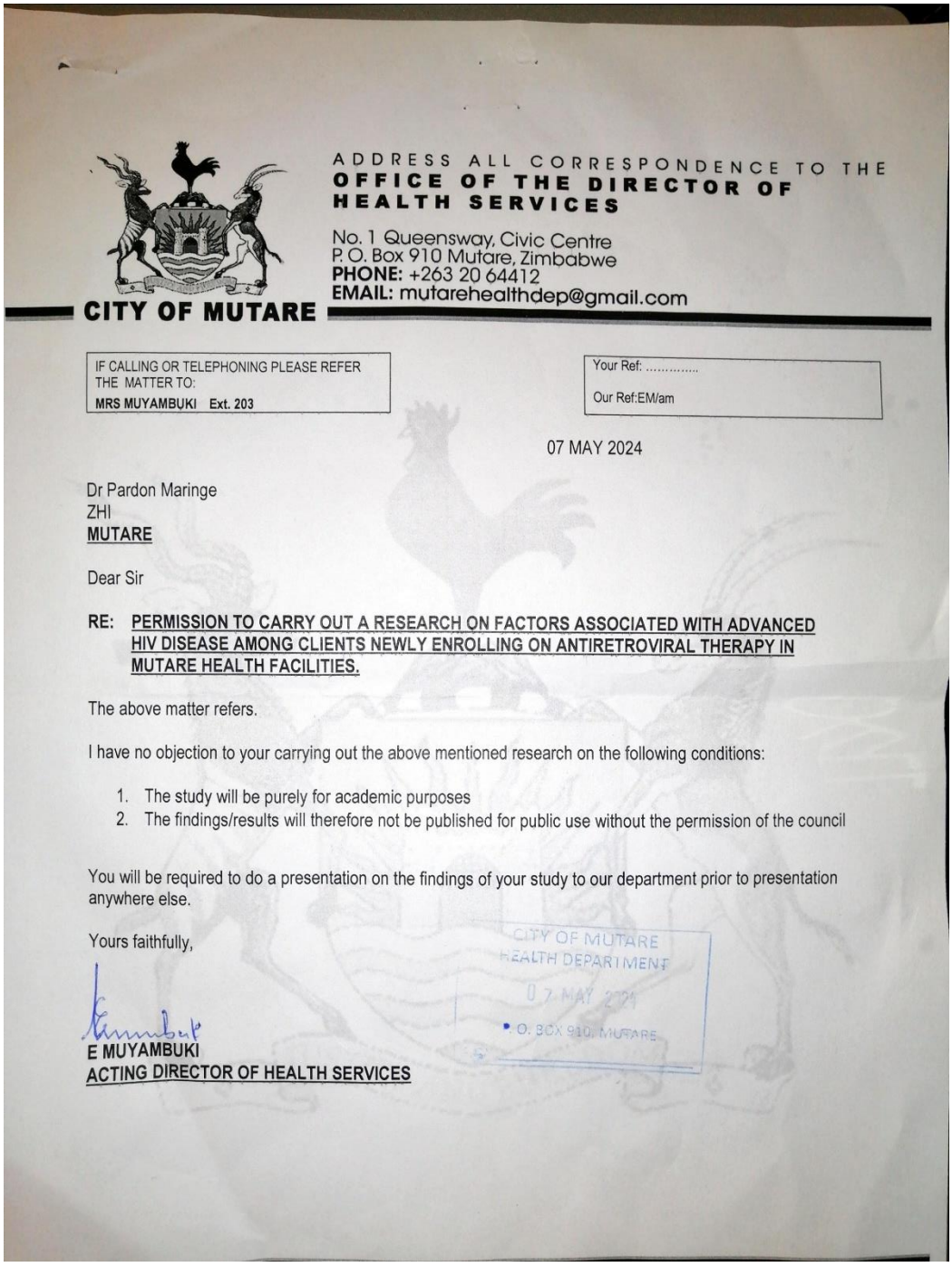
Appendix VI: World Health Organization HIV clinical staging

WORLD HEALTH ORGANIZATION

ADULTS	PAEDIATRICS
WHO STAGE 1 • Asymptomatic • Persistent Generalised Lymphadenopathy (PGL)	**WHO STAGE 1** • Asymptomatic • PGL
WHO Stage 2 • Weight loss, <10% of body weight • Recurrent RTI • Herpes Zoster • Angular Cheilitis • Recurrent ulcerations occurring twice or more then in six months. • Papular pruritic eruptions • Seborrheic dermatitis • Fungal nail infections of the fingers	**WHO STAGE 2** • Hepatosplenomegaly • Papular pruritic eruptions • Seborrheic dermatitis • Fungal nail infections of the fingers • Angular Cheilitis • Lineal Gingival erythema (LGE) • Human Papilloma Virus infection (extensive facial >5% of body area or disfiguring) • Molluscum contagiosum infection (extensive facial >5% of body area or disfiguring) • Recurrent ulcerations occurring twice or more then in six months • Parotid enlargement • Herpes Zoster • Recurrent Respiratory Tract Infections (RTI) (twice or • more in any six month period)
WHO STAGE 3 • Weight loss; >10 % of body weight • Unexplained chronic diarrhoea >1 month. • Unexplained prolonged fever >1 month • Pulmonary Tuberculosis, current or within the past 2 months or TB adenitis • Severe infection including pneumonia, meningitis, bone or joint infection. • Oral Candidiasis • Oral hairy leukoplakia • Acute necrotising ulcerative gingivitis or necrotizing ulcerative periodontitis • Unexplained anaemia >1 month.	**WHO STAGE 3** • Unexplained malnutrition (very low eight for age; up to 2 standard deviations) • Unexplained persistent diarrhoea (> 14 days and above) • Unexplained persistent fever (intermittent or constant and for longer than 1 month) • Oral Candidiasis (outside first 6 weeks of life) • Oral hairy leukoplakia • Pulmonary Tuberculosis • Severe presumed bacterial pneumonia • Acute necrotising ulcerative gingivitis, or stomatitis or acute necrotizing ulcerative periodontitis. • Symptomatic Lymphocytic Interstitial Pneumonia • Chronic HIV associated disease (including bronchiectasis) • Unexplained anaemia or neutropenia >1 monthly
WHO STAGE 4 • HIV wasting syndrome • Pneumocystis Pneumonia • Recurrent severe or radiological bacterial pneumonia (two or more episodes within a year). • Cryptococcal meningitis or other extra pulmonary. • Cryptococcus infections • Extra Pulmonary Tuberculosis except TB adenitis • Kaposi Sarcoma • HIV Encephalopathy • Candidiasis of the oesophagus, trachea, bronchi or lungs • Chronic Herpes simplex virus (HSV)infection (orolabial, genital or anorectal >1 month, or visceral any duration) • Cytomegalovirus (CMV) disease of an organ other than liver, spleen or lymph nodes. • Progressive Multifocal Leukoencephalopathy (PML) • Any disseminated mycosis (e.g. histoplasmosis, coccidioidomycosis, or penicilliosis) • Lymphoma (cerebral or B cell non-Hodgkin) • Recurrent non typhoidal salmonella septicaemia (2 or more episodes in last year). • Invasive cervical cancer • Visceral leishmaniosis • Cryptosporidiosis with diarrhoea lasting more than 1 month. • Psoriasis • Disseminated non-tuberculous mycobacterial infection. • CNS toxoplasmosis	**WHO STAGE 4** • Unexplained severe wasting or severe malnutrition not adequately responding to standard therapy. • Pneumocystis Jirovecci Pneumonia (PJP). • Recurrent severe presumed bacterial infection (e.g. meningitis, empyema, pyomyocitis bone or joint infection, bacteraemia). • Chronic Herpes simplex virus infection (chronic orolabial or intraoral lesions, of more than 1 month or visceral of any duration). • Extra pulmonary Tuberculosis. • Kaposi Sarcoma • HIV Encephalopathy • Candidiasis of the oesophagus, trachea, bronchi or lungs • Cytomegalovirus (CMV) disease of an organ other than liver, spleen or lymph nodes with onset of age >1 month. • Cryptococcal Meningitis • PML • Disseminated mycobacteriosis other than TB. • Any disseminated mycosis (e.g. histoplasmosis, coccidioidomycosis, or penicilliosis) • Lymphoma (cerebral or B cell non-Hodgkin) • Cryptosporidiosis with diarrhoea lasting more than 1 month. • Psoriasis • CNS toxoplasmosis (outside the neonatal period). • Acquired HIV-associated rectal fistula, including rectovaginal fistula) • HIV associated nephropathy • HIV associated cardiomyopathy

1 *VERSION 6: January 2024*

Appendix VII: Mutare City Council letter of study approval



ADDRESS ALL CORRESPONDENCE TO THE
OFFICE OF THE DIRECTOR OF HEALTH SERVICES

No. 1 Queensway, Civic Centre
P. O. Box 910 Mutare, Zimbabwe
PHONE: +263 20 64412
EMAIL: mutarehealthdep@gmail.com

CITY OF MUTARE

IF CALLING OR TELEPHONING PLEASE REFER THE MATTER TO:
MRS MUYAMBUKI Ext. 203

Your Ref: .....
Our Ref:EM/am

07 MAY 2024

Dr Pardon Maringe
ZHI
MUTARE

Dear Sir

RE: PERMISSION TO CARRY OUT A RESEARCH ON FACTORS ASSOCIATED WITH ADVANCED HIV DISEASE AMONG CLIENTS NEWLY ENROLLING ON ANTIRETROVIRAL THERAPY IN MUTARE HEALTH FACILITIES.

The above matter refers.

I have no objection to your carrying out the above mentioned research on the following conditions:

1. The study will be purely for academic purposes
2. The findings/results will therefore not be published for public use without the permission of the council

You will be required to do a presentation on the findings of your study to our department prior to presentation anywhere else.

Yours faithfully,

CITY OF MUTARE
HEALTH DEPARTMENT
07 MAY 2024
P. O. BOX 910, MUTARE

E MUYAMBUKI
ACTING DIRECTOR OF HEALTH SERVICES

Appendix i: AUREC letter of approval

"Investing in Africa's future"

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 Website: www.africau.edu

Ref: AU 3464/24 4 October, 2024

PARDON MARINGE
C/O Africa University
Box 1320
MUTARE

RE: **FACTORS ASSOCIATED WITH ADVANCED HIV DISEASE AMONG RECIPIENTS OF CARE NEWLY ENROLLING IN CARE IN MUTARE CITY COUNCIL FACILITIES, ZIMBABWE IN 2024**

Thank you for the above-titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

- **APPROVAL NUMBER** AUREC 3464/24
  This number should be used on all correspondences, consent forms, and appropriate document
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** October 4, 2024
- **EXPIRATION DATE** October 4, 2025
- **TYPE OF MEETING**: Expedited
  After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.
- **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

Yours Faithfully

MARY CHINZOU
ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE