DEPRESSION IN NEWLY DIAGNOSED PEOPLE LIVING WITH HIV IN KILIMANJARO REGION: PREVALENCE, SEVERITY AND ASSOCIATED FACTORS

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Master of Medicine (Psychiatry) Dissertation
Muhimbili University of Health and Allied Sciences
October, 2021

Muhimbili University of Health and Allied Sciences

School of Medicine

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By

Kim S. Madundo, MD

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

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October, 2021

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: Depression in Newly Diagnosed People Living with HIV in Kilimanjaro Region: Prevalence, Severity and Associated Factors in partial fulfillment of the requirements for the degree of Master of Medicine (Psychiatry) of the Muhimbili University of Health and Allied Sciences.

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Dr. Jessie Mbwambo

(Supervisor)

_____

Date

DECLARATION

I, Kim S. Madundo, declare that this dissertation is my own original work; it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature: ……. Date: …….

ACKNOWLEDGEMENTS

I would like to express sincere thanks to my supervisor Dr. Jessie Mbwambo for offering unwavering support, invaluable knowledge and time, mentorship and inspiration throughout the development, execution and refinement of this research work.

My gratitude goes out to the Department of Psychiatry and Mental Health staff (MUHAS and MNH) for their motivation and support along the way.

I am forever grateful to the participants who generously offered their time and deeply personal life experiences without whom this study would not have been possible.

I am thankful to the CTC staff at all 3 study sites whose cooperation created a necessary bridge between the participants and I, thus enabling this study to move forward.

Special thanks to Ms. Lisa Wanda and Mr. Ismail Shekibula whose devotion and unity in data collection made for a very enjoyable and smooth process.

Lastly, I express the utmost gratitude to my family and friends for their encouragement, understanding and support throughout my postgraduate studies.

DEDICATION

To all those facing Depression, and to everyone who attempts to transform their pain and suffering into hope for others.

TABLE OF CONTENTS

ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
APA	American Psychology Association
ART	Anti-Retroviral Therapy
CDC	Centers for Disease Control and Prevention
CTC	Care and Treatment Clinic
DSM	Diagnostic and Statistical Manual for Mental Disorders
HIV	Human Immunodeficiency Virus
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences
PLHIV	People Living with HIV
PMTCT	Prevention of Mother-to-child Transmission
RA	Research Assistant
SLE	Stressful Life Event
SSA	Sub-Saharan Africa
TND	Target Not Detected
USAID	United States Agency for International Development
VCT	Voluntary Counselling and Testing
WHO	World Health Organization

LIST OF FIGURES

LIST OF TABLES

DEFINITION OF TERMS

Associated Factors – A combination of biological, psychological and social factors to be investigated as independent variables, namely: Age, sex, CD4 count (at baseline and most recent), Viral load, duration of ART, level of income/employment status, level of education, perceived social support, distance from home to CTC centre.

HIV – The Human Immunodeficiency Virus is a virus that attacks the body's immunity, making the body more vulnerable to infections and affecting its ability to recover from them. HIV is most commonly transmitted through contact with bodily fluids; through unprotected sexual intercourse, sharing injections etc. Treatment is available to mitigate the virus' attacks; however, currently there is no cure available. If untreated, HIV can lead to AIDS (Acquired Immunodeficiency Syndrome)(1).

Newly Diagnosed People Living with HIV – Individuals who have been diagnosed with HIV within the past 12 months, regardless of duration and adherence to anti-retroviral treatment. As far as I am aware there is no consensus on what duration constitutes the newly diagnosed period, therefore, 12 months was selected for convenience.

Stressful Life Event – Events with the potential for psychotrauma that can occur at any time during an individual's lifetime, such as loss of a loved one, divorce or separation, loss of employment, physical trauma or serious illness. They are also the occurrences most likely to cause distress and have been associated with mental disturbances such as Depression(2).

ABSTRACT

Background:

Human Immunodeficiency Virus (HIV) has been shown to increase susceptibility to mental health issues, with Depression being the most common associated illness. The event of being diagnosed with HIV can be considered a Stressful Life Event and, therefore, being newly diagnosed with HIV could be associated with the incidence of Depression. To the best of my knowledge no studies in Tanzania have systematically explored the associations between recent HIV diagnosis (within the past 12 months), prevalence and severity of Depression and its associated factors.

Objectives:

To determine prevalence and severity of Depression, and associated factors among newly diagnosed PLHIV attending CTC centres in Kilimanjaro Region

Methodology:

Cross-sectional hospital-based using quantitative methods and utilizing the Patient Health Questionnaire-9 (PHQ-9) as a screener and diagnostic tool for Depression, Demographic Health Survey (SES-DHS8) for socio-demographic characteristics, Patient records for other associated factors, Duke-UNC Functional Social Support Questionnaire (FSSQ) to assess perceived social support and a Stressful Life Events checklist. 272 participants diagnosed with HIV within the past 12 months were sampled consecutively. Analysis was conducted using STATA v16. Univariate analysis, Chi-square and Analysis of Variance (ANOVA) for Bivariate analysis, and Ordinal logistic regression for Multivariate analysis with a 95% confidence interval and $p<0.05$ were conducted.

Results:

106 (38.97%) participants were male and 166 (61.03%) female. Mean age was 41 (SD±12.25) years. Overall prevalence of Depression was 41.18%; 54 (19.85%): moderate, 42 (15.44%): moderately severe and 16 (5.88%): severe Depression. Severity was highest in participants diagnosed with HIV less than 1 month ago. ANOVA revealed significant variance (F-ratio = 10.45) between the severity of Depression at different durations post-HIV diagnosis (p=0.00). Study site (Reference: Mawenzi. Majengo: p=0.007, Hai: p=0.001), no/informal education (Primary: p=0.02, Secondary: 0.05, Higher: 0.04) and those with <1-month anti-retroviral therapy (Reference: <1 month, 1-3 months: p=0.001, 3-6 months: 0.00, 6-12 months: 0.00) were more likely to have Depression.

Conclusion:

The study clearly answers questions on prevalence, severity and associated factors of Depression, while also confirming the alternative hypothesis in that there is an association between being newly diagnosed with HIV and the presence of clinically significant depressive symptoms. This indicates that integration of mental health interventions into CTC care is pertinent. However, this study raises further questions on how to address this issue of Depression among newly diagnosed PLHIV.

Recommendations:

Integration of interventions for improved detection and treatment of Depression such as routine screening of PLHIV for Depression from time of enrollment into CTC care, and offering appropriate linkage to treatment services where necessary. Developing brief manuals for clinicians on assessing Depression may also be useful. Prospective studies could help to identify patterns of Depression among a cohort of newly diagnosed clients.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Human Immunodeficiency Virus (HIV) is a virus that attacks the body's immunity, predisposing it to further infections and diseases. The human body is unable to clear HIV on its own, there is currently no cure, and it is therefore a lifelong condition (3). Left untreated, HIV progresses to a more deadly condition Acquired Immunodeficiency Syndrome (AIDS), whereby the body's ability to fight infection is dramatically reduced, leading to serious illness and death. As a result, it remains one of the deadliest viruses known to humankind (4) - having caused more than 32 million deaths since its emergence in humans in the early 1980s, including approximately 770,000 deaths per year currently. Today, there are approximately 38 million people living with HIV (PLHIV) worldwide and 1.7 million new infections each year, making HIV/AIDS a critical public health concern (3,5). As of 2018, Tanzania has 1.4 million PLHIV, hence a significant contributor to the global prevalence of HIV. This amounts to a national prevalence of HIV of 4.6% in adults, with more than 72,000 new cases being diagnosed as well as 24,000 AIDS-related deaths per year (6). To address the global HIV pandemic, research has largely focused on attempts to develop a cure for HIV/AIDS, vaccination to prevent new HIV infections, and medication to reduce the impact of the virus on health and longevity (7).

Increasingly, ART research is focusing on efforts to improve access and adherence to ART, including addressing the mental health and psychosocial barriers that may prevent ART initiation and long-term adherence (8). In the Tanzanian context, the diagnosis of HIV typically occurs in one of the following settings: a dedicated HIV clinic located in a community health centre or hospital, routine HIV testing during antenatal care for all pregnant women and their accompanying male partners, or community outreach events aimed at increasing rates of testing in the general public.

Test results are typically available immediately. In each of these settings, testing should be provided by a trained nurse or other health worker, and should include pre-test education about HIV and the testing process, as well as post-test counseling and further education to discuss next steps (9,10).

Strategies such as Voluntary counseling and testing (VCT), integration of HIV screening into Antenatal clinics and Prevention of Mother-to-Child Transmission (PMTCT) as well as safety measures governing national blood transfusion services have helped to improve identification of PLHIV as well as linkage to care. Worldwide interventions have led to the 90-90-90 target; that by 2020: for 90% of all PLHIV to be aware of their status, for 90% of those diagnosed PLHIV to be on steady ART, and for 90% of those on ART to have undetectable viral loads. Countries such as Tanzania have even shifted from a CD4-based protocol for initiating ART to a universal test-and-treat formality which requires treatment to start soon after a positive HIV diagnosis is made so as to improve ART coverage and related outcomes (11).The 90-90-90 target is an ambitious effort to finally put an end to the devastating HIV/AIDS pandemic (12).

The stress associated with having a severe and chronic illness, as well as the direct effects of HIV on the brain have been shown to increase susceptibility to mental health issues among PLHIV (13). A bi-directional relationship has been noted between HIV/AIDS and mental disorders; their co-existence tends to worsen morbidity and mortality indicating that the detection of both is highly essential (14). The event of diagnosing someone with HIV in itself carries with it the information that an individual will have a life-long, incurable and severe illness that will have effects on the biological, psychological and social aspects in the individual's life and can cause enduring changes in psychosocial status (15). Post-diagnosis counseling may also include discussions of HIV stigma, disclosure of one's HIV status to loved ones, the need for lifelong daily medication, and implications for sexual activity and childbearing (16). Due to the personal and sensitive nature of these issues, being recently diagnosed with HIV could, therefore, contribute the onset of mental health challenges such as Depression (17).

Depression is one of the most common mental health conditions among PLHIV (18). According to DSM 5, the diagnostic and statistical manual created under the American Psychiatric Association, Depression is a mental disorder featuring the presence of persistent sad, empty, or irritable mood, accompanied by somatic and cognitive changes that significantly affect the individual's capacity to function. Some of these changes include diminished interest in pleasurable activities, significant weight loss, insomnia or hypersomnia, fatigue or loss of energy, feelings of worthlessness or inappropriate guilt, reduced ability to concentrate and recurrent thoughts of death or suicide. Depressive symptoms featured on this spectrum of emotional, cognitive and behavioural changes are common however must meet certain criteria – in quantity, quality and a minimum of 2 weeks duration – as illustrated in the DSM 5 to be considered a disorder (19).

The WHO reports Depression as one of the illnesses causing the most burden of disease worldwide; it placed in 3rd position in 2004 and is expected to rise to be the leading cause by 2030 (20). The Global Burden of Disease Study done in 2017 places Depression as the most common mental illness and the 3rd leading cause of disability worldwide (21). Worldwide studies have shown a 50% increase in reports of Depression over the past three decades; from 1990 to 2017 (22). The co-existence of Depression with HIV is, therefore, an even more significant problem especially in low-income countries, such as the majority of the Sub Saharan Africa Region which carries most – more than 70% - of the global burden of HIV infection (16,20).

Despite Depression in PLHIV being an issue of the utmost pertinence, it largely remains an untreated and inadequately managed condition; with studies from both high- and low-income countries reporting high proportions (ranging between 40 to 85%) of untreated Depression (24–26) or even neglected in the HIV health-care context (27), and especially in the Sub-Saharan African (SSA) region which lacks the resources to combat mental health (28).

A double disease burden in the SSA region would, therefore, be a sizable concern. Depression co-occurring with HIV carries a significant burden on global health and an even greater burden

in the SSA context (18). If the prevalence of HIV in SSA is to remain high, the increasing incidence of Depression could lead to a synergistic double burden of disease. Recent data shows that PLHIV are twice as likely to develop Depression as those without HIV/AIDS (14). Studies done globally (22,29) as well as locally in Tanzania (28,30) have consistently shown that Depression occurs at a high prevalence among PLHIV. Studies have also gone further to highlight that Depression can occur at a high prevalence in both asymptomatic and symptomatic PLHIV (31) although it has also been discussed that Depression is associated with low CD4 counts (below 500) and is an indicator of likely progression to more severe stages of AIDS, hence poorer outcomes (31,32).

Studies have also shown that certain factors are associated with both HIV and Depression such as gender, socio-economic challenges or unemployment, low level of education and poor social support (29,33,34) while others have highlighted age below 40 (35,36) and marital status (37) are associated. These phenomena sharing many factors, therefore, demonstrate a syndemic pattern of illness (38).

Very few studies in Tanzania have focused on estimating the prevalence of depressive symptoms in PLHIV within first 12 months of HIV diagnosis (39). One study utilised newly diagnosed PLHIV as a sub- sample, however, the objectives were on adherence to ART medications and HIV clinical outcomes (40). A similar study also studied recently diagnosed PLHIV looking primarily at HIV related stigma and treatment adherence as well as depressive symptoms (41). In contrast, another study looked at depressive symptoms in a prospective cohort of women recently diagnosed with HIV but also featuring objectives on adherence and virological failure (42). Given the dearth of data on the prevalence of Depression specifically among newly diagnosed PLHIV in Tanzania, this study aimed to estimate the prevalence of Depression, determine differences in the severity of Depression and its associated factors among newly diagnosed PLHIV attending selected CTC centres.

1.2 Problem Statement

Tanzania is a country in the SSA region, and has the fifth-highest incidence of HIV in the world and a high rate of AIDS-related deaths (6). Despite multi-faceted interventions to increase identification of PLHIV and linkage to care the prevalence of HIV remains high (9). Studies from within Tanzania show that mental health challenges, especially Depression, have been found to be more common in PLHIV compared to those without HIV infection and these challenges are largely underdiagnosed and undertreated (27,28,39,43). This is possibly due to many interventions surrounding HIV and Depression mostly focusing on the biological aspects of the illnesses and neglecting the psychological and social facets (44,45). In several cohort studies PLHIV are shown to have a higher incidence of depressive symptoms within the first 12 months of HIV diagnosis compared to PLHIV who have been on ART for more extended periods (28,30,40,42). Socio-demographic factors have also been implicated in the occurrence and progression of Depression in PLHIV according to multiple local studies (28,30,40).

Multiple studies indicate that Depression as a co-morbid illness with HIV can affect engagement with services, quality of life and clinical outcomes (40,42,46). Little is known with regards to how prevalent this issue is in the Tanzanian context specifically during this period of 12-months post-diagnosis and, therefore, the problem could be addressed by observing Depression in such a population of individuals.

A limited number of studies have been conducted in Tanzania to study Depression, depressive symptoms and associated characteristics in recently diagnosed PLHIV as a focus group. These studies, however, looked at Depression as an exposure variable rather than an outcome of interest (39,41) or utilized samples which were not exclusively newly diagnosed men and women (40,42). To the best of my knowledge, this is the first study in Tanzania to comprise a sample of both men and women who are all newly diagnosed with HIV, and the first to determine the prevalence and severity of Depression among such a population.

1.3 Conceptual Framework

One of the more common and comprehensive ways of reflecting on and analysing mental health issues and how they occur is through the Biopsychosocial theory model (47). This theory was developed by George Engel, a psychiatrist and physician, in an attempt to explain how illness can occur as a consequence of complex interaction between biological, psychological and social factors and is unlikely to be one-dimensional (48). Factors can be on different levels based on when they occurred and how they affect the individual, such as predisposing, precipitating, perpetuating and protective roles (49,50). While the model has been criticised for its inability to specify a cause of illness and insufficient sensitivity in terms of individual needs (50,51) it is often used in current mental health care practice to offer collaborative and broad management plans (52). Another point of criticism is the lack of spiritual consideration, which is important in the Tanzanian context whereby the majority follow a religion (53). As a result, the biopsychosocial model has been revised by some to be the bio-psycho-social-spiritual model (54). A state of health and proper functioning requires that these biological, psychological and social factors be in balance otherwise a deviation towards illness may occur.

Previous research shows that being diagnosed with HIV in itself can be considered a Stressful Life Event (SLE) and can lead to developing Depression (55); however HIV and AIDS as a disease can manifest with neuropsychiatric complications, commonly Depression (56). Adjustment disorder is a form of mental illness that presents after an identifiable stressor and can comprise emotional changes such as depressive symptoms and behavioural changes, both disproportionate with the stressor (19). However, there has been a decline in the diagnosis of Adjustment disorder in recent years as awareness around Depression has increased and detection improved (57).

Consulting the Biopsychosocial theory model, the researcher observed the prevalence and severity of Depression among newly diagnosed PLHIV and studied some of its Associated Factors.

Biological factors:

- Age, sex, CD4 count (Baseline and most recent, if any), viral load count

Social factors:

- Level of education, type of employment, marital status, and perceived social support

Psychological factors:

- Being newly diagnosed with HIV (SLE), continuing stress of living with HIV

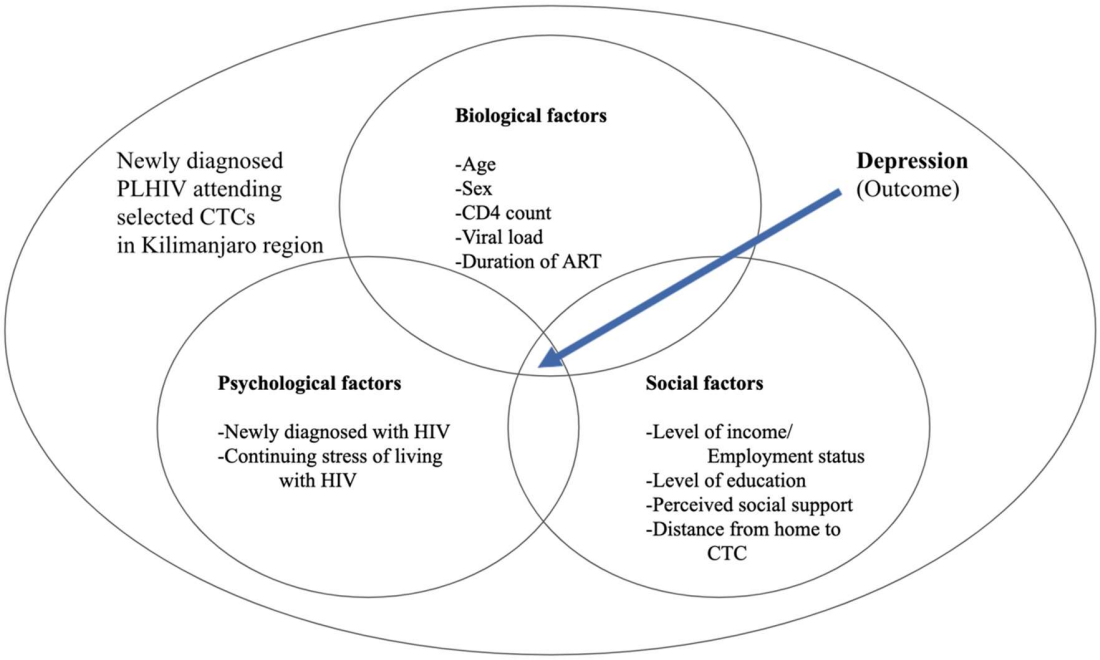


Figure 1: Conceptual framework illustrating Independent variables and Outcome of interest following the Biopsychosocial model

1.4 Rationale

The purpose of this study was to estimate the prevalence of Depression among newly diagnosed PLHIV attending selected Care and Treatment Centres (CTC) in Kilimanjaro Region and to determine factors associated with the occurrence of Depression in this population.

The findings from this study could add to the growing base of current knowledge on mental health issues such as Depression in the PLHIV population in Tanzania, and add to the information available on Depression and its associated factors in newly diagnosed PLHIV by providing a snapshot of these issues, hinting at a need for early detection, appropriate management, and linkage to mental health care which could build on the evidence for policy makers and possibly benefit end users of CTC services.

This study is also being conducted for partial fulfillment of a Master of Medicine in Psychiatry Degree.

1.5 Research Questions

1.5.1 Primary Research Question

1. What is the prevalence and severity of Depression and its Associated Factors among newly diagnosed PLHIV attending selected CTCs in Kilimanjaro Region?

1.6 Objectives

1.6.1 Broad Objective

To determine the prevalence and severity of Depression and identify Associated Factors among newly diagnosed PLHIV attending CTC centres in Kilimanjaro Region.

1.6.2 Specific Objectives

1. To estimate prevalence of Depression among PLHIV seen at different post-HIV diagnosis periods (less than one month, 1-3 months, 3-6 months, 6-12 months)

2. To determine differences in the severity of Depression among individuals seen at different post-HIV diagnosis periods (less than one month, 1-3 months, 3-6 months, 6-12 months).
3. To determine the association between Depression and Associated Factors of PLHIV diagnosed within the past 12 months.

1.7 Hypothesis

Null hypothesis

There is no association between being newly diagnosed with HIV and Depression, and its Associated Factors.

Alternative hypothesis

There is an association between being newly diagnosed with HIV and Depression, and its Associated Factors.

1.8 Literature Review

This chapter outlines various literatures that display the issues of depressive symptoms in newly diagnosed PLHIV as well as associated factors. It has been structured based on the specific objectives of the proposed study as follows: The prevalence of Depression in newly diagnosed PLHIV who attend CTC centres in Kilimanjaro Region, the differences in severity in the depressive symptoms at different durations post-diagnosis and the factors associated with Depression among newly diagnosed PLHIV.

1.8.1 Prevalence of Depression in PLHIV diagnosed within the past 12 months

Mental disorders have been found to occur at a high rate in PLHIV, occurring up to 2 to 3 times more often than in the general population (29). Of these disorders Depression is the most common according to studies that have been done globally as well as in the African region including in Tanzania (28,58,59). The WHO reports a prevalence of Depression in PLHIV as high as 60% in some settings (21).

Research worldwide has analysed the occurrence of depressive symptoms in PLHIV particularly in recently diagnosed individuals in an attempt to learn more about changes in psychosocial status after being diagnosed with HIV (15). Given that the presence of depressive symptoms can increase overall morbidity (60) and have a negative impact on HIV-related outcomes (40) it becomes of high relevance to detect depressive symptoms as early as possible and manage them effectively (42).

Studies done internationally confirm this; In India findings (55) show an estimated 67% prevalence of depressive symptoms among recently diagnosed PLHIV compared to a slightly lower range in those on long-term treatment; between 40 to 50% (37). Recent studies conducted in China (15,60) both show a 39% prevalence of depressive symptoms in newly diagnosed PLHIV. In Brazil, one study highlights a relatively higher prevalence (61%) of symptoms of Depression in recently diagnosed PLHIV while the prevalence of depressive symptoms in PLHIV on treatment for more extended periods to be between 25 and 36% (61).

Studies from the SSA region reveal similar findings like those from global ones; A South African study found 30% of newly diagnosed individuals had depressive symptoms (32) whereas a study from Cameroon that included individuals diagnosed with HIV within the past six months found a 63% prevalence of depressive symptoms (17). Similarly in Uganda a prospective study concluded a high prevalence (25%) of depressive symptoms at the time of diagnosis (62).

Few studies in Tanzania have studied Depression in newly diagnosed PLHIV as a focus. A prospective observational study detected a 10% prevalence of depressive symptoms in the PLHIV, noting a positive association between depressive features and non-adherence to ART as well as a higher incidence of virological failure (40). The relatively low prevalence of Depression compared to other studies concerning newly diagnosed PLHIV could be because the sample was a combination of recently diagnosed individuals (22% of the sample) and those with established infection already under care. Another article, also from a prospective cohort study, included only newly diagnosed women living with HIV and noted almost 58% had Depression at the time of ART initiation (42). Similarly a study conducted at an urban HIV care clinic found that 56.3% individuals diagnosed within the past 6 months has depressive symptoms although the majority (45.9%) was of mild severity (41). This prevalence is still much higher compared to findings from a study that included individuals under long-term care, with an estimated prevalence of 21% (30). Of note is that none of these studies had a pure sample of men and women newly diagnosed to have HIV.

1.8.2 Differences in severity of Depression among individuals seen at different post-diagnostic periods

Previous studies have hypothesised that the timing of diagnosis has an association with the severity of depressive symptoms (60,62). Not only have symptoms been noted to be of higher severity in the period soon after being informed about their seropositive status but symptoms can last longer without appropriate intervention (40,42).

In China, a recent longitudinal study showed that the marked depressive symptoms at the baseline visit were quite high at 39%, compared to the one year follow-up visit where a significant proportion of participants had recovered and only 16% had clinically significant symptoms (15). Comparable results are noted in a prospective cohort study also from China whereby the prevalence of depressive symptoms among PLHIV being 39% and 10% at baseline and one year follow-up visits respectively (60). Similar findings are reported in a longitudinal study from the same country whereby the prevalence of features of Depression at the time of initiation of ART was high at 36% with decreasing prevalence over time. However, of note is a reported association between the presence of depressive symptoms and delay in ART initiation, whereby depressed individuals are almost two times more likely to delay starting treatment on ART (63).

Elsewhere in the world, research findings from a mixed qualitative and quantitative study done in Australia demonstrated that illness concerns and depressive symptom scores were both high at baseline (post-diagnosis) and both fell over the course of the following 12 months with an intervention (64). In the United States it was found that a cohort of individuals recently enlightened about their serostatus had an overall improvement in features related to Depression with intervention over a period of 15 months (65).

In the SSA region there is little information available on how depressive symptoms progress over time post-diagnosis. A Ugandan study (62) highlights an association between depressive symptoms and timing of diagnosis, whereby the severity lessens over time specifically noting a significant reduction in the severity and prevalence of symptoms over 6 months of follow-up in those who utilised mental health services. A study done in Cameroon detailed that significant change in depressive symptom scores occurred over a period of 4 months with intensive intervention addressing the features of Depression (66).

The situation in Tanzania is similar, with limited references as to the progression of depressive symptoms over time soon after PLHIV are informed about their diagnosis. One study tot(42) outlined that with a cohort of HIV infected women only 7% had persistent depressive symptoms at the end of the study's 24-month follow-up period, down from 58% at baseline. This study

noted that appropriate mental health intervention plays a crucial role in bringing down the symptom scores. As far as I am aware other studies in Tanzania have not looked into the differences in prevalence or severity of depressive symptoms among individuals attended at different time-points after HIV diagnosis. The decision to group patients according to duration since HIV diagnosis is based on the methodology of the study conducted by (62) whereby the severity of depressive symptoms was observed closely during the first month, then at 3 months and 6 months post-diagnosis for follow-up. This could help to show differentiation in severity of symptoms over time which, in turn, has a role in determining which intervention(s) to provide.

1.8.3 Depression and Associated Factors of PLHIV diagnosed within the past 12 months

Research has been able to identify several factors as being associated with Depression in PLHIV. Multiple studies from across the globe have mentioned gender (being female), low level of education, unemployment or having low income and poor social support as common factors (29,33,34).

In Brazil, several studies demonstrated that being female and being younger than 40 were associated with a higher risk of PLHIV developing depressive symptoms; (35,36). Studies from India displayed that in addition to gender and age, marital status (being single, unmarried or widowed) was associated with a higher incidence of depressive symptoms in PLHIV (37). A research article from France added that unemployment and material deprivation (low socioeconomic status) had an association with depressive symptoms among PLHIV (67). Similar results were identified in Canada whereby female gender, unemployment, age below 50 years and low literacy were factors that had a significant association with depressive symptoms amongst PLHIV (68).

In the SSA region a lot of focus has been paid towards PLHIV and some studies have managed to delineate the relationship between certain factors and Depression in this population. A regional systematic review gathered findings from Kenya, Rwanda, South Africa and Uganda which collectively identified female gender, low level of education, living alone and poor social support as independent variables associated with Depression in PLHIV (29), while a study from

rural Southern Ethiopia added that age between 18-39 years also had a significant association with depressive symptoms in this population group (69). A couple of Nigerian studies concluded that female individuals and those never married were more likely to be depressed among PLHIV (70,71).

In East Africa, a study from Uganda concurred that female gender was associated with the presence of depressive disorders among PLHIV (72) whereas a rural study from Kenya mentioned marital status (divorced or widowed) as being independently associated with Depression among PLHIV (73).

In Tanzania a limited number of research articles have focused on the association between socio-demographic factors and features of Depression in PLHIV; according to one (74) female individuals and those who had not disclosed their HIV status were found to have a higher incidence of depressive symptoms among PLHIV while another identified poor social support and enacted stigma as significantly associated with Depression among a cohort of women infected with HIV (39,42).

CHAPTER TWO

2.0 METHODOLOGY

2.1 Study Design

This study was of a cross-sectional design with the use of quantitative methods to assess the prevalence of Depression and its Associated Factors among newly diagnosed PLHIV attending CTCs in Kilimanjaro Region. The cross-sectional design was used for its relatively quick and less expensive qualities (75). This study proposed independent variables of Recent HIV diagnosis (within the past 12 months) as well as the following Associated Factors: Age, sex, CD4 count (at baseline and most recent), Viral load, duration of ART, type of employment, level of education, perceived level of social support, distance from home to CTC centre and one dependent variable being Depression.

2.2 Study Area and Setting

Since CTCs in Tanzania are often attached to hospitals of Health Centre level or higher this study was hospital-based. The study sites were Mawenzi Regional Referral Hospital, Hai District Hospital and Majengo Health Centre, purposively selected for their different functional levels and conveniently selected as they are all located in Kilimanjaro Region. These are all government-run centres serving the greater part of Kilimanjaro Region in Northern Tanzania. Clients can be initiated on CTC care directly at these centres as well as being referred from lower-level health centres and dispensaries. The CTCs located at these hospitals are open on Monday to Friday from 8:00am to 14:00pm.

2.3 Study Population

All available adult patients (aged 18 and above) attending the CTCs who were diagnosed with HIV within the past 12 months and provided written informed consent to participate. These were individuals often identified as PLHIV through VCT, ANC and routine diagnostics performed during medical care then channeled for CTC care.

2.4 Sample Size Calculation

The sample size was calculated using an equation taken from Cochran's formula. The researcher referred back to a previous study from Tanzania due to a similar study sample to obtain a prevalence figure that could be used to calculate the sample size for this study. The prevalence (P) of Depression in this Tanzanian study among PLHIV was 23%

$$N = \frac{Z^2 P (1-P)}{d^2}$$

Whereby:

N= estimated desired sample size

Z= confidence level at 95% (standard value of 1.96)

P= Prevalence of Depression (mild, moderate and severe forms) among PLHIV was 23% in Tanzania in a study by Belenky et al, 2014 (40).

d= Margin of error at 5%

Hence, according to the formula above

$$N=\frac{1.96^2*0.23(1-0.23)}{(0.05)^2}$$

N= 272

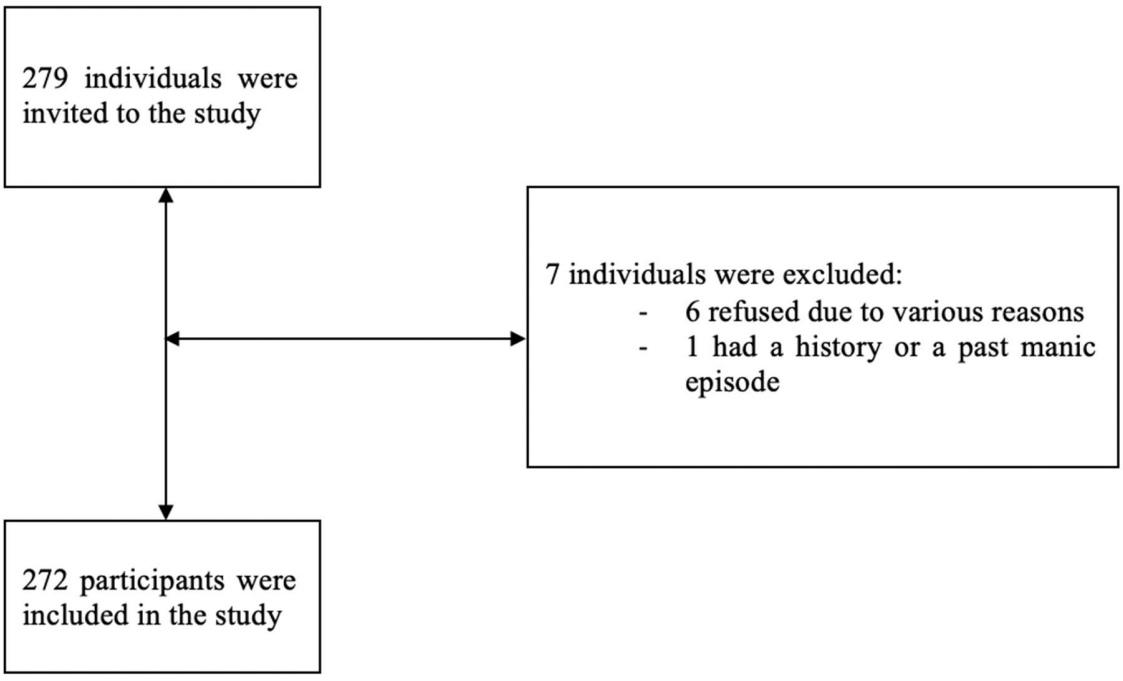
The minimum number of participants required for this study is **272**.

2.5 Sampling Procedure

Convenience sampling procedure was used to select study participants. This is one of the types of non-probability sampling, meaning there is not an equal chance for all participants to be selected. Convenience sampling involves the selection of all study participants that meet the study inclusion criteria (76).

Upon receiving permission from the respective CTC centres to proceed with participant recruitment the total sample size was portioned depending on average monthly patient visits at

each study site for the past 12 months. The number of monthly attending clients from each site was added and this sum was used to determine the proportion each site carried, therefore, the site with the highest proportion was assigned the largest number of participants from the overall sample. Potential study participants were identified through patient medical records at the respective CTC centres. Selected participants were then categorized according to age: 18-24, 25-49 and 50 or older, and categorized as male or female due to the highlighted associations with age and sex, respectively (77,78). The study was introduced to patients by the researcher and/or Research Assistants (RAs) and sampling was done daily by the same people prior to data collection on working days. Every individual that met inclusion criteria was selected as a study participant and interviewed consecutively until the sample size was reached. If a participant declined to participate at the beginning of or during the interview another participant who met the criteria was interviewed.



Study site	Number of individuals diagnosed with HIV in the past 12 months	Proportion of individuals at each site per total individuals diagnosed (%)	Number of participants required at each respective site
Mawenzi	307	41.8	114
Hai	266	36.2	98
Majengo	162	22	60
Total	735	100	**272**

2.6 Data Collection Procedure

Data collection was performed by the researcher and two RAs (trained medical staff/students). Eligible and interested participants were escorted to a private research office where they completed the informed consent procedure and the study survey. The informed consent form and all survey questions were read aloud and responses were recorded on a printed form. No identifying information was gathered on the survey and the signed informed consent form was stored separately from the survey responses whereby only the researcher had access to the filled consent forms after collection. Every interview took approximately 20 minutes giving an estimated total of 6 participants per day.

2.7 Data Collection Tools

The study involved the following variables: Depression, being newly diagnosed with HIV, age, sex, CD4 count (at baseline and most recent), Viral load, duration of ART, level of income/employment status, level of education, perceived social support, and distance from home to CTC centre. The tools used to measure this were as follows:

- Patient Health Questionnaire 9 (PHQ-9)
- Demographic Health Surveys Questionnaire (SES-DHS8 – Household Schedule)
- Duke UNC Functional Social Support Questionnaire (FSSQ)
- Patient records
- Stressful Life Events Checklist

The questionnaires were compiled into a research document, and thereafter the patient records were consulted for the remaining required information.

Patient Health Questionnaire (PHQ-9)

The Patient Health Questionnaire is a self-reporting tool that is used for both screening and diagnostic functions in common mental disorders. The PHQ-9 is the brief module used for assessment of depressive symptoms and comprises of 9 items which match the DSM 5 criteria (19). Each item can be scored from 0 (no symptoms at all) to 3 (symptoms nearly every day) with a maximum score of 27. The PHQ-9 has several cut-off points to indicate the severity of symptoms; however, these cut-offs can vary with clinical context. As reported from studies done in Tanzania the cut-off scores commonly used are 0-4 to indicate minimal severity, 5-9 (mild), 10-14 (moderate), 15-19 (moderately severe) and 20+ (severe symptoms) with a score greater than 9 is equivalent to a major depressive episode (79). This tool has been translated to Kiswahili in past studies (80), adapted to Tanzanian cultural context and validated showing very good internal consistency values – Cronbach's alpha of 0.83 (79). The measure has also been widely used elsewhere in SSA with promising validity and reliability (81,82). An additional two questions were added to this tool to rule out history of a manic episode, based on criteria in the DSM 5 (19). A 'yes' response to either of these questions automatically disqualified the participant from the study because a past experience of a manic or hypomanic episode disqualifies a diagnosis of Depression and qualifies for Bipolar disorder instead.

Demographic Health Surveys Questionnaire (SES-DHS8 – Household Schedule)

The DHS program ensures data availability and promotes research partly through the creation of various questionnaires. The program is primarily funded by USAID and supports broad socio-demographic surveys in more than 80 countries – often on a national or multi-national level (83). The household questionnaire was used in this study to collect data on characteristics of the participants (age, sex, level of education etc.) and therefore provided insightful information regarding the demographic characteristics that are often closely associated to health-related issues, in this case HIV and Depression. This questionnaire – as well as the others created through the DHS program – has been used extensively in national studies in Tanzania such as the Malaria Indicator and HIV Impact Surveys (10,84).

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. However, as far as I am aware no definitive cut-off scores have been set in previous literature to determine specific levels of social support. For this study, scores were divided into quartiles with an inter-quartile range of 17.5 to create equally-weighted ordinal levels from poor (0-17.5), fair (17.6-35), good (35.1-52.5) and excellent social support (52.6-70). This tool has demonstrated good construct and concurrent validity, however, shows questionable internal consistency with a reported Cronbach's alpha value of 0.66(85) whereas a more recent study from 2013 (86) showed very good reliability, with a value of 0.87. This tool has not been validated nor adapted to the Tanzanian cultural context.

Patient medical records

Official documentation was requested from the individual participants and CTC clinics to obtain details on the date of HIV diagnosis, the date of initiation on treatment, viral load and CD4 counts to corroborate information provided by the participant. Viral load counts were classified as TND (indicating a count 20 or lower), Viral suppression (21-200), Low (201-1,000), Medium (1,001-10,000), High (10,001-100,000) and Very high (>100,000). These groups were derived from previous study findings (87,88) showing that viral load changes occur in an exponential growth pattern, hence the need to accommodate a large range of numbers based on a log scale. Details from patient records were used primarily in identifying potential study participants and in the analysis stage. No identifying information was recorded on the surveys.

Stressful Life Events Checklist

A screening checklist based on the Life Events Checklist for DSM 5 (LEC-5) tool was used to detect history of Stressful Life Events with the main aim of identifying possible confounders that could offer an alternative explanation for the occurrence of Depression (89). The LEC-5 is used as a self-report measure and identifies events from a list of potentially traumatic events from an individual's lifetime. It is intended to detect these events and there is no scoring system or other interpretation done (90). It is based on different tools with good test-retest reliability and internal consistency (91).

2.8 Variables

Independent Variables:

1. Being newly diagnosed with HIV (within the past 12 months)
2. Age, sex, CD4 count (at baseline and most recent), Viral load, duration of ART, level of income/employment status, level of education, perceived social support, distance from home to CTC centre, SLE

Dependent Variables:

1. Depression

2.9 Sample Selection Criteria

Inclusion Criteria

1. Available patients at the time of data collection who were 18 years of age or older.
2. Patients diagnosed with HIV in the past 12 months.
3. Patients who could provide informed consent through either signature or fingerprint mark – for those who could provide a signature – hence indicating participation voluntarily.

Exclusion Criteria

1. Clients unable to participate either physically or verbally unable to express themselves.
2. Individuals who had previously experienced a manic or hypomanic episode to rule out bipolar disorder.

2.10 Data Analysis Plan

Data from the physical collection tools was entered into a laptop-computer and cross-checked by the researcher to ensure accuracy, then stored securely using password-protection and analysed by the researcher utilising STATA 16.

Descriptive statistics – socio-demographic data from the SES-DHS8 questionnaire, patient records and SLE checklist – were collected, organised, and summarised; continuous data through means, frequencies, standard deviations and ranges, and categorical data through frequencies.

Bivariate analysis was then done; Chi-Square (χ^2) of 1.96 and a p-value (p) of 0.05 as cut off points to check for significant association between the outcome of interest (Depression) and

independent variables (Associated Factors and recent HIV diagnosis). Analysis of Variance (ANOVA) was used to determine the associations between categorical and continuous variables. Multivariate analysis was also performed to inform on these associations. Firstly, a backward logistic regression model was used to identify independent variables with p-values of less than 0.20. Secondly, ordinal logistic regression was performed on these variables and adjusted to control for confounders, hence determining independent associations between Depression and the Associated Factors with the use of odds ratios and confidence intervals.

ANOVA was performed to detect significant differences in severity of Depression scores between the sub-sample groups (those diagnosed less than one month ago, between 1-3 months, between 3-6 months and lastly between 6-12 months) using F ratio and p-value.

Tables and figures were used to display findings.

2.11 Pre-Testing of Data Collection Tools

Five patients from each CTC centre were invited to pre-test the questionnaires. Patients were selected randomly and the researcher administered the questionnaires (the SES-DHS8 Demographic Health Survey Questionnaire and the Patient Health Questionnaire-9**).** This process helped to assess if the tools were easy to understand, as well as to provide an estimate of the time frame for the interviews to allow the researcher and assistants to make necessary adjustments. All these activities were done by both the researcher and the RAs.

2.12 Recruitment and Training of Research Assistants

Two research assistants were recruited to assist in the data collection process. These assistants were both University graduates with years of experience in research, particularly related to mental health and public health fields. Training the RAs on the study procedures and research instruments was done one week prior to the start of the data collection process. The RAs were trained on skills for effectively building research rapport, informed consent procedures, how to administer the questionnaires, common threats to validity and how to minimize these, sampling procedures, as well as on ethical issues. Training included practice administering the surveys with real time feedback. The researcher and RAs did both sampling and data collection. RAs

were required to satisfactorily complete a full mock interview contact and questionnaire with the researcher prior to any participant contact.

2.13 Ethical Issues and Research Clearance

Clearance to carry out this study was sought from the MUHAS Senate Research and Publications Committee, and the KCMC-Duke Medical Education Partnership Initiative which funded this study through the D43-TW0095959 Grant. Permission was also requested from the Medical Officers in Charge at the Mawenzi Regional Referral Hospital, Hai District Hospital and Majengo Health Centre, as well at the Officers in Charge at their respective CTC clinics.

The study participants were informed verbally about the study by the researcher and/or RAs, then those who showed interest were escorted to a consultation room that was made available and provided with detailed information about the study. Those who provided informed consent for participation were then interviewed by the researcher and RAs. Data collection was done during working hours of the CTC clinics.

Data will be retained for three years in case there is a need for reference or data cleaning before being disposed of.

The consent form clearly stated the intention of the study as well as highlighting the benefits and risks of participating in the study. For those participants who became emotionally distressed as a result of some questions, the interview was postponed or paused to allow time for the participant to recover. Any participants who scored high on the PHQ-9 questionnaire, particularly question #9 which relates to thoughts about harming oneself, were informed about the inference from this score – risk of harm – and then referred for appropriate mental health intervention if warranted. These participants also discussed with the Officers in Charge at the respective CTC centre, and plans were made to refer the participant to the Psychiatry department at either Mawenzi Regional Referral Hospital or Kilimanjaro Christian Medical Centre.

Participants were explicitly informed that there was no financial gain. They were also given the contact information of the researcher, the supervisor as well as those of the Director of Research and Publication Committee from MUHAS in case they had any questions, concerns or complaints.

CHAPTER THREE

3.0 RESULTS

This study enrolled 272 participants from September to December, 2020. Table 1 displays the characteristics of the sample.

Table 1: Sample characteristics (N=272)

Variable	Observations n (%)	Mean	SD	Range
Study site	272			
Mawenzi	114 (41.91)			
Majengo	60 (22.06)			
Hai	98 (36.03)			
Age	272	41.02	12.25	18-75
18-24	24 (8.82)			
25-49	184 (67.65)			
50+	64 (23.53)			
Sex	272			
Male	106 (38.97)			
Female	166 (61.03)			
Level of education	272			
None or informal	21 (7.72)			
Primary education	185 (68.01)			
Secondary education	49 (18.01)			
Higher education	17 (6.25)			
Marital status	272			
Single	86 (31.62)			
Co-habiting	10 (3.68)			
Married	62 (22.79)			
Divorced	77 (28.31)			
Widowed	37 (13.60)			
Currently living with	272			
Alone	89 (32.72)			
Spouse or partner	65 (23.90)			
Family or relatives	115 (42.28)			
Friend	2 (0.74)			

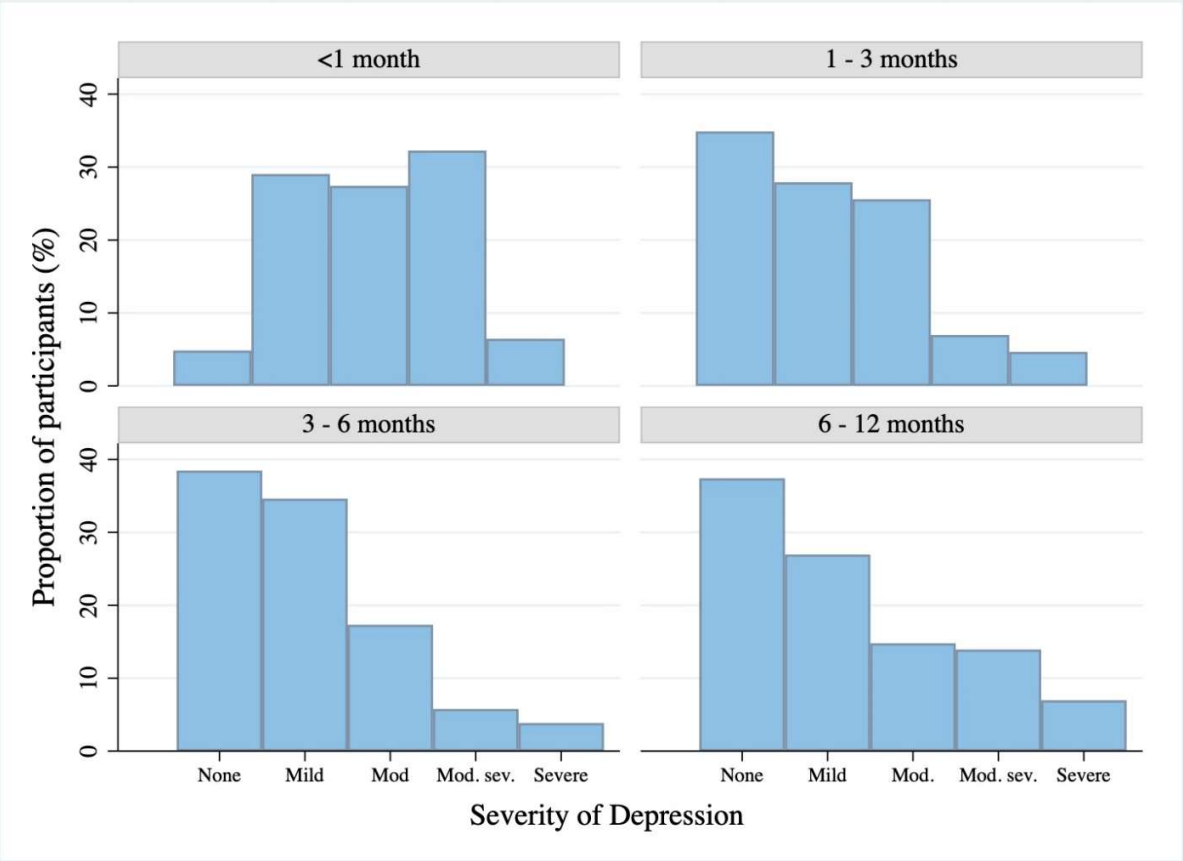
Other	1 (0.37)			
Type of employment	272			
Unemployed	59 (21.69)			
Throughout the year	135 (49.63)			
Seasonal	78 (28.68)			
Distance from home to CTC	272			
<5km	85 (31.25)			
5 - 10km	73 (26.84)			
>10km	114 (41.91)			
Duration since HIV diagnosis	272			
<1 month	62 (22.79)			
1-3 months	43 (15.81)			
3-6 months	52 (19.12)			
6-12 months	115 (42.28)			
Duration on treatment for HIV				
<1 month	63 (23.16)			
1-3 months	43 (15.81)			
3-6 months	53 (19.49)			
6-12 months	113 (41.54)			
Most recent viral load (particles per millilitre)	254	420.97	2868.29	0 - 35,200
Target not detected (0 - 20)	152 (59.84)			
Viral suppression (20 – 200)	72 (28.35)			
Low (201 – 1,000)	25 (9.84)			
High (1,001 – 10,000)	2 (0.79)			
Very high (10,001 – 100,000)	3 (1.18)			
Baseline CD4 count (cells per µl)	111 (40.80)	294.69	223.93	5-1,003
Most recent CD4 count (cells per µl)	12 (4.41)	414	183.81	182-685
Perceived social support	272	52.2	14.66	14 - 70
Poor (0 - 17.5)	1 (0.37)			
Fair (17.6 - 35)	38 (13.97)			
Good (35.1 – 52.5)	87 (31.99)			
Excellent (52.6 – 70)	146 (56.38)			

Of the 272 participants, the highest number were enrolled at Mawenzi Regional Referral Hospital with 114 (41.94%). The mean age was 41.02 (SD ±12.25) with the majority of participants falling in the 25-49 years age group. The age of study participants ranged from 18 to 75 years. More than 61% of the participants were female and the majority (68.01%) had a primary level of education. Nearly a third (31.62%) of the participants were single while 22.79% were married and another 28.31% were separated or divorced. While 42.28% of participants were living with family, almost a third (32.72%) were living alone and 23.90% with a spouse or partner. Nearly half (49.63%) of the participants – had employment throughout the year and 114 (41.91%) participants lived more than 10 kilometres from the CTC they were attending. 62 (22.79%) of the participants had been newly diagnosed with HIV less than month prior to the interview, 43 (15.81%) between 1 and 3 months, 52 (19.12%) between 3 and 6 months and 115 (42.28%) between 6 and 12 months. The mean viral load count from 254 participants was 420.97 (SD ±2868.29) particles per millilitre. The counts ranged from undetectable to 35,200 particles per milliliter. Nearly 60% had undetectable counts and only 5 participants had a high (0.79%) or very high (1.18%) count. Of note is the 6.6% missing data on viral load count. Data on baseline CD4 counts was collected from less than half of the sample with an average of 294.69 (SD ±223.93) cells/µl and only 12 (4.4%) of the participants' records had information on a consequent CD4 count, with a mean of 414 (SD ±183.81) cells/µl. More than half (56.38%) of the participants had excellent level of perceived social support although the mean (52.2) falls in the 'good' category.

Table 2: Prevalence of Depression and perceived level of difficulty in functioning over the past 2 weeks, according to the PHQ-9 questionnaire

Variable	Outcome	n (%)
Depression	Yes	112 (41.18)
	No	160 (58.82)
	Severity	**n (%)**
	None	81 (29.78)
	Mild	79 (29.04)
	Moderate	54 (19.85)
	Moderately severe	42 (15.44)
	Severe	16 (5.88)
	Total	**272 (100)**
Level of difficulty for one to function	Not difficult at all	117 (43.01)
	Somewhat difficult	96 (35.29)
	Very difficult	38 (13.97)
	Extremely difficult	21 (7.72)
	Total	**272 (100)**

The prevalence of Depression was 41.18% using a cut-off score above 9 indicating moderate to severe forms of Depression. In terms of perceived difficulty of functioning due to the Depression, more than half (56.98%) reported difficulty in areas such as occupation, academics and social interactions.



Key: Mod. = Moderate, Sev. = Severe

Figure 2: Histogram displaying the prevalence and severity of Depression by category of post-diagnostic period (<1 month, 1 - 3 months, 3 - 6 months and 6 - 12 months after HIV diagnosis).

The graph above shows that of the 62 participants seen in the early post-diagnostic duration (<1 month) there is a higher percentage of participants with Depression especially in the mild to moderately severe forms. In subsequent categories (1 - 3 months: n= 43, 3 - 6 months: n= 52, and 6 - 12 months: n= 115) the percentages of those with no Depression is higher compared to the first category. The final category of participants seen between 6 and 12 months after HIV diagnosis displays a slight increase in those experiencing moderately severe and severe forms of Depression.

Table 3: Showing One-way ANOVA results concerning the severity of Depression and its association with duration since HIV diagnosis (<1 month, 1-3 months, 3-6 months, 6-12 months)

When first diagnosed to have HIV	Summary of Total Score (PHQ-9)				
	Observations	**Mean**	**SD**	**F ratio**	**Level of Sig.**
<1 month	62	12.5	5.24	10.45	**0.00*** **
1 - 3 months	43	7.72	5.7		
3 - 6 months	52	6.87	5.79		
6 - 12 months	115	8.25	6.55		
Total	272	8.87	6.3		

Key: * = p<0.05, ** = p<0.01, *** = p<0.001

The above table highlights the number of participants in each category according to duration since HIV diagnosis. The mean score on the PHQ-9 was highest among those diagnosed <1 month ago (12.5 ± 5.24) whereby a score of 12.5 corresponds to moderate severity of Depression. The ANOVA results show a significant association between severity of Depression and duration since HIV diagnosis (p= 0.00) and a large F ratio (10.45) indicating a much greater variance between categories compared to within the categories themselves. Post-hoc analysis through Bonferroni correction was done to identify which groups showed significant variance in their means (Table 4). The '<1 month' group showed a significant variance from all other groups (all p= 0.00).

Table 4: Bonferroni correction results displaying the level of significance in variance among the groups of participants according to duration since HIV diagnosis (<1 month, 1-3 months, 3-6 months, 6-12 months)

	<1 month	**1 - 3 months**	**3 - 6 months**
1 - 3 months	-4.78		
	p*=0.00 **		
3 - 6 months	-5.63	-0.86	
	p*=0.00 **	*p*=1	
6 - 12 months	-4.25	0.53	1.39
	p*=0.00 **	*p*=1	*p*=1

Table 5: Bivariate analysis to determine factors associated with Depression and its severity among newly diagnosed PLHIV attending CTC centres in Kilimanjaro Region

Variable	**Severity of Depression (past 2 weeks)**					**Range**	**Chi-square**	**Level of Sig.**
	None	**Mild**	**Moderate**	**Moderately Severe**	**Severe**			
Study site								
Mawenzi	28 (24.6)	28 (24.6)	22 (19.3)	24 (21.1)	12 (10.5)		15.45	**0.051**[#]
Majengo	21 (35)	21 (35)	10 (16.7)	7 (11.7)	1 (1.7)			
Hai	32 (32.7)	30 (30.6)	22 (22.4)	11 (11.2)	3 (3.1)			
Age								
18-24	9 (37.5)	5 (20.8)	7 (29.2)	2 (8.3)	1 (4.2)	18 - 75	6.21	0.62
25-49	49 (26.6)	59 (32.1)	35 (19)	29 (15.8)	12 (6.5)			
50+	23 (35.9)	15 (23.4)	12 (18.8)	11 (17.2)	3 (4.7)			
Sex								
Male	36 (34)	30 (28.3)	21 (19.8)	15 (14.2)	4 (3.8)		2.56	0.64
Female	45 (27.1)	49 (29.5)	33 (19.9)	27 (16.3)	12 (7.2)			
Level of education								
None or informal	5 (23.8)	3 (14.3)	1 (4.8)	10 (47.6)	2 (9.5)		28.23	**0.005****

Primary	59 (31.9)	55 (29.7)	35 (18.9)	22 (11.9)	14 (7.6)		
Secondary	12 (24.5)	16 (32.7)	14 (28.6)	7 (14.3)	0 (0)		
Higher	5 (29.4)	5 (29.4)	4 (23.5)	3 (17.6)	0 (0)		
Marital status							
Single	22 (25.6)	24 (27.9)	20 (23.3)	13 (15.1)	7 (8.1)	16.78	0.40
Co-habiting	1 (10)	4 (40)	2 (20)	2 (20)	1 (10)		
Married	17 (27.4)	21 (33.9)	15 (24.2)	9 (14.5)	0 (0)		
Divorced	28 (36.4)	24 (31.2)	11 (14.3)	10 (13)	4 (5.2)		
Widowed	13 (35.1)	6 (16.2)	6 (16.2)	8 (21.6)	4 (10.8)		
Currently living with							
Living alone	28 (31.5)	20 (22.5)	19 (21.3)	16 (18)	6 (6.7)	27.52	**0.036***
Spouse or partner	15 (23.1)	21 (32.3)	16 (24.6)	12 (18.5)	1 (1.5)		
Family or relatives	37 (32.2)	38 (33)	18 (15.7)	14 (12.2)	8 (7)		
Friend(s)	1 (50)	0 (0)	1 (50)	0 (0)	0 (0)		
Other	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)		
Type of employment							
Unemployed	14 (23.7)	13 (22)	14 (23.7)	11 (18.6)	7 (11.9)	18.99	**0.015***
Throughout the year	45 (33.3)	40 (29.6)	32 (23.7)	13 (9.6)	5 (3.7)		
Seasonal	22 (28.2)	26 (33.3)	8 (10.3)	18 (23.1)	4 (5.1)		
Distance from home to CTC							
<5km	28 (29.5)	22 (23.2)	21 (22.1)	10 (10.5)	4 (4.2)	8.33	0.4
5-10km	22 (30.1)	16 (21.9)	15 (20.5)	14 (19.2)	6 (8.2)		
>10km	31 (27.2)	41 (36)	18 (31.6)	18 (31.6)	6 (5.3)		
Duration on ART (months)							
<1 month	3 (4.8)	19 (30.2)	17 (27)	20 (31.7)	4 (6.3)	39.06	**0.00*****
1 - 3 months	15 (34.9)	12 (27.9)	11 (25.6)	3 (7)	2 (4.7)		
3 - 6 months	21 (39.6)	18 (34)	9 (17)	3 (5.7)	2 (3.8)		
6 - 12 months	42 (37.2)	30 (26.5)	17 (15)	16 (14.2)	8 (15.1)		
Viral load count							

Target not detected	51 (33.6)	44 (28.9)	26 (17.1)	22 (14.5)	9 (5.9)	0 - 35,200	9.53	0.89
Viral suppression	21 (29.2)	19 (26.4)	18 (25)	9 (12.5)	5 (6.9)			
Low	7 (28)	9 (36)	7 (28)	2 (8)	0 (0)			
Medium	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)			
High	1 (33.3)	1 (33.3)	0 (0)	1 (33.3)	0 (0)			
Level of social support								
Poor	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)	14-70	27.84	**0.006****
Fair	7 (18.4)	11 (28.9)	7 (18.4)	8 (21.1)	5 (13.2)			
Good	32 (36.8)	21 (24.1)	21 (24.1)	10 (11.5)	3 (3.4)			
Excellent	42 (28.8)	47 (32.2)	26 (17.8)	24 (16.4)	7 (4.8)			

Key: * = $p<0.05$, ** = $p<0.01$, *** = $p<0.001$, # = borderline

A number of factors were revealed to have significant associations with Depression using Chi-square. Study site showed a borderline association (p=0.05), however, level of education and employment were revealed to have significant associations, with p-values of 0.005 and 0.015 respectively. The person(s) living with the participant and perceived level of social support were also shown to be associated; p= 0.036 and 0.006, respectively.

Chi-square was also used to analyse for associations between SLE and Depression. Each SLE (see Appendix IV) was individually investigated as a categorical variable (yes/no) against the outcome variable (Depression). Of all 16 types of SLE listed on the checklist significant relationships were only detected among three – severe suffering was reported among eight participants (p=0.002), witnessing a sudden violent death by seven participants (p=0.01) and serious injury, harm or death you caused to someone else by two participants (p=0.03).

Table 6: Multivariate analysis showing independent associations between Depression and the selected Associated Factors among newly diagnosed PLHIV

Variable	OR	CI	P value	AOR	Adj. CI	Adj. P
Site						
Mawenzi	Ref			Ref		
Majengo HC	0.45	0.25-0.79	**0.005****	0.43	0.24-0.79	**0.007***
Hai DH	0.53	0.32-0.86	**0.01***	0.41	0.24-0.7	**0.001****
Level of education						
None or Informal	Ref			Ref		
Primary education	0.33	0.14-0.76	**0.01***	0.35	0.15-0.81	**0.02***
Secondary education	0.36	0.14-0.92	**0.033***	0.38	0.15-0.98	**0.05**#**
Higher education	0.33	0.1-1.06	0.064	0.29	0.09-0.95	**0.04***
Currently living with						
Alone	Ref			Ref		
Spouse or partner	1.03	0.59-1.82	0.91	0.87	0.47-1.62	0.67
Family or relatives	0.77	0.47-1.28	0.31	0.76	0.44-1.3	0.31
Friend(s)	0.52	0.04-7.32	0.63	1.09	0.08-15.11	0.95
Other	1.13	0-4	0.99	5.73	0-6	0.99
Duration on ART (months)						
<1 month	Ref			Ref		
1 - 3 months	0.28	0.14-0.57	**0.00****	0.3	0.15-0.62	**0.001****
3 - 6 months	0.21	0.11-0.41	**0.00****	0.17	0.08-0.34	**0.00*****
6 - 12 months	0.3	0.17-0.52	**0.00****	0.24	0.13-0.43	**0.00*****
Type of employment						
Unemployed	Ref			Ref		
Throughout the year	0.49	0.28-0.85	**0.01***	0.6	0.33-1.1	0.1
Seasonal	0.65	0.35-1.21	0.18	0.7	0.37-1.34	0.28
Level of social support						
Poor	Ref			Ref		
Fair	6.51e-9	0-1	0.996	1.22e-8	0-1	0.998
Good	2.73e-9	0-1	0.996	5.72e-9	0-1	0.998
Excellent	3.45e-9	0-1	0.996	5.85e-9	0-1	0.998

Key: CI = Confidence Interval, OR = Odds Ratio,
AOR = Adjusted Odds Ratio, Adj. P = Adjusted P value
* = p<0.05, ** = p<0.01, *** = p<0.001, #= borderline

Ordinal logistic regression was performed on all selected independent variables with a p-value of 0.2 or less obtained during bivariate analysis (see table 7). These variables were study site, level of education, person(s) the participant was living with, type of employment, duration on ART and perceived level of social support by the participant. Through an ordinal logistic regression model, study site, having no or informal education, and duration of ART were identified as having independent associations with Depression.

Looking at study site revealed that participants at Hai District Hospital and Majengo Health Centre were less than half as likely to report symptoms of Depression, compared to Mawenzi Regional Referral Hospital (AOR = 0.43 and 0.41, respectively). Level of education was also detected as an associated factor; participants who had not received any education or those with informal schooling carried almost 3 times the odds of experiencing symptoms of Depression compared to those with primary, secondary or higher education. Similarly, participants on ART for less than 1 month carried more than three times higher odds of reporting symptoms of Depression in contrast to all other sub-groups (1-3 months, 3-6 months and 6-12 months). On the other hand, after adjustment for all selected independent variables there was no significant association to the type of employment, person(s) living with the participant at time of data collection or perceived level of social support.

CHAPTER FOUR

4.0 DISCUSSION

Depression is known to be one of the commonly occurring mental health issues related to HIV, either as a direct effect of the virus on the brain or indirectly through the stress of living with a severe and chronic illness. There are many studies conducted locally looking at Depression or depressive symptoms among PLHIV; some have recruited newly diagnosed individuals as part of their focus. This is the first study in Tanzania to comprise a sample of both men and women who are all newly diagnosed to have HIV with Depression as the outcome of interest. This study was aimed at estimating the prevalence of Depression among newly diagnosed PLHIV attending selected CTCs in Kilimanjaro Region, to determine any differences in the prevalence and severity of Depression between groups of participants seen at different post-diagnostic periods and to determine factors associated with Depression in newly diagnosed PLHIV.

4.1 Prevalence of Depression

With regards to Depression the prevalence was 41.18% using a PHQ-9 cut-off score of 9 indicating moderate to severe forms of the illness. Previous studies from different parts of the world report similar findings from their samples comprising newly diagnosed PLHIV. Studies from China (15,60) both reported a prevalence of 39% Depression; both of these studies utilised PHQ-9 criteria for screening and had similar population characteristics to this current study. It is important to note that the presence of clinically significant Depression has been associated with impact on treatment adherence and engagement with CTC care (41) – especially in the initial period of treatment.

Studies from Cameroon, Brazil and India – middle-income countries similar to Tanzania – that all studied participants newly diagnosed with HIV report higher numbers compared to this present study with prevalence of 63%, 61% and 67% respectively (17,55,61). The study from Cameroon utilized a much smaller sample of 100 individuals and all participants were seen at

the referral hospital level whereas the studies from Brazil and India used different screening tools for Depression, which may explain the higher prevalence. A Tanzanian study including only women recently initiated on ART found that 58% of the participants presented with depressive symptoms (42). While the prevalence is higher than this current study's findings the use of a different screening tool may have also contributed to different findings from this current study.

While other studies detected a lower prevalence, such as the 23% reported in a Tanzanian study (40), this can be explained by the sample being comprised of both newly diagnosed participants and those on longer-term care for HIV and having a much larger sample of 1191 participants; had the sample constituted only newly diagnosed individuals the prevalence may have been higher. Another study from Tanzania (41) reported a prevalence of 56.3% although the inclusion criteria were participants diagnosed not more than 6 months ago, rather than 12 months in this study, and the majority (more than 80% of those who screened positive for Depression) were reported to experience mild forms of the illness. Two studies from higher income countries (France and Canada) both revealed a prevalence of depressive symptoms around 28% (67,68) and while this is lower than the findings from this study, both of these studies adopted different screening tools for Depression and their selected samples were also a combination of participants newly diagnosed with HIV and those on treatment for longer durations, therefore, the numbers may have been higher had the samples been comprised solely of newly diagnosed participants. This suggests that Depression as a phenomenon among PLHIV transcends geography or economy and can be considered a global issue.

4.2 Severity of Depression at different post-diagnostic periods

This study reveals that the severity of Depression – notably the mild to moderately severe forms – was higher in participants seen soon after HIV diagnosis (less than 1 month) compared to those interviewed later (see fig.2). Although this study is of a cross-sectional design, the findings are suggestive of the severity of Depression decreasing with time after HIV diagnosis. This is also evident from the bivariate analysis performed in this present study which displays an

association between duration since HIV diagnosis and the severity of Depression (see table 3 and 4). Similar findings have been found from other studies; one from Uganda (62) revealed a rapid decrease in severity of depressive symptoms after the first 2 weeks of being diagnosed with HIV. Similarly, a study from Cameroon (66) highlights the improvement in levels of Depression by 4-months follow-up indicating the association of time post-diagnosis with severity of Depression. Another study from China (15) also reveals a decrease in severity of depressive symptoms over a 1-year period from HIV diagnosis. Notably, these are prospective studies and the authors mention the role of appropriate intervention to address the Depression during follow-up visits. This current study's findings on the severity of Depression are of value for this same reason; they can inform on the need for intervention to be provided.

Interestingly, the severity was higher in the participants seen between 6 and 12 months after HIV diagnosis compared to those between 1- and 6-months post-diagnosis. This may be expounded by participants facing changes in psychosocial status and more stress related to living with HIV in the long-run; stigma, decreased levels of social support, ongoing use of medications and frequent visits to CTCs.

The severity of Depression being highest after HIV diagnosis is suggestive of the prominent and stressful nature of the event of being diagnosed with HIV (13,15); not only due to the deeply sensitive nature of being diagnosed with a severe and chronic illness but also the accompanying information on the necessary life-long use of medications, anticipation of stigma, concerns regarding disclosure and social support all add weight to the probability of HIV diagnosis as a contributing factor to the onset of Depression (15,17).

4.3 Associated Factors of Depression among newly diagnosed PLHIV

Factors found to be associated with Depression included study site, level of education and duration on ART. Study participants interviewed at the Mawenzi site were more than twice as likely to have Depression compared to those at Hai and Majengo ($p = 0.001$, 0.007 respectively). This may be explained by Mawenzi being a regional referral hospital and, therefore, often

receiving clients with more severe illness that could not be appropriately managed at lower level centres hence a higher likelihood of Depression. A study from Cameroon (17) also found high prevalence (63%) of Depression at referral level centres. Being uneducated or having informal education was also detected as a predictor of Depression in this study, around 3 times as likely compared to those with primary, secondary or higher education. This is also a finding from a systematic review of various articles from across SSA (29), as well as a study conducted in India (33). Duration of ART was also found to be significantly associated with Depression which was also reported in a Ugandan study (62).

While bivariate analysis showed a significant relationship between the person(s) living with the participant and Depression, adjusting for other variables at the multivariate analysis stage produced no significant association. This was also the case for type of employment, whereby studies from South Africa (29) and India (33) detected unemployment as a predictor of Depression, along with a study from France (67). The reason for this difference in findings could be differences in tools used to collect data on socio-demographics and the study design. Poor social support was recognized as an associated factor of Depression according to studies from Tanzania (39,42) whereas this study found no significant association between perceived social support and Depression, which could also be due to utilization of different research tools. Predictors such as age did not show a significant association to Depression. This is in contrast to a study from Brazil (35) which identified this as a strong predictor, however, classified age in a different way (less than 40 and above 40). Sex was another variable that did not reveal significant association with Depression while a meta-analysis of studies from SSA (29) showed such an association. While this study was cross-sectional in contrast to the meta-analysis done over a period of several years, there were a diverse number of tools on socio-demographics used which may explain the different findings from this current study. Furthermore, marital status has been shown to have a significant association with Depression in other literature, such as a study from Botswana (34), however, was not associated with Depression in this study. Reasons for this could be differences in the methodology such as narrower age range of participants in

the Botswana study (18-49) and selection of participants from areas with the highest prevalence of HIV/AIDS.

Among the 16 SLE screened through a checklist, three were revealed to have significant associations with Depression; severe suffering, witnessing a sudden violent death, and serious injury, harm or death you caused to someone else. Although it is unclear whether these SLE were related to the HIV diagnosis, this is indicative of a possibility that SLE in themselves can contribute to the start of Depression; a study from China (15) postulates that individuals newly diagnosed with HIV may develop Depression as a psychological reaction, while another from India (55) states that recently diagnosed PLHIV were 2 to 3 times more likely to experience Depression soon after being diagnosed.

CHAPTER FIVE

5.0 STUDY LIMITATIONS

5.1 Participant bias

There is a risk of social desirability bias as participants may have chosen to share a version of information that is deemed more socially acceptable due to concerns about stigma or embarrassment about their true feelings related to Depression and HIV, therefore, this could affect estimates of Depression. This was minimised by the selection of RAs that were familiar with observing confidentiality and building rapport. Recall bias is a limitation since details on depressive symptoms required the participants to remember information from the past – a period of past 2 weeks and even months prior – which can be challenging.

5.2 Interviewer bias

The use of three interviewers in the assessment of Depression may have increased the likelihood of intra- and inter-interviewer bias. To minimize this, RAs were selected based on their prior experience with mental health research, and mock interviews were completed with the researcher prior to any participant contact to ensure repeatability of data collection procedures.

5.3 Study design flaws

Due to the cross-sectional nature of this study, it is not possible to infer causality between the independent and dependent variables but it can inform on the magnitude of Depression and identify significant associations. Issues around causality could be addressed by employing a prospective design in any future studies.

Another limitation is due to similarities between Depression and Adjustment disorder; both feature emotional and behavioural changes and can be precipitated by a SLE. However, as long as the criteria for a Major Depressive episode are met (considering the diagnostic value of the

PHQ-9) in the context of an identifiable stressor a diagnosis of Depression is favoured over that of Adjustment disorder (19).

A diagnosis of Depression is preferably made through a clinical interview which allows for more open conversation, collection of qualitative data and direct observation, however, the PHQ-9 tool is based on the same criteria required to formulate this diagnosis. To mitigate this, questionnaires were followed as prepared and assessments were made objectively.

Since some clients may have been referred to the selected study sites from lower level health centres or dispensaries due to more complex health challenges – especially in the case of Mawenzi Regional Referral Hospital – there runs a risk of selection bias.

5.4 Data collection challenges

Due to unanticipated breakdown of CD4 machines at all study sites, data on baseline and most recent CD4 counts was missing for more than half participants at Mawenzi and Majengo sites, and none was available for the participants at Hai. Making inference from the available data would, therefore, be inappropriate hence being presented at the univariate analysis level alone.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

This study aimed to estimate the prevalence and severity of Depression among newly diagnosed PLHIV in Kilimanjaro Region, determining whether there was a significant difference between the severity of Depression at different post-diagnostic periods, and identifying associated factors. The study clearly answers those questions, as the results highlight the significance of Depression in this population, while also confirming the alternative hypothesis in that there is an association between being newly diagnosed with HIV and the presence of clinically significant depressive symptoms. This indicates that integration of mental health interventions into CTC care is pertinent. However, this study raises further questions on how to address this issue of Depression among newly diagnosed PLHIV. The findings from this study can contribute to filling the knowledge gap around Depression in this population as well as HIV diagnosis as a SLE, prompting further studies to investigate the possible contribution of being diagnosed with HIV to the onset of Depression. Overall, it can be concluded that Depression is an issue that needs further attention among PLHIV.

6.2 Recommendations

6.2.1 Service providers:

CTCs should integrate interventions for improved detection and early management of mental health issues such as Depression; routine screening for Depression at enrolment into care and periodically thereafter. Determining the severity of Depression during screening can provide an opportunity to begin intervention or for linkage and referrals between CTC centres and mental health facilities for further care.

6.2.2 End users:

Service users (newly diagnosed PLHIV) should be made aware of the risk of developing Depression soon after HIV diagnosis, how to recognize it and the steps to take in seeking help.

6.2.3 Research:

To better understand the implications of this study, further research is required among newly diagnosed PLHIV; prospective studies to observe patterns of Depression, prevalence and severity among a cohort over a longer period of time, qualitative studies around the perception of mental health challenges such as Depression with relation to HIV and the attitude towards quality of care provided which could attempt to inform on gaps in current care from the clients' perspective.

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APPENDICES

Appendix I: INFORMED CONSENT (ENGLISH VERSION)

Principal Investigator: Dr. Kim S Madundo

Study Title: DEPRESSION IN NEWLY DIAGNOSED PEOPLE LIVING WITH HIV IN KILIMANJARO REGION: PREVALENCE, SEVERITY AND ASSOCIATED FACTORS

Information to Participants:

My name is …… I am a doctor and studying to become a specialist in Psychiatry at Muhimbili University of Health and Allied Science in Dar es Salaam, Tanzania. I am conducting a study on the prevalence of Depression and Associated Factors in newly diagnosed people living with HIV attending CTC clinics in Kilimanjaro Region.

I would like to thank you as one of the individuals attending this clinic, in being interested in participate in this study. Your participation is based on your own will, and you are free to take part or not. There will be no consequences should you decide against participating or choose to withdraw from the study and there will be no effects on the treatment and other services you receive here. The interview will take approximately 30 minutes of your time.

All the information that you provide will be kept confidential; the questionnaires used will not bear any identifying information such as your name, address or national identification number. The information that you provide will be stored securely and only used for research purposes, and no one will be able to access this information except the researcher. Therefore I request that you provide accurate information to the best of your ability, and do not provide responses that you may think are socially desirable. Some of the questions in this questionnaire may bring about an emotional reaction. If at any point this happens, you are free to pause or end the interview. You are also encouraged to ask any question at any point during the interview if the need arises.

Should there be a need for mental health services or counselling after the interview arrangements will be made, so that you can be offered an intervention appropriate to your needs.

Remember that there is no direct benefit to you for participating in this study; however, the results obtained will help to provide an idea as to the magnitude of Depression in this region and also to help health care providers offer better care. As this is academic-based research, there is no payment offered for your participation.

Agreement: I have read and understood the above information. I have understood that my participation is solely voluntary, and no payment that will be obtained by participating.

Please put (√) if you Agree or Disagree.

Agree [ ]
Client signature ……
Tel number: ……...… Date: …… (DD/MM/YYYY)
If you have any questions or need further clarification concerning this study, please feel free to contact the Principal Investigator, Dr. Kim S Madundo, through 0784 811 785.
You may also contact my supervisor through 0754 339 747.

Additionally, in case of any complaints based on this research, please forward your complaints to:

1. Director of MUHAS Senate Research and Publications Committee
   P.O Box 65001 Dar Es Salaam, Tel No.: +255 222151596

Disagree [ ]
Client signature ……
Tel number: ……...… Date: …… (DD/MM/YYYY)
Reason for refusal ……..

Appendix I: INFORMED CONSENT (KISWAHILI VERSION)

Mtafiti Mkuu: Dr. Kim S Madundo

Kichwa cha Utafiti: DEPRESSION IN NEWLY DIAGNOSED PEOPLE LIVING WITH HIV IN KILIMANJARO REGION: PREVALENCE, SEVERITY AND ASSOCIATED FACTORS

Taarifa kwa mshiriki:

Mimi ninaitwa …….. Ni daktari na pia ninasomea udaktari bingwa wa afya na magonjwa ya akili katika chuo cha Muhimbili cha Afya na Sayansi Shirikishi kilichopo Dar es Salaam, Tanzania. Ninafanya utafiti wa kuangalia jinsi tatizo la sonona lilivoenea kwa watu wenye maambukizi ya virusi vya UKIMWI ambao wanapata matibabu katika kliniki mbalimbali mkoani Kilimanjaro.

Ningependa kukushukuru wewe kama mmojawapo wanaopata matibabu katika kliniki hii kwa kujitolea kushiriki katika utafiti huu. Ushiriki wako ni kwa maamuzi yako pekee, unaruhusiwa kushiriki au kukataa. Hakuna madhara yoyote yatakayotokea iwapo utakataa kushiriki au kujitoa kwenye utafiti huu, na matibabu unayopokea hapa hayatabadilika kwa vyovyote vile. Mahojiano yatachukua dakika 30 tu kwa kukadiria.

Taarifa zote utakazotoa zitabaki kati yetu, na hili dodoso halitakuwa na kitu chochote cha kukutambulisha wewe mfano jina, anuani au namba ya kitambulisho cha taifa. Taarifa zote zitahifadhiwa na kutumika kwa ajili ya utafiti tu na hamna mtu yeyote mwingine atakayeweza kuzitumia isipokuwa mtafiti mkuu. Hivyo nakuomba utoe taarifa za ukweli iwezekanavyo, na usitoe majibu ambayo unahisi tu yangependa kusikika.

Baadhi ya maswali yanaweza kusababisha muamko wa hisia. Endapo hali kama hii itatokea unaruhusiwa kuomba muda wa kupumzika kidogo au kusimamisha mahojiano kabisa. Pia unahimizwa kuuliza maswali pale unapohitaji ufahamu zaidi.

Endapo uhitaji wa matibabu ya afya ya akili au ushauri nasaha kwako ukionekana, mpango wa kuendelea na utaratibu huo utafanyika baada ya mahojiano.

Unakumbushwa kuwa hakutakuwa na faida ya moja kwa moja kwa kushiriki kwenye utafiti huu, ila matokeo yanaweza kutusaidia kuelewa jinsi Sonona ilivoenea katika jamii na pia kuleta maoni na mawazo ambayo yatasaidia utoaji wa huduma na aina za huduma zinazopatikana. Kwa vile utafiti huu unafanyika kama sehemu ya elimu ya chuo, hakutakuwa na malipo yoyote kwa ushiriki wako.

Makubaliano: Nimesoma na nimeelewa taarifa za hapo juu. Nimeelewa kuwa ushiriki wangu ni wa hiari na kwamba sitapokea malipo yoyote kwa kushiriki.

Tafadhali weka alama (√) pale panapostahiki.
Nimekubali [ ]

Sahihi ya mshiriki ……

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

Ukiwa una maswali yoyote au unahitaji ufahamu zaidi kuhusu utafiti huu, tumia namba ifuatayo kumfikia Mtafiti Mkuu: Dr. Kim S Madundo: 0784 811 785.

Vile vile unaweza kumfikia Msimamizi wa Utafiti kupitia namba ya simu: 0754 339 747.

Endapo utakuwa na malalamiko yoyote kuhusu utafiti huu tafadhali tumia anuani ifuatayo:

1. Mkurugenzi wa Kamati ya Utafiti na Machapisho
   S.L.P. 65001 Dar Es Salaam, Simu: +255 222151596

Nimekataa [ ]

Sahihi ya mshiriki ……

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

Sababu ya kukataa kushiriki: ……..

Appendix II: SES DHS-8 DEMOGRAPHIC FACTORS QUESTIONNAIRE

1. **What is your age?**
   Umri wako ni miaka mingapi?
   _____

2. **Sex**
   Jinsia
   1. Male/Me
   2. Female/Ke

3. **What is your level of education?**
   Una kiwango gani cha elimu?
   1. None or Informal/ Sijasoma au sijasomea shuleni
   2. Primary/ Elimu ya msingi
   3. Secondary/ Elimu ya sekondari
   4. Higher/ Elimu ya chuo

4. **What is your marital status?**
   Hali yako ya ndoa?
   1. Single/ Sijaoa au sijaolewa
   2. Co-habiting/Ninaishi na mpenzi ambaye sijamuoa/hajanioa
   3. Married to one partner/ Nimeoa au nimeolewa
   4. Divorced or separated/ Tumetengana au kuachana
   5. Widowed/ Amefariki

5. **Who do you currently live with?**
   Unaishi na nani?
   1. Alone/ Peke yangu
   2. Spouse or partner/ Mume au mke au mchumba
   3. Family or relatives/ Familia au ndugu
   4. Friend/ Rafiki
   5. Other/ Mtu mwingine

6. **What is your current level of employment?**
   Hali yako ya ajira?
   1. Unemployed/ Sina ajira
   2. Throughout the year/ Ajira muda wote
   3. Seasonal/ Kwa msimu

7. **How long have you been on treatment for HIV?**
   Ni muda gani tangu uanze matibabu ya VVU?
   1. Less than 1 month
   2. Between 1 and 3 months/ Kati ya mwezi mmoja na mitatu
   3. Between 3 and 6 months/ Kati ya miezi 3 na 6
   4. Between 6 and 12 months/Kati ya miezi 6 na 12

8. **How far is your home from the CTC?**
   Mahali unapoishi pana umbali gani na kituo cha matibabu?
   1. Less than 5km/ Chini ya km 5
   2. 5-10km/ km 5- 10
   3. >10km/ Zaidi ya km 10

9. **When was the participant first diagnosed to have HIV?**
   Lini mshiriki aligundulika kuwa na maambukizi ya VVU?
   1. Less than one months ago/ Chini ya mwezi mmoja uliopita
   2. Between 1 and 3 months ago/ Kati ya mwezi mmoja na mitatu iliyopita
   3. Between 3 and 6 months ago/ Kati ya miezi 3 na 6 iliyopita
   4. Between 6 and 12 months ago/Kati ya miezi 6 na 12 iliyopita

10. **What is the most recent viral load? (Check patient medical records)**
    Idadi ya chembechembe za VVU katika kipimo cha mara ya mwisho? (Angalia katika taarifa za mgonjwa)

    _____

    Date of test/Tarehe ya kipimo _____

11. **What was the CD4 count at baseline? (Check patient medical records)**
    Idadi ya chembechembe-T katika kipimo cha mwanzo

    _____

    Date of test/Tarehe ya kipimo _____

12. **What was the most recent CD4 count**? **(Check patient medical records)**

    Idadi ya chembechembe-T katika kipimo cha mara ya mwisho

    _____

    Date of test/Tarehe ya kipimo _____

Appendix III: DUKE-UNC FUNCTION SOCIAL SUPPORT QUESTIONNAIRE (FSSQ)

	5	4	3	2	1
	As much as I would like Nime-ridhika kabisa	**Almost as much as I would like** Nime-ridhika kiasi	**Some, but I would like more** Kiasi, lakini ninge-penda zaidi	**Less than I would like** Sija-ridhika kiasi	**Much less than I would like** Sija-ridhika kabisa
1. I get visits from friends and family Natembelewa na ndugu, jamaa na marafiki					
2. I get help around the house Napata msaada katika shughuli za nyumbani					
3. I get help with money in an emergency Napata msaada wa kifedha nikiwa na dharura					
4. I get praise for a good job Napongezwa kwa jitihada zangu					
5. I have people who care what happens to me Nina watu wanaojali kinachonitokea					
6. I feel love and affection Nahisi upendo kutoka kwa watu wangu wa karibu					
7. I get telephone calls from people I know					

Napigiwa simu na watu ninaowafahamu					
8. I get chances to talk to someone about problems at work or with my housework Napata nafasi ya kuongea na mtu kuhusu shida ninazopitia kazini au nyumbani					
9. I get chances to talk to someone I trust about my personal and family problems Napata nafasi ya kuongea na mtu ninayemuamini kuhusu matatizo yangu na ya familia					
10. I get chances to talk about money matters Napata nafasi kuongelea matatizo ya kifedha					
11. I get invitations to go out and do things with other people Napata mialiko kutoka kwa ndugu, jamaa na marafiki					
12. I get useful advice about important things in life Napata ushauri mzuri kuhusu mambo muhimu katika maisha					
13. I get help when I need transportation Napata msaada ninapohitaji usafiri					
14. I get help when I am sick in bed					

Napata msaada ninapokuwa nauguliwa au nimelazwa					

Appendix IV: PATIENT HEALTH QUESTIONNAIRE-9

Circle the score corresponding to the most appropriate response

Zungushia duara kwenye alama inayoendana na jibu sahihi

	Over the past 2 weeks how often have you been bothered by the following problems: Kwa wiki mbili zilizopita ni mara ngapi umesumbuliwa na matatizo haya:	
1. Little interest or pleasure in doing things Mwelekeo mdogo au kukosa raha ya kufanya vitu	**Not at all** Hapana kabisa **Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi **Nearly every day** Karibu kila siku	0 1 2 3
2. Feeling down, depressed or hopeless Kujiskia kama huwezi kuchangamka, kusikia huzuni au kukosa tumaini	**Not at all** Hapana kabisa **Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi **Nearly every day** Karibu kila siku	0 1 2 3
3. Trouble falling asleep, staying asleep or sleeping too much	**Not at all** Hapana kabisa	0

Tatizo kwenye kupata usingizi, kuendelea kulala baada ya kupata usingizi au kulala kupita kiasi	**Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi **Nearly every day** Karibu kila siku	1 2 3
4. Feeling tired or having little energy Kujisikia kuchoka au kuwa na nguvu kidogo	**Not at all** Hapana kabisa **Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi **Nearly every day** Karibu kila siku	0 1 2 3
5. Poor appetite or overeating Kukosa hamu ya kula au kula kupita kiasi	**Not at all** Hapana kabisa **Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi **Nearly every day** Karibu kila siku	0 1 2 3
6. Feeling bad about yourself, or that you are a failure or have let yourself or your family down Kujisikia vibaya binafsi, au kusikia kama umeshindwa kujitoa katika matatizo haya, ama umejishusha au	**Not at all** Hapana kabisa **Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi **Nearly every day** Karibu kila siku	0 1 2 3

kuishusha hadhi familia yako		
7. Trouble concentrating on things, such as reading a newspaper or listening to the radio Tatizo la kutuliza akili kwenye vitu kama kusoma gazeti au kusikiliza redio	**Not at all** Hapana kabisa **Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi **Nearly every day** Karibu kila siku	0 1 2 3
8. Moving or speaking slowly such that other people could have noticed. Or the opposite, being so fidgety or restless that you have been moving around a lot more than usual Kusogea au kuzungumza polepole sana hadi inaweza kuonekana kwa watu wengine. Ama kinyume, kuwa na mashaka/wasiwasi au kutokutulia kiasi kwamba unatembea tembea sana kuliko kawaida	**Not at all** Hapana kabisa **Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi **Nearly every day** Karibu kila siku	0 1 2 3
9. Thoughts that you would be better off dead, or of hurting yourself Mawazo kwamba ni heri ukifa, au fikra za kujiumiza kwa njia fulani	**Not at all** Hapana kabisa **Several days** Siku kadhaa **More than half days** Zaidi ya nusu ya siku hizi	0 1 2

	Nearly every day Karibu kila siku	3
Total Jumla		
10. If you checked off any problems 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? Kama umejibu maswali yoyote, ni kwa kiasi gani haya matatizo yameleta ugumu katika kufanya kazi zako, kutunza vizuri vitu nyumbani au kuelewana na watu wengine?	**Not difficult at all** Sio vigumu hata kidogo **Somewhat difficult** Vigumu kiasi **Very difficult** Vigumu sana **Extremely difficult** Vigumu kupitiliza	_____ _____ _____ _____

11. Have you ever experienced elevated or expansive mood, or irritability persistently for a period of more than 1 week?
Umeshawahi kuhisi furaha, kusisimuka au hasira iliyopitiliza kwa kipindi cha zaidi ya wiki moja mfululizo? **YES**/NDIO [ ] **NO**/HAPANA [ ]

12. Have you ever experienced an increase in energy or goal-oriented activity **persistently for a period of more than 1 week?**
Umeshawahi kuhisi ongezeko la nguvu au ongezeko katika mipango kwa kipindi cha zaidi ya wiki moja mfululizo? **YES**/NDIO [ ] **NO**/HAPANA [ ]

'YES' response to either 11 or 12 automatically disqualifies the participant from this study.

Appendix IV: STRESSFUL LIFE EVENT CHECKLIST

No.	**Event** Tukio	**Happened to me** Imenitokea
1	**Natural disaster, for example, flood, earthquake** Maafa asilia, kwa mfano mafuriko au tetemeko la ardhi	
2	**Fire or explosion** Moto au mlipuko	
3	**Transportation accident (for example, car accident, boat accident)** Ajali ya chombo cha usafiri, mfano ajali ya gari au meli	
4	**Serious accident at work, homeor during recreational activity** Ajali kubwa ukiwa kazini, nyumbani au katika maeneo ya burudani	
5	**Contact with toxic substance or radiation** Kushika kemikali za hatari au sumu, au kuwepo kwenye eneo lenye mionzi	
6	**Physical assault (for example, being attacked, hit)** Kuvamiwa, kupigwa	
7	**Assault with a weapon** Kupigwa kwa kutumia silaha	

8	**Sexual assault** Kulazimishwa kufanya ngono bila kuridhia	
9	**Other unwanted or uncomfortable sexual experience** Tendo lingine la ngono ambalo hukulipendelea	
10	**Combat or exposure to a war-zone** Kupigana katika vita au kuwepo maeneo yenye vita	
11	**Being held captive** Kutekwa	
12	**Life-threatening illness or injury** Ugonjwa au jeraha lililotishia maisha yako	
13	**Severe suffering** Mateso makali	
14	**Witnessing a sudden violent death (for example, homicide, suicide)** Kushuhudia kifo cha ghafla au kutokana na vurugu, mfano mtu kuuliwa au kujiua	
15	**Witnessing a sudden accidental death** Kushuhudia kifo cha ghafla kutokana na ajali	
16	**Serious injury, harm, or death you caused to someone else** Jeraha kubwa, madhara au kifo ulichosababisha kwa mtu mwingine	
17	**Any other very stressful event or experience** Tukio lolote lingine lililokuletea msongo wa mawazo	

Appendix V: ETHICAL CLEARANCE CERTIFICATE

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR OF RESEARCH AND PUBLICATIONS

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Ref. No.DA.282/298/01.C/ Date: 03/09/2020

MUHAS-REC-09-2020-369
Dr. Kim S. Madundo
MMed - Psychiatry ,School of Medicine
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: PREVALENCE OF DEPRESSION AND ASSOCIATED SOCIO-DEMOGRAPHIC FACTORS IN NEWLY DIAGNOSED PEOPLE LIVING WITH HIV IN KILIMANJARO REGION

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: 03/09/2020
EXPIRATION DATE OF APPROVAL: 02/09/2021

STUDY DESCRIPTION:
Purpose:
The purpose of this Cross-sectional hospital-based study is to determine the prevalence of Depression and identify associated factors among newly diagnosed PLHIV attending CTC centres in Kilimanjaro Region.

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-%20221.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 data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
8. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
9. 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)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. 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. Bruno Sunguya
Chairman, MUHAS Research and Ethics Committee

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research & Publications

Appendix VI: DISSERTATION REPORT SUBMISSION LETTER

c/o MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES,
P. O. BOX 65001,
DAR ES SALAAM
29TH JUNE, 2021

To: DIRECTOR OF POSTGRADUATE STUDIES,
MUHAS,

U.F.S: DEAN, SCHOOL OF MEDICINE,
MUHAS

U.F.S: HEAD OF DEPARTMENT,
PSYCHIATRY AND MENTAL HEALTH,
MUHAS

U.F.S: DR. JESSIE MBWAMBO,
RESEARCH SUPERVISOR,
MUHAS

forwarded for processing
30.06.2021

RE: SUBMISSION OF LOOSE-BOUND DISSERTATION REPORTS

Kindly refer to the above heading.

I, Dr. Kim S. Madundo, a postgraduate student with registration number HD/MUH/T.223/2018, pursuing a Master of Medicine degree in Psychiatry, hereby submit two (2) copies of my supervisor's approved loose-bound dissertation report entitled "DEPRESSION IN NEWLY DIAGNOSED PEOPLE LIVING WITH HIV IN KILIMANJARO REGION: PREVALENCE, SEVERITY AND ASSOCIATED FACTORS" for examination.

Yours sincerely,

Kim S. Madundo