PREVALENCE AND FACTORS ASSOCIATED WITH ALCOHOL USE DISORDER AMONG PEOPLE LIVING WITH HIV ATTENDING CARE AND TREATMENT CENTERS AT MOSHI MUNICIPAL, KILIMANJARO

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By

Dr Florian Emanuel

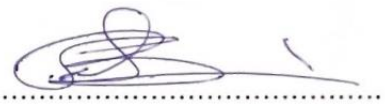
A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Medicine (Psychiatry) at

Muhimbili University of Health and Allied Sciences,

October, 2024

CERTIFICATION

The undersigned certifies that she/he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: "Prevalence and factors associated with alcohol use disorder among People Living with HIV attending Care and Treatment Centers at Moshi Municipal, Kilimanjaro" in (Partial) fulfillment of the requirement for the degree of Master of Medicine (Psychiatry) of the Muhimbili University of Health and Allied Sciences.



.....

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Date.....31.5.2024.....



.....

Dr. Samuel Likindikoki

(Co-supervisor)

Date.....30.05.2024.....

DECLARATION AND COPYRIGHT

I, Dr Florian Emanuel, declare that this dissertation is my original work. It has not been presented to any University for a similar or any other degree award, and it will not be presented to any university.

Signature …….. Date……..

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Finally, I would like to convey my sincere gratitude to my family, friends, and colleagues for their support, understanding, and encouragement during my postgraduate studies.

DEDICATION

To everyone who struggles with Alcohol Use Disorder (AUD) and everyone who tries to turn their misery into inspiration and hope.

ABSTRACT

Background: Alcohol use disorder (AUD) is very common among people living with HIV (PLHIV), with 2-6 times the general population's prevalence, despite being connected to higher rates of morbidity and mortality among PLHIV. Furthermore, AUD increases sexual risk behaviors, which can, in turn, lead to further transmission of HIV. Despite these negative consequences, a paucity of studies have explored this problem in Tanzania. Hence, this study aimed to determine AUD's prevalence and associated factors among PLHIV attending Care and Treatment Centers (CTCs) in Moshi Municipal, Kilimanjaro.

Methods: A multifacility-based cross-sectional study was carried out among 532 PLHIV attending four CTC centers in Moshi Municipal, Kilimanjaro. A multistage cluster systematic sampling method was utilized to choose CTC centers and participants. The data were collected using standardized tools through interviewer administration. The statistical analyses were conducted using STATA (version 16). A binary logistic regression model was used to examine the associations between AUD and the independent variables. Odds ratios and their 95% confidence intervals were utilized to quantify the strength of these associations.

Results: The mean age of the study participants was 46.6 years (SD±13.3). The weighted prevalence of alcohol use disorder (AUDIT ≥ 8) in the past 12 months was 28.2%. Factors that were associated with AUD in this study in the final analysis model included male sex (AOR=4.18, P <0.001), healthcare level (Reference tertiary health facility: secondary health facility AOR=1.80, P<0.001), primary health facility (AOR=9.65, P<0.001), being divorced or widowed (AOR=2.82, P<0.001), having at least a secondary level of education (AOR=1.35, P=0.005), and having probable depression (AOR=2.48, P <0.001)

Conclusion: This study revealed a high prevalence of AUD among PLHIV, highlighting the need for enhancement of the integration of psychosocial services at CTCs.

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LIST OF ABBREVIATIONS

ART	Antiretroviral therapy
AU	Alcohol use
AUD	Alcohol use disorder
AUDIT	Alcohol Use Disorder Identification Test
CTC	Care and Treatment Center
DE	Design Effect
HASI	HIV/AIDS stigma instrument
HC	Health facility
HED	Heavy Episodic Drinking
HIC	High-Income Countries
HIV	Human Immunodeficiency virus
LMIC	Low- and Middle-Income Countries
MUHAS	Muhimbili University of Heath and Allied Sciences
PHQ-9	Patient Health Questionnaire-9
PLHIV	People living with HIV
SD	Standard Deviation
WHO	World Health Organization

DEFINITION OF TERMS

Alcohol – is a psychoactive substance characterized by the presence of a hydroxyl (-OH) functional group attached to a carbon atom that has dependence–producing properties. It is legal in most countries (Dianti, 2017)

A standard alcoholic drink -is a drink that contains 10 grams of pure alcohol (WHO, 2021)

Alcohol Use Disorder (AUD)- is a disorder where a person continues to consume alcohol despite considerable physical, mental, behavioral, social, or occupational alcohol-related problems (World Health Organization, 2018)

ART adherence- is defined as taking ART medications correctly and timely according to the prescription by the health practitioner. It is good adherence if a patient takes medication at ≥a 95% level as prescribed by the health practitioner (Sangeda et al., 2018)

HIV- refers to Human immunodeficiency virus which is the virus that attacks and weakens the body's immune system (World Health Organization, 2022)

Heavy Episodic Drinking (HED)- refers to a pattern of drinking in which an individual has had at least 60 grams (approximately 6 standard alcoholic drinks) or more of pure alcohol on at least one occasion in the past 12 months (World Health Organization, 2022)

Undetectable viral load- means the levels of Human immunodeficiency virus (HIV) in the blood are so low that the virus cannot be passed on (less than 20 copies of HIV RNA in a milliliter of blood) (World Health Organization, 2022)

People living with HIV (PLHIV) - refers to individuals who are infected with the Human immunodeficiency virus (HIV) (World Health Organization, 2022)

CHAPTER ONE: INTRODUCTION

1.1 Background

Given that it has resulted in 40.1 million fatalities since its discovery in the 1980s, HIV/AIDS continues to be one of the deadliest chronic health disorders (World Health Organization, 2022). In 2021 alone HIV/AIDS-related deaths were approximated to be around 650000 shedding light that it is indeed a major public health issue (Heath et al., 2021; World Health Organization, 2022). In 2021, there were over 38.4 million HIV-positive persons in the world, with 25.6 million of them living in Africa (Heath et al., 2021; World Health Organization, 2022). In addition, 1.5 million people acquired the virus that year alone. According to statistics, 4.8% of adults nationwide have HIV, making up about 1.7 million persons in Tanzania (World Health Organization, 2022)

Globally over 43% of the overall population that is at least 15 years old use alcohol and ap proximately 5.1% have alcohol use disorder (WHO, 2021). Alcohol use disorder is linked to various health problems ranging from mental and behavioral problems to non-communicable conditions like liver, cancers, as well as heart conditions. Moreover, alcohol use disorder is associated with injuries following violence and road traffic accidents (Organização Mundial de Saúde, 2022). For the year 2016 alone Alcohol Use Disorder (AUD) stemmed to about 5.3% of all deaths across the globe and 5.1 percent of all disability-adjusted life years. Alcohol use causes more deaths compared to major diseases like HIV/AIDS, TB, and diabetes (Hammer et al., 2018)

Among the risk factors that are associated with increased morbidity and mortality among PLHIV is alcohol use disorder (Akgün et al., 2013; Azar et al., 2010; Crawford & Thornton, 2019). This is because alcohol can exacerbate immunosuppression, lessen cognitive function, hinder viral suppression, and is associated with ART non-adherence which can contribute to treatment failure and ART resistance (Akgün et al., 2013; Baum et al., n.d.; Pokhrel et al., 2018; Velloza et al., 2020). Furthermore, alcohol use disorder increases sexual risk behaviors including unprotected sex which in turn leads to further transmission of HIV (Avalos et al., 2010; Gerbi

et al., 2009; Shuper et al., 2009). Therefore, alcohol use disorder is one of the main obstacles to UNAIDS, the Joint Programme on HIV/AIDS which aims by 2025, 95%-95%-95% of people will have had HIV testing, treatment, and have had their virus suppressed (Heath et al., 2021)

Alcohol Use Disorder (AUD) is highly prevalent among PLHIV (da Silva et al., 2017) with 2-6 times the overall population's prevalence (Galvan et al., 2002). Factors like young age, male gender, depression, family history of alcohol use disorder, low education level, HIV stigma, being employed, ART non-adherence, being single/unmarried, and poor social support have been demonstrated to be associated with AUD among PLHIV (Duko, Toma, et al., 2019)(Lipira et al., 2020; Lunze et al., 2017).

There is a paucity of published data from East Africa on the prevalence of AUD among PLHIV therefore, there is a need to determine the prevalence and associated factors of AUD among PLHIV in Tanzania.

1.2. Problem statement

According to studies, AUD is common in PLHIV and has been linked to higher rates of morbidity and mortality in this population through reducing immunological function, preventing viral suppression, impairing cognitive function, and indirectly by mediating the impact of ART non-adherence (Kahler et al., 2017). In addition, AUD has been found to increase risky sexual behavior and ultimately increase HIV transmission (Gerbi et al., 2009).

Little is known with regards to how prevalent this problem is in the Tanzanian context since very few studies have explored this area with most studies exploring the problem of alcohol use in the general population and not on PLHIV. Due to limited studies that have explored the prevalence and associated factors of AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro Tanzania, this study generates knowledge on the prevalence and factors associated with AUD among PLHIV and hence informs healthcare providers of the **need for** prevention, early diagnosis, and treatment of AUD among PLHIV especially those with less

advanced HIV infection and those who don't have any signs of chronic diseases like liver disease where the problem usually goes undiagnosed.

1.3. Conceptual framework

This study adopted the biopsychosocial model which was invented in 1977 by Dr. George Engel an American physician and psychiatrist. This model clarifies how illness can develop as a result of the intricate interactions between biological, psychological, and social factors. The biopsychosocial model's biological component explains how genetic and biochemical traits may contribute to the development of the illness, while the psychological component discusses how mood, personality, and behavior may affect the development of the illness. Finally, the social components of the model address issues like societal values and beliefs, religion, socioeconomic status, and familial ties. In this study, the biological factors that were investigated included age, sex, viral load, family history of alcohol use disorder, and ART non-adherence. The psychological and social factors included **depression,** education level, employment, HIV stigma, marital status, and social support. The interaction between these biological and psychosocial factors and how they can associate with AUDs is shown below:

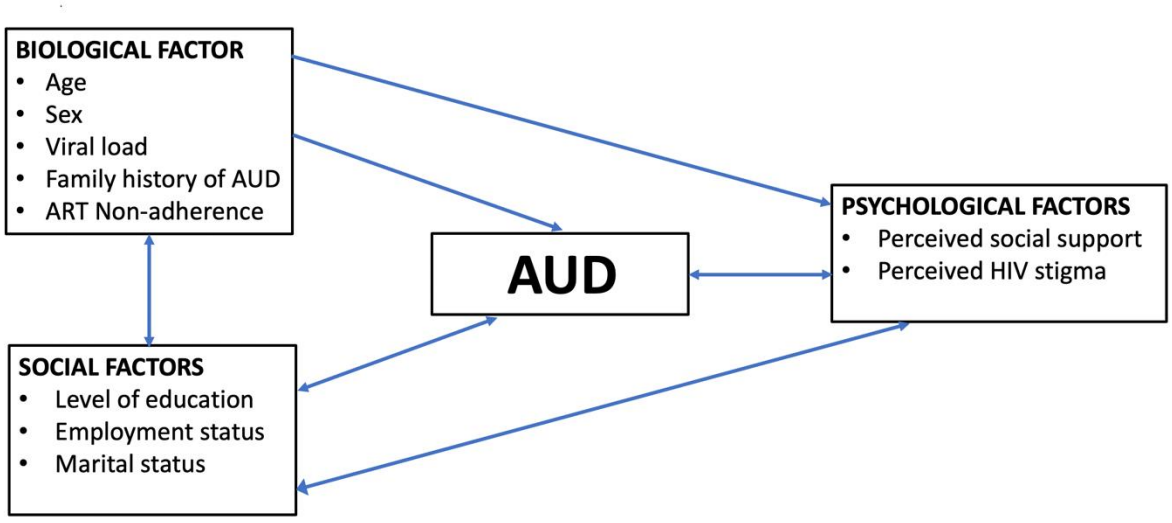


Figure 1: Conceptual framework following biopsychosocial model illustrating factors associated with AUD

1.4. Rationale of the study

This research aimed to determine the prevalence of AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro, Tanzania, and to determine factors associated with AUD in the same population.

The data which were obtained from this study give a picture of the prevalence of AUD among PLHIV and the factors associated and therefore highlight the need for mental health service integration among CTC Centres in Tanzania. Additionally, the information from this study supplements what is already known about the problems with mental health among PLHIV in Tanzania. This research is also one of my requirements for receiving a Master of Medicine in Psychiatry and Mental Health.

1.5. Research questions

1.5.1 Primary Research Question

What is the prevalence and factors associated with AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro?

1.5.2 Secondary Research Questions

1. What is the prevalence of AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro?
2. What are the factors associated with AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro?

1.6. Objectives

1.6.1 Broad objective

To determine the prevalence and associated factors of AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro.

1.6.2 Specific objectives

1. To determine the prevalence of AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro
2. To determine factors associated with AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro

1.7. Research hypothesis

1.7.1 Null hypothesis

There is no association between biological or psychosocial factors of interest and having probable AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro

1.7.2 Alternative hypothesis

There is an association between biological or psychosocial factors of interest and having probable AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro

CHAPTER TWO: LITERATURE REVIEW

The essence of this chapter is to give an overview of various literature on the prevalence and factors associated with AUD among PLHIV. It has been organized depending on specific objectives.

2.1. Prevalence of Alcohol Use Disorder (AUD) among PLHIV

Globally, AUD is among the common mental health challenges in PLHIV. A meta-analysis study that was done in both high-income and low- and middle-income countries found a pooled prevalence of 29.8% of AUD among PLHIV and more interestingly it found a heightened pooled prevalence in high-income countries (42.09%) compared to low-income countries (24.52%) (Duko, Ayalew, et al., 2019). The prevalence of AUD in PLHIV differs between countries. For instance, In America and European countries, a recent cohort study that was done in the US utilizing AUDIT-C as the measurement tool shows an estimated 39% prevalence of AU and 15% of AUD among PLHIV (Williams et al., 2021) in contrast to a Russian study, highlighted the heightened prevalence of 71% of AU and 62% of AUD among PLHIV (Patts et al., 2017) In Peru, a study done among HIV-positive males who engage in male-to-male sexual activity using AUDIT as the measurement tool showed a matching prevalence of AUD and depression to be 43.2% and 44.5% respectively, with 5.3% meeting the criteria for alcohol dependence (Ferro et al., 2015). A relatively low prevalence of AUD was seen in Brazil with an estimate of 28.6% prevalence and 5% of them meeting the criteria for alcohol dependence (da Silva et al., 2017). Similar results were also seen in Vietnam with a 30.1% prevalence of AUD (Xuan Tran et al., 2014).

In Africa, there are fewer published data on AUD contrary to the rest of the globe. For instance, the recent systematic review from low-middle-income countries pointed to a pooled prevalence of AUD to be 22.03% with a higher prevalence observed in South Africa (28.77%) than in Uganda (16.61%) and Nigeria (22.8%) respectively (Necho et al., 2020). The prevalence of harmful alcohol use of 7.8% was reported in Nigeria with 2.2% alcohol dependence (Egbe et al., 2017). A very recent South African study found a prevalence of 66% of current AU among

PLHIV (S. Kalichman et al., 2019) while studies from Ethiopia and Uganda did not differ much both showing the prevalence of AUD to be 31.8% and 27.7% respectively (Duko, Toma, et al., 2019; Wandera et al., 2017).

Very few studies in Tanzania have examined the problem of AUD among PLHIV. The only retrievable study that utilized PLHIV and TB co-infection, was done in Dar es Salaam and discovered the prevalence of 7.4% (Mwiru et al., 2018). The relatively low prevalence of AU among PLHIV in this study compared to other studies across the globe could be because this sample included PLHIV who were also TB co-infected.

2.2. Factors associated with Alcohol Use Disorder (AUD) among PLHIV

2.2.1 Biological factors

Age: Numerous research has revealed a strong association between age and AUD among PLHIV across the globe with most studies indicating that being younger is more associated with AUD. For instance, an American study that explored the problem of hazardous AU among PLHIV revealed that being younger than thirty years was associated with hazardous AU (Crane et al., 2017). Similarly, studies from the Tanzanian context have found substance use (including alcohol) among youth PLHIV to decrease by two times as the age at HIV diagnosis rises (Morawej et al., 2022)**.** Contrary findings were elicited in another Tanzanian study from the northern part of the country which found both heavy episodic drinking and AUD to increase with age however this study utilized a sample from the general population and not PLHIV (Mushi et al., 2022).

Sex: The majority of the studies both in high-income and low and middle-income countries have revealed that AUD among PLHIV is strongly associated with the male gender. This difference might result from variations in neurochemistry between men and women as it was observed an increased rate of dopamine release among men compared to women despite consuming similar levels of alcohol this could promote alcohol-seeking tendency and eventually increase the chances of AUD in men (Necho et al., 2020) and the second reason could be the cultural reason as some culture prohibit alcohol use in women and so decrease the likelihood of AUD in this

gender (Necho et al., 2020). A recent systematic review which included 25 studies in both high-income and low-income countries has shown that being male increases the likelihood of having AUD among PLHIV by two times compared to being female (Duko, Ayalew, et al., 2019) Likewise an African systematic review found an increased likelihood of AUD for about 5 times among male compared to female (Necho et al., 2020) Similar findings were observed in most of the sub-Saharan studies (Duko, Toma, et al., 2019; Necho et al., 2020; Shuper et al., 2009; Soboka et al., 2014). From the Tanzanian context similar observations were observed in several studies which explored the problem of AUD in the general population (Francis et al., 2015) Furthermore, a study from northern Tanzania revealed that the male gender has 4 times greater likelihood of being associated with heavy episodic drinking compared to being female however this study also utilized a sample from the general population and not PLHIV (Mushi et al., 2022).

Current viral load: Several studies across the globe have indicated that AUD in PLHIV has a significant association with viral load suppression. The majority of them point out that AUD in PLHIV is associated with viral non-suppression. For instance, a longitudinal cohort research conducted in the United States found that PLHIV with AUD were more likely to have a detectable viral load (23), which suggests viral load non-suppression. Similar findings were found by Miguez MJ and colleagues in their longitudinal cohort study, which showed that PLHIV with AUD are four times less likely to achieve viral suppression than non-drinkers (Miguez et al., 2003). In a similar vein, a South African study from a sub-Saharan setting discovered a direct association between AUD and viral non-suppression, with PLHIV with AUD having a 2 times greater risk of having viral load non-suppression (45).

Family history of AUD: As with most other mental illnesses, AUD has a genetic tendency and does run in families. Linkage studies carried out in families with multiple affected members have revealed that a wide range of loci may be connected to family variants of the disease (APA, 2018) This has been evidenced in several studies from both developed and developing countries. For instance, a systematic review carried out in three African nations revealed a strong positive association between AUD and a family history of AUD, with PLHIV who have a positive family

history of AUD having a 4 times higher likelihood of having AUD than those who do not (Necho et al., 2020)

ART non-adherence: There is a vast number of research both in developed and developing countries that have studied the problem of AUD among PLHIV and have linked it to poor adherence to ART. The majority of these studies have pointed out AUD as the major modifiable associated factor with ART adherence. For example, a systematic review from high-income countries pointed out that PLHIV who miss their ART medications are 50% more likely to be alcohol users (Woolf-King et al., 2022) similar findings were replicated in a sub-Saharan setting whereby non-adherent PLHIV were two times more likely to have AUD (Duko, Toma, et al., 2019). This link between ART non-adherence and AUD has partly been shown to be due to 1) forgetting to take medications due to the effects of alcohol intoxication or 2) interactive alcohol toxicity theory and 3) Avoiding ART whilst drinking. The term "alcohol ART interactive toxicity belief" refers to the notion that combining alcohol and ART can be harmful. It has been demonstrated that holding this view is significantly associated with ART non-adherence while drinking alcohol. The phenomenon of avoiding taking ART when drinking is referred to as ART avoidance behavior (S. Kalichman et al., 2019). Through their observational cohort study, Pellowski, J. A. et al. came to the firm conclusion that these beliefs contributed to ART non-adherence more so than other factors such as the amount of AU, depression, etc (Pellowski et al., 2016). Additionally, Kalichman, S. et al. reproduced similar findings from a cross-sectional study conducted at a hospital in South Africa, which showed that 24% of PLHIV who use alcohol stop taking their ART when drinking and 25% of PLHIV who use alcohol believe they should stop taking their ART when drinking (S. Kalichman et al., 2019). These data point to the need for additional education of PLHIV regarding the lack of known severe effects in patients with normal liver function, despite the fact that ART alcohol interaction can exacerbate hepatotoxicity in patients with pre-existing liver disease (S. C. Kalichman et al., 2022).

2.2.2 Psychosocial factors

Depression: Patients with long-term medical conditions, like HIV, frequently have to change their life objectives, aspirations, and lifestyles owing to their medical conditions, which causes emotional suffering and may eventually make them more susceptible to depression (Necho et al., 2020). Furthermore, a higher rate of depression among PLHIV has also been shown to be the result of a higher rate of HIV-related stigma (Olashore et al., 2021). Unfortunately, there is no available retrievable data that links depression and AUD among PLHIV. However, due to the fact that PLHIV who suffer from depression can use alcohol as their coping mechanism for depression (Felker-Kantor et al., 2019; Lyimo et al., 2014; Wardell et al., 2018) then arises a need to explore whether depression is associated with AUD

HIV stigma: Research has demonstrated that discrimination against people living with HIV is to blame for mental health and substance use issues in PLHIV (Felker-Kantor et al., 2019). The bulk of studies have revealed a stronger connection between HIV stigma and AUD among PLHIV. For example, in a longitudinal Russian study where the Berger HIV stigma scale was used as a measurement tool for HIV stigma, a significant association was seen between individuals with alcohol dependence and high HIV stigma (Lunze et al., 2017) emphasizing the need of intervening in both AUD and HIV-related stigma in this population. Furthermore, a South African study that was done in an HIV clinic elicited that high HIV stigma predisposes a person to AUD (Kekwaletswe & Morojele, 2014). In a Tanzanian context, much the same findings were seen in a study from the northern party of the country, both perceived and self-stigma (assessed using Berger and colleagues' stigma scale) were found to be prevalent in PLHIV attending HIV clinic in the rural part of Kilimanjaro (Lyimo et al., 2014)

Social support: Numerous studies have demonstrated the significance of social support for a person's health and life expectancy and the possibility that a lack of social engagement and inadequate social support may predispose someone to use substances as a coping technique. This is witnessed in a Russian study in a country that has the highest number of PLHIV in Europe whereby a significant association between AUD and having poor social support measured by the Social Provisions Scale (SPS)was noted (Ye & De, 2017). Similar findings were confirmed in a sub-Saharan setting among PLHIV from Ethiopia in a facility-based cross-sectional study, which found that 11.8% of their study participants began drinking alcohol due to a lack of social support (assessed using the Oslo 3-item social support scale), and they also discovered a significant association between lack of social support and AUD (Duko, Toma, et al., 2019) Moreover, a South African study pointed out that poor social support significantly predisposes PLHIV to AUD and this negatively affects ART adherence (Kekwaletswe et al., 2017).

Employment: Previous research from Tanzania among PLHIV has found that having a higher income and being employed is associated with AU. A study from Dar es Salaam Tanzania among PLHIV with TB co-infection found that high income increases the likelihood of AU in this population however it found no association between AUD and employment (Mwiru et al., 2018). Contrary to this observation another study from the capital city of Tanzania among youth PLHIV found that being employed is associated with an increased likelihood of substance use (Mpelo et al., 2018).

Marital status: The presence of AUD and depression in PLHIV has been linked to being in a marriage or relationship that shares those characteristics. Similar to other mental disorders, marriage protects against AUD, as seen by the 3 times lower risk of AUD in people in marriage-like relationships (Egbe et al., 2017). In the Tanzanian context, a study that looked at the issue of alcohol abuse in the general population in the northern portion of the nation also came to the same conclusions, showing that AUD was more common in single women than in married women (Mitsunaga & Larsen, 2008).

Education level: Several previous studies have pointed out the level of education among PLHIV to be one of the associated factors of AUD. For instance, a Brazilian hospital-based study revealed that having a low level of education is associated with an increased likelihood of AUD among PLHIV (da Silva et al., 2017) this could be due to the fact that being educated is associated with being more knowledgeable on the negative impacts of using alcohol hence playing a protective role. The majority of sub-Saharan research, though, has not discovered a connection between educational attainment and the current AUD (Duko, Toma, et al., 2019; Morawej et al., 2022; Mwiru et al., 2018).

CHAPTER THREE: METHODOLOGY

3.1. Study design

The study was a facility-based analytical cross-sectional study that used a quantitative approach to investigate the prevalence and factors associated with AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro.

3.2. Study population

The study population was **adult (aged 18 and above) PLHIV** who attended CTC centers at Moshi Municipal, Kilimanjaro who matched the inclusion criteria at the time of the study.

3.3. Study area and setting

The research was carried out at CTC centers located at Moshi, Kilimanjaro. With about 184,292 residents and 58 square kilometers, Moshi Municipal Council is one of the seven districts located in the Kilimanjaro area (Republic et al., 2013). It serves about 800-1200 PLHIV a week across a total of 21 wards and 19 CTCs. The services offered at CTCs are integrated into all levels of healthcare facilities, from the lower primary level (health centers and dispensaries) to the secondary level (Mawenzi Regional Referral Hospital) and higher tertiary level (Kilimanjaro Christian Medical Center -KCMC Zonal hospital).

3.4. Sample size calculation

In accordance with a study conducted in Hawassa City, Ethiopia, where the prevalence of AUD among PLHIV was 31.8% (Duko, Toma, et al., 2019). Ethiopia also belongs to the Sub-Saharan region of Africa, much like Tanzania. There was no Tanzanian retrieval study that examined the scope of AUD among PLHIV and the contributing factors, therefore:

Utilizing Cochran's (1977) sampling formula

$$n = \frac{Z^2 p(1-p)}{e^2}$$

Whereby:

n - Estimated sample size.

Z - Confidence level.

P - Proportion of those with the condition of interest

e - Level of precision

5% level of significance, 95% confidence interval%

$$n = \frac{1.96^2 \times 0.318(1-0.318)}{0.05^2}$$

n= 333.26

Assuming a 10% non-response rate of the required minimum sample size, the correction is completed, and n=366.586 =367

Hence sample size n= 367

Design effect: Since this study involved different levels of health facilities (clusters) we adjusted for cluster variations by calculating the design effect utilizing the adjusted intracluster correlation coefficient that was used in the same region by a Tanzanian researcher who also explored the same problem of AUD on the general population and then multiplying it with calculated sample size from the crossectional study above (Adams et al., 2004; Mushi et al., 2022)

$$DE = 1 + \sigma(n - 1)$$

DE- Design effect

σ- Intracluster correlation coefficient (0.005) (Adams et al., 2004)

n - Average number of clusters (estimated sample size divided by number of health facilities, =367/4)

$$DE = 1 + 0.005(367/4 - 1)$$

DE=1.45

Adjusted sample size = 367 X 1.45=532

Therefore, the final sample size was 532.

3.5. Sampling Technique

This study used a multistage cluster systematic sampling technique.

The first level was a selection of CTC centers at Moshi Municipality. At this level, we used the purposeful sampling technique to select 4 CTC centers among the 19 CTCs based on levels of health facilities. Kilimanjaro Christian Medical Center (KCMC) and Mawenzi Regional Referral Hospital (MRRH) were purposefully selected since they are the only tertiary and secondary-level health facilities respectively. At the Primary level, we selected Pasua and

Majengo health centers due to the fact that they both have high numbers of attendance compared to the rest of the facilities in their category.

The second level was a selection of participants at the facility level. This was divided into four stages.

In the first stage, we specified the number of individuals to be enrolled at each facility. This was achieved through the use of proportional sampling whereby we obtained data on the total number of enrolled CTC attendance from the selected facilities (KCMC-2645, MRRH-3883, PASUA-1083, MAJENGO-1347). From the total CTC attendance, we calculated the proportion of attendance of each facility and afterward used this proportion to calculate the number of individuals to be enrolled at each of the four facilities which were KCMC-157, MRRH-231, PASUA-64, and MAJENGO-80.

In the second stage, we specified the number of individuals to be enrolled at each facility on each day of data collection. Data for this study was gathered over the course of a month., and since most of these facilities operated on weekdays, we, therefore, estimated to collect data for 5 days in 4 weeks. With this in mind, we divided the calculated number of participants from each facility from stage 1 by 20 days. This gave us the number of participants to be recruited on each day of data collection for each facility which is KCMC-8, MRRH- 12, PASUA- 3, and MAJENGO-4.

In the third stage, we determined the number of male and female participants to be recruited in the study separately because sex has been associated with AUD. To achieve this, we computed the proportion of men and women who were recruited for this study by first calculating the average patient attendance of male and female patients at the facility level over the previous month. The precise number of male and female participants that were recruited at each facility was subsequently determined using the calculated proportions.

In the fourth stage, we determine which sampling procedure to be used; as more women than men attend CTCs, with an approximate ratio of men to women of 1:3, Men were oversampled to ensure an adequate sample size that aimed for equal representation of men and women as gender had a strong association with AUD, therefore, all men were recruited and a systematic sample of one in three women was recruited using a systematic random sampling technique. To achieve this, we used a CTC register to list all CTC attendees on our recruitment forms for that particular day. The recruitment forms were separate for males and females. We then assigned numbers to all listed female patients and systematically picked the 3rd participants.

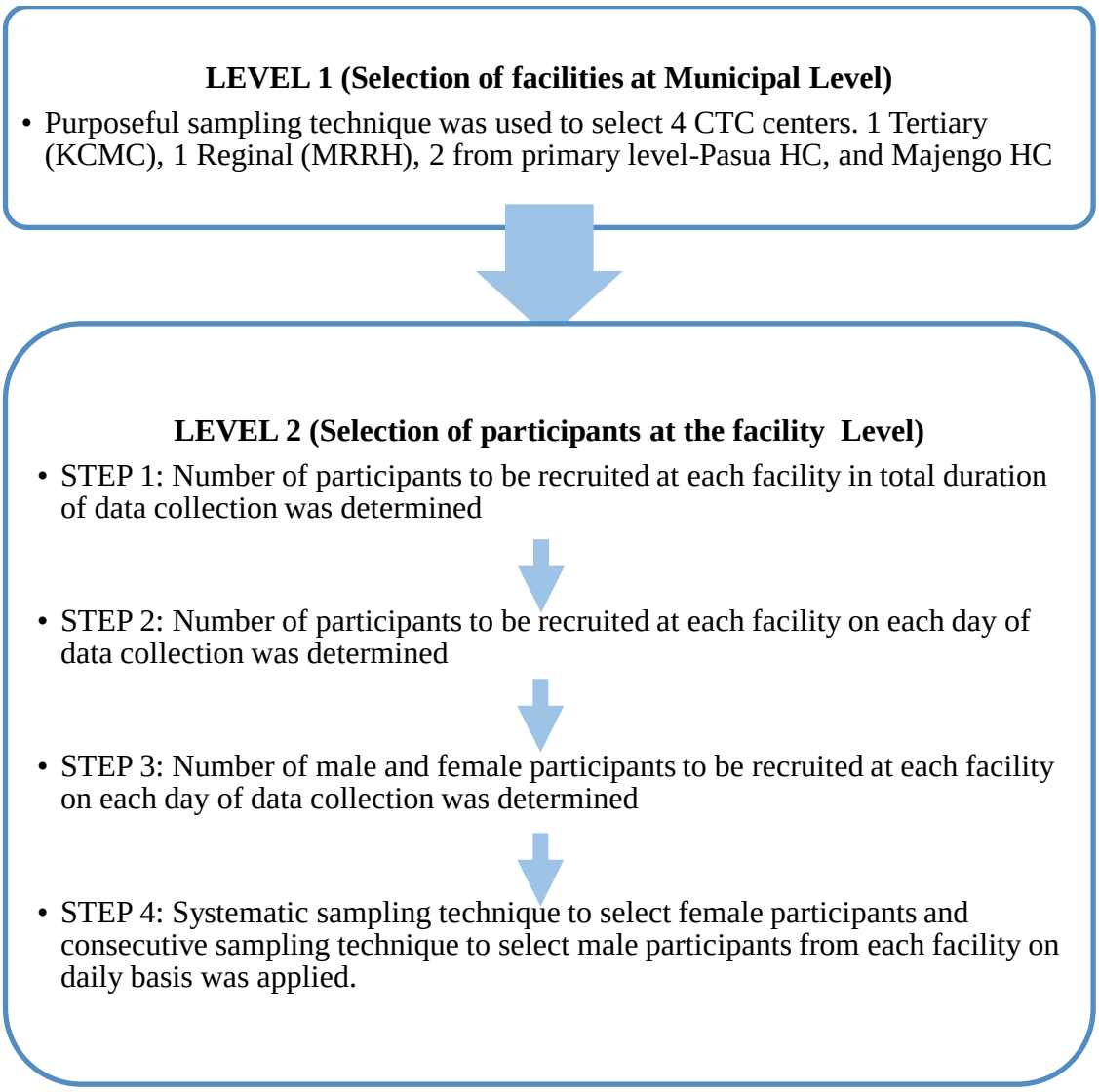


Figure 2: Summary of the Sampling Procedure

3.6. Inclusion and exclusion criteria

3.6.1. Inclusion criteria:

Adult PLHIV who were available at the time of data collection, aged 18 years and above, at least 6 months on ART treatment, and gave informed consent to take part in the research.

3.6.2. Exclusion criteria:

Those who were not able to participate due to **being physically too ill to be able to communicate**

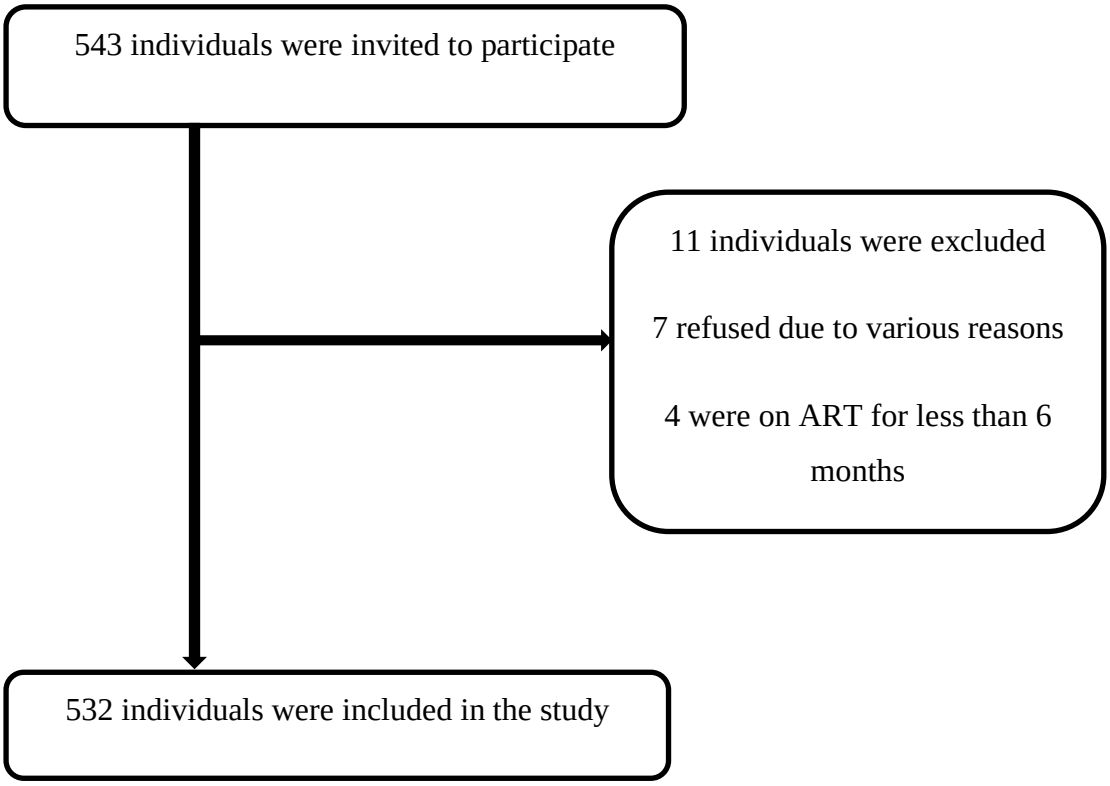


Figure 3: Flow chart of the participant's r recruitment

3.7. Measures and Variables

3.7.1. Independent Variables

Biological factors: Age, sex, family history of alcohol use, and ART non-adherence

Psychosocial factors: depression HIV stigma, social support, education level, employment, and marital status.

3.7.2. Dependent Variable

AUD

3.8. Tools and measurement

All tools were interviewer-administered and were translated into Swahili language since most of the participants used Swahili as their main official language for communication and they were administered by both researcher and research assistants using REDCap software. Tools that captured all variables of interest are listed below:

Socio-demographic questionnaire: This was the researcher-designed tool based on sociodemographic factors associated with AUD in previous works of literature and was used to capture information on age, sex, education level, marital status, employment status, and family history of AUD.

Patient's medical records: I kept track of viral load using patient files and CTC cards.

Duke-UNC Functional Social Support Questionnaire (FSSQ): This tool was originally designed to assess perceived social support among family medicine patients. It is often used as a self-administered evaluation tool and covers multiple dimensions of social support including material, emotional, physical/instrumental, and social aspects. The 14 items are rated on a Likert scale of 1 to 5, with a score of 5 representing total satisfaction with level of support and a score of 1 for total dissatisfaction. The higher scores, therefore, indicate higher levels of social support with a maximum score of 70. For this study, scores were categorized into tertiles; poor (14-23.3), fair/average (23.4-46.6), and good (46.7-70) (Ziaei et al., 2015). This tool has demonstrated good construct and concurrent validity, however, shows questionable internal consistency with a reported Cronbach's alpha value of 0.66 (Broadhead et al., 1988) whereas a more recent study from 2013 showed very good reliability, with a value of 0.87 (Amador-campos & Mas-expo, 2013).

This tool has not been validated nor adapted to the Tanzanian cultural context however it has been used by Tanzanian researchers on the same population of PLHIV in the same setting of northern Tanzania in a very recent study of 2023 assessing newly diagnosed depression (Madundo et al., 2023).

Patient Health Questionnaire (PhQ-9): The PHQ-9 is a flexible tool for detecting depression and for diagnosing, tracking, and assessing its severity (Kroenke et al., 2001). It condenses DSM-5 TR 2022 criteria with additional major depression symptoms into a validated short self-reporting tool. There are nine items on the survey that inquire about how frequently participants have had depressive symptoms within the last two weeks. With a maximum score of 27, each statement can receive a score ranging from 0 to 3 (where 0 equals not all, 1 means a few days, 2 means more than half the days, and 3 means virtually every day). A score of 0-4 indicates no symptoms, 5-9 suggests mild depression, 10-14 indicates moderate depression, 15-19 indicates fairly severe depression and 20-27 indicates severe depression. According to George and Mallery (2003), it is validated in the Tanzanian context and tailored to the participants with a Cronbach's Alpha of 0.83 and cut-off points of 9 (60). People who score nine or more are depressed, whereas those who score less are not. The majority of Tanzanians speak Swahili; hence a Swahili version of the tool has been created.

Alcohol use disorders identification test (AUDIT): This instrument was used to evaluate AUD. With the use of pictorial representations of various alcoholic beverages. (Calculated based on a standard drink) that are commonly consumed in the Kilimanjaro region participants identified the kinds of alcoholic drinks they use. This approach has been used in a previous study within the study region (Francis et al., 2015). This study adopted WHO's definition of a standard alcoholic drink which is a drink that contains 10 grams of pure alcohol (Stockwell et al., 2000). AUDIT is a fully structured questionnaire, it has 10 elements and assigns a score between 0 and 40 with different cut-offs which are < 8 indicates no AUD, a score of at least 1 indicates AU while scores ≥ 8 indicate the presence of AUD which are further classified into three categories

depending on the scores as follows; 8 to 15 implies hazardous drinking, 16 to 19 shows harmful drinking, and 20 or higher indicates likely alcohol dependence. The AUDIT has not been validated in Tanzania, but it was derived based on international studies that covered sub-Saharan nations Kenya Mozambique, and Ethiopia (Atkins et al., 2021; Habtamu & Madoro, 2022). In Ethiopia, Cronbach's alpha for AUDIT was determined to be 0.9., with a sensitivity of 92%, and a specificity of 87% (SAUNDERS et al., 1993). It has been translated into the Swahili language and used in previous studies in northern Tanzania (Francis et al., 2015; Mushi et al., 2022)

The HIV/AIDS stigma instrument (HASI-P) was utilized to evaluate the HIV-related stigma. It is the 12-item scale used to measure HIV/AIDS stigma. Items cover issues with personal stigma, bad self-image, disclosure, and public opinion. Higher scores indicate higher anticipated stigma. It is assessed on a four-point scale from "1-Strongly disagree" to "4" for a total score of 12-48. It has been validated in five African nations: Lesotho, Malawi, South Africa, Swaziland, and Tanzania and it was discovered to have Cronbach's >0.7 with a cut-off score of ≥ 30 indicating high perceived HIV stigma and a score of < 30 reflecting low perceived HIV stigma (Holzemer et al., 2007). It has been utilized by Tanzanian researchers on the same population of PLHIV in the same setting of northern Tanzania in a relatively recent 2023 study that addressed the problem of depression and suicide ideation (Gamassa et al., 2023)

CASE Adherence tool: was used to measure ART non-adherence, The Center for Adherence Support Evaluation (CASE) at the New York Academy of Medicine (NYAM) developed this test. There are three adherence-related questions in it: (according to the Likert scale) How frequently do you feel you struggle to take your HIV medications on time? How many days a week, on average, would you say you missed taking at least one HIV medicine dose? When was the last time you failed to take at least one HIV medicine dose? Better adherence is indicated by a higher composite score (greater than 10), while non-adherence is indicated by a score less than or equal to 10. The Adult AIDS Clinical Trial Group (AACTG) three-day self-reported adherence data and the CASE Adherence Index showed a substantial correlation (p 0.001), and the CASE Adherence Index is more closely correlated with HIV outcomes and fared equally well as the three-day self-report for predicting CD4 cell count status (Ahn & Jun, 2007). This

tool has not been validated in Tanzania, but it was utilized in a Kenyan study, an Eastern African country that shares a cultural context with Tanzania. The study was also multiple facility-based cross-sectional study similar to the present study that assessed the magnitude of ART adherence among adults PLHIV attending CTCs in Nairobi (Wakibi et al., 2011). Forward and backward translation was done whereby the tool was first translated into Swahili version by an independent translator and then it was translated back to English version by the second independent translator finally consensus meeting was done to make sure the original meaning of each item of the tool was maintained.

3.9. Data collection procedure

Data were gathered by the researcher and four qualified research assistants with a background in medicine. Patient medical records were used to identify potential study participants. Clients who were at CTC centers at the time of data collection were contacted and requested to voluntarily take part in the study. The clients who objected were acknowledged and permitted to continue using the clinic's services and were assured that their decline to take part in the research wouldn't impair the provision of their services. After the informed consent was obtained a set of developed questionnaires were used to conduct face-to-face interviews for about 30 minutes. Identifying data of the participants were not gathered and the interview took place in a private room.

3.10. Data Analysis Plan

The statistical analyses were conducted using STATA (version 16). Categorical variables were summarized using frequencies and percentages, while continuous variables were described using means and standard deviations. The presentation of results utilized tables and figures.

Bivariate and multivariable logistic regression models were conducted to ascertain the existence of associations between independent and outcome variables. These models were adjusted for sampling weights and clustering by sites to account for unequal selection probabilities and design effects. Odds ratios, along with their corresponding 95% confidence intervals, were

calculated to assess the associations between the independent variables and dependent variable (AUD) with a significance level set at $p<0.05$

3. 11. Recruiting and training research assistants

To help with data gathering, four research assistants with credentials in medicine were hired. They received training on the study's methods, which covered developing rapport with research participants, obtaining informed consent, conducting interviews using questionnaires, and ethical concerns.

3.12. Pre-testing of the study instruments

Pre-testing of the data-gathering tools was carried out by randomly selecting 5 clients from each CTC center and then administering the questionnaires. This exercise was conducted by both the researcher and research assistants. This was an important process because it shed light as if the tools were easily understandable and it gave an overview of the estimated time required to conduct interviews. The identified gaps were used to refine data collection tools and make other adjustments accordingly.

3.13. Ethical issues

The Muhimbili University of Health and Allied Sciences (MUHAS) Senate's Research and Publication Committee was asked for ethical approval before this study was carried out, the Regional Administrative Secretary (RAS), the District Medical Officer (DMO) and the officers in charge of the relevant CTC clinics also signed off on a letter granting permission to conduct the study in a hospital setting.

Participants were only recruited after they had given informed consent and voluntary participation was encouraged with insurance of lack of consequences if participation was declined. Furthermore, participants had the right to revoke consent at any moment before, during, or after the interview.

Confidentiality of the participants was also observed as no identification details were gathered and the interviews were carried out in an enclosed room to ensure privacy. Participants were informed that no time or travel expenses would be compensated, but the entire process was handled carefully to prevent interfering with the clinic's regular service schedule.

No data from this study was communicated over email; instead, it was all kept on the investigator's computer with passwords secured. To share information among investigators, we did so using end-to-end encryption. All data containing materials will be destroyed after the publication of this study

All individuals who scored highly on the AUDIT and PHQ-9 instruments, and those who reported having suicidal behaviors, were informed about the meaning of their scores. They were then directed to Mawenzi or the KCMC Psychiatry department for the necessary mental health assistance, as communicated to them initially before the commencement of the interview while obtaining informed written consent.

CHAPTER FOUR: RESULTS

4.1 Sociodemographic and clinical characteristics of the participants

This study enrolled 532 participants from September to October 2023. The mean age of the participants was 46.6 (SD±13.3) with just above half (56.4%) of the participants falling under middle adulthood age of between 36–59 years. Approximately three-quarters (71.4%) of the participants were female. Over two-fifths of them were attending secondary health facility level (Mawenzi Regional Referral Hospital) with 231 (43.4%) participants.

Just above two-fifths of the sample participants (41%) were married or cohabiting while about a third of the participants (36.8%) were divorced or widowed. Nearly two-thirds (64.7%) had a primary level of education, over three-quarters (76.7%) were employed in a formal sector or self-employed and nearly one-third of all participants (32.1%) had detectable viral load in their most recent viral load measurements.

Just above a quarter of all the participants (27.1%) reported having a positive family history of alcohol use disorder and over two-thirds (66.4%) of the participants had a poor level of perceived social support. Nearly one-sixth (14.8%) had screened positive for probable depression and approximately seven out of ten study participants (71.6%) had experienced a high level of perceived HIV stigma. Approximately one-tenth of the study participants (10.7%) had poor adherence to their ART. Table 1 displays the sociodemographic and clinical characteristics of the participants.

Table 1: Sociodemographic and clinical characteristics of participants (N=532)

Characteristics	Observations, n (%)	Mean (SD)
Age, years		46.6 (13.3)
Age group, years		
18–35	141(26.5)	
36–59	300 (56.4)	
≥60	91 (17.1)	
Sex		
Female	380 (71.4)	
Male	152 (28.6)	
Site		
Tertiary HF	157 (29.5)	
Secondary HF	231 (43.4)	
Primary HF	144 (27.1)	
Marital status		
Single/never married	118 (22.2)	
Married/Cohabiting	218 (41.0)	
Divorced/Widowhood	196 (36.8)	
Education level		
None	20 (3.8)	
Primary	344 (64.7)	
Secondary	136 (25.6)	
College/Higher	32 (5.9)	
Current occupation		
Unemployed	124 (23.3)	
Employed	408 (76.7)	
Recent viral load count		
Not detected (<20 copies/ml)	361 (67.9)	
Detected (≥ 20 copies/ml)	171 (32.1)	
Family history AUD		
No	388 (72.9)	
Yes	144 (27.1)	

Table 1: Continue

Characteristics	Observations, n (%)	Mean (SD)
Level of social support		
Poor (14-23.3)	353 (66.4)	
Average (23.4-46.6)	129 (24.3)	
Good (46.7-70)	50 (9.3)	
Probable depression		
No (score < 9)	453 (85.2)	
Yes (score ≥9)	79 (14.8)	
Level of perceived HIV stigma		
High (score ≥30)	381 (71.6)	
Low (score <30)	151 (28.4)	
Adherence to ART		
Good (score >10)	475 (89.3)	
Poor (score ≤10)	57 (10.7)	

Key: HF=Health Facility

4.2 Prevalence of AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro

Overall, just above half of all participants recruited (52.8%) reported using alcohol in the past 12 months, and nearly one-third of them (29.7%) reported being heavy episodic drinkers. The weighted prevalence of Alcohol Use Disorder (AUDIT ≥ 8) was 28.2%. According to the AUDIT score of individuals who reported they had used alcohol within the previous 12 months, 18.0% had hazardous alcohol use (AUDIT score 8-15), 4.0% had harmful alcohol use (AUDIT score 16-19) and 6.2% had probable alcohol dependence (AUDIT score ≥ 20). Figure 4 shows the prevalence of Alcohol Use Disorders (AUD).

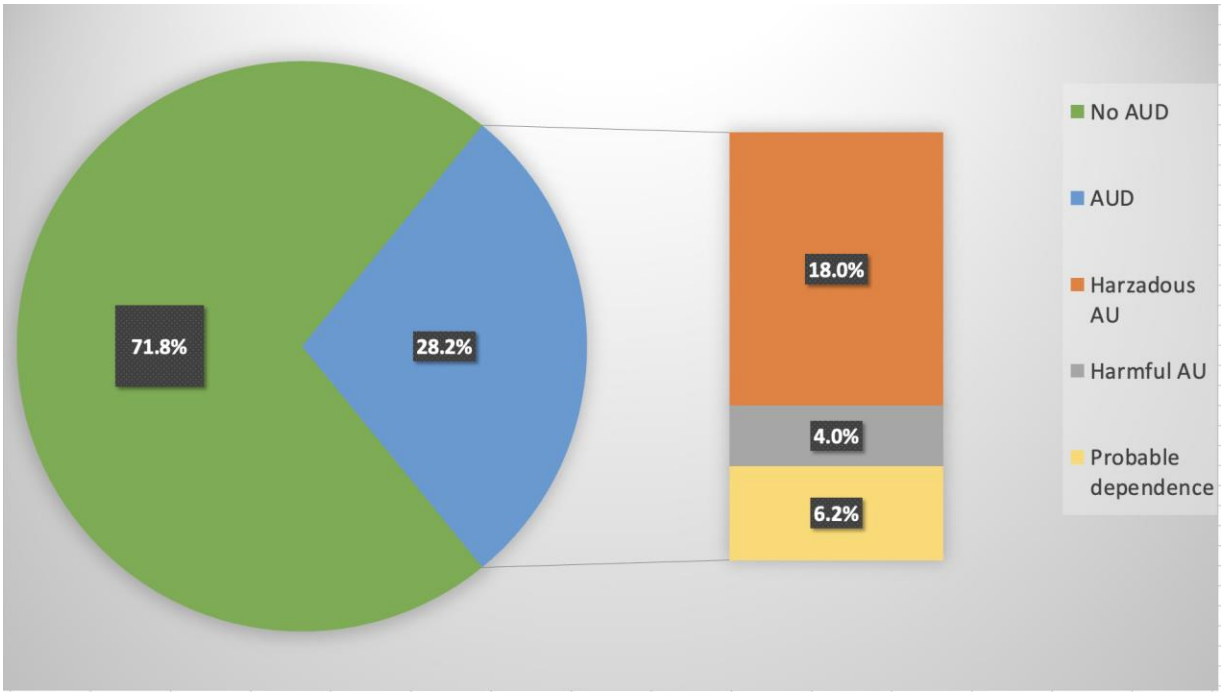


Figure 4: Prevalence of AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro

4.3 Factors Associated with AUD among PLHIV attending CTC centers at Moshi Municipal, Kilimanjaro

Bivariate and multivariate analysis were performed on all independent variables that were studied and variables with a p-value of equal or less than 0.05 were declared to have statistically significant association with AUD.

The variables that were statistically significantly associated with AUD on multivariate analysis were biological factors: gender, probable depression, and poor adherence to ART and psychosocial factors: study site, marital status, and education level.

Gender was identified as an associated factor for AUD, with male participants being four times more likely to have AUD compared to females (AOR=4.18, 95% CI: 3.84-4.54, P <0.001) and participants who screened positive for probable depression had over two times higher likelihood of having AUD compared to those who screened negative for depression (AOR=2.48, 95% CI: 2.15-2.86, P <0.001). The last biological factor to be associated with AUD in multivariate analysis in this study was adherence to ART whereby participants who reported poor adherence to ART were twice more likely to have AUD compared to their counterparts (AOR=2.16, 95% CI: 1.22-3.82, P=0.008).

For psychosocial factors, the study site was found to have an association with AUD whereby participants attending the primary health facility level (Majengo and Pasua health centers) and secondary health facility level (Mawenzi regional referral hospital) were more likely to have AUD compared to participants attending tertiary health facility level (KCMC Zonal hospital) and this association was statistically significant with p-values less than 0.001. Participants attending primary health facilities (Majengo and Pasua health centers) were nearly ten times more likely to have AUD compared to those attending tertiary health facility (KCMC Zonal hospital) (AOR=9.65, 95% CI: 7.64-12.18, P<0.001) while participants attending a secondary health facility (Mawenzi regional referral hospital) were nearly two times more likely to have AUD compared to those attending tertiary health facility (KCMC Zonal hospital) (AOR=1.80, 95% CI: 1.68-1.93, P<0.001).

Additionally, participants who were divorced or widowed were thrice more likely to have AUD compared to participants who were never married (AOR=2.82, 95% CI: 1.58-5.04, P<0.001) and participants who had at least secondary level of education had thirty-five percent higher likelihood of having AUD compared to those participants who had never gone to school or had only a primary education level (AOR=1.35, 95% CI: 1.09-1.68, P=0.005).

Moreover, four factors; which were the age group between 36 and 59 years (COR=1.39, 95% CI: 1.28-1.50, P<0.001), detectable viral load (COR=1.33, 95% CI: 1.20-1.48, P<0.001), family history of AUD (COR=2.04, 95% CI: 1.39-2.98, P<0.001), and poor (COR=0.47 95% CI: 0.29-0.77, P=0.003) to average social support (COR=0.78, 95% CI: 0.64-0.96, P=0.017) were found to be associated with AUD only in bivariate analysis however after adjusting for other variables at the multivariate analysis stage these associations were found to be not statistically significant. Table 2 displays the bivariate and multivariate analysis results to determine factors associated with AUD.

Table 2: Bivariate and Multivariate analysis to determine factors associated with AUD

Variable	Total	Reported AUD	COR (95% CI)	P	AOR (95% CI)	Adj.P
Age group, years						
18–35	141	27 (19.2)	Ref		Ref	
36–59	300	74 (24.7)	1.39 (1.28-1.50)	<0.001*	1.06 (0.81-1.39)	0.680
≥60	91	22 (24.2)	1.48 (0.44-4.99)	0.528	1.22 (0.31-4.83)	0.773
Sex						
Female	380	63 (16.6)	Ref		Ref	
Male	152	60 (39.5)	3.48 (2.74-4.40)	<0.001*	4.18 (3.84-4.54)	<0.001*
Site						
Tertiary HF	157	17 (10.8)	Ref		Ref	
Secondary HF	231	39 (16.9)	1.67 (1.67-1.67)	<0.001*	1.80 (1.68-1.93)	<0.001*
Primary HF	144	67 (46.5)	7.17 (7.17-7.17)	<0.001*	9.65 (7.64-12.18)	<0.001*
Marital status						
Single/never married	118	20 (17.0)	Ref		Ref	
Married/Cohabiting	218	45 (20.6)	1.55 (0.98-2.46)	0.063	1.52 (0.56-4.19)	0.411
Divorced/Widowhood	196	58 (29.6)	2.25 (1.68-3.00)	<0.001*	2.82 (1.58-5.04)	<0.001*
Education level						
Informal/primary	364	82 (22.5)	Ref		Ref	
Secondary	136	33(24.3)	1.15 (0.97-1.37)	0.115	1.35 (1.09-1.68)	0.005*
College/Higher	32	8(25.0)	1.72 (0.41-7.26)	0.462	3.47 (0.56-21.37)	0.179
Current occupation						
Unemployed	124	30 (24.2)	Ref		Ref	
Employed	408	93 (22.8)	0.90 (0.69-1.18)	0.440	1.01 (0.76-1.45)	0.930

Table 2: continue

Variable	Total	Reported AUD	COR (95% CI)	P	AOR (95% CI)	Adj.P
Recent viral load count						
Not detected	361	78 (21.6)	Ref		Ref	
Detected	171	45 (26.3)	1.33 (1.20-1.48)	<0.001*	1.34 (0.92-1.96)	0.129
Family history AUD						
No	388	78 (20.1)	Ref		Ref	
Yes	144	45 (31.3)	2.04 (1.39-2.98)	<0.001*	1.76 (0.98-3.15)	0.058
Level of social support						
Good	50	17 (34.0)	Ref		Ref	
Average	129	37 (28.7)	0.78 (0.64-0.96)	<0.017*	0.90 (0.42-1.28)	0.795
Poor	353	69 (19.6)	0.47 (0.29-0.77)	<0.003*	0.55 (0.22-1.34)	0.186
Probable depression						
No	453	91 (20.1)	Ref		Ref	
Yes	79	32 (40.5)	3.07 (1.98-4.76)	<0.001*	2.48 (2.15-2.86)	<0.001*
Level of perceived HIV stigma						
Low	151	35 (23.1)	Ref		Ref	
High	381	381(23.2)	1.18 (0.66-2.11)	0.573	1.05 (0.44-2.50)	0.927
Adherence to ART						
Good	475	100 (21.5)	Ref		Ref	
Poor	57	23 (40.4)	2.73 (1.49-5.01)	0.001*	2.16 (1.22-3.82)	0.008*

Key: CI = Confidence Interval, COR = Crude Odds Ratio, HF=Health Facility
AOR = Adjusted Odds Ratio, Adj. P = Adjusted P value, * = p<0.05

CHAPTER FIVE: DISCUSSION

5.1 Prevalence of Alcohol Use Disorder among PLHIV

The prevalence of AUD among PLHIV in the past 12 months in this study using the AUDIT tool with a cut-off of ≥8 was 28.20%. This is consistent with findings from previous studies conducted both globally and locally. Systematic review and meta-analysis that was done in both high and low-middle-income countries, for example, found a pooled prevalence of AUD among PLHIV to be 29.80%, (Duko, Ayalew, et al., 2019) similar findings were also replicated in studies from middle-income countries such as Brazil and Vietnam which found the prevalence of AUD among PLHIV utilizing AUDIT tool to be 28.6% and 30.1% respectively. Likewise, studies from Sub-Saharan African countries also reported similar results, whereby Ethiopian, Ugandan, and South African studies reported a prevalence of 31.80%, 27.70%, and 28.77%, respectively.

However, some studies from high-income countries detected higher prevalence compared to the present study. For instance, the pooled prevalence of 42.09% was revealed from a systematic review of high-income countries, and 62% from a Russian study (Duko, Ayalew, et al., 2019; Hershow et al., 2018; Necho et al., 2020; Patts et al., 2017). The possible explanation for this difference may be due to socioeconomic factors, as many participants from high-income countries may have higher incomes compared to those from low-income countries, and therefore may be able to afford alcohol. Additionally, cultural norms surrounding alcohol consumption, such as the tradition of drinking alcohol with meals in high-income countries, may also contribute to this variation (WHO, 2021). Another possible explanation may be access to better healthcare and improved ARV medications. This access might lead to better physical health, consequently influencing increased drinking habits among participants (Pokhrel et al., 2018). In contrast, individuals from low-income countries might drink less due to being more physically ill, attributed to limited access to quality healthcare services (Pokhrel et al., 2018;Galvan et al., 2002). Similarly, a relatively higher prevalence of 43.20% AUD was observed among HIV-positive males who engaged in male-to-male sexual activity in a Peruvian cohort study which

also utilized AUDIT as the measurement tool (Ferro et al., 2015). This higher prevalence in this Peruvian study may again be explained by two possible reasons; one because this study employed only male participants who were shown to be more predisposed to AUD due to biological and sociocultural backgrounds and secondly because this population could be encountering more stress due to criticisms from moral and religious individuals hence, they could be using substances such as alcohol to cope(Ferro et al., 2015; Stockwell et al., 2000;Wardell et al., 2018).

5.2 Factors Associated with Alcohol Use Disorder among PLHIV

Alcohol Use Disorder among PLHIV can be attributed to multiple factors. Logistic regression models were used to predict these associations. Significant factors that were independently associated with AUD in this study included male gender, study site, being divorced or widowhood, having at least a secondary level of education, having probable depression, and having poor adherence to ARV medications.

Male gender was identified as an associated factor that increased the likelihood of having AUD in this present study. This is also a finding from multiple other previous studies across the globe as well as from Sub-Saharan Africa (Duko, Ayalew, et al., 2019; Francis et al., 2015; Mushi et al., 2022; Necho et al., 2020; Shuper et al., 2009; Soboka et al., 2014). This difference might result from variations in neurochemistry between men and women as it was observed an increased rate of dopamine release occurs among men compared to women despite consuming similar levels of alcohol and this could promote alcohol-seeking tendency and eventually increase the chances of AUD in men (Necho et al., 2020) as well socio-cultural beliefs whereby in most societies men to be involved in drinking tendency is more acceptable compared to female(Soboka et al., 2014).

Study participants attending lower levels of health facilities that is primary health care level (Pasua and Majenjo health centers) as well as secondary health care level (Mawenzi regional referral hospital) were more likely to have AUD compared to those participants attending higher

tertiary level (KCMC zonal hospital) in this study. This may be explained by KCMC being a tertiary referral hospital, where psychosocial interventions, including brief interventions such as psychoeducation and motivational interviewing about alcohol use, are integrated into its CTCs (NASP, 2019). Additionally, specialized mental health services are available for severe cases of AUD, potentially resulting in a lower likelihood of AUD compared to participants attending primary and secondary health facilities where these services are limited (Ministry of Health, 2019; NASP, 2019).

This study detected an association between marital status and AUD whereby participants who were widowed or divorced had an increased likelihood of having AUD compared to have never been married. This finding is in line with a Nigerian study (Egbe et al., 2017). Widowhood and divorce are among the most traumatic life events that are most linked to negative stress(Bernabei et al., 2011;Hong et al., 2015). Widowed people report worse mental health and more depressive symptoms than never-married and married people hence more likely to abuse substances such as alcohol as a coping mechanism (Yimer et al., 2021). Education level was also found to be associated with AUD in the present study whereby having at least a secondary level of education increased the chances of having AUD compared to having no formal education or having a primary level of education. This finding is contrary to some other previous studies which noted the low level of education to be associated with AUD (da Silva et al., 2017). The probable explanation for this finding may be having at least a secondary level of education is associated with more knowledge of the lack of direct interaction between ARV medication and alcohol hence the lack of known severe effects (S. C. Kalichman et al., 2022) and therefore higher likelihood of using alcohol.

Additionally, probable depression also showed a significant association with AUD in this study whereby participants who screened positive for depression had an increased likelihood of having AUD compared to their counterparts. This finding may be explained by the reason that patients with long-term medical conditions, like HIV, frequently have to change their life objectives, aspirations, and lifestyles owing to their medical conditions, which causes emotional suffering and may eventually make them more susceptible to depression and hence consuming alcohol as

the copying mechanism and to self medicate their depressive symptoms (Felker-Kantor et al., 2019; Wardell et al., 2018)(Felker-Kantor et al., 2019; Wardell et al., 2018).

Another factor that showed an association with AUD in this study was having poor adherence to ARV medications whereby non-adherent study participants were more likely to have AUD compared to their counterparts. This is also the finding from most of the previous studies across the globe (Woolf-King et al., 2022)(Ferro et al., 2015;(Williams et al., 2021)Miguez et al., 2003) as well as from sub-saharan (Duko, Toma, et al., 2019)(Adrawa et al., 2020)(Pellowski et al., 2016)(Myers et al., 2021). The most probable explanation for this finding may be forgetting to take medication due to the effects of alcohol intoxication as well as holding to the belief that alcohol and medication should never be mixed hence, they should stop taking their ARV medication while drinking. These explanations were also pointed out in several South African studies which explored the reasons for medication non-adherence among PLHIV (S. Kalichman et al., 2019; S. C. Kalichman et al., 2022)

CHAPTER SIX

STUDY LIMITATIONS AND MITIGATION AVAILABLE

6.1 Participant bias

Participant bias could have occurred due to participants' potential social desirability to select which information to communicate due to the issues of stigma around HIV and alcohol use in the community which could have underestimated or overestimated the results. To mitigate this study participants were ensured that the information they provided would have no negative impacts on their clinic services and that confidentially and privacy were observed. Moreover, another limitation could be recall bias as participants were required to remember information about alcohol use for the past year.

6.2 Study design shortcomings

This study's cross-sectional design makes it impossible to determine a cause-and-effect relationship between the independent and dependent variables, however, it can provide insight into the prevalence of AUD and point to important associated factors. Any future research could solve causality-related issues by utilizing a prospective design. Additionally, the Duke-UNC Functional Social Support Questionnaire (FSSQ), and the CASE Adherence tools employed in this study haven't been validated in Tanzania. This could have led to over or underestimation of the present study's findings. However, they have been used in previous studies involving the same population of PLHIV, in similar hospital-based settings in Tanzania and Kenya (Gamassa et al., 2023; Madundo et al., 2023; Wakibi et al., 2011).

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusion

This study sought to determine the prevalence of AUD and its associated factors among PLHIV who were on antiretroviral treatment in Moshi Municipality-Kilimanjaro. Results indicated that nearly one in three of PLHIV had AUD which is similar to most of the studies on PLHIV from low-middle-income countries. Male gender, being treated at primary and secondary health facility levels, being divorced or widowhood, having at least a secondary education, having probable depression, and having poor adherence to ART were associated with having probable AUD.

7.2 Recommendations

7.2.1 Policymakers and law enforcers

Through collaborative efforts of multidisciplinary stakeholders, policies should be refined as also proposed in the WHO global alcohol action plan strategy to reduce the harmful use of alcohol among PLHIV.

7.2.2 Service providers:

Psychosocial services such as screening and providing brief interventions for common mental disorders such as AUD at the CTCs, as well as the referral of severe cases to higher levels of health facilities for specialized care as stipulated in recent national guidelines for the management of HIV/AIDS, should be enhanced.

7.2.3 End users:

Through group education sessions, during their regular clinic visits, service users (PLHIV) should be psycho-educated about the AUD’s potential consequences, the possibility of having it, how to identify it, what to do, and where to get support.

7.2.4 Research

More research on PLHIV is needed, including prospective studies to monitor the causality of AUD and severity over a longer period in a cohort, and qualitative studies to explore available mental health services at CTCs.

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APPENDICES

Appendix i: Informed consent form (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR OF RESEARCH AND PUBLICATIONS

Study Title: Prevalence and Factors Associated with Alcohol Use Disorders among People Living with HIV Attending Care and Treatment Centers at Moshi Municipal, Kilimanjaro.

Principal Investigator: **Dr. Florian Emanuel**

MUHAS

Other Investigators: **Dr. Saidi Kuganda** -MUHAS

Dr. Samuel Likindikoki -MUHAS

Introduction: We are a team of researchers from MUHAS researching the Prevalence and factors associated with Alcohol Use Disorders among People Living with HIV attending Care and Treatment Centers at Moshi Municipal, Kilimanjaro. I want to ask your permission to participate in this study. The following are explanations about the study and I will be pleased to answer any questions you have.

Goal and purpose: This study aims to explore the prevalence of alcohol use disorders among people living with HIV. Moreover, this study will also explore factors associated with Alcohol use disorder among people living with HIV attending CTC centers in Moshi Municipal.

Procedures: What am I being asked to do? I will conduct a face-to-face interview with you. The interview will take place in a private place. We expect each interview to take 30 minutes of your time. In the interview, I will ask you about your history of using alcohol for the past year and the factors associated with alcohol use in the same period.

Confidentiality: Who will know that I took part in the interview? Your particulars will not be made public, given to anyone, or written on any notes taken during the data collection in any way, we will not record your name so your participation will be anonymous. Your name or any other identifiers will not link to the information you will provide. If someone interrupts us during the interview, I will change the topic so the person does not connect you to this study. At the end of the study the information will be kept in the lock and later deleted after being entered in the electronic data format.

Risks/Discomforts: There is no physical risk to being in this study. We anticipate that you may become emotionally distressed when giving your thoughts during the interview. If this occurs, we will handle the situation by giving you time to relax unless you are comfortable continuing.

Benefits and compensation: There are no direct benefits to your participation in this study. The information that you give us will be incorporated to use in different areas eg policies and strengthening the health system in the provision of mental health services among people living with HIV in Tanzania.

Participation and voluntariness: For you to participate in this study is completely your choice. You can disagree to participate or decide to stop participating in the study at any time you wish, even if you have already given your informed written consent. In addition to that, you are also not obligated to answer all my questions, you can skip any questions without giving me any explanation—refusal to participate or withdraw warrants no penalty or loss of benefits to which you are otherwise entitled.

Whom to contact: If you have any unanswered questions about the study contact the following

Principle Investigator: Dr. Florian Emanuel Tel: +255 762962044

Supervisor: Dr. Saidi Kuganda Tel: +255 783328844

If you have any questions about your rights as a research participant or if you think you have not been treated fairly you may call the Chairman of the Research and Publication committee

Dr. Nahya, Director of Research Publication and Innovation (DRPI), Muhimbili University of Health and Allied Sciences P. O. Box 65001, Dar es Salaam.Tel: +255-222-150-302, +255-222-152-489 Email: drp@muhas.ac.tz

Permission to proceed: Is it okay for you to participate in the study? After you have made your choice, please sign on the space provided below and record today's date.

I have read or told the content of this form. My questions have been answered. I agree with my participation in this study.

Participant agrees to participate in the study YES ☐ NO ☐

Signature of participant _____ Date ___/____/_____

Signature of data collector _____ Date ___/____/_____

Appendix ii: Informed consent form (Swahili Version)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI
MKUU WA IDARA YA UTAFITI NA UCHAPISHAJI

FOMU YA RIDHAA KUSHIRIKI KWENYE UTAFITI KUHUSU UKUBWA WA TATIZO NA MAMBO YANAYOHUSIANA NA MATUMIZI YA POMBE NA MAGONJWA YATOKANAYO NA MATUMIZI YA POMBE KWA WATU WAISHIO NA MAAMBUKIZI YA VIRUSI VYA UKIMWI WAHUDHURIAO MATIBABU YA NJE KATIKA KLINIKI ZINAZOTOA TIBA ZA VVU KATIKA MANISPAA YA MOSHI.

Utangulizi.: Sisi ni timu ya watafiti kutoka chuo kikuu cha tiba na afya Muhimbili katika Idara ya afya na magonjwa ya akili ninafanya utafiti kuhusu ukubwa wa tatizo na mambo yanayohusiana na matumizi ya pombe na magonjwa yatokanayo na matumizi ya pombe kwa watu waishio na maambukizi ya virusi vya ukimwi wahudhuriao matibabu ya nje, katika kliniki zinazotoa tiba za VVU.

Ikiwa huu ni utafiti wa sayansi ya tiba unapaswa ufahamu yafuatayo kabla ya kushiriki;

Dhumuni la Utafiti huu: Kama nilivyo sema hapo awali Dhumuni ni kufanya utafiti kuhusu ukubwa wa tatizo na mambo yanayohusiana na matumizi ya pombe na magonjwa yatokanayo na matumizi ya pombe kwa watu waishio na maambukizi ya virusi vya ukimwi wahudhuriao matibabu ya nje, katika kliniki zinazotoa tiba za VVU.

Namna ya kushiriki : Kushiriki kwako kwenye utafiti huu ni wa hiyari kabisa na unaweza kukataa kushiriki au kusitisha mahojiano wakati wowote. Kukataa kushiriki hakutaingilia huduma zako za tiba wala faida unazotakiwa kuzipata.

Usisite kuuliza swali lolote pale unapoona kuna sababu. Kama ukikubali kushiriki mahojiano yataendeshwa kwa kutumia dodoso maalum.

Madhara: Ikiwa wakati unajieleza ukipata kikwazo na kuona unahitaji mshauri nasaha au mtoa huduma wa afya ya akili kwa mazungumzo zaidi tutakuwa tayari kusaidia.

Usiri: Taarifa zako utakazozitoa hazitawekwa hadharani kwa namna yeyote ile kwa hiyo ushiriki wako hautafahamika. Jina lako au taarifa zozote zinazokutambulisha hazitaambatanishwa na taarifa zako utakazozitoa.

Mwisho wa ufafiti taarifa hizi zitafungiwa na baadaye kuharibiwa baada ya kuwekwa na kutunzwa kwenye mfumo wa elektroniki.

Kumbuka: Hakutakuwa na faida ya moja kwa moja kwako kutokana na utafiti huu ila matokeo ya utafiti yatasaidia katika mpango wa tiba kwa watu wenye maambukizi ya virusi vya ukimwi watumiao pombe na walioathirika na magonjwa yatokanayo na matumizi ya pombe.

Nani wa kumuuliza: Kama una maswali zaidi ambayo ungependa kuuliza kuhusiana na utafiti huu, tafadhali wasiliana na mtafiti mkuu Florian Emanuel (0762962044), Idara ya magonjwa ya akiliChuo Kikuu cha afya Muhimbili.

Pia unaweza mfikia msimamizi wa utafiti Dr. Saidi Kuganda katika idara ya afya na magonjwa ya akili katika chuo cha Afya na Sayansi Shirikishi Muhimbili.

Vile vile unaweza kumfikia endapo utakuwa na malalamiko yoyote kuhusu utafiti huu tafadhali tumia anuani ifuatayo: **Mkurugenzi wa Kamati ya Utafiti, Machapisho na Ubunifu** S.L.P. 65001 Dar Es Salaam, Simu: +

Nimesoma na nimeelewa taarifa za hapo juu. Nimeelewa kuwa ushiriki wangu ni wa hiari na taarifa hizi zitatumika katika utafiti huu tu.

Sahihi ya mshiriki ……

Namba ya simu: ……. Tarehe: …… (DD/MM/YYYY)

Appendix iii: Questionnaire (English version)

GENERAL INFORMATION

Date of interview: {...../...../2023} Questionnaire serial No: .....

Name of interviwer: .....

I. Social demographic questionnaire

1. **What is your age?**
   _____
2. **Sex**
   1. Male
   2. Female
3. **What is your level of education?**
   1. None or Informal
   2. Primary
   3. Secondary
   4. Higher
4. **What is your marital status?**
   1. Single
   2. Co-habiting
   3. Married
   4. Divorced or separated
   5. Widowed
5. **What is your current level of employment?**
   1. Employed
   2. Self-employed
   3. Unemployed
   4. Retired

   What is the most recent viral load? (Check patient medical records)
   Date of test _____
6. Do you have a blood-related family member who has a history of excessive alcohol use that impairs his/her functionality?
   0= No
   1=Yes

II. DUKE-UNC FUNCTION SOCIAL SUPPORT QUESTIONNAIRE (FSSQ)

Here is a list of some things that other people do for us or give us that may be helpful or supportive. Indicate the response that is closest to your situation

	5	4	3	2	1
	As much as I would like	**Almost as much as I would like**	**Some, but I would like more**	**Less than I would like**	**Much less than I would like**
1. I get visits from friends and family					
2. I get help around the house					
3. I get help with money in an emergency					
4. I get praise for a good job					
5. I have people who care what happens to me					
6. I feel love and affection					
7. I get telephone calls from people I know					
8. I get chances to talk to someone about problems at work or with my housework					
9. I get chances to talk to someone I trust about my personal and family problems					
10. I get chances to talk about money matters					
11. I get invitations to go out and do things with other people					
12. I get useful advice about important things in life					
13. I get help when I need transportation					
14. I get help when I am sick in bed					

III. Patient Health Questionnaire (PhQ-9)

No		(0) Not at all	(1) Several days	(2) More than half the days	(3) Nearly every day
1.	Feeling down, depressed, irritable, or hopeless?				
2.	Little interest or pleasure in doing things?				
3.	Trouble falling asleep, staying asleep, or sleeping too much?				
4.	Poor appetite, weight loss, or overeating?				
5.	Feeling tired, or having little energy?				
6.	Feeling bad about yourself – or feeling that you are a failure, or that you have let yourself or your family down?				
7.	Trouble concentrating on things like school work, reading, or watching TV?				
8.	Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you were moving around a lot more than usual?				
9.	Thoughts that you would be better off dead, or of hurting yourself in some way?				

TOTAL
If you are experiencing any of the problems on this form, how **difficult** have these problems made it for you to do your work, take care of things at home or get along with other people? Not difficult at all ☐ Somewhat difficult ☐ Very difficult ☐ Extremely difficult ☐

IV. Alcohol use disorders identification test (AUDIT)

SECTION 2: ALCOHOL USE In this section, we are going to ask you about alcohol use during the past year. Because alcohol use can have an effect on health, psychosocial, and the economy. It is important to know how much you usually drink and whether you have experienced any problems with your drinking. This information will facilitate the plan of health services. Please try to be truthful and accurate. Apply pictures to assist visual cues for "a drink" - Show what is meant by "alcoholic beverages" by using a prepared picture of local examples of beer, wine, etc. Code answers in terms of "standard drinks".				
B1	Audit 1	How often do you have a drink containing alcohol?	Never 0 Monthly or less 1 2-4 times a month 2 2-3 times a week 3 4 or more times a week 4	**If answer is never go to B9**
B2	Audit 2	How many standard drinks do you have on a typical day when drinking?	1 or 2 0 3 or 4 1 5 or 6 2 7 or 9 3 10 or more 4	
B3	Audit 3	How often do you have six or more drinks on one occasion?	Never 0 Less than monthly 1 Monthly 2 Weekly 3 Daily or almost daily4	
If Question B2 and B3 are both scored 0---------- go to B9)				
B4	Audit 4	How often during the last year have you found that you were not	Never 0 Less than monthly 1 Monthly 2 Weekly 3	

		able to stop drinking once you had started?	Daily or almost daily4	
B5	Audit 5	How often during the last year have you failed to do what was normally expected of you because of drinking?	Never 0 Less than monthly 1 Monthly 2 Weekly 3 Daily or almost daily 4	
B6	Audit 6	How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session	Never 0 Less than monthly 1 Monthly 2 Weekly 3 Daily or almost daily 4	
B7	Audit 7	How often during the last year have you had a feeling of guilt or remorse after drinking?	Never 0 Less than monthly 1 Monthly 2 Weekly 3 Daily or almost daily4	
B8	Audit 8	How often during the last year have you been unable to remember what happened the night before because of your drinking?	Never 0 Less than monthly 1 Monthly 2 Weekly 3 Daily or almost daily4	
B9	Audit 9	Have you or someone else been injured because of your drinking?	No 0 Yes, but not in the last year 2 Yes, during the last year 4	

B10	Audit 10	Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	No 0 Yes, but not in the last year 2 Yes, during the last year 4	
Please give me a moment to tabulate some of your responses. (Total score for B1-B10; for skipped questions score as = 0)			…….	
AUDIT score			**<8 (End interview)** **≥8 (go to B)**	

V. **HIV RELATED STIGMA**

For each item, give your answer: Strongly disagree (SD), Disagree (D), Agree (A), or Strongly agree (SA)

Dimensions	No		(1) Strongly disagree (SD)	(2) Disagree (D)	(3) Agree (A)	(4) Strongly agree (SA)
Personalized stigma	1a	Some people avoid touching me if they know I have HIV				
	2a	People I care about stopped calling after learning I have HIV				
	3a	I have lost friends by telling them I have HIV				
Disclosure Concerns	1b	Telling someone I have HIV is risky				
	2b	Most people believe a person who has HIV is dirty				
	3b	I am very careful who I tell that I have HIV				
Concerns with Public Attitudes	1c	People with HIV are treated like outcasts				
	2c	Most people believe a person who has HIV is dirty				
	3c	Most people are uncomfortable around someone with HIV				
Self-Negative Image	1d	I feel guilty because I have HIV				
	2d	I feel like I am a bad person because of HIV				
	3d	I feel I'm not as good a person as others because I have HIV				

VI. Case Adherence Index questionnaire

Please ask each question and circle the corresponding number next to the answer, then add up the numbers circled to calculate the Index score.

A1. How often do you feel that you have difficulty taking your HIV medications on time? By 'on time' we mean no more than two hours before or two hours after the time your doctor told you to take it.

4 Never
3 Rarely
2 Most of the time
1 All of the time

A2. On average, how many days per week would you say that you missed at least one dose of your HIV medications?

1 Everyday
2 4–6 days/week
3 2–3 days/week
4 Once a week
5 Less than once a week
6 Never

A3. When was the last time you missed at least one dose of your HIV medications?

1 Within the past week
2 1–2 weeks ago
3 3–4 weeks ago
4 Between 1 and 3 months ago
5 More than 3 months ago
6 Never

INDEX SCORE: _____

>10 = good adherence

≤10 = poor adherence

Appendix iv: Questionnaire (Swahili version)

MAELEZO YA AWALI

Tarehe ya Mahojiano (……/……/2023) Namba ya Dodoso……...

Jina la Msaili……

I. MAELEZO BINAFSI

1. Umri wako ni miaka mingapi?
   _____
2. Jinsia
   1. Me
   2. Ke
3. Una kiwango gani cha elimu?
   1. Sijasoma au sijasomea shuleni
   2. Elimu ya msingi
   3. Elimu ya sekondari
   4. Elimu ya chuo
4. Hali yako ya ndoa?
   1. Sijaoa au sijaolewa
   2. Ninaishi na mpenzi ambaye sijamuoa/hajanioa
   3. Nimeoa au nimeolewa
   4. Tumetengana au kuachana
   5. Amefariki
5. Hali yako ya ajira?
   1. Nimeajiriwa
   2. Nimejiajiri
   3. Sina ajira
   4. Nimestaafu
6. Idadi ya chembechembe za VVU katika kipimo cha mara ya mwisho? (Angalia katika taarifa za mgonjwa) _____

   Tarehe ya kipimo _____

8. Je, una ndugu kutoka kwenye familia yako aliyekuwa na historia ya matumizi ya Pombe kupitiliza yaliyokua yakiathiri ufanyaji wake wa kazi?

   0= Hapana 1= Ndio

II. MAMBO TUYAPATAYO KIJAMII KAMA MSAADA

Hivi ni vitu ambavyo watu wanatufanyia au kutupa ambavyo vinaweza kutusaidia au kuwa na msaada kwetu. Tafadhali onyesha jibu linaloshabihiana kwa ukaribu na hali yako

Jibu kwa kila kipengele iwapo kinakaribiana na hali yako kwa kiasi kikubwa, kidogo au kidogo Zaidi unachopenda au haijawahi kutokea”

	5	4	3	2	1
	Nime-ridhika kabisa	Nime-ridhika kiasi	Kiasi, lakini ninge-penda zaidi	Sija-ridhika kiasi	Sija-ridhika kabisa
Natembelewa na ndugu, jamaa na marafiki					
Napata msaada katika shughuli za nyumbani					
Napata msaada wa kifedha nikiwa na dharura					
Napongezwa kwa jitihada zangu					
Nina watu wanaojali kinachonitokea					
Nahisi upendo kutoka kwa watu wangu wa karibu					
Napigiwa simu na watu ninaowafahamu					
Napata nafasi ya kuongea na mtu kuhusu shida ninazopitia kazini au nyumbani					

Napata nafasi ya kuongea na mtu ninayemuamini kuhusu matatizo yangu na ya familia					
Napata nafasi kuongelea matatizo ya kifedha					
Napata mialiko kutoka kwa ndugu, jamaa na marafiki					
Napata ushauri mzuri kuhusu mambo muhimu katika maisha					
Napata msaada ninapohitaji usafiri					
Napata msaada ninapokuwa nauguliwa au nimelazwa					

III. Udadisi kuhusu dalili za sonona (PHQ-9)

Sasa nitakuuliza kuhusu dalili ambazo umekuwa nazo wiki mbili zilizopita, kwa kila dalili uliyoipata weka vema jibu ambalo lipo karibu na hali yako halisi

Katika wiki mbili zilizopita, ni mara ngapi umesumbuliwa na matatizo tajwa yafuatayo (weka vema kuonyesha jibu sahihi)	Hakuna kabisa=0	Siku kadhaa=1	Zaidi ya nusu ya siku zote=2	Karibu kila siku=3
1. Kuwa na mwelekeo mdogo na kukosa raha ya kufanya vitu				
2.Kujisikia huwezi kuchangamka, kuwa na huzuni au kukosa tumaini				
3.Tatizo la kupata usingizi, au kuendelea kulala baada ya kuupata au kulala kupita kiasi				
4.Kujisikia kuchoka na kuwa na nguvu kidogo				
5.Kupungua hamu ya kula chakula au kula kupita kiasi				
6.Kujisikia vibaya au kujisikia kama umeshindwa au umejishusha au kuishushia[thamani] familia yako				
7.Tatizo la kutuliza akili kwenye vitu kama kusoma magazeti au kuangalia luninga (TV)				
8.Kusogea au kuzungumza polepole sana hata ingeweza kuonekana kwa watu wengine ama kuwa na mashaka/wasiwasi au kufadhaika kiasi hata ukitembea, unatembea kuliko kawaida				
9.Fikira kwamba ni heri kufa au kuwaza kujiumiza				
10.Kama kumekuwa na tatizo lolote hapo juu, je ni kwa kiasi gani hili tatizo limeacha usiweze kufanya kazi, kushughulikia maswala ya nyumbani au katika mahusiano yako nawatu wengine? 0 = Sio vigumu hata kidogo; 1 = Vigumu kidogo; 2 = Vigumu sana 3 = Vigumu kupita kiasi				

IV. MATUMIZI YA POMBE

Sehemu hii ya pili nitapenda unieleze matumizi yako ya pombe katika kipindi cha mwaka mmoja uliopita. Dhumuni lake ni kufahamu madhara yatokanayo na pombe ya kiafya, kijamii, kisaikolojia na, kiuchumi. Ni vizuri ukitufahahamisha kwa kiasi unachotumia na kama umewahi kupata madhara yoyote yatokanayo na matumizi ya pombe. Taarifa hizi zitasaidia katika kupanga na kufanikisha huduma za tiba kwa watu wanaopata magonjwa yatokanayo na matumizi ya pombe. Ninaomba uwe mkweli na mwenye uhakika kadiri uwezavyo. Onyesha picha zinazofanikisha utambuzi wa aina za vilevi na pia nakili kulingana na "standard drinks".

B1	Audit 1	Ni mara ngapi huwa unakunywa pombe au kinywaji chenye kilevi?	Sijawahi **1** Mara 1 kila mwezi au chini ya hapo **2** Mara 2-4 kwa mwezi **3** Mara 2-3 kwa wiki **4** Mara 4 au zaidi kwa wiki **5**	**Kama jibu ni sijawahi nenda namba B9**
B2	Audit 2	Je, huwa unakunywa jumla ya vinywaji vingapi (standard drinks/ units) kwa siku unapokunywa?	1 au 2 0 3 au 4 1 5 au 6 2 7 au 9 3 10 au zaidi 4	
B3	Audit 3	Ni mara ngapi huwa unakunywa pombe kiwango cha vinywaji(standard drinks) 6 au zaidi katika tukio au mkao mmoja?	Sijawahi 0 Chini ya mwezi 1 Kila mwezi 2 Kila wiki 3 Kila siku au karibu kila siku 4	
Ikiwa swali B2 na B3 yote amepata 0---------- nenda namba B9)				
B4	Audit 4	Katika mwaka mmoja uliopita, ni mara ngapi ulijikuta umeshindwa kujizuia kuacha kunywa pombe mara ulipoanza kunywa?	Sijawahi 0 Chini ya mwezi 1 Kila mwezi 2 Kila wiki 3 Kila siku au karibu kila siku 4	

B5	Audit 5	Katika mwaka mmoja uliopita, ni mara ngapi ulishindwa kutimiza wajibu wako kutokana na unywaji wa pombe?	Sijawahi 0 Chini ya mwezi 1 Kila mwezi 2 Kila wiki 3 Kila siku au karibu kila siku 4	
B6	Audit 6	Katika mwaka mmoja uliopita, ni mara ngapi ulihitaji kunywa pombe kama kitu cha kwanza asubuhi kuzimua ili uweze kuendelea na shughuli zako za kawaida baada ya kunywa pombe nyingi siku iliyopita?	Sijawahi 0 Chini ya mwezi 1 Kila mwezi 2 Kila wiki 3 Kila siku au karibu kila siku 4	
B7	Audit 7	Katika mwaka mmoja uliopita, ni mara ngapi ulijisikia vibaya au ulijutia nafsi yako kutokana na unywaji wako wa pombe??	Sijawahi 0 Chini ya mwezi 1 Kila mwezi 2 Kila wiki 3 Kila siku au karibu kila siku 4	
B8	Audit 8	Katika mwaka mmoja uliopita, ni mara ngapi ulishindwa kukumbuka mambo yaliyotokea usiku uliopita kutokana na unywaji wa pombe?	Sijawahi 0 Chini ya mwezi 1 Kila mwezi 2 Kila wiki 3 Kila siku au karibu kila siku 4	
B9	Audit 9	Je, imewahi kutokea wewe au mtu mwingine kujeruhiwa kutokana na unywaji wako wa pombe?	Hapana 0 Ndiyo, lakini ni kabla ya mwaka jana 2 Ndiyo, ndani ya mwaka uliopita 4	

B10	Audit 10	Je, kuna ndugu, rafiki, daktari au wahudumu wengine wa afya wameguswa na unywaji wako wa pombe na kukushauri kupunguza unywaji?	Hapana 0 Ndiyo, lakini ni kabla ya mwaka jana 2 Ndiyo, ndani ya mwaka uliopita 4	
Ninaomba muda kidogo nijumlishe majibu yako. (Jumla B1-B10; maswali yaliyorukwa ni = 0)			…….	
Majibu ya AUDIT			***<8 (malizia mahojiano)*** ***≥8(nenda sawali namba B15)***	

V. UNYANYAPAA UTOKANAO NA VVU

Kipimo cha Unyanyapajiwa VVU kina sehemu ndogondogo zilizokusudiwa kupima unyanyapaaji wa kibinafsi, wasiwasi wa kufichua hali yako ya kiafya, wasiwasi na mitazamo ya umma na picha hasi ya ubinafsi.

			(0) Sikubaliani sana (SS)	**(1)** Sikubaliani (S)	**(2)** Nakubali (N),	**(3)** nakubali kabisa (NK)
Unyanyapaa wa kibinafsi	1a	Watu wengine huepuka kunigusa ikiwa wanajua nina VVU				
	2a	Watu ninao wajali waliacha kupiga simu baada ya kujifunza kuwa nina VVU				
	3a	Nimepoteza marafiki kwa kuwaambia kuwa nina VVU				
Hofu za kufichua hali ya kiafya	1b	Kumwambia mtu kuwa na VVU nihatari				
	2b	Ninajitahidi kuweka hali yangu ya VVU kwa siri				
	3b	Niko mwangalifu sana kwa ambaye ninamwambia nina VVU				
Hofu na Mtazamo kutoka kwa Umma	1c	Watu waliona VVU huchukuliwa kama wafukuzwaji				
	2c	Watu wengi wanaamini mtu ambaye ana VVU nimchafu				
	3c	Watu wengi hawana raha kuwa karibu na mtu aliye na VVU				

			(0) Sikubaliani sana (SS)	**(1)** Sikubaliani (S)	**(2)** Nakubali (N),	**(3)** nakubali kabisa (NK)
Picha hasi ya ubinafsi	1d	Ninajiona nahatia kwa sababuni na VVU				
	2d	Ninahisi kama mimi ni mtu mbaya kwa sababu ya VVU				
	3d	Ninahisi sio mtu mzuri kama wengine kwa sababu nina VVU				

Kwa kila kitu, toa jibu lako

Sikubaliani sana (SS) =0, Sikubaliani (S) =1, Nakubali (N)=2, au nakubali kabisa (NK)=3

VI. Case Adherence Index questionnaire

Tafadhali uliza kila swali na zungushia duara namba mkabala na jibu kisha jumlisha namba zilizozungushiwa duara Kupata jumla ya Majibu ya vipengele

A1. Ni mara ngapi hupata ugumu kutumia dawa zako za kufubaza VVU katika muda sahihi. Muda sahihi tunamaanisha masaa mawili kabla au baada ya muda ulioelekezwa na Daktari kumeza dawa

4 Haijawahi tokea
3 Nadra Sana
2 Mara nyingi
1 Kila mara

A2. Kwa wastani, Ni mara ngapi katika wiki unaweza sema angalau hukutumia dozi moja ya dawa za VVU?

1 Kila siku
2 Siku 4-6 kwa wiki
3 Siku 2-3 kwa wiki
4 Mara moja kwa wiki
5 Chini ya mara moja kwa wiki
6 Sijawahi kosa kabisa

A3. Ni Lini mara ya mwisho umeacha kumeza angalau dozi moja ya dawa zako za VVU?

1 Ndani ya wiki iliyopita
2 Wiki 1-2 zilizopita
3 Wiki 3-4 zilizopita
4 Kati ya miezi 1-3 iliyopita
5 Zaidi ya miezi 3 iliyopita
6 Sijawahi

Tafsiri ya Majibu ya vipengele_____

>10 = Anatumia dawa vizuri

≤10 = Hatumii dawa vizuri

Appendix V: Ethical clearance certificate

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/1749 Date: 15/06/2023

MUHAS-REC-06-2023-1749

FLORIAN EMANUEL

School of Medicine

MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: PREVALENCE AND FACTORS ASSOCIATED WITH ALCOHOL USE AND ALCOHOL USE DISORDERS AMONG PEOPLE LIVING WITH HIV ATTENDING CARE AND TREATMENT CENTERS AT MOSHI MUNICIPAL, KILIMANJARO

Reference is made to the above heading,

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 15/06/2023
EXPIRATION DATE OF APPROVAL: 15/06/2024

STUDY DESCRIPTION:

Purpose:

The purpose of this cross-sectional observational study is to determine the prevalence and associated factors of AU/AUD among PLWH attending CTC centers at Moshi Municipal, Kilimanjaro.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014817.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Kasusu Klinf Nyamuryekung'e,

For Chairperson, MUHAS Research and Ethics Committee



Appendix VI: Introduction Letters

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.222/2021 14th August, 2023

The Regional Administrative Secretary,
P.O. Box 3070,
MOSHI.

Re: INTRODUCTION LETTER

The bearer of this letter is Florian Emanuel (HD/MUH/T.222/2021), a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MMed. Psychiatry.

As part of his studies he intends to do a study titled: **Prevalence and Factors Associated with Alcohol Use and Alcohol Use Disorders Among People Living with HIV Attending Care and Treatment Centes at Moshi Municipl, Kilimajaro."**

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of his research.

We thank you for your cooperation.

Sebe Mohamed
For: DIRECTOR, POSTGRADUATE STUDIES

c.c. Florian Emanuel

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix VI: Permission Letter

JAMHURI YA MUUNGANO WA TANZANIA

OFISI YA RAIS TAWALA ZA MIKOA NA SERIKALI ZA MITAA (TAMISEMI)

HALMASHAURI YA MANISPAA YA MOSHI

Unapojibu tafadhali taja:

Kumb. Na. .40/13/1/VOL.33/63 Tarehe: 29/08/2023

Mganga Mfawidhi KCMC, Mawenzi Hospitali
Kituo cha Afya Pasua na Kituo cha Afya Majengo
Halmashauri ya Manispaa
MOSHI.

Yah: UTAMBULISHO WA WANAFUNZI KWA AJILI YA UTAFITI

Tafadhali mada tajwa hapo juu isomwe pamoja na barua ya Katibu Tawala Mkoa - Kilimanjaro yenye Kumb. Na. DC.109/228/01'H'/104 ya tarehe 21 Agosti, 2023.

2. Barua hii inamtambulisha kwenu Neema Allen Ngunda,Frank Kiwango na Florian Emanuel wanafunzi kutoka Chuo Kikuu cha MUHAS ambao wamepata kibali cha kufanya utafiti unaotambulika kama **"Utafiti unaotathimini sababu zainazochangia watu wanaoishi na Virusi vya Ukimwi (VVU) Kupata magonjwa ya akili ".** Utafiti huu utafanyika kwa kipindi cha mwaka mmoja katiaka Hospitali ya KCM, Mawnzi Hospitali Kituo cha Afya Pasua na Majaengo.

3. Nawatakia kazi njema.

Justine J.Chami
Kny. MKURUGENZI
Kny.MKURUGENZI WA MANISPAA
MOSHI

Nakala: Katibu Tawala (W) Moshi,
Ofisi ya Mkuu wa Wilaya ya Moshi,
S.L.P 3042,
MOSHI.

: Neema Allen Ngunda,Frank Kiwango na Florian Emanuel
Wanafunzi
MUHAS

Ukumbi wa Manispaa, S.L.P 318, MOSHI, KILIMANJARO. Simu: +255-027-2752344, +255-027-2754371/4, Nukushi: +255-027-2752906, Barua pepe md@moshimc.go.tz, Tovuti: www.moshimc.go.tz