UNIVERSITY OF GHANA

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

Determinants of Depression Among HIV Patients Attending the Weija-Gbawe Municipal Hospital in Accra.

BY

PRINCE AGYEMAN

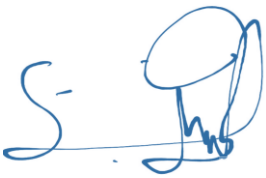
10935025

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MSc. IN CLINICAL TRIALS DEGREE.

January 2023

DECLARATION

I, Prince Agyeman hereby declare that this proposal is my work except for references made to other people's work which have been duly acknowledged



……..

PRINCE AGYEMAN DATE: 30th January 2023

(STUDENT

……..

DR. ALEXANDER ANSAH MANU DATE:30th January 2023

(SUPERVISOR)

DEDICATION

This work is dedicated to God Almighty for his grace and mercies and to my dear mom and beloved wife, for their immense love and support.

ACKNOWLEDGEMENT

First and foremost, I want to thank God, Almighty, who has provided me with direction and inspiration throughout this process. I would like to express my deepest gratitude to my supervisor, Dr. Alexander Ansah Manu, for his guidance, support, and encouragement throughout the course of this research. His expertise and knowledge have been invaluable in shaping this dissertation.

I am grateful to the participants of this study for their time and willingness to share their experiences, without their valuable contributions, this research would not have been possible. I would also like to thank the Department of Epidemiology and Disease Control, School of Public Health, for providing the resources and support necessary for this research.

I am deeply grateful to my family and friends for their unwavering love and support. Their encouragement and belief in me have been a constant source of strength during the challenging times of my study and research.

Finally, I would like to thank the staff and management of Weija/Gbawe Municipal Hospital for providing me with the support necessary to complete this research.

This dissertation is a reflection of the collective efforts, support, and guidance of all those mentioned above, and I am truly grateful for their contributions.

ABSTRACT

Introduction: Depression is one of the most common psychological disorders experienced by HIV patients. The risk of depression among Persons Living with HIV (PLWHIV) is reported to be 2-5 times the risk among HIV-negative people. This higher risk is believed to be an outcome of several factors, including the impact of the infection itself, the side effects of the Antiretroviral Therapy (ART) drugs, stigma from society, the burden of life-long treatment, and the challenges with an economically productive life, living with the disease. Whilst depression among HIV patients and its consequences on the progression of the disease are well documented, the factors that predispose to depression among this sub-population, particularly in Ghana, have not been explicitly described. This study sought to estimate the prevalence and determinants of depression among PLWHIV attending the Weija-Gbawe Municipal Hospital in Accra.

Methods: A cross-sectional study was conducted in Weija/Gbawe Municipal Hospital within the Accra Metropolis of Ghana over a period of 4 weeks. A total of 319 participants' data were analysed using STATA version 17. Univariate and multivariate logistic regression models were fitted to identify factors associated with depressive symptoms among participants. All variables from the univariate analysis with a p-value <0.1 were entered into a forward-stepwise multivariate logistic regression analysis. All tests were two-tailed and a $p< 0.05$ was considered statistically significant.

Results: The prevalence of depression among HIV-positive patients on HAART in the Accra Metropolis is 58.3%. The participants showed varying degrees of depressive symptoms. Mild depressive symptoms were observed in 14.7% of participants, 24.1% showed moderate depressive symptoms, 11.3% showed moderately severe symptoms of depression and 8.2% showed severe depressive symptoms. The determinants that were significantly associated with an increased risk of depression among PLWHIV were age (AOR= 0.33, 95% CI 0.14-0.77), marital status (AOR= 0.38, 95% CI 0.18-0.81), monthly expenditure (AOR= 7.78, 95% CI 1.49-40.56), being bothered by HIV-related comorbidity (AOR 42.78, 95% CI 8.07-226.81), and availability of social support (AOR= 0.31, 95% CI 0.11-0.90). Some of the confidence intervals were very wide suggesting low outcome numbers and hence greater uncertainty around the estimates.

Conclusion: These findings suggest that the prevalence of depression is high among PLWHIV and the determinants are mainly age and social factors that are amenable to targeted interventions if management is to improve their treatment outcomes and patients' well-being.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ART – Anti-Retroviral Therapy

AIDS – Acquired Immune Deficiency Syndrome

CNS – Central Nervous System

ENT – Ear, Nose, and Throat

ELISA – Enzyme-Linked Immunosorbent Assay

GARH – Greater Accra Regional Hospital

HAART – Highly Active Anti-Retroviral Therapy

HIV – Human Immunodeficiency Virus

HSS – HIV Sentinel Survey

NRTI – Nucleotide Reverse Transcriptase Inhibitor

NNRTI – Non-Nucleotide Reverse Transcriptase Inhibitor

PI – Protease Inhibitors

PHQ-9 – Patient Health Questionnaire 9

PLWHIV – People Living with HIV

PRIME-MD – Primary Care Evaluation of Mental Disorders

SDGs – Sustainable Development Goals

WHO – World Health Organization

WMHSI – World Mental Health Survey Initiative

CHAPTER ONE

1.0 INTRODUCTION

Despite significant progress in its containment, the Human Immunodeficiency Virus (HIV) pandemic continues to be a significant public health challenge of our time. With over 36 million people now living with HIV and over 39 million fatalities from AIDS-related causes, HIV has unsettling impacts on health around the world. Although treatment as prevention programs are being implemented globally, almost 2 million individuals still contract HIV each year (Frank et al., 2019; Pandey & Galvani, 2019). The world's worst-affected region by HIV is Sub-Saharan Africa (SSA). (WHO, 2012). In 2018, 37.9 million people were estimated to be living with HIV with 1.7 million new infections globally and 77,000 AIDS-related deaths (Adam et al., 2021). Sub-Saharan Africa was reported to contribute about 70% of the global burden in 2015 (UNAIDS, 2016). HIV remains a generalized epidemic even though Ghana has experienced a steady decline in prevalence from 3.6% to a prevalence of 1.6%, according to the reports of the HIV Sentinel Survey (HSS) in 2003 and 2014 respectively (Ghana AIDS Commission, 2015).

Given that HIV is linked to stigma, exclusion, repression, and discrimination, the disease has grown to be of significant social concern. People who have HIV or are suspected to have HIV have experienced rejection from their families, their friends, and their cultures in both developing and industrialized countries (Agyemang & Otoo, 2013). The difficulty for PLWHIV in Ghana is the uncertainty surrounding being labelled as living with HIV as well as the dread of dying too soon (Hayfron-Benjamin et al., 2019).

The majority of Ghanaians think that immoral behaviour, which is seen as a sin against the gods, is to blame for the development of certain diseases like HIV and other STDs. Some Ghanaians think HIV-positive individuals need to be kept away from the general public because they view

everyone with the virus as potentially harmful. In the Ghanaian community, there is a strong negative perception of HIV. Condescending terms like untimely death, humiliating death, imminent death, shameful death, long-suffering death, and dreadful disease are used to describe even the death of an HIV-positive patient. (Clottey-Sefa, 2001; Doat et al., 2021; Ohemeng, 2016; Poku et al., 2005).

Since the introduction of Active Antiretroviral Therapy, patients with HIV have had a longer average lifespan (ART). In the most impacted region of the world, Eastern and Southern Africa, the number of patients receiving ART has increased by more than a factor of two since 2010 (UNAIDS, 2016). ART had a crucial role in the dramatic decline in AIDS-related fatalities, from 1.5 million in 2010 to 1.1 million in 2015 (UNAIDS, 2016). Since ART became widely accessible in the 1990s, it has been successful in stopping the spread of the virus, turning HIV infection from an illness with a high mortality rate to a chronic condition that can be managed with a favorable prognosis (Maartens et al., 2014).

Despite these advances, PLWHIV in Ghana still encounter several obstacles when trying to get access to ART. These obstacles include the lack of ART in settings with low resources, as well as the high cost of traveling to ART facilities. Access to ART is hampered by PLWHIV due to anxiety over ART's side effects, a lack of adequate social support, and fear of stigma and discrimination. (Ankomah et al., 2016; Sayles et al., 2009; Seeling et al., 2014). Nonetheless, Protease inhibitors, a component of Highly Active Antiretroviral Therapy, have still been linked to depression and other mental illnesses, including neurological impairment, in HIV infection. (Gannon et al., 2017).

Anger, sadness, guilt, loss of interest, disrupted sleep, lack of focus, and frustration are some of the well-known symptoms of depression, a mental health disease that can interfere with day-to-day activities. In the worst situation, persistent depression can impair a person's social and cognitive functioning, resulting in disability and suicide (Tao et al., 2018; Tesfaw et al., 2016).

The occasional melancholy that most individuals feel due to suffering or despair is not the same as depression. It results in severe pain for both people and families, as well as impaired social interaction and productivity. Depression is linked to premature death via illnesses or suicide. (Herrman et al., 2022). In lower-income nations, including those in Africa, depression is gradually becoming a common cause of morbidity and disability (Thapa et al., 2014). Increased drinking and smoking, poor eating patterns, and consumption of unhealthy foods are among harmful behaviours that have been linked to depression and are also risk factors for physical disability (Davis et al., 2008; Herrman et al., 2022; Paans et al., 2018).

Around 350 million people worldwide are believed to have experienced depression, with one in five women and one in ten men at lifetime risk (Abadiga, 2019). Global estimates place the number of excess deaths among depressed individuals at about 2 million. According to reports, depression, the worst psychiatric ailment, accounts for a disproportionately high number of suicide fatalities among all causes of mortality worldwide (Cavanagh et al., 2003). People with depression frequently attempt suicide, although, in low- and middle-income countries, the relative impact of depression on suicide is smaller than it is in high-income nations (Knipe et al., 2019; Vijayakumar, 2004).

Depression is one of the most common psychological disorders experienced by PLWHIV. The depressive disorder has been associated with HIV disease progression and mortality (Ganu et al., 2018; Patel et al., 2005; Weisbord et al., 2007). It is estimated that by 2030, depression and HIV/AIDS will be the world's two leading causes of disability (Abadiga, 2019; Mathers & Loncar, 2006). According to earlier research, stigma, discrimination, sex, unemployment, age, a lack of social support, and medication side effects, all increase the risk of depression among HIV/AIDS patients. According to reports, more than one-third of HIV-infected people in the United States

who seek basic medical treatment have depression (Gibbie et al., 2007; Nachega et al., 2010; Nakimuli-Mpungu et al., 2012; Uthman et al., 2014).

According to a population-based survey conducted in Nigeria by the World Mental Health Survey Initiative (WMHS), the prevalence of major depression was 3.1 percent over the course of one year and 1.1 percent over the course of one lifetime. The majority of studies on depression in Africa have focused on special populations, such as those living with HIV and younger people (Suraj & Martinez, 2015). The level of depression is directly related to the severity of the signs and symptoms of HIV infection (Abadiga, 2019).

Public awareness of depression may play a significant role in both policymaking and the help-seeking behaviour of people of all ages. To encourage the general people to participate in the prevention and treatment of depression, governments in Australia and Canada have focused on increasing mental health literacy (Herrman et al., 2022; Jorm, 2012).

The frequency of depressive symptoms among PLWHIV patients varies greatly. According to some research, the prevalence ranges between 22% and 71% (Campos et al., 2010; Dal-Bó et al., 2015). It is well known that depression in PLHIV is not just a case of feeling "blue," but is instead a significant risk factor for increased health care use, worse quality of life, and the possibility of "risk behaviour" that may increase the likelihood of HIV transmission (Al Madhani et al., 2020; Brawner et al., 2017; Millar et al., 2017). While depression in HIV patients and its effects on the course of the disease are well established, there isn't a clear explanation of the causes of depression in PLWHIV, particularly in Ghana. Given this context, the goal of this study was to determine the prevalence of depression and its causes among HIV patients receiving HAART at the Weija-Gbawe Municipal Hospital in Accra.

1.1 PROBLEM STATEMENT

HIV-positive patients are at an increased risk of developing mental disorders. The risk of depression among PLWHIV is reported to be 2-5 times the risk among HIV-negative people (E. G. Bing et al., 2001; Ciesla & Roberts, 2001; Sin & DiMatteo, 2014). This higher risk is believed to be as a result of a combination of factors including the effect of the infection itself, the side effects of the ART drugs, stigma from society, the burden of life-long treatment, and the challenges with an economically productive life, living with the disease (Collins et al., 2006; Guaraldi et al., 2008; Simbayi et al., 2007a; Wouters et al., 2016).

Depression among PLWHIV has a worse prognosis, in part because the sufferer loses interest in everything around them, including themselves, which has a severe impact on their adherence to ART. It has been discovered that untreated depression is connected to HIV treatment non-adherence (Yun et al., 2005). People who are depressed tend to isolate themselves and suffer from cognitive impairment and self-deprecation. Because of the consumption of sub-optimal drug doses, inadequate viral suppression, the development of drug resistance, or non-response, non-adherence to ART may result in permanent treatment ineffectiveness (Tao et al., 2018).

Whilst depression among HIV patients and its consequences on the progression of the disease are well documented, the factors that predispose to depression among this sub-population, particularly in Ghana, have not been explicitly described. Understanding these factors will inform program strategies including providing evidence in support of a systematic screening program and incorporate the management of common mental disorders into HIV care. This study, therefore, sought to estimate the prevalence and determinants of depression among HIV patients on HAART attending the Weija-Gbawe Municipal Hospital in Accra.

1.2 CONCEPTUAL FRAMEWORK

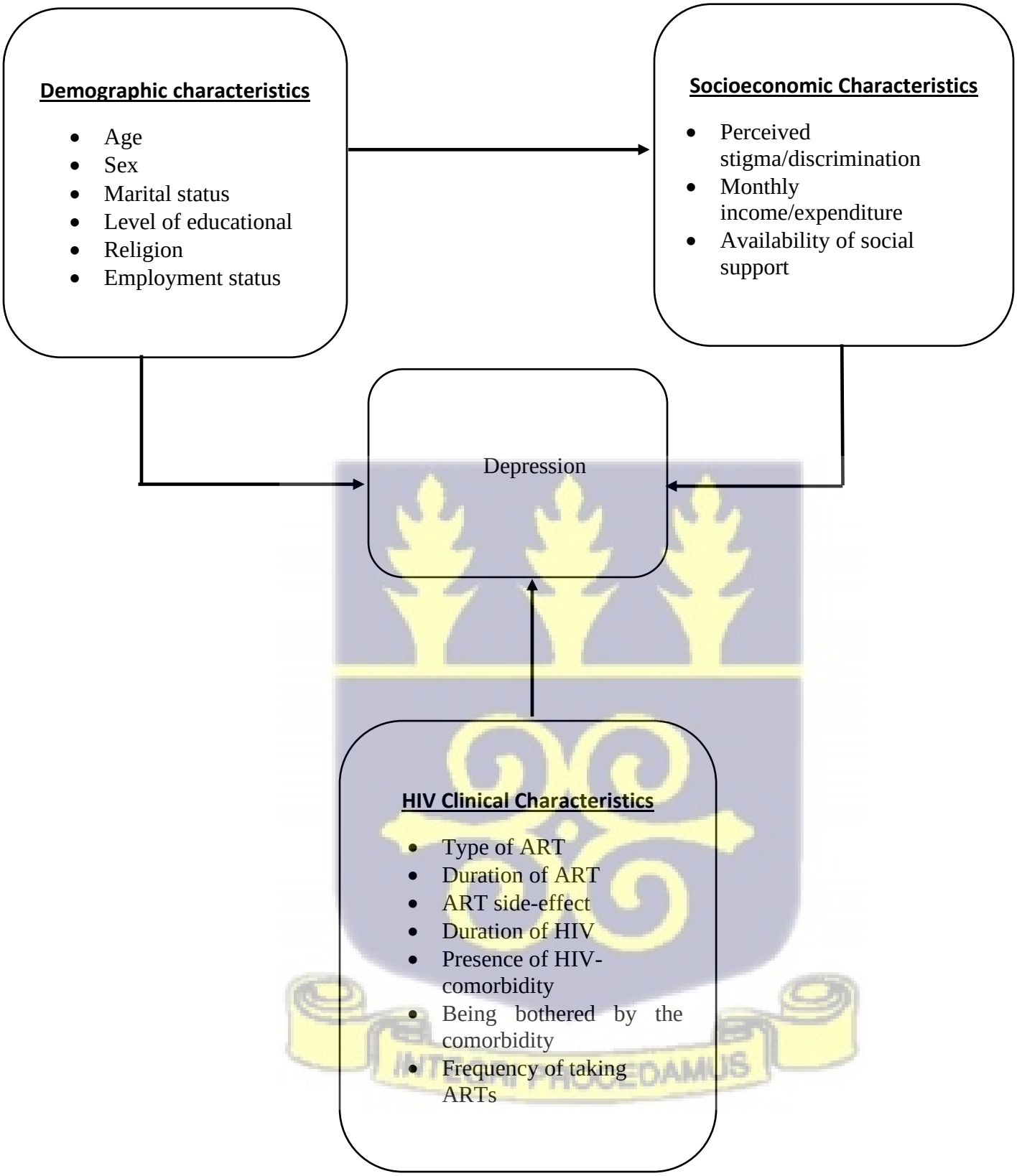


Figure 1: Conceptual Framework of factors associated with depression.

The conceptual framework describes the influence of demographic characteristics, socioeconomic characteristics, and clinical characteristics, on depression.

Depression is linked to demographic and socioeconomic factors like sex, education, housing arrangement, and employment status. Less educated women who live alone and have lower work rates are reported to experience depressive symptoms more frequently (Deter et al., 2018). Furthermore, it has been reported that young HIV-positive persons with less social support worry more about HIV displays and symptoms of depression (Agyemang & Otoo, 2013). Mitchell and Knowlton (2009), and Deacon and Stephney (2007) found that stigma was associated with depression among HIV patients.

Incidents such as pregnancy and the menstrual cycle that are related to hormonal changes in females make them susceptible to depression (Maier et al., 1999). Herrman et al. (2022) showed that people with marital dissatisfaction or unpleasant marriage were likely to show depressive symptoms. Also, Tesfaw et al. (2016) reported a significant association between the HIV infection stage and poor social support and depression. A meta-analysis study by Bonelli et al. (2012) reported that 61% of their studies found less depression among more religious people.

Gannon et al. (2017) reported that, HIV infection-related neurological impairment and cognitive problems are exacerbated by the protease inhibitors which forms part of the HAART regimen Low-Beer et al. (2000) reported worsened depressive symptoms after the initiation of a protease inhibitors-based regimen. Financial dependence dependency has been linked to being a major cause of depression (Sarnak et al., 2013).

1.3 JUSTIFICATION

The Greater Accra Region, where this study would be carried out is one of the 2 regions with the highest prevalence of HIV in Ghana. Determining the prevalence and factors associated with depression among HIV patients on ART in this region will provide evidence in support of program strategies such as systematic screening programs of common mental disorders to be incorporated into the management of HIV patients. This will improve the knowledge and understanding of the effect of depression and its subsequent treatment on ART adherence. This information may direct clinicians towards early diagnosis and more aggressive treatment for depression among HIV-positive persons on ART. Also, this data will aid the need to make the identification, prevention, and treatment of depression in HIV patients an immediate national priority, which needs to be addressed.

1.4 OBJECTIVES

1.4.1 General Objective

To investigate the determinants of depression among HIV patients on HAART attending the Weija-Gbawe Municipal Hospital in Accra.

1.4.2 Specific Objectives

a) To estimate the prevalence of depression among HIV patients on HAART attending the Weija-Gbawe Municipal Hospital in Accra using the locally validated 9-item patient health questionnaire (PHQ-9).

b) To classify the severity of depression among HIV patients on HAART attending the Weija-Gbawe Municipal Hospital in Accra using the locally validated 9-item patient health questionnaire (PHQ-9).

c) To determine the factors (socio-demographic, economic, and HIV-related) associated with depression among HIV patients on HAART attending the Weija-Gbawe Municipal Hospital in Accra.

1.5 RESEARCH QUESTIONS

1) What is the prevalence of depression among HIV patients on HAART attending the Weija-Gbawe Municipal Hospital in Accra?
2) What are the determinants of depression among HIV patients on HAART attending the Weija-Gbawe Municipal Hospital in Accra?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Depression

Depression is a very common psychological condition in people. Unhappy mood, loss of interest, feelings of guilt or low self-esteem, loss of food, decreased energy, interrupted sleep, and difficulty concentrating are some depression symptoms that are typically experienced by a person. In rare cases, a person may simultaneously suffer depression and anxiety symptoms. Chronic depression can make it difficult for someone to accomplish everyday tasks, and at its worst, it can result in suicide. Depression can be characterized as mild, moderate, or severe depending on the quantity and intensity of the symptoms. Only routine or everyday tasks may be challenging for someone experiencing mild to moderate depression. But a severely depressed person is very unlikely to perform any regular chores (Marcus et al., 2012; WHO, 2008, 2012).

2.2 Prevalence of depression in HIV-positive patients.

It has been determined that several factors play a role in the high incidence of depression among PLWHIV. The shock, denial, and helplessness that come with receiving an HIV diagnosis can contribute to the emergence of depression. Social isolation brought on by the stigma around HIV can worsen the symptoms of depression. In addition, a lot of the HIV treatments include side effects that might impact mood.

Additionally, studies have shown that depression is linked to worse outcomes for PLWHIV, such as reduced adherence to ART and a higher risk of HIV progression. However, different studies have found quite different rates of depression among HIV-positive people. This could be a result of variations in the many depression assessments or measuring scales, techniques, demographic characteristics, and sample size. Deshmukh et al. (2017) reported a 50% prevalence of depression

among PLWHIV. However, because this study was cross-sectional, the problem of temporality made it difficult to determine how different characteristics, such as low BMI and physical problems, are related to depression. It was challenging to distinguish whether depression came before or after these conditions. In a meta-analysis by Amare et al. (2018), the estimated prevalence of HIV among PLWHIV from the total pool was 36.65%.

The estimated prevalence of depression, however, was 37.91 percent in six studies that used the PHQ-9, as opposed to 31.19 percent in three studies that used the Centre for Epidemiologic Studies Depression Scale (CES-D). Those that utilized the Hospital Anxiety and Depression Scale (HADS) indicated a 41.2 percent prevalence of depression in PLWHIV, compared to studies that used the Hopelessness Depression Symptom Questionnaire (HDSQ), which reported a prevalence of 43.9 percent (Rishi et al., 2017).

2.3 Global prevalence of depression.

The promotion of mental health and well-being for all by the year 2030 is a specific goal included in Sustainable Development Goal (SDG) 3's target 3.4. Despite all efforts made to accomplish this goal, mental health continues to be a significant public health issue. Around 792 million people worldwide face mental health problems (Amu et al., 2021; Ritchie & Roser, 2018). It is estimated that at any given point in time, about 10% of the population in a given community is stricken by depression (WHO, 2008). The World Health Organization (WHO) estimates that between 2005 and 2015, more than 300 million people were living with depression, a rise of more than 18% (Archana et al., 2017).

The lifetime prevalence of depressive disorders is estimated between 22 to 61% in PLWHIV, a rate significantly higher than the estimate in the general population (Bhatia & Munjal, 2014). Bhatia and Munjal (2014) and Berger-Greenstein et al. (2007) estimated the prevalence of

depression in HIV patients to be 58.75% and 72.9% respectively. Depression in HIV patients is often regarded as a common reaction to a medical illness (Pérez-Stable et al., 1990; Schulberg et al., 1997). A report by E. Bing et al. (2001) indicated one in three persons with HIV may suffer from depression. A meta-analysis conducted by Wang et al. (2018) reported a 50.8% prevalence of depression in PLWHIV. Uthman et al. (2014) in a meta-analysis also estimated the prevalence of depressive symptoms in PLWHIV across low-, middle- and high-income countries to be between 13 to 78%. Other studies done in Cameroon and Malawi reported a prevalence of depression among HIV patients to be 26.7%, and 18.9% respectively (Kim et al., 2015; Ngum et al., 2017). In Abadiga (2019), the prevalence of depression among PLWHIV/AIDS in West Ethiopia was estimated to be 41.7%. Abadiga's finding was in consonant with studies done in Tigray (43.9%), Harar (45.8%), and China (40.9%) (Liu et al., 2018; Mohammed et al., 2015; Tucker et al., 2003).

2.4 The prevalence of depression in Ghana.

WHO (2011) reported that over 2 million Ghanaians suffer from mild to moderate mental conditions with about 650.000 suffering from a severe disorder. According to a study on mental health in Ghana conducted by the Kintampo Health Research Centre, depression is the main issue the nation is now dealing with. According to the study, the percentage of Ghanaians who experienced depression varied between 80 and 90 percent (Sefa-Boateng, 2019). Amu et al. (2021) reported that about 51.8% of the adult population in Ghana, has at least one mental health issue with the prevalence of depression estimated to be 25.2% (Amu et al., 2021).

However, no study in Ghana had specifically assessed depression in ART-receiving HIV-positive patients. However, few studies looked at depression and mental health as a whole. Siakwa et al. (2015) reported in their study that, 70% of the HIV-positive participants who were on HAART had some form of mental disorder. Sipsma et al. (2013) also reported a high prevalence of

psychological distress among the Ghanaian population with 11.7% having moderate symptoms and 7.0% having severe symptoms. Opoku Agyemang et al. (2022) reported a 28.6% prevalence of depression in PLWHIV. Although the majority of the "exposure variables" included in their study were sociodemographic factors, which may or may not be modifiable factors related to the outcomes, their study did not measure antiretroviral adherence/medical adherence, the length of time lived with HIV/illness, or social adversities experienced due to HIV.

2.5 Demographic characteristics influencing depression outcomes.

Socio-demographic factors such as age, gender, race, education, and income level can contribute to the development of depression among PLWHIV. Studies have found that older adults, women, and individuals from ethnic minority groups are at a higher risk for depression among PLWHIV. Additionally, people with lower levels of education and income are also at higher risk for depression.

2.5.1 Age

According to earlier research, elderly PLWHIV had an increased chance of developing depression. Several factors contribute to this increased risk, such as the physical and cognitive changes associated with aging, the increased likelihood of comorbidities, and the social and emotional changes that can come with aging. For example, older adults may have more difficulty managing their medication regimens, which can negatively impact their adherence to antiretroviral therapy (ART) and lead to feelings of frustration and despair (Wang et al., 2021). Additionally, older adults may have more difficulty coping with the social isolation and stigma that can come with an HIV diagnosis. They may also experience more severe side effects from ART, which can have a negative impact on their quality of life.

Some studies have specifically looked at the relationship between age and depression in students. Depression can affect people of all ages, from early childhood to adulthood. In 2015, the Indian According to the National Mental Health Survey, 1 in 20 (5.25%) adults over the age of 18 have experienced depression at some point in their lives (Bhavsar, 2022). This accounted for a total of over 45 million (13.98 %) persons presenting with depressive symptoms (Meitei & Singh, 2019). Even though, it has been reported that age is associated with depression in the general population with increased prevalence in younger participants than participants older than 50yrs (Kessler et al., 2003).

It is still unclear the association between depression and age among PLWHIV. A study by Grov et al. (2010) found that older adults had a higher risk of depression than younger adults among PLWHIV in the United States. This research also reported that elderly PLWHIV experience a higher rate of comorbidities reduced cognitive and physical function, and increased frailty, which all contribute to an increased risk for depression.

The findings by Seth et al. (2014) and Akena et al. (2012) described that younger age was significantly associated with depression even after adjusting for confounding factors. However, a study conducted by Kaharuza et al. (2006) on HIV-positive adults on ART revealed that older people above 50 years old were at twice the risk of developing depression compared to participants between 18 and 30 years old. But these findings are contrary to the findings by Deshmukh et al. (2017). Deshmukh et al. (2017) reported that there was no significant association between age and depression among PLWHIV on ART.

2.5.2 Marital Status

Previous studies have shown that marital status can contribute to the development of depression among PLWHIV, especially for people who have recently been widowed, divorced, or separated. Divorcees and those who have been recently bereaved may have less social support, which can

make it more difficult for them to cope with the emotional and practical challenges of living with HIV. They may also have more difficulty managing their illness due to a lack of financial and emotional support. They may be more likely to experience social isolation, which can increase their risk of depression (Fu et al., 2002). A study by Logie et al. (2016) found that divorced and separated individuals with HIV had higher rates of depression than those who were married or single. Similarly, a study by Krishnan et al. (2002) found that people living with HIV who reported being divorced, separated, or widowed were more likely to report depression, anxiety, and other emotional distress than those who were married.

Being single, divorced, or widowed can increase social isolation and loneliness, which can lead to a lack of emotional and practical support, which can negatively impact an individual's mental health. Additionally, people who are not in a committed relationship may have difficulty disclosing their HIV status to sexual partners, which can lead to feelings of shame, guilt, and fear. According to a study by Kalichman et al. (2011), individuals with HIV who were not currently involved in a romantic relationship were more likely to experience depression than those who were.

2.5.3 Sex

Certain research has shown that sex can contribute to the development of depression among PLWHIV, with women being at a higher risk than men. The higher incidence of depression among women with HIV may be caused by a number of reasons. Women may be more likely to experience discrimination and stigma, which can negatively impact their mental health (Narasimhan et al., 2016). Additionally, women may be more likely to experience intimate partner violence, which can increase their risk of depression. Women may also have difficulty accessing health care due to social, economic, and cultural barriers. This can make it more difficult for women to manage their illnesses which can increase their risk of depression.

A study by (Chin-Hong et al., 2015) found that women had a higher risk of depression than men among PLWHIV. Richards (2011) supported the assumption that women living with HIV are at higher risk of developing depression with findings from a study conducted in PLWHIV populations. Deshmukh et al. (2017) in a cross-sectional study in India found that a greater proportion of females (59.9%) showed significant depressive symptoms when compared with males (43.7%). However, Wang et al. (2018) did not discover any significant association between the prevalence of depression or depressive symptoms and sex. The relationship between depression and menopausal state in women has been the subject of numerous studies. Females have been noted to have mood swings throughout times of hormonal change, such as adolescence, the postpartum period, and the menopause transition (Mulhall et al., 2018).

However, research that looked at the connection between menopausal state and depression symptoms have produced inconsistent findings. Depressive symptoms and menopausal transition have been linked in several research (Bromberger et al., 2007; Freeman et al., 2006; Kaufert et al., 2008). Nevertheless, other studies have associated the presence of symptoms of depression during this period with sociodemographic factors, the stress in daily life, and declining physical health (Dennerstein et al., 1994; McKinlay et al., 1987; Mulhall et al., 2018).

Women with irregular periods have a significant rate of depression (Bhatia & Munjal, 2014). In Turkey, depression was present in 24.7% of postmenopausal women (Unsal et al., 2011), whiles in Nigeria, Onya and Otorkpa (2018) reported 35.4% in pre-menopausal women and 45.6% in post-menopausal, Chedraui et al. (2009) in Ecuador reported 78.7 and in Iran, Afshari et al. (2015) stated 59.8%.

2.5.4 Educational Levels

Studies have shown that lower educational levels can contribute to the development of depression among PLWHIV. Individuals with lower levels of education may have less access to information about HIV and its management, which can make it more difficult for them to understand and cope with their illness. They may also have more difficulty accessing healthcare, which can negatively impact their adherence to antiretroviral therapy (ART) and lead to poorer treatment outcomes. Additionally, lower educational levels are often associated with lower income and fewer economic resources, which can make it more difficult for individuals to manage the demands of living with HIV and increase the risk of depression.

According to previous research, those with HIV who had lower levels of education were more likely to report depression than those with higher education levels (Ayano et al., 2021; Deshmukh et al., 2017; Seid et al., 2020). A study by Aboge (2011) found that people living with HIV who had lower levels of education were more likely to report depression than those with higher levels of education.

2.6 Socio-economic factors associated with depression.

2.6.1 Family income and expenditure.

Lower income levels have been linked in studies to depression in PLWHIV. Individuals with lower income may have less access to information about HIV and its management, which can make it more difficult for them to understand and cope with their illness. They may also have more difficulty accessing healthcare, which can negatively impact their adherence to antiretroviral therapy (ART) and lead to less favorable treatment outcomes. Additionally, lower income is often associated with fewer economic resources, which can make it more difficult for individuals to manage the demands of living with HIV and increase the risk of depression.

A study by Leserman et al. (1999) found that people living with HIV who had lower income were more likely to report depression than those with higher income. Another study by Leserman et al. (1992) found that people living with HIV who had lower income were more likely to report depression, anxiety, and other emotional distress than those with higher income. The findings by Bhatia and Munjal (2014) indicate that depression is very high in PLWHIV who lost their jobs due to HIV illness as well as HIV-positive patients who could not work due to ill health. This study also reported that the prevalence of depression was greater in patients with low family income compared to patients with higher family income.

2.6.2 Availability of social support and depression.

Several studies have reported the importance of family and social support in sickness like HIV/AIDS. Good family and social support not only provide economic and social stability to the patients but also psychological stability. The care and comfort provided to patient in need of help decrease the stresses they face as a result of the infection (Bhatia & Munjal, 2014; Nogueira Campos et al., 2006).

Prior studies have reported that PLWHIV who receive social support from family members and close friends tend to have positive psychological effect compared to those without or with less social support (Asante, 2012). Young adults living with HIV have been reported to receive more social support from family and friends than older adults. It is therefore true to say that lack of positive social relations between PLWHIV and close relatives and friends may likely lead to negative mental disorders such as anxiety or depression (Cohen & Wills, 1985).

2.6.3 HIV-associated stigma and discrimination.

All diseases are stigmatized to a significant degree, but this is particularly true of those with incurable, disfiguring, severe, and progressive symptoms, as well as those whose means of

transmission are thought to be under the control of personal behaviour (Koka et al., 2013). HIV/AIDS prevention and treatment is compromised by widespread stigma and discrimination against PLWHIV. Studies have consistently shown that stigma and discrimination can contribute to the development of depression among PLWHIV. The experience of stigma and discrimination can lead to feelings of shame, guilt, and isolation, which can have a negative impact on mental health. The stigma associated with HIV can manifest in various ways, including verbal and physical abuse, discrimination in the workplace, and rejection by friends and family. Discrimination can also make it difficult for people living with HIV to access healthcare and other resources they need to manage their illness.

Studies have found a strong association between stigma, discrimination, and depression among PLWHIV. A study by Simbayi et al. (2007a) found that internalized HIV-related stigma was associated with an increased risk of depression among PLWHIV in South Africa. Another study by Bowen (2006) found that perceived discrimination was associated with increased levels of depression among PLWHIV in the United States. People with HIV/AIDS are subjected to a variety of discrimination and stigmatization, including rejection by their communities, restrictions on their ability to eat, sleep, or shake hands, as well as being held accountable or given the silent treatment (Amo-Adjei & Darteh, 2013; Awolu et al., 2021; Bonnington et al., 2017).

The concept of stigma can be divided into three types: self-, or internalized stigma, which may limit self-efficacy and empowerment; perceived stigma, which describes what others think of people with HIV or how they may treat them; and experience stigma, which is actual discrimination, exclusion, or other social sanctions as a result of having HIV (Nachega et al., 2012). For PLWHA, stigma has several negative consequences. Reduced access to care and poor adherence to antiretroviral therapy are a few of them. Other factors include low self-esteem, feelings of guilt or disgrace, depression, and unwillingness to disclose one's HIV status to others,

including partners, which causes social seclusion and risky sexual behaviour (Logie & Gadalla, 2009; Simbayi et al., 2007b).

2.7 HIV clinical characteristics associated with depression.

2.7.1 ART-related factors

Antiretroviral Therapy (ART) is a medicine used to treat HIV/AIDS infection. The type of ART combination is based on the severity or the incidence of opportunistic infections. It is usually in a combination of three or more drugs. Antiretroviral therapy was introduced to reduce the morbidity and mortality associated with HIV infection, to ensure the utmost suppression of viral replication, and improve the quality of life of the patients (Sena, 2019). The standard treatment guide for ART in Ghana consists of a first- and second-line treatment-making triple therapy regimen (NACP, 2010). The first line treatment consists of two Nucleotide Reverse Transcriptase Inhibitor (NRTI) and a Non - Nucleotide Reverse Transcriptase Inhibitor (NNRTI) and the second line treatment consists of two NRTI with an enhanced protease inhibitor (PI). The second line is used when an individual becomes resistant to the first-line treatment.

Studies have shown that ART-related factors, such as side effects and difficulty adhering to medication regimens, can contribute to the development of depression among PLWHIV. The use of ART can have a range of physical and psychological side effects, including nausea, fatigue, and changes in body shape. These side effects can be distressing for people living with HIV, and can negatively impact their quality of life. Additionally, an HIV medication regimen can be complex and demanding, requiring strict adherence to a regimen that may include multiple pills taken multiple times per day, which can be difficult to adhere to. Difficulty adhering to a medication regimen is associated with poor treatment outcomes and increased risk of treatment failure, this in turn can lead to feelings of anxiety, hopelessness, and depression.

A study by Berger-Greenstein et al. (2007) found that side effects of ART were significantly associated with depression among PLWHIV in the United States. Similarly, a study by Tadios and Davey (2006) found that difficulty adhering to medication regimens was associated with increased rates of depression among PLWHIV in Ethiopia. Other studies have revealed that some non-adherence to ART by HIV-positive is due to drug adverse effects. Some of the commonly reported adverse effects of ART include insomnia, nausea, fatigue, depression, and anxiety (Boakye & Mavhandu-Mudzusi, 2019). According to reports, the protease inhibitors in ART play a role in the neurological damage and cognitive impairments linked to association with HIV infection (Gannon et al., 2017).

Numerous mechanisms are involved in the development of depression in PLWHIV. Chronic inflammation results from the stimulation and elevation of microglia and astrocytes, or decreased monoaminergic activity, particularly in dopaminergic neurons due to neurotoxicity mediated by the direct influence of the virus. This mechanism and or trauma of undesirable psychosocial burden of the disease are involved in depression. Depression is caused by a mechanism, as well as by trauma from an unfavourable psychosocial load of the illness. The hypothalamic-pituitary adrenal axis, sympathetic nervous system, and other processes may be activated, allowing cellular immunity to be activated in peripheral and central nervous system (CNS) tissues (Ali et al., 2021; Chaudhury et al., 2016).

2.7.2 HIV-related comorbidities and depression

The risk of depression is further increased by the existence of additional medical and mental health issues such as persistent pain, anxiety, or substance use problems. According to studies, PLWHIV are more likely to have depression when they also have other physical or mental health concerns such as anxiety, chronic pain, or drug use disorders (Hoare et al., 2021; Opoku Agyemang et al., 2022).

Anxiety, chronic pain, and substance use disorders are common comorbidities among PLWHIV, and they can exacerbate the emotional burden of living with HIV. Chronic pain can impact physical function, interfere with daily activities, and sleep and have a negative impact on emotional well-being (Madden et al., 2020; Pedrosa et al., 2020). Anxiety can affect the ability to cope with a chronic illness and cause feelings of worry and fear. Substance use disorders can lead to several negative outcomes, including financial instability, legal problems, and social isolation, which can contribute to the development of depression (Munir & Takov, 2017).

A study by Charles et al. (2012) found that chronic pain was associated with increased rates of depression among PLWHIV in India. Similarly, a study by Jiang et al. (2019) found that anxiety and substance use disorders were associated with increased rates of depression among PLWHIV in China.

2.7.3 HIV-related factors and depression

The severity of the illness and lack of hope for the future are other important factors that contribute to depression among PLWHIV. According to studies, depression in PLWHIV might be exacerbated by the illness' severity and a lack of future hope (Costiniuk et al., 2019). The severity of the illness can include factors such as the level of immune suppression and the presence of opportunistic infections, which can have a significant impact on a person's physical and emotional well-being (Teka, 2022).

The development of depression may be influenced by these sentiments of helplessness and despair. Additionally, living with a chronic illness like HIV can create uncertainty about the future, and individuals may also experience fear and anxiety about the progression of their illness, potential disability, and premature death. In contrast to those with less advanced HIV disease, people with advanced HIV disease were more likely to experience depression, according to a study by Benton (2008).

CHAPTER THREE

3.0 METHODS

3.1 Study Design

This study was a cross-sectional survey that was conducted in Weija-Gbawe Municipal Hospital over a period of 4 weeks. A cross-sectional study allows multiple variables to be accessed simultaneously through the measurement of each item collected at one point in time. One advantage of this design is that it is relatively less expensive to perform and does not require a lot of time.

3.2 Study Location

The study was conducted in Weija-Gbawe Municipal Hospital in the Weija-Gbawe Municipal Assembly, within the Greater Accra Region. According to the 2019 HIV Sentinel Survey (HSS) report released by the National AIDS and STI Control Programme, the Greater Accra and Ashanti regions recorded the highest prevalence of HIV/AIDS in Ghana (3.2%). The Weija-Gbawe Municipal Assembly has an estimated population of 213,674. The assembly's catchment area is about 53.83km^2 with a population density of 3,969/km^2. The Weija-Gbawe Municipal Hospital is the only public hospital in the Weija-Gbawe municipality and serves as the major referral hospital for all the clinics within the municipality. The facility offers 24-hour multidisciplinary services in the areas of internal medicine, obstetrics and gynaecology, paediatrics and surgery, ENT, and public health services including an HIV clinic.

3.3 Study Population and Sampling

The study population was HIV-positive patients who were 18yrs and older. A systematic random sampling procedure was used to sample HIV-positive patients who attended the ART clinic on

daily basis. Using a sampling interval of 3 and starting point 2, the 3rd patient after the starting point was selected. This procedure was repeated until the desired sample size was achieved throughout the data collection period.

3.4 Sample Size Estimation

The sample size for the study was calculated using the Cochran formula for quantitative sample size determination [$n = z^2 (p \times q)/d^2$]

Where; n = minimum sample size z = the critical probability value for confidence level of 95% (1.96), p = estimated proportion (p) of depression in Ghana, 25.2% (Amu et al., 2021)., q = 1-p, d = margin of error (0.05). n = 290 (minimum number to be enumerated).

An estimation of 10% loss out of 290 observations due to incomplete data was 29. Approximately 319 participants were recruited for the study. A census of all HIV cases from 1st January 2021 to 31st December 2021 in the hospital was conducted.

3.5 Inclusion Criteria

Patients with positive HIV infection based on ELISA or Western blot tests. Participants were 18yrs or older.

3.6 Exclusion Criteria

Patients who are actively addicted to alcohol consumption were excluded. Patients who have had normal bereavement in less than 2 months were excluded from the study. Patients with a history of manic episode (bipolar disorder) were excluded from the study. Also, patients taking medication or other drugs that cause depressive symptoms like corticosteroids, anti-anxiety medications etc were excluded from the study.

3.7 Variables

3.7.1 Dependent Variables

Depression dichotomised into depressive symptoms and no-depressive symptoms. Depressive symptoms were further categorized into: Mild: 5-9, Moderate: 10-14, Moderately Severe: 15-19, and Severe: 20-27 using the scores from the screening tool.

3.7.2 Independent Variables

The following data on demographic and socioeconomic characteristics were collected: age, sex, marital status, level of education, religion, employment status, perceived stigma and discrimination, monthly income and expenditure, and availability of social support. The ages of participants were categorized into 18–30yrs, 31–40yrs, 41–50yrs, 51yrs and above. Employment status was categorized into unemployed, employed-private sector, publicly employed, self-employed, and retiree. Marital status was divided into single, married, divorced, and widowed. Monthly income and expenditure were categorized into below GhȻ 500, GhȻ 500 - GhȻ 1000, GhȻ 1,000 - GhȻ 2000, and above GhȻ 2000. The availability of social support was divided into poor, moderate, and strong. Perceived stigma and discrimination were divided into agree and disagree. The following data on clinical characteristics were collected HIV duration, medication duration, frequency of taking ARTs, naïve of ARTs side effects, presence of HIV comorbidity, and being bothered by the comorbidity. HIV duration and medication duration were categorized into < 1 yr., 1 – 5 yrs., 5 – 10 yrs., and >10 yrs. The frequency of taking ARTs was divided into always and not always. Being naïve ARTs' side effects, the presence of HIV comorbidity, and being bothered by the comorbidity were each divided into yes and no.

3.8 Data Collection Technique and Tools

A pre-tested questionnaire was used to collect data on participants' demographic, socioeconomic and clinical characteristics. Data on individuals' levels of depression were gathered using the Patient Health Questionnaire 9 (PHQ-9). An individual's existence and degree of depression symptoms are evaluated using the self-report screening tool known as the Patient Health Questionnaire 9. The Patient Health Questionnaire is a condensed version of the Primary Care Evaluation of Mental Disorders-9 scale (PRIME-MD). The Patient Health Questionnaire Primary Care Study Group and Spitzer, Williams, and Kroenke created the PHQ-9 in 1999 (Spitzer et al., 1999). The questionnaire consists of nine items that screens the participant's behaviour and thinking with regard to the most important depressive symptoms such as interest in things, feeling down, eating, self-perception, concentration, sleep, energy level, speed while doing things, and thoughts of suicide. Responses range from "0" (not at all) to "3" (nearly every day). Thus, a total sum between 0 and 27 can be obtained at the end, which indicates the severity of the depression. Usually, a total sum above 10 shows the presence of depression (Kroenke et al., 2001).

3.9 Data Quality Control

Research Assistants were trained in data collection processes involving interviewing participants. Research Assistants were educated on ethics and conduct of fieldwork. All checklists were checked for consistency and correctness by the principal investigator. Data was validated and entered into Microsoft Excel. It was then exported into STATA 17 for analysis.

3.10 Pre-testing of tools

Pre-testing of tools was conducted in another government hospital (Legon Hospital) in the Accra Metropolis which had an HIV clinic. This was done to make sure the checklist was thorough and

to spot any potential sources of data gathering problems. Pre-testing also functioned as training for Research Assistants.

3.11 Privacy and Confidentiality

The information gathered was treated in a private manner. The sole uses of the data were for scholarly or published works. Only the lead investigator and supervisor had access to the obtained data, which were secured and kept under lock and key.

3.12 Data Management and Analysis

Categorical variables were presented as numbers (percentages) and analyzed using the Chi-squared test. Univariate and multivariate logistic regression analyses were adopted to identify factors associated with depressive symptoms among participants. All variables from the univariate analysis with a p-value <0.1 were entered into a forward-stepwise multivariate logistic regression analysis. Stata version 16 was used for statistical analysis. A test was two-tailed and statistically significant set at 0.05 with a 95% confidence level.

3.13 Ethical Consideration

The Ghana Health Service Ethics Review Committee was consulted for ethical approval. The management of the Weija/Gbawe Municipal Hospitals was contacted to request permission to conduct the study.

3.14 Declaration of Conflict of Interest

There are no competing interests.

3.15 Funding

The lead researcher provided funding for the study.

CHAPTER FOUR

4.0 Results

4.1 Demographic characteristics of participants

Table 1 shows the distribution of demographic characteristics of participants. Overall, 319 participants were enrolled in the study. The oldest participant was aged 78 years and the youngest was 18 years old. The mean age was 38.54±12.21. The majority of the participants were aged 31-40 years. Female participants were higher in number (189) compared to male participants. Almost half (153, 48%) of the participants were married. 32.3% of the participants had education level higher than senior high although participants who have had education up to senior high (37%) dominated. The majority of the participants were self-employed (38.9%). The largest proportion (77.1%) were Christians (Table 1).

Table 1: Demographic characteristics of participants

Variable	Categories	Frequency	Percent
Age groups	<= 30	93	29.2
	31 - 40	95	29.8
	41 - 50	78	24.5
	51+	53	16.6
Sex	Female	189	59.2
	Male	130	40.8
Marital status	Single	109	34.2
	Married	153	48
	Divorced	30	9.4
	Widowed	27	8.5
Education	Primary	36	11.3
	Junior High	62	19.4
	Senior High	118	37
	College / University	103	32.3
Employment	Unemployed	41	12.9
	Employed-private sector	65	20.4
	Publicly Employed	79	24.8
	Retiree	10	3.1
	Self-employed	124	38.9
	Retiree	10	3.1
Religion	Christian	246	77.1
	Muslim	62	19.4
	Traditional	11	3.4

4.2 Socio-economic characteristics of participants

Table 2 summarizes the socio-economic characteristics of participants. The monthly income of most of the participants was Ghc500-Ghc1000 (30.1%), however, a considerable number of the participants (28.2%) reported they earn monthly income between Ghc1000-Ghc2000. The monthly expenditure of the majority of study participants was between Ghc500 and Ghc1000. A greater number of the study participants had moderate social support (54.5%). Approximately, 83.4% of the participants agreed that people would talk badly about them if their HIV status is known. Interestingly, 72.1% of the study participants stated not having any history of being talked about. A majority of the participants agreed to being avoided if one's HIV status is known (82.1%).

Table 2: Socio-economic characteristics of participants

Variable	Categories	Frequency	Percent
Monthly income	Below GhȻ 500	80	25.1
	GhȻ 500 - GhȻ 1000	96	30.1
	GhȻ 1,000 - GhȻ 2000	90	28.2
	Above GhȻ 2000	53	16.6
Monthly expenditure	Below GhȻ 500	54	16.9
	GhȻ 500 - GhȻ 1000	125	39.2
	GhȻ 1,000 - GhȻ 2000	115	36.1
	Above GhȻ 2000	25	7.8
Availability of social support	Poor	108	33.9
	Moderate	174	54.5
	Strong	37	11.6
Possibility of being talked about if HIV status is known	Disagree	53	16.6
	Agree	266	83.4
History of being talked about if HIV status is known	No	230	72.1
	Yes	89	27.9
Possibility of being avoided if HIV status is known	Disagree	57	17.9
	Agree	262	82.1

4.3 Clinical characteristics of participants

The clinical characteristics of participants are summarized in table 3. A little over half (163/319; 51.1%) of the participants had lived with HIV for 1-5 years. A large proportion of the participants reported having been on medication for a period of 1-5 years. A slight majority (58.6%) intimated taking their ARTs frequently. Of the participants, 59.9% indicated that they experience side effects from the ARTs. Comorbidity was present in 30.4% of participants. Overwhelming 222 out of 319 participants reported not having comorbidity. Out of the 30.4% of total participants with comorbidities, 26% reported being bothered by the comorbidity.

Table 3: Clinical characteristics of participants

Variable	Categories	Frequency	Percent
HIV duration	< 1 year	75	23.5
	1 – 5 years	163	51.1
	5 – 10 years	55	17.2
	>10 years	26	8.2
Medication duration	< 1 year	92	28.8
	1 – 5 years	154	48.3
	5 – 10 years	50	15.7
	>10 years	23	7.2
Frequency of taking ARTs	Not Always	132	41.4
	Always	187	58.6
Naïve of ARTs side effects	No	128	40.1
	Yes	191	59.9
Presence of HIV comorbidity	No	222	69.6
	Yes	97	30.4
Bothered by the comorbidity	No	14	4.4
	No response	222	69.6
	Yes	83	26

4.4 Prevalence of depressive symptoms among participants

Out of the 319 participants recruited for the study, 133 (41.7%) showed no symptoms of depression. Prevalence of depression was seen in 186 (58.3%) participants. These participants showed varying degrees of depressive symptoms. Mild depressive symptoms were observed in 14.7% of participants. 11.3% showed moderately severe symptoms of depression while 8.2% showed severe depressive symptoms. A large proportion (24.1%) of participants with symptoms of depression showed moderate depressive symptoms (Figure 1).

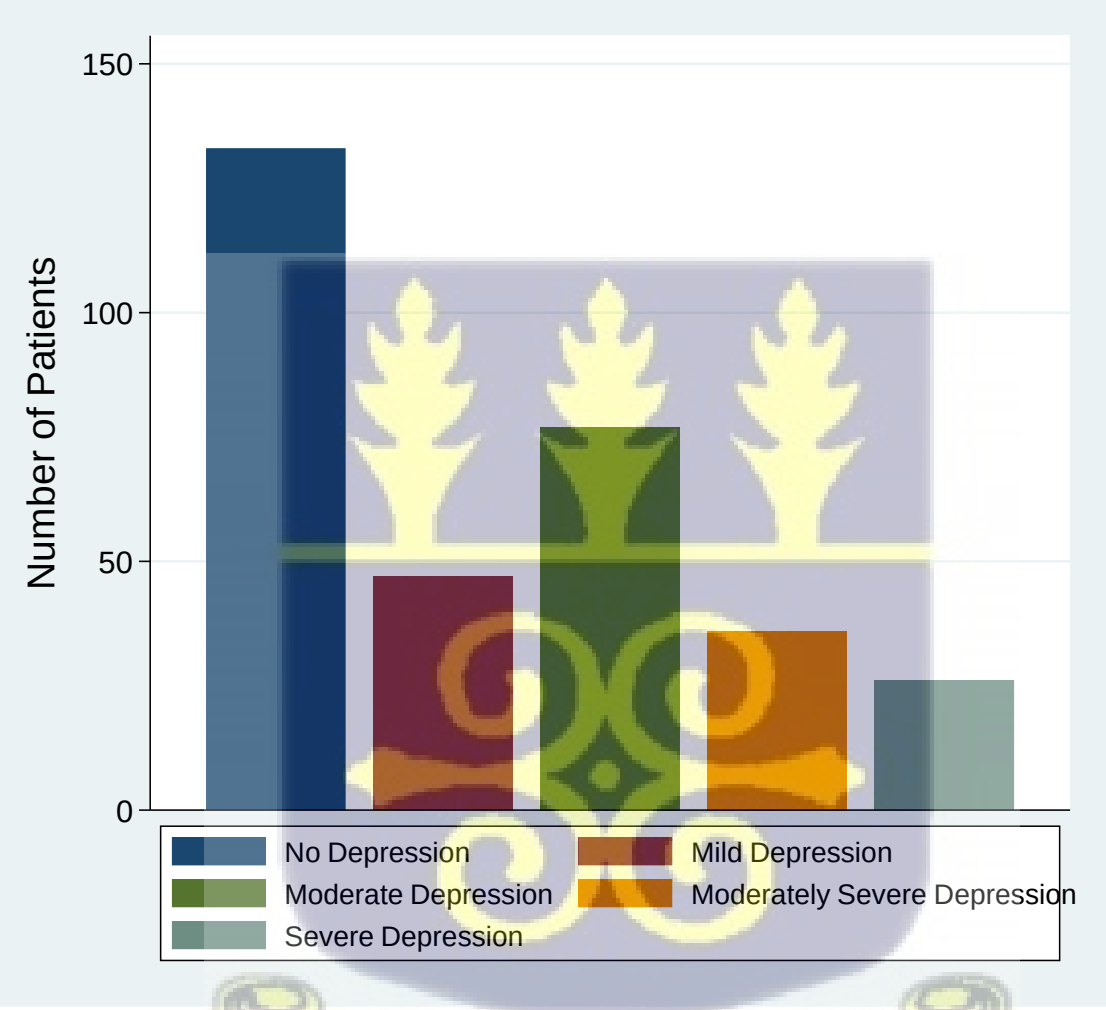


Figure 2: Distribution of depressive symptoms among participants

Table 4 shows the bivariate distribution of participants based on their experience of depressive symptoms. Age was significantly associated with depressive symptoms with participants aged 30 years or less having the highest depressive symptoms (p=0.004). Marital status was significantly associated with depression with participants who were single being the largest with depressive symptoms (p=0.005). Level of education was significantly associated with depression (p=0.015). Availability of social support was significantly associated with depression (p=0.004). Perceived stigma and discrimination were significantly associated with depressive symptoms (p=0.007, p=0.015 respectively). Frequency of taking ARTs was significantly associated depression (p=0.037). Presence of HIV-related comorbidity and being bothered by these comorbidities were significantly associated with depressive symptoms (p=0.037).

Table 4: Bivariate distribution of participants based on the experience of depressive symptoms.

Variable	Categories	Subject without depression	Participants with depression	x^2	p-value
Socio-demographic characteristics					
Age groups	<= 30	28 (21.1)	65 (34.9)	13.185	0.004
	31 - 40	49 (36.8)	46 (24.7)		
	41 - 50	39 (29.3)	39 (21.0)		
	51+	17 (12.8)	36 (19.4)		
Sex	Female	75 (56.4)	114 (61.3)	0.771	0.380
	Male	58 (43.6)	72 (38.7)		
Marital status	Single	33 (24.8)	76 (40.9)	12.877	0.005
	Married	79 (59.4)	74(39.8)		
	Divorced	12 (9.0)	18 (9.7)		
	Widowed	9 (6.8)	18 (9.7)		
Education	Primary	13 (9.8)	23 (12.4)	10.523	0.015
	Junior High	18 (13.5)	44 (23.7)		
	Senior High	47 (35.3)	71 (38.2)		
	College / University	55 (41.4)	48 (25.8)		
Employment	Unemployed	15 (11.3)	26 (14.0)	5.263	0.261
	Employed-private sector	26 (19.5)	39 (21.0)		
	Publicly Employed	41 (30.8)	38 (20.4)		
	Retiree	5 (3.8)	5 (2.7)		
	Self-employed	46 (34.6)	78 (41.9)		
	Retiree	5 (3.8)	5 (2.7)		
Religion	Christian	102 (76.7)	144 (77.4)	0.071	0.965
	Muslim	26 (19.5)	36 (19.4)		

Variable	Categories	Subject without depression	Participants with depression	x^2	p-value
	Traditional	5 (3.8)	6 (3.2)		
Socio-economic characteristics					
Monthly income	Below GhȻ 500	28 (21.1)	52 (28.0)	5.793	0.122
	GhȻ 500 - GhȻ 1000	35 (26.3)	61 (32.8)		
	GhȻ 1,000 - GhȻ 2000	43 (32.3)	47 (25.3)		
	Above GhȻ 2000	27 (20.3)	26 (14.0)		
Monthly expenditure	Below GhȻ 500	22 (16.5)	32 (17.2)	7.787	0.051
	GhȻ 500 - GhȻ 1000	42 (31.6)	83 (44.6)		
	GhȻ 1,000 - GhȻ 2000	59 (44.4)	56 (30.1)		
	Above GhȻ 2000	10 (7.5)	15 (8.1)		
Availability of social support	Poor	36 (27.1)	72 (38.7)	11.282	0.004
	Moderate	73 (54.9)	101 (54.3)		
	Strong	24 (18.0)	13 (7.0)		
Possibility of being talked about if HIV status is known	Disagree	31 (23.3)	22 (11.8)	7.377	0.007
	Agree	102 (76.7)	164 (88.2)		
History of being talked about	No	101 (75.9)	129 (69.4)	1.672	0.196
	Yes	32 (24.1)	57 (30.6)		
Possibility of being avoided if HIV status is known	Disagree	32 (24.1)	25 (13.4)	5.959	0.015
	Agree	101 (75.9)	161 (86.6)		
Clinical characteristics					
Duration of HIV	< 1 year	24 (18.0)	51 (27.4)	7.266	0.064
	1 – 5 years	76 (57.1)	87 (46.8)		
	5 – 10 years	19 (14.3)	36 (19.4)		
	>10 years	14 (10.5)	12 (6.5)		
Medication duration	< 1 year	34 (25.6)	58 (31.2)	2.553	0.466
	1 – 5 years	68 (51.1)	86 (46.2)		
	5 – 10 years	19 (14.3)	31 (16.7)		
	>10 years	12 (9.0)	11 (5.9)		
Frequency of taking ARTs	Not Always	46 (34.6)	86 (46.2)	4.339	0.037
	Always	87 (65.4)	100 (53.8)		

Variable	Categories	Subject without depression	Participants with depression	x^2	p-value
Naïve of ART side effect	No	52 (39.1)	76 (40.9)	0.1	0.752
	Yes	81 (60.9)	110 (59.1)		
Presence of HIV comorbidity	No	118 (88.7)	104 (55.9)	39.444	<0.001
	Yes	15 (11.3)	82 (44.1)		
Bothered by the comorbidity	No	10 (7.5)	4 (2.2)	60.624	<0.001
	No response	118 (88.7)	104 (55.9)		
	Yes	5 (3.8)	78 (41.9)		

4.5 Determinants of depressive symptoms among study participants

Table 5 displays univariate and multivariate logistic regression analyses of factors associated with depressive symptoms among study participants. Based on univariate regression analysis, participants between the ages of 31-40 (COR=0.40, 95% CI (0.22-0.74)), and 41-50 (COR=0.43, 95% CI 0.23-0.81) had a lower odd of showing depressive symptoms compared to participants aged 30 and below. Married participants had lower odds of having depression compared to participants who were single; Participants who have had education up to college/university (COR=0.49, 95% CI 0.23-1.08) had lower chances of having depression compared to participants with education up to the primary level.

Participants with strong social support (COR=0.27, 95% CI 0.12-0.59) had lower chances of having depression compared to participants with poor social support; participants who agreed to be talked badly about if their status is known had 2.27 (COR= 2.27, 95% CI 1.24-4.13) times higher odds of developing depression as compare to participants who disagreed. Similarly, participants who stated that they have a history of being talked badly about had 1.40 times higher odds of depression than participants with no history of being talked about.

Again, participants who agreed to the possibility of being talked about if their HIV status is known had the odds 2.04 times greater as compared to participants who disagreed (COR= 2.04, 95% CI 1.14-3.64). Participants who have had HIV for a period of 1-5 years (COR= 0.54, 95% CI 0.30-0.96) had lower odds of having depression as compared to participants who had lived with HIV for less than a year. Study participants who reported that they always take ARTs (COR= 0.62, 95%

CI 0.39-0.97) had lower odds of having depression compared to those who report not taking ARTs frequently. Participants with comorbidity had 6.20 times greater odds than participants with no comorbidity (COR= 6.20, 95% CI 3.37-11.42). Participants who stated that they are bothered by the comorbidity had 39 times greater odds as compared to participants who stated they are not bothered by the comorbidity (COR= 39, 95% CI 8.96-169.69).

Based on multivariate regression analysis, participants aged between 31-40 (AOR= 0.33, 95% CI 0.14-0.77) had lower chances of having depression compared to participants aged 30 and below; married participants had lower odds of having depression compared to single participants (AOR= 0.38, 95% CI 0.18-0.81); Study participants with monthly expenditure above Gh₵ 2000 had 7.78 times increased odds (AOR= 7.78, 95% CI 1.49-40.56) of having depression compared to participants with monthly expenditure below Gh₵ 500; participants with strong social support had lower chances of showing depressive symptoms compared to participants with poor social support (AOR= 0.31, 95% CI 0.11-0.90); study participants who reported they were bothered by their comorbidity had the odds 42.78 times greater as compared to participants who were not bothered by the comorbidity (AOR 42.78, 95% CI 8.07-226.81). The confidence interval was wide suggesting less precision because of the fewer outcomes.

Table 5: Univariate and multivariate logistic regression of factors associated with depressive symptoms among participants

Variable	Univariate analysis		Multivariate analysis	
	Crude OR	p-value	Adjusted OR	p-value
Age groups				
<= 30*	1		1	
31 - 40	0.40 (0.22-0.74)	0.003	0.33 (0.14-0.77)	0.010
41 - 50	0.43 (0.23-0.81)	0.008	0.39 (0.15-1.06)	0.065
51+	0.91 (0.44-1.89)	0.804	0.62 (0.18-2.14)	0.449
Sex				
Female*	1			
Male	0.82 (0.52-1.28)	0.38		
Marital status				
Single*	1		1	
Married	0.41 (0.24-0.68)	0.001	0.38 (0.18-0.81)	0.013
Divorced	0.65 (0.28-1.50)	0.315	0.74 (0.23-2.42)	0.617
Widowed	0.87 (0.35-2.13)	0.758	0.86 (0.21-3.44)	0.826
Education				
Primary*	1		1	
Junior High	1.38 (0.58-3.31)	0.468	1.60 (0.54-4.78)	0.398
Senior High	0.85 (0.39-1.85)	0.689	0.70 (0.24-2.07)	0.520
College / University	0.49 (0.23-1.08)	0.077	0.36 (0.11-1.24)	0.105
Employment				
Unemployed*	1			
Employed-private sector	0.87 (0.39-1.94)	0.725		
Publicly Employed	0.54 (0.25-1.16)	0.113		
Self-employed	0.98 (0.47-2.04)	0.953		
Retiree	0.58 (0.14-2.32)	0.439		
Religion				
Christian*	1			
Muslim	0.98 (0.56-1.73)	0.946		
Traditional	0.85 (0.25-2.86)	0.793		
Monthly income				
Below GhȻ 500*	1		1	
GhȻ 500 - GhȻ 1000	0.94 (0.51-1.74)	0.841	1.12 (0.48-2.61)	0.790
GhȻ 1,000 - GhȻ 2000	0.59 (0.32-1.09)	0.093	0.93 (0.32-2.71)	0.892
Above GhȻ 2000	0.52 (0.26-1.05)	0.069	1.35 (0.33-5.55)	0.674
Monthly expenditure				
Below GhȻ 500*	1		1	
GhȻ 500 - GhȻ 1000	1.36 (0.70-2.62)	0.361	2.51 (0.99-6.36)	0.052

Variable	Univariate analysis		Multivariate analysis	
	Crude OR	p-value	Adjusted OR	p-value
GhȻ 1,000 - GhȻ 2000	0.65 (0.34-1.26)	0.201	2.34 (0.76-7.23)	0.141
Above GhȻ 2000	1.03 (0.39-2.71)	0.950	7.78 (1.49-40.56)	0.015
Availability of social support				
Poor*	1		1	
Moderate	0.69 (0.42-1.14)	0.149	0.71 (0.35-1.47)	0.359
Strong	0.27 (0.12-0.59)	0.001	0.31 (0.11-0.90)	0.031
Possibility of being talked about if HIV status is known				
Disagree*	1		1	
Agree	2.27 (1.24-4.13)	0.008	2.54 (0.25-25.82)	0.432
History of being talked about				
No*	1		1	
Yes	1.40 (0.84-2.31)	0.197	1.58 (0.74-3.36)	0.241
Possibility of being avoided if HIV status is known				
Disagree*	1		1	
Agree	2.04 (1.14-3.64)	0.016	0.60 (0.07-5.62)	0.657
Duration of HIV				
< 1 year*	1		1	
1 – 5 years	0.54 (0.30-0.96)	0.035	0.63 (0.29-1.34)	0.228
5 – 10 years	0.89 (0.43-1.87)	0.761	0.96 (0.33-2.80)	0.939
>10 years	0.40 (0.16-1.00)	0.051	0.44 (0.12-1.62)	0.217
Medication duration				
< 1 year*	1			
1 – 5 years	0.74 (0.44-1.26)	0.268		
5 – 10 years	0.96 (0.47-1.95)	0.902		
>10 years	0.54 (0.21-1.35)	0.186		
Frequency of taking ARTs				
Not Always*	1		1	
Always	0.62 (0.39-0.97)	0.038	0.83 (0.45-1.55)	0.564
Presence of HIV comorbidity				
No*	1		1	
Yes	6.20 (3.37-11.42)	<0.001	0.46 (0.02-9.49)	0.618
Bothered by the comorbidity				
No*	1		1	
No response	2.20 (0.67-7.24)	0.193	0.80 (0.04-15.61)	0.882
Yes	39 (8.96-169.69)	<0.001	42.78 (8.07-226.81)	<0.001

*Reference category

Chapter Five

5.1 Discussion

5.1.1 Prevalence of depressive symptoms among participants.

The study found a high prevalence of depression among PLWHIV (58%) and a good proportion of these falling within the moderate to severe divide of the spectrum. Just under one out of every ten was severely depressed. This prevalence is higher than in previous studies conducted by Tilahune et al. (2016), Shittu et al. (2013), Reis et al. (2017), and Dorsisa et al. (2020) 24.5%, 56.7%, 42.3%, and 31% respectively. The differences may reflect differences in context, and the screening methodology but may be a signal for poor attention to the mental health of PLWHIV in low resource settings as part of their comprehensive care.

Depression among PLWHIV has a worse prognosis, in part because the sufferer loses interest in everything around them, including themselves, which has a severe impact on their adherence to ART. It has been discovered that untreated depression is connected to HIV treatment non-adherence (Yun et al., 2005). Even though depression among HIV patients and its effects on the course of the illness are well recognized, the specific causes of depression in this subgroup, particularly in Ghana, have not been thoroughly discussed. The management of common mental disorders will be incorporated into HIV care as a result of program methods that will be informed by an understanding of these factors, which will include presenting evidence in support of a systematic screening program. Therefore, the purpose of this study was to determine the prevalence and risk factors associated with depression among HIV patients on HAART attending the Weija-Gbawe Municipal Hospital.

5.1.2 Classification of severity of depressive symptoms among participants.

The finding of this study indicated that 58.3% of the HIV-positive patients on HAART had depression. The participants showed varying degrees of depressive symptoms. Mild depressive symptoms were observed in 14.7% of participants, 24.1% showed moderate depressive symptoms, 11.3% showed moderately severe symptoms of depression and 8.2% showed severe depressive symptoms. According to the aforementioned data, depression is quite prevalent among PLWHIV attending the Weija-Gbawe Municipal Hospital, which could impact negatively their treatment outcomes and well-being. The high prevalence of depression in PLWHIV could be attributed to several factors, including the physical and psychological impact of the virus, social stigma and discrimination, and the burden of taking lifelong medication and managing the disease. Additionally, the experience of being diagnosed and living with a chronic illness can also contribute to feelings of hopelessness and helplessness, which can lead to depression. Furthermore, it's possible that answering questions in a face-to-face interview influenced the participants to provide answers that were deemed to be socially acceptable. This very important finding in the current study, however, emphasizes the necessity of early depression diagnosis in this vulnerable population.

5.1.3 Factors associated with depressive symptoms among participants.

The results of the study revealed several factors that were significantly associated with an increased risk of depression among PLWHIV. These factors included age, marital status, monthly expenditure, being bothered by HIV-related comorbidity, and availability of social support. This study found that marital status is significantly associated with depression among PLWHIV (p-value=0.005) and being married is significantly associated with a decreased risk of developing depression in people living with HIV as compared to PLWHIV who are single (AOR=0.41, 95%

CI 0.24-0.68). It means that individuals who are not in a romantic relationship like widows, divorced, and single PLWHIV are more likely to experience depression than those who are in a romantic relationship. This finding is in line with studies conducted by Dorsisa et al. (2020), Tilahune et al. (2016), Hemin et al. (2020), and Mohammed et al. (2015). Participants who were married may have more social support, which may contribute to the reduced risk of depression. The association between being single and depression in PLWHIV may be due to a variety of factors, such as social support, access to resources, and coping mechanisms. found that PLWHIV. However, it's important to note that being married may not be protective for everyone, and it's also possible that other confounders such as financial stability, education, and access to healthcare might play a role in the relationship between marriage and depression in PLWHIV.

This study also found a significant association between depression and persons who have HIV-related comorbidity or opportunistic infections ($p<0.001$). Also, there was a significant association between depression and PLWHIV being bothered about HIV-related comorbidity or opportunistic infections ($p<0.001$). The study findings found that participants who stated that participants with comorbidity had 6.20 times greater odds than participants with no comorbidity (AOR= 6.20, 95% CI 3.37-11.42) and the participants who were bothered by the comorbidity had 39 times greater odd as compared to participants who stated they are not bothered by the comorbidity (AOR= 39, 95% CI 8.96-169.69). It is common for PLWHIV to experience feelings of depression or anxiety due to the physical and emotional impact of the virus and its related opportunistic infections. Previous studies have shown that PLWHIV may have a higher risk of depression and anxiety due to the impact of the infection and the additional burden of managing co-occurring conditions. The findings about depression and opportunistic infections are in line with a study by Yeneabat et al. (2017). This finding was also in agreement with the findings from the study by Dorsisa et al. (2020) and Abadiga (2019). Additionally, the fear of developing an opportunistic infection and the

uncertainty of the disease progression can cause significant psychological distress, which can further exacerbate the risk of developing depression.

In this study, factors such as social support, perceived stigma, and discrimination were significantly associated with depression (p=0.004, p=0.007, p=0.015 respectively). The findings from this study show that PLWHIV who have strong social support have 69 times reduced risk of developing depression (AOR 0.31, 95% CI 0.11-0.90). Participants in the study who had weaker social support experienced higher levels of depression than those with good social support. This may be because a lack of social support might result in social isolation, which can cause depression. This finding is consistent with studies done by Duko et al. (2018), Abadiga (2019); Zhao et al. (2019). However, this finding is contrary to the findings by Dorsisa et al. (2020). Perceived stigma can lead to depression among PLWHIV through several mechanisms. One way is by causing negative self-image and self-esteem, which can lead to feelings of hopelessness and helplessness. The fear of rejection, discrimination, and being treated differently can also lead to social isolation, which can also contribute to depression. Perceived stigma can also make it more difficult for PLWHIV to access health care, which can lead to poor health outcomes and an increased risk of depression. This can happen when individuals avoid seeking medical care or disclosing their HIV status due to fear of discrimination, which can impede the management of the disease and lead to an increased risk of depression.

The findings revealed age to be significantly associated with depression with the majority of the participants who had depressive symptoms aged 30 years or below (34.9%, p-value=0.004). This finding acquiesces with previous studies done by Gottlieb et al. (2004) and Huang et al. (2020). Again, the findings of this study agree with Crystal et al. (2003), and Nokes et al. (2000), who reported that when compared to younger age groups, older persons exhibit comparable or fewer depressive symptoms, and have higher overall emotional well-being. However, a study by

Alexopoulos (2005) found that older adults have a higher risk of depression compared to younger adults, with rates of depression increasing with age. This may be due to a combination of factors such as physical health problems, social isolation, and the loss of loved ones. Yet, these findings contradict with the summary of the findings provided by Asante (2012) which indicated that there is no significant difference in psychological well-being between age groups of participants living with HIV.

It is perplexing that this study did not find a significant association between depression and sex among the participants. Previous studies have reported a significant association between sex and depression among PLWHIV. Asante (2012) reported that female was a significant predictor of depression among HIV-positive patients. Also, other studies have found that women living with HIV have higher rates of depression compared to men living with HIV. Studies done by Goggin et al. (2001) and Brittain et al. (2017) suggest that women living with HIV may be at a higher risk of developing depression compared to men living with HIV. There are several potential explanations for why women living with HIV may be at a higher risk of depression compared to men. One possibility is that women living with HIV may experience more physical symptoms related to the virus, which can contribute to depression. Studies have found that women living with HIV may be at a higher risk of developing certain opportunistic infections and complications related to the virus, which can negatively impact their physical health and overall well-being Mellins et al. (2011).

This study did not find any significant association between the duration on HIV medication and depressive symptoms. This discovery was unexpected as it contradicts several previously published research that indicated HIV therapy is linked to a decrease in the severity of depression symptoms in HIV-positive individuals (Martinez et al., 2014; Tsai et al., 2013; Wagner et al., 2012). Ashaba et al. (2018) however, reported that the likelihood of depressive symptoms was

positively associated with the length of time that people had been receiving HIV treatment. However, it should be emphasized that the length of therapy from this study was assessed by self-report instead of an examination of clinic records, which may restrict its accuracy.

Also, it was seen from the findings that study participants who reported that they always take ARTs (AOR= 0.62, 95% CI 0.39-0.97) had lower odds of having depression compared to those who report not taking ARTs frequently. In a similar vein, research by Abebe et al. (2019) and Getaye et al. (2021) revealed that responders with poor medication adherence had a higher likelihood of developing depression among young HIV patients. Poor medication adherence has been linked to increased disease progression, a higher chance of contracting opportunistic infections, and stigma, all of which contribute to a reduction in achieving and maintaining viral suppression. Medication adherence is critical for effective HIV treatment and maintaining good health, and non-adherence can lead to poor treatment outcomes, including the development of drug resistance, increased morbidity, and mortality. Kalichman et al. (2011) reported in their study that those with depression were more likely to have poor medication adherence than those without depression.

The findings of this study did not identify any association between unemployment and depression which demur the findings of previous studies that reported that unemployment was significantly associated with depressive symptoms (Berhe & Bayray, 2013; Bernard et al., 2020; Kitshoff & Naidoo, 2012; Ngum et al., 2017). Kitshoff and Naidoo (2012) reported that in South Africa, PLWHIV who are unemployed may be three times more likely to experience severe depression symptoms. Unemployment can lead to a variety of negative outcomes, including increased stress, financial hardship, and a sense of loss of purpose or self-worth. For people living with HIV (PLWHIV), unemployment can also exacerbate the negative impact of their HIV diagnosis on their mental health. This study, however, found that monthly expenditure was significantly associated with depression. Participants whose monthly expenditure was above GhȻ 2000 were 7.78 times

(AOR= 7.78, 95% CI 1.49-40.56) more likely to develop depressive symptoms than participants whose monthly expenditure was below GhȻ 2000.

5.2 Limitations of The Study

This study is a cross-sectional study, and as such does not establish causality. Work was done in a facility setting and so may be subject to selection biases: people who come to hospitals are different from those who do not. However, it is at least representative of the PLWHIV population since they are all expected to come to facilities for their HAART.

Data collection period was short to fit in with the school's academic calendar. It might have been better to collect the data over an extended period of time to cover a wider variety of respondents. Nevertheless, the collection was spread over the entire period to cover as different people as possible.

CHAPTER SIX

6.0 CONCLUSION

The prevalence of depression among HIV-positive patients on HAART attending the Weija-Gbawe Municipal Hospital is 58.3%. The participants showed varying degrees of depressive symptoms. Mild depressive symptoms were observed in 14.7% of participants, 24.1% showed moderate depressive symptoms, 11.3% showed moderately severe symptoms of depression and 8.2% showed severe depressive symptoms. Younger adults living with HIV, those who are not married, those with high monthly expenditure, persons who lack social support and individuals who are bothered by HIV-related comorbidity had an increased risk of depression. According to the findings from this study, depression is quite prevalent among PLWHIV attending the Weija-Gbawe Municipal Hospital, which may have a negative effect on their treatment success and general well-being.

6.1 RECOMMENDATION

The following recommendations can be considered for taming depression among PLWHIV to improve their treatment outcomes and well-being:

1. Ghana Health Service, in the short to medium term (within 2 years) set up depression screening services as part of routine care for PLWHIV attending ART clinics. This should be accompanied with incorporating evidence-based interventions for depression, such as cognitive-behavioral therapy (CBT) or medication
2. Health facilities should establish counseling and support groups for mental health to help PLWHIV to cope with stigma and challenges of living with HIV.
3. The Mental Health Authority and the National AIDS Control program should in the medium to long term (over the next 5 years) explore mechanisms to offer financial protection to PLWHIV as key determinant of depression and the possible consequences in sufferers.

Future Research

Longitudinal studies or clinical trials are needed to further understand the course of depression in this population and identify risk factors that may contribute to its development as well as effective interventions to prevent or treat the condition among the PLWHIV in Ghana and the sub-Saharan Africa sub-region.

REFERENCES

Abadiga, M. (2019). Depression and its associated factors among HIV/AIDS patients attending ART clinics at Gimbi General hospital, West Ethiopia, 2018. *BMC research notes*, *12*(1), 1-8.

Abebe, H., Shumet, S., Nassir, Z., Agidew, M., & Abebaw, D. (2019). Prevalence of depressive symptoms and associated factors among HIV-positive youth attending ART follow-up in Addis Ababa, Ethiopia. *AIDS research and treatment*, *2019*.

Aboge, F. A. (2011). *The prevalence of depressive symptoms among sensory and physically challenged persons living with HIV/AIDS attending clinics in Nyanza province, Kenya* University of Nairobi, Kenya].

Adam, A., Fusheini, A., Ayanore, M. A., Amuna, N., Agbozo, F., Kugbey, N., Appiah, P. K., Asalu, G. A., Agbemafle, I., Akpalu, B., Klomegah, S., Nayina, A., Hadzi, D., Afeti, K., Makam, C. E., Mensah, F., & Zotor, F. B. (2021). HIV Stigma and Status Disclosure in Three Municipalities in Ghana. *Ann Glob Health*, *87*(1), 49. https://doi.org/10.5334/aogh.3120

Afshari, P., Manochehri, S., Tadayon, M., Kianfar, M., & Haghighizade, M. (2015). Prevalence of depression in postmenopausal women. *Jundishapur Journal of Chronic Disease Care*, *4*(3).

Agyemang, C. B., & Otoo, E. (2013). HIV/AIDS stigmatization on relatives and associates of people living with HIV/AIDS: A psychological study. *International Journal of Health and Psychology Research*, *1*(2), 1-13.

Akena, D., Musisi, S., Joska, J., & Stein, D. J. (2012). The association between aids related stigma and major depressive disorder among HIV-positive individuals in Uganda. *PLoS One*, *7*(11), e48671.

Al Madhani, A., Al Harthi, L., Balkhair, A., Chan, M. F., Albusaidi, B. S., Al Sibani, N., & Al-Adawi, S. (2020). Prevalence and correlates of depressive symptoms among people living with HIV attending tertiary care hospitals in Oman. *Pan African Medical Journal*, *37*(1).

Alexopoulos, G. S. (2005). Depression in the elderly. *The Lancet*, *365*(9475), 1961-1970.

Ali, D. M. S., Alireza, M. S., Reza, S. M., Jayran, Z., SeyedAhmad, S., Ali, R. S., Saeid, M. S., & Ali, A.-A. (2021). Effect of green tea consumption in treatment of mild to moderate depression in Iranian patients living with HIV: A double-blind randomized clinical trial. *Chinese Herbal Medicines*, *13*(1), 136-141.

Amare, T., Getinet, W., Shumet, S., & Asrat, B. (2018). Prevalence and Associated Factors of Depression among PLHIV in Ethiopia: Systematic Review and Meta-Analysis, 2017. *AIDS Res Treat*, *2018*, 5462959. https://doi.org/10.1155/2018/5462959

Amo-Adjei, J., & Darteh, E. K. (2013). Drivers of young people's attitudes towards HIV/AIDS stigma and discrimination: evidence from Ghana. *African journal of reproductive health*, *17*(4), 51-59.

Amu, H., Osei, E., Kofie, P., Owusu, R., Bosoka, S. A., Konlan, K. D., Kim, E., Orish, V. N., Maalman, R. S.-E., & Manu, E. (2021). Prevalence and predictors of depression, anxiety, and stress among adults in Ghana: A community-based cross-sectional study. *PLoS One*, *16*(10), e0258105.

Ankomah, A., Ganle, J. K., Lartey, M. Y., Kwara, A., Nortey, P. A., Okyerefo, M. P. K., & Laar, A. K. (2016). ART access-related barriers faced by HIV-positive persons linked to care in southern Ghana: a mixed method study. *BMC infectious diseases*, *16*(1), 1-12.

Archana, P. S., Soumitra, D., Sairu, P., Rekha Rachel, P., Jose, J., Varghese, P. P., & Deepthilal Pachan, L. (2017). Prevalence of depression among middle aged women in the rural area of Kerala. *Asian Journal of Psychiatry*, *29*, 154-159. https://doi.org/https://doi.org/10.1016/j.ajp.2017.05.016

Asante, K. O. (2012). Social support and the psychological wellbeing of people living with HIV/AIDS in Ghana. *African journal of psychiatry*, *15*(5), 340-345.

Ashaba, S., Cooper-Vince, C., Maling, S., Rukundo, G., Akena, D., & Tsai, A. (2018). Internalized HIV stigma, bullying, major depressive disorder, and high-risk suicidality among HIV-positive adolescents in rural Uganda. *Global Mental Health*, *5*.

Awolu, Fusheini, A., Ayanore, M. A., Amuna, N., Agbozo, F., Kugbey, N., Appiah, P. K., Asalu, G. A., Agbemafle, I., & Akpalu, B. (2021). HIV stigma and status disclosure in three municipalities in Ghana. *Annals of global health*, *87*(1).

Ayano, G., Demelash, S., Abraha, M., & Tsegay, L. (2021). The prevalence of depression among adolescent with HIV/AIDS: a systematic review and meta-analysis. *AIDS research and therapy*, *18*(1), 1-10.

Benton, T. D. (2008). Depression and hiv/aids. *Current Psychiatry Reports*, *10*(3), 280-285.

Berger-Greenstein, J. A., Cuevas, C. A., Brady, S. M., Trezza, G., Richardson, M. A., & Keane, T. M. (2007). Major depression in patients with HIV/AIDS and substance abuse. *AIDS Patient Care and STDs*, *21*(12), 942-955.

Berhe, H., & Bayray, A. (2013). Prevalence of depression and associated factors among people living with HIV/AIDS in tigray, North Ethiopia: a cross sectional hospital based study. *International Journal of Pharmaceutical Sciences and Research*, *4*(2), 765.

Bernard, C., Font, H., Diallo, Z., Ahonon, R., Tine, J. M., N'guessan Abouo, F., Tanon, A., Messou, E., Seydi, M., Dabis, F., de Rekeneire, N., Zannou, M. D., Poda, A., Sarfo, F. S., Messou, E., Chenal, H., Minga, K. A., Bissagnene, E., Tanon, A., . . . the Ie, D. E. A. W. A. C. C. (2020). Prevalence and factors associated with severe depressive symptoms in older west African people living with HIV. *BMC psychiatry*, *20*(1), 442. https://doi.org/10.1186/s12888-020-02837-0

Bhatia, M., & Munjal, S. (2014). Prevalence of depression in people living with HIV/AIDS undergoing ART and factors associated with it. *Journal of clinical and diagnostic research: JCDR*, *8*(10), WC01.

Bhavsar, D. (2022). Effectiveness of Physical Activity as an Intervention for Clinical Depression: A Narrative Literature Review. *International Journal of Science and Healthcare Research*, *7*, 358-364. https://doi.org/10.52403/ijshr.20220450

Bing, E., Burnam, M., Longshore, D., Morton, S., Fleishman, J., & Ortiz-Barron, L. (2001). The estimated prevalence of psychiatric disorders, drug use and drug dependence among people with HIV disease in the United States: results from the HIV Cost and Services Utilization Study. *Archives of general psychiatry*, *58*, 721-728.

Bing, E. G., Burnam, M. A., Longshore, D., Fleishman, J. A., Sherbourne, C. D., London, A. S., Turner, B. J., Eggan, F., Beckman, R., & Vitiello, B. (2001). Psychiatric disorders and drug use among human immunodeficiency virus–infected adults in the United States. *Archives of general psychiatry*, *58*(8), 721-728.

Boakye, D. S., & Mavhandu-Mudzusi, A. H. (2019). Nurses knowledge, attitudes and practices towards patients with HIV and AIDS in Kumasi, Ghana. *International Journal of Africa Nursing Sciences*, *11*, 100147.

Bonelli, R., Dew, R. E., Koenig, H. G., Rosmarin, D. H., & Vasegh, S. (2012). Religious and spiritual factors in depression: review and integration of the research. *Depression research and treatment*, *2012*.

Bonnington, O., Wamoyi, J., Ddaaki, W., Bukenya, D., Ondenge, K., Skovdal, M., Renju, J., Moshabela, M., & Wringe, A. (2017). Changing forms of HIV-related stigma along the HIV care and treatment continuum in sub-Saharan Africa: a temporal analysis. *Sexually transmitted infections*, *93*(Suppl 3).

Bowen, A. (2006). Stigma: Perceived Discrimination and Barriers to Services and Care among Persons with HIV and Substance Use Disorders.

Brawner, B. M., Sweet Jemmott, L., Wingood, G., Reason, J., Daly, B., Brooks, K., & Lanier, Y. (2017). Feelings matter: Depression severity and emotion regulation in HIV/STI risk-related sexual behaviors. *Journal of Child and Family Studies*, *26*, 1635-1645.

Brittain, K., Mellins, C. A., Phillips, T., Zerbe, A., Abrams, E. J., Myer, L., & Remien, R. H. (2017). Social support, stigma and antenatal depression among HIV-infected pregnant women in South Africa. *AIDS and Behavior*, *21*(1), 274-282.

Bromberger, J. T., Matthews, K. A., Schott, L. L., Brockwell, S., Avis, N. E., Kravitz, H. M., Everson-Rose, S. A., Gold, E. B., Sowers, M., & Randolph Jr, J. F. (2007). Depressive symptoms during the menopausal transition: the Study of Women's Health Across the Nation (SWAN). *Journal of affective disorders*, *103*(1-3), 267-272.

Campos, L. N., Guimarães, M. D. C., & Remien, R. H. (2010). Anxiety and depression symptoms as risk factors for non-adherence to antiretroviral therapy in Brazil. *AIDS and Behavior*, *14*, 289-299.

Cavanagh, J. T., Carson, A. J., Sharpe, M., & Lawrie, S. M. (2003). Psychological autopsy studies of suicide: a systematic review. *Psychological medicine*, *33*(3), 395-405.

Charles, B., Jeyaseelan, L., Pandian, A. K., Sam, A. E., Thenmozhi, M., & Jayaseelan, V. (2012). Association between stigma, depression and quality of life of people living with HIV/AIDS (PLHA) in South India–a community based cross sectional study. *BMC public health*, *12*(1), 1-11.

Chaudhury, S., Bakhla, A. K., & Saini, R. (2016). Prevalence, impact, and management of depression and anxiety in patients with HIV: A review. *Neurobehavioral HIV Medicine*, *7*, 15-30.

Chedraui, P., Pérez-López, F. R., Morales, B., & Hidalgo, L. (2009). Depressive symptoms in climacteric women are related to menopausal symptom intensity and partner factors. *Climacteric*, *12*(5), 395-403. https://doi.org/10.1080/13697130902718150

Ciesla, J. A., & Roberts, J. E. (2001). Meta-analysis of the relationship between HIV infection and risk for depressive disorders. *American journal of psychiatry*, *158*(5), 725-730.

Clottey-Sefa, D. (2001). HIV/AIDS and discrimination observations from Ghana. *AFLA Quarterly*, 1384-1282.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological bulletin*, *98*(2), 310.

Collins, P. Y., Holman, A. R., Freeman, M. C., & Patel, V. (2006). What is the relevance of mental health to HIV/AIDS care and treatment programs in developing countries? A systematic review. *AIDS (London, England)*, *20*(12), 1571.

Costiniuk, C. T., Saneei, Z., Routy, J.-P., Margolese, S., Mandarino, E., Singer, J., Lebouché, B., Cox, J., Szabo, J., & Brouillette, M.-J. (2019). Oral cannabinoids in people living with HIV on effective antiretroviral therapy: CTN PT028—study protocol for a pilot randomised trial to assess safety, tolerability and effect on immune activation. *BMJ open*, *9*(1), e024793.

Crystal, S., Akincigil, A., Sambamoorthi, U., Wenger, N., Fleishman, J. A., Zingmond, D. S., Hays, R. D., Bozzette, S. A., & Shapiro, M. F. (2003). The diverse older HIV-positive population: a national profile of economic circumstances, social support, and quality of life. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *33*, S76-S83.

Dal-Bó, M. J., Manoel, A. L., Filho, A. O. B., Silva, B. Q. T. d., Cardoso, Y. S., Cortez, J., Tramujas, L., & Silva, R. M. d. (2015). Depressive symptoms and associated factors among people living with HIV/AIDS. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*, *14*(2), 136-140.

Davis, L., Uezato, A., Newell, J. M., & Frazier, E. (2008). Major depression and comorbid substance use disorders. *Current opinion in psychiatry*, *21*(1), 14-18.

Deacon, H., & Stephney, I. (2007). *HIV/AIDS, stigma and children: A literature review*. HSRC press Cape Town.

Dennerstein, L., Smith, A. M., & Morse, C. (1994). Psychological well-being, mid-life and the menopause. *Maturitas*, *20*(1), 1-11.

Deshmukh, N. N., Borkar, A. M., & Deshmukh, J. S. (2017). Depression and its associated factors among people living with HIV/AIDS: Can it affect their quality of life? *Journal of family medicine and primary care*, *6*(3), 549.

Deter, H.-C., Weber, C., Herrmann-Lingen, C., Albus, C., Juenger, J., Ladwig, K.-H., Soellner, W., de Zwaan, M., Hellmich, M., & Grün, A.-S. (2018). Gender differences in psychosocial outcomes of psychotherapy trial in patients with depression and coronary artery disease. *Journal of Psychosomatic Research*, *113*, 89-99.

Doat, A. R., Navab, E., & Sadat Hoseini, A. S. (2021). Lived experiences of adolescent living with human immunodeficiency virus in Ghana: A phenomenology study. *Nursing Open*, *8*(1), 299-307.

Dorsisa, B., Ahimed, G., Anand, S., & Bekela, T. (2020). Prevalence and Factors Associated with Depression among HIV/AIDS-Infected Patients Attending ART Clinic at Jimma University Medical Center, Jimma, Southwest Ethiopia. *Psychiatry Journal*, *2020*, 5414072. https://doi.org/10.1155/2020/5414072

Duko, B., Geja, E., Zewude, M., & Mekonen, S. (2018). Prevalence and associated factors of depression among patients with HIV/AIDS in Hawassa, Ethiopia, cross-sectional study. *Annals of general psychiatry*, *17*(1), 1-6.

Frank, T. D., Carter, A., Jahagirdar, D., Biehl, M. H., Douwes-Schultz, D., Larson, S. L., Arora, M., Dwyer-Lindgren, L., Steuben, K. M., & Abbastabar, H. (2019). Global, regional, and national incidence, prevalence, and mortality of HIV, 1980–2017, and forecasts to 2030, for 195 countries and territories: a systematic analysis for the Global Burden of Diseases, Injuries, and Risk Factors Study 2017. *The lancet HIV*, *6*(12), e831-e859.

Freeman, E. W., Sammel, M. D., Lin, H., & Nelson, D. B. (2006). Associations of hormones and menopausal status with depressed mood in women with no history of depression. *Archives of general psychiatry*, *63*(4), 375-382.

Fu, Q., Heath, A. C., Bucholz, K. K., Nelson, E. C., Glowinski, A. L., Goldberg, J., Lyons, M. J., Tsuang, M. T., Jacob, T., True, M. R., & Eisen, S. A. (2002). A twin study of genetic and environmental influences on suicidality in men. *Psychological medicine*, *32*(1), 11-24. https://doi.org/10.1017/S0033291701004846

Gannon, P. J., Akay-Espinoza, C., Yee, A. C., Briand, L. A., Erickson, M. A., Gelman, B. B., Gao, Y., Haughey, N. J., Zink, M. C., & Clements, J. E. (2017). HIV protease inhibitors alter amyloid precursor protein processing via β-site amyloid precursor protein cleaving enzyme-1 translational up-regulation. *The American Journal of Pathology*, *187*(1), 91-109.

Ganu, V. J., Boima, V., Adjei, D. N., Yendork, J. S., Dey, I. D., Yorke, E., Mate-Kole, C. C., & Mate-Kole, M. O. (2018). Depression and quality of life in patients on long term hemodialysis at a national hospital in Ghana: a cross-sectional study. *Ghana medical journal*, *52*(1), 22-28.

Getaye, A., Cherie, N., Bazie, G. W., & Gebremeskel Aragie, T. (2021). Proportion of Depression and Its Associated Factors Among Youth HIV/AIDS Clients Attending ART Clinic in Dessie Town Government Health Facilities, Northeast Ethiopia. *J Multidiscip Healthc*, *14*, 197-205. https://doi.org/10.2147/jmdh.S296849

Gibbie, T., Hay, M., Hutchison, C. W., & Mijch, A. (2007). Depression, social support and adherence to highly active antiretroviral therapy in people living with HIV/AIDS. *Sexual health*, *4*(4), 227-232.

Goggin, K., Catley, D., Brisco, S. T., Engelson, E. S., Rabkin, J. G., & Kotler, D. P. (2001). A female perspective on living with HIV disease. *Health & Social Work*, *26*(2), 80-89.

Gottlieb, S. S., Khatta, M., Friedmann, E., Einbinder, L., Katzen, S., Baker, B., Marshall, J., Minshall, S., Robinson, S., & Fisher, M. L. (2004). The influence of age, gender, and race on the prevalence of depression in heart failure patients. *Journal of the American College of Cardiology*, *43*(9), 1542-1549.

Grov, C., Golub, S. A., Parsons, J. T., Brennan, M., & Karpiak, S. E. (2010). Loneliness and HIV-related stigma explain depression among older HIV-positive adults. *AIDS care*, *22*(5), 630-639.

Guaraldi, G., Murri, R., Orlando, G., Squillace, N., Stentarelli, C., Zona, S., Garlassi, E., & Martinez, E. (2008). Lipodystrophy and quality of life of HIV-infected persons. *Aids Rev*, *10*(3), 152-161.

Hayfron-Benjamin, A., Akorsu, A. D., Asiedua, E., Yemah, B., Baidoo, I., Ayisi-Addo, S., & Obiri-Yeboah, D. (2019). Psychosocial assessment of Ghanaian adolescent living with HIV using the HEADSSS assessment approach: a mixed methods study.

Hemin, S., Manouchehr, A., Mahshid, F., Bahman, B., & Saeed, K. M. (2020). Prevalence and risk factors of depression among community dwelling elderly. *Medical Science*, *24*(103), 1287-1294.

Herrman, H., Patel, V., Kieling, C., Berk, M., Buchweitz, C., Cuijpers, P., Furukawa, T. A., Kessler, R. C., Kohrt, B. A., & Maj, M. (2022). Time for united action on depression: a Lancet–World Psychiatric Association Commission. *The Lancet*, *399*(10328), 957-1022.

Hoare, J., Sevenoaks, T., Mtukushe, B., Williams, T., Heany, S., & Phillips, N. (2021). Global systematic review of common mental health disorders in adults living with HIV. *Current HIV/AIDS Reports*, 1-12.

Huang, Y., Luo, D., Chen, X., Zhang, D., Huang, Z., & Xiao, S. (2020). HIV-related stress experienced by newly diagnosed people living with HIV in China: a 1-year longitudinal study. *International Journal of Environmental Research and Public Health*, *17*(8), 2681.

Jiang, H., Tan, Z., Cheng, W., Xu, M., Lin, P., Huang, X., Huang, R., Liu, J., Yang, F., & Li, Y. (2019). Negative life events and major depressive disorder among HIV-positive individuals in Guangdong, China: a cross-sectional study. *Medicine*, *98*(37).

Jorm, A. F. (2012). Mental health literacy: empowering the community to take action for better mental health. *American psychologist*, *67*(3), 231.

Kaharuza, F. M., Bunnell, R., Moss, S., Purcell, D. W., Bikaako-Kajura, W., Wamai, N., Downing, R., Solberg, P., Coutinho, A., & Mermin, J. (2006). Depression and CD4 cell count among persons with HIV infection in Uganda. *AIDS and Behavior*, *10*(1), 105-111.

Kalichman, S. C., Cherry, C., Kalichman, M. O., Amaral, C. M., White, D., Pope, H., Swetzes, C., Eaton, L., Macy, R., & Cain, D. (2011). Integrated behavioral intervention to improve HIV/AIDS treatment adherence and reduce HIV transmission. *Am J Public Health*, *101*(3), 531-538. https://doi.org/10.2105/ajph.2010.197608

Kaufert, P. A., Gilbert, P., & Tate, R. (2008). The Manitoba Project: a re-examination of the link between menopause and depression. *Maturitas*, *61*(1-2), 54-66.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Koretz, D., Merikangas, K. R., Rush, A. J., Walters, E. E., & Wang, P. S. (2003). The epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication (NCS-R). *Jama*, *289*(23), 3095-3105.

Kim, M. H., Mazenga, A. C., Yu, X., Devandra, A., Nguyen, C., Ahmed, S., Kazembe, P. N., & Sharp, C. (2015). Factors associated with depression among adolescents living with HIV in Malawi. *BMC psychiatry*, *15*(1), 1-12.

Kitshoff, C., & Naidoo, S. (2012). The association between depression and adherence to antiretroviral therapy in HIV-positive patients, KwaZulu-Natal, South Africa. *South African Family Practice*, *54*(2).

Knipe, D., Williams, A. J., Hannam-Swain, S., Upton, S., Brown, K., Bandara, P., Chang, S.-S., & Kapur, N. (2019). Psychiatric morbidity and suicidal behaviour in low-and middle-income countries: A systematic review and meta-analysis. *PLoS medicine*, *16*(10), e1002905.

Koka, E., Ahorlu, C. K., & Agyeman, D. K. (2013). Social Death through HIV and AIDS Stigmatization and Discrimination in Ghana: A Case Study of the Central Regional Hospital, Cape Coast, Ghana. *Advances in Applied Sociology*, *Vol.03No.06*, 6, Article 37788. https://doi.org/10.4236/aasoci.2013.36031

Krishnan, K. R. R., Delong, M., Kraemer, H., Carney, R., Spiegel, D., Gordon, C., McDonald, W., Dew, M. A., Alexopoulos, G., & Buckwalter, K. (2002). Comorbidity of depression with other medical diseases in the elderly. *Biological psychiatry*, *52*(6), 559-588.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of general internal medicine*, *16*(9), 606-613.

Leserman, J., Jackson, E. D., Petitto, J. M., Golden, R. N., Silva, S. G., Perkins, D. O., Cai, J., Folds, J. D., & Evans, D. L. (1999). Progression to AIDS: the effects of stress, depressive symptoms, and social support. *Psychosomatic medicine*, *61*(3), 397-406.

Leserman, J., Perkins, D. O., & Evans, D. L. (1992). Coping with the threat of AIDS: the role of social support. *The American Journal of Psychiatry*.

Liu, H., Zhao, M., Ren, J., Qi, X., Sun, H., Qu, L., Yan, C., Zheng, T., Wu, Q., & Cui, Y. (2018). Identifying factors associated with depression among men living with HIV/AIDS and undergoing antiretroviral therapy: a cross-sectional study in Heilongjiang, China. *Health and quality of life outcomes*, *16*(1), 1-10.

Logie, C., & Gadalla, T. (2009). Meta-analysis of health and demographic correlates of stigma towards people living with HIV. *AIDS care*, *21*(6), 742-753.

Logie, C. H., Jenkinson, J. I., Earnshaw, V., Tharao, W., & Loutfy, M. R. (2016). A structural equation model of HIV-related stigma, racial discrimination, housing insecurity and wellbeing among African and Caribbean Black women living with HIV in Ontario, Canada. *PLoS One*, *11*(9), e0162826.

Low-Beer, S., Chan, K., Wood, E., Yip, B., Montaner, J., O'shaughnessy, M., & Hogg, R. (2000). Health related quality of life among persons with HIV after the use of protease inhibitors. *Quality of Life Research*, *9*(8), 941-949.

Madden, V. J., Parker, R., & Goodin, B. R. (2020). Chronic pain in people with HIV: a common comorbidity and threat to quality of life. *Pain Manag*, *10*(4), 253-260. https://doi.org/10.2217/pmt-2020-0004

Maier, W., Gänsicke, M., Gater, R., Rezaki, M., Tiemens, B., & Urzúa, R. F. (1999). Gender differences in the prevalence of depression: a survey in primary care. *Journal of affective disorders*, *53*(3), 241-252.

Marcus, M., Yasamy, M. T., Ommeren, M., Chisholm, D., & Saxena, S. (2012). Depression: A global public health concern. *World Health Organization Paper on Depression*, 6-8.

Martinez, P., Tsai, A. C., Muzoora, C., Kembabazi, A., Weiser, S. D., Huang, Y., Haberer, J. E., Martin, J. N., Bangsberg, D. R., & Hunt, P. W. (2014). Reversal of the Kynurenine pathway of tryptophan catabolism may improve depression in ART-treated HIV-infected Ugandans. *Journal of acquired immune deficiency syndromes (1999)*, *65*(4), 456.

Mathers, C. D., & Loncar, D. (2006). Projections of global mortality and burden of disease from 2002 to 2030. *PLoS medicine*, *3*(11), e442.

McKinlay, J. B., McKinlay, S. M., & Brambilla, D. (1987). The Relative Contributions of Endocrine Changes and Social Circumstances to Depression in Mid-Aged Women. *Journal of Health and Social Behavior*, *28*(4), 345-363. https://doi.org/10.2307/2136789

Meitei, K., & Singh, H. (2019). Prevalence of Depression Among Indian Population. *Online J Health Allied Scs*, *18*(4), 12.

Mellins, C. A., Tassiopoulos, K., Malee, K., Moscicki, A.-B., Patton, D., Smith, R., Usitalo, A., Allison, S. M., Van Dyke, R., & Seage III, f. t. P. H.-A. C. S., George R. (2011). Behavioral health risks in perinatally HIV-exposed youth: co-occurrence of sexual and drug use behavior, mental health problems, and nonadherence to antiretroviral treatment. *AIDS Patient Care and STDs*, *25*(7), 413-422.

Millar, B. M., Starks, T. J., Gurung, S., & Parsons, J. T. (2017). The impact of comorbidities, depression, and substance use problems on quality of life among older adults living with HIV. *AIDS and Behavior*, *21*, 1684-1690.

Mitchell, M. M., & Knowlton, A. (2009). Stigma, disclosure, and depressive symptoms among informal caregivers of people living with HIV/AIDS. *AIDS Patient Care and STDs*, *23*(8), 611-617.

Mohammed, M., Mengistie, B., Dessie, Y., & Godana, W. (2015). Prevalence of depression and associated factors among HIV patients seeking treatments in ART clinics at Harar Town, Eastern Ethiopia. *J AIDS Clin Res*, *6*(474), 2.

Mulhall, S., Andel, R., & Anstey, K. J. (2018). Variation in symptoms of depression and anxiety in midlife women by menopausal status. *Maturitas*, *108*, 7-12.

Munir, S., & Takov, V. (2017). Generalized anxiety disorder.

Nachega, J. B., Leisegang, R., Bishai, D., Nguyen, H., Hislop, M., Cleary, S., Regensberg, L., & Maartens, G. (2010). Association of antiretroviral therapy adherence and health care costs. *Annals of internal medicine*, *152*(1), 18-25.

Nachega, J. B., Morroni, C., Zuniga, J. M., Sherer, R., Beyrer, C., Solomon, S., Schechter, M., & Rockstroh, J. (2012). HIV-Related Stigma, Isolation, Discrimination, and Serostatus Disclosure:A Global Survey of 2035 HIV-Infected Adults. *Journal of the International Association of Physicians in AIDS Care*, *11*(3), 172-178. https://doi.org/10.1177/1545109712436723

Nakimuli-Mpungu, E., Bass, J. K., Alexandre, P., Mills, E. J., Musisi, S., Ram, M., Katabira, E., & Nachega, J. B. (2012). Depression, alcohol use and adherence to antiretroviral therapy in sub-Saharan Africa: a systematic review. *AIDS and Behavior*, *16*(8), 2101-2118.

Narasimhan, M., Payne, C., Caldas, S., Beard, J. R., & Kennedy, C. E. (2016). Ageing and healthy sexuality among women living with HIV. *Reproductive Health Matters*, *24*(48), 43-51. https://doi.org/10.1016/j.rhm.2016.11.001

Ngum, P. A., Fon, P. N., Ngu, R. C., Verla, V. S., & Luma, H. N. (2017). Depression among HIV/AIDS patients on highly active antiretroviral therapy in the southwest regional hospitals of Cameroon: a cross-sectional study. *Neurology and therapy*, *6*(1), 103-114.

Nogueira Campos, L., De Fatima Bonolo, P., & Crosland Guimarães, M. (2006). Anxiety and depression assessment prior to initiating antiretroviral treatment in Brazil. *AIDS care*, *18*(6), 529-536.

Nokes, K. M., Holzemer, W. L., Corless, I. B., Bakken, S., Brown, M.-A., Powell-Cope, G. M., Inouye, J., & Turner, J. (2000). Health-related quality of life in persons younger and older than 50 who are living with HIV/AIDS. *Research on Aging*, *22*(3), 290-310.

Ohemeng, F. N. (2016). The Meaning of AIDS-Related Deaths in an Urban Town in Ghana. *Illness, Crisis & Loss*, *24*(4), 261-278.

Onya, O. N., & Otorkpa, C. (2018). Prevalence and socio-demographic determinants of depression in women: a comparison between pre-menopausal and post-menopausal attendees of the general outpatient department in Fmc Lokoja. *Open Journal of Depression*, *7*(3), 51-59.

Opoku Agyemang, S., Ninonni, J., Bennin, L., Agyare, E., Gyimah, L., Senya, K., Birikorang, E., Quarshie, E. N., Baddoo, N. A., Addo, S. A., & Obiri-Yeboah, D. (2022). Prevalence and associations of depression, anxiety, and stress among people living with HIV: A hospital-based analytical cross-sectional study. *Health Sci Rep*, *5*(5), e754. https://doi.org/10.1002/hsr2.754

Paans, N. P., Bot, M., Brouwer, I. A., Visser, M., Roca, M., Kohls, E., Watkins, E., & Penninx, B. W. (2018). The association between depression and eating styles in four European countries: The MooDFOOD prevention study. *Journal of Psychosomatic Research*, *108*, 85-92.

Pandey, A., & Galvani, A. P. (2019). The global burden of HIV and prospects for control. *The lancet HIV*, *6*(12), e809-e811.

Patel, S. S., Peterson, R. A., & Kimmel, P. L. (2005). Psychosocial factors in patients with chronic kidney disease: The impact of social support on end-stage renal disease. Seminars in dialysis,

Pedrosa, A. L., Bitencourt, L., Fróes, A. C. F., Cazumbá, M. L. B., Campos, R. G. B., de Brito, S. B. C. S., & Simões e Silva, A. C. (2020). Emotional, behavioral, and psychological impact of the COVID-19 pandemic. *Frontiers in psychology*, *11*, 566212.

Pérez-Stable, E. J., Miranda, J., Muñoz, R. F., & Ying, Y.-W. (1990). Depression in medical outpatients: underrecognition and misdiagnosis. *Archives of Internal Medicine*, *150*(5), 1083-1088.

Poku, K. A., Linn, J. G., Fife, B. L., Azar, S., & Kendrick, L. (2005). A comparative analysis of perceived stigma among HIV-positive Ghanaian and African American males. *SAHARA-J: Journal of Social Aspects of HIV/AIDS*, *2*(3), 344-351.

Reis, R. K., Melo, E. S., de Castro Castrighini, C., Galvão, M. T. G., Toffano-Malaguti, S. E., & Elucir, G. (2017). Prevalence and factors associated with depressive symptoms in individuals living with HIV/AIDS. *Salud mental*, *40*(2), 57-62.

Richards, D. (2011). Prevalence and clinical course of depression: a review. *Clinical psychology review*, *31*(7), 1117-1125.

Rishi, P., Rishi, E., Maitray, A., Agarwal, A., Nair, S., & Gopalakrishnan, S. (2017). Hospital anxiety and depression scale assessment of 100 patients before and after using low vision care: A prospective study in a tertiary eye-care setting. *Indian journal of ophthalmology*, *65*(11), 1203.

Ritchie, H., & Roser, M. (2018). Opioids, cocaine, cannabis and illicit drugs. *Our World in Data*.

Sarnak, M. J., Tighiouart, H., Scott, T. M., Lou, K. V., Sorensen, E. P., Giang, L. M., Drew, D. A., Shaffi, K., Strom, J. A., & Singh, A. K. (2013). Frequency of and risk factors for poor cognitive performance in hemodialysis patients. *Neurology*, *80*(5), 471-480.

Sayles, J. N., Wong, M. D., Kinsler, J. J., Martins, D., & Cunningham, W. E. (2009). The association of stigma with self-reported access to medical care and antiretroviral therapy adherence in persons living with HIV/AIDS. *Journal of general internal medicine*, *24*(10), 1101-1108.

Schulberg, H. C., Block, M. R., Madonia, M. J., Scott, C. P., Lave, J. R., Rodriguez, E., & Coulehan, J. L. (1997). The'usual care'of major depression in primary care practice. *Archives of Family Medicine*, *6*(4), 334.

Seeling, S., Mavhunga, F., Thomas, A., Adelberger, B., & Ulrichs, T. (2014). Barriers to access to antiretroviral treatment for HIV-positive tuberculosis patients in Windhoek, Namibia. *International Journal of Mycobacteriology*, *3*(4), 268-275.

Sefa-Boateng, S. (2019). *Determinants Of Depressive Symptoms Among Adolescents In Senior High Schools In The La Dadekotopon District Of The Greater Accra Region* University of Ghana].

Seid, S., Abdu, O., Mitiku, M., & Tamirat, K. S. (2020). Prevalence of depression and associated factors among HIV/AIDS patients attending antiretroviral therapy clinic at Dessie referral hospital, South Wollo, Ethiopia. *International Journal of Mental Health Systems*, *14*, 1-8.

Sena, C. E. (2019). *Determinants of Health Related Quality of Life in HIV-Positive Patients on Antiretroviral Therapy* University of Ghana].

Seth, P., Kidder, D., Pals, S., Parent, J., Mbatia, R., Chesang, K., Mbilinyi, D., Koech, E., Nkingwa, M., & Katuta, F. (2014). Psychosocial functioning and depressive symptoms among HIV-positive persons receiving care and treatment in Kenya, Namibia, and Tanzania. *prevention science*, *15*(3), 318-328.

Shittu, R., Issa, B., Olanrewaju, G., Mahmoud, A., Odeigah, L., Salami, A., & Aderibigbe, S. (2013). Prevalence and correlates of depressive disorders among people living with HIV/AIDS. *North Central Nigeria. J AIDS Clin Res*, *4*(11), 251.

Siakwa, M., Okanlawon, F., Druye, A., Ankobil, A., Aniweh, Y., & Dzah, S. (2015). Prevalence of psychiatric disorders in HIV patients in the Central Region of Ghana. *Journal of Community Medicine and Primary Health Care*, *27*(1), 79-85.

Simbayi, L. C., Kalichman, S., Strebel, A., Cloete, A., Henda, N., & Mqeketo, A. (2007a). Internalized stigma, discrimination, and depression among men and women living with HIV/AIDS in Cape Town, South Africa. *Social science & medicine*, *64*(9), 1823-1831.

Simbayi, L. C., Kalichman, S. C., Strebel, A., Cloete, A., Henda, N., & Mqeketo, A. (2007b). Disclosure of HIV status to sex partners and sexual risk behaviours among HIV-positive men and women, Cape Town, South Africa. *Sexually transmitted infections*, *83*(1), 29-34.

Sin, N. L., & DiMatteo, M. R. (2014). Depression treatment enhances adherence to antiretroviral therapy: a meta-analysis. *Annals of Behavioral Medicine*, *47*(3), 259-269.

Sipsma, H., Ofori-Atta, A., Canavan, M., Osei-Akoto, I., Udry, C., & Bradley, E. H. (2013). Poor mental health in Ghana: who is at risk? *BMC public health*, *13*(1), 1-9.

Spitzer, R. L., Kroenke, K., Williams, J. B., Group, P. H. Q. P. C. S., & Group, P. H. Q. P. C. S. (1999). Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. *Jama*, *282*(18), 1737-1744.

Tadios, Y., & Davey, G. (2006). Antiretroviral treatment adherence and its correlates in Addis Ababa, Ethiopia. *Ethiopian medical journal*, *44*(3), 237-244.

Tao, J., Vermund, S. H., & Qian, H.-Z. (2018). Association between depression and antiretroviral therapy use among people living with HIV: a meta-analysis. *AIDS and Behavior*, *22*(5), 1542-1550.

Teka, A. (2022). *Prevalence and associated Factors of Suicidal Ideation and Attempt among People Living with HIV/AIDS Attending Art Clinic at Public Hospitals in Hawassa City, Sidama Region Ethiopia* HU].

Tesfaw, G., Ayano, G., Awoke, T., Assefa, D., Birhanu, Z., Miheretie, G., & Abebe, G. (2016). Prevalence and correlates of depression and anxiety among patients with HIV on-follow up at Alert Hospital, Addis Ababa, Ethiopia. *BMC psychiatry*, *16*(1), 1-7.

Thapa, S. B., Martinez, P., & Clausen, T. (2014). Depression and its correlates in South Africa and Ghana among people aged 50 and above: Findings from the WHO Study on global AGEing and adult health. *Journal of psychiatry*, *17*(6).

Tilahune, A. B., Bekele, G., Mekonnen, N., & Tamiru, E. (2016). Prevalence of unrecognized depression and associated factors among patients attending medical outpatient department in Adare Hospital, Hawassa, Ethiopia. *Neuropsychiatric disease and treatment*, *12*, 2723.

Tsai, A. C., Bangsberg, D. R., Bwana, M., Haberer, J. E., Frongillo, E. A., Muzoora, C., Kumbakumba, E., Hunt, P. W., Martin, J. N., & Weiser, S. D. (2013). How does antiretroviral treatment attenuate the stigma of HIV? Evidence from a cohort study in rural Uganda. *AIDS and Behavior*, *17*(8), 2725-2731.

Tucker, J. S., Burnam, M. A., Sherbourne, C. D., Kung, F.-Y., & Gifford, A. L. (2003). Substance use and mental health correlates of nonadherence to antiretroviral medications in a sample of patients with human immunodeficiency virus infection. *The American journal of medicine*, *114*(7), 573-580.

Unsal, A., Tozun, M., & Ayranci, U. (2011). Prevalence of depression among postmenopausal women and related characteristics. *Climacteric*, *14*(2), 244-251. https://doi.org/10.3109/13697137.2010.510912

Uthman, O. A., Magidson, J. F., Safren, S. A., & Nachega, J. B. (2014). Depression and adherence to antiretroviral therapy in low-, middle-and high-income countries: a systematic review and meta-analysis. *Current Hiv/aids Reports*, *11*(3), 291-307.

Vijayakumar, L. (2004). Suicide prevention: the urgent need in developing countries. *World psychiatry*, *3*(3), 158-159.

Wagner, G. J., Ghosh-Dastidar, B., Garnett, J., Kityo, C., & Mugyenyi, P. (2012). Impact of HIV antiretroviral therapy on depression and mental health among clients with HIV in Uganda. *Psychosomatic medicine*, *74*(9), 883-890.

Wang, C., Zhang, J., Hu, C., & Wang, Y. (2021). Prevalence and Risk Factors for Cognitive Frailty in Aging Hypertensive Patients in China. Brain Sci. 2021, 11, 1018. In: s Note: MDPI stays neutral with regard to jurisdictional claims in published ….

Wang, T., Fu, H., Kaminga, A. C., Li, Z., Guo, G., Chen, L., & Li, Q. (2018). Prevalence of depression or depressive symptoms among people living with HIV/AIDS in China: a systematic review and meta-analysis. *BMC psychiatry*, *18*(1), 1-14.

Weisbord, S. D., Fried, L. F., Unruh, M. L., Kimmel, P. L., Switzer, G. E., Fine, M. J., & Arnold, R. M. (2007). Associations of race with depression and symptoms in patients on maintenance haemodialysis. *Nephrology dialysis transplantation*, *22*(1), 203-208.

WHO. (2008). *The global burden of disease: 2004 update*. World Health Organization.

WHO. (2012). World suicide prevention day 2012 http://www. who. int/mediacentre/events/annual/world_suicide_prevention_day/en. In: Accessed.

Wouters, E., Masquillier, C., & le Roux Booysen, F. (2016). The importance of the family: a longitudinal study of the predictors of depression in HIV patients in South Africa. *AIDS and Behavior*, *20*(8), 1591-1602.

Yeneabat, T., Bedaso, A., & Amare, T. (2017). Factors associated with depressive symptoms in people living with HIV attending antiretroviral clinic at Fitche Zonal Hospital, Central Ethiopia: cross-sectional study conducted in 2012. *Neuropsychiatric disease and treatment*, *13*, 2125.

Yun, L. W., Maravi, M., Kobayashi, J. S., Barton, P. L., & Davidson, A. J. (2005). Antidepressant treatment improves adherence to antiretroviral therapy among depressed HIV-infected patients. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *38*(4), 432-438.

Zhao, M., Liu, B., Zheng, T., Xu, J., Hao, Y., Wang, J., Zhang, X., Nie, W., Wang, C., & Wang, F. (2019). Factors associated with hostility among people living with HIV/AIDS in Northeast China: a cross-sectional study. *BMC public health*, *19*(1), 1-10.

APPENDICES

APPENDIX I: QUESTIONNAIRE

TITLE: DETERMINANTS OF DEPRESSION AMONG HIV PATIENTS ON HIGHLY ACTIVE ANTIRETROVIRAL THERAPY IN THE ACCRA METROPOLIS.

Interview Information

Questionnaire Number/ Sample ID: [___|___][___| Study Site……

Interview: Day:_____ Month :_____ Year:_____

Time of Interview: Started _____ Finished _____

Name of Interviewer: _____

Interview Status : [__] FULLY Completed [__] PARTLY Completed [__] Refused

Comments on interview……

INSTRUCTION: Please circle the appropriate answer the respondent gives

NO.	QUESTIONS	CODING	SKIP TO
1.0	SECTION 1: DEMOGRAPHIC CHARACTERISTICS	THE QUESTIONS IN THIS SECTION IS ABOUT YOUR DEMOGRAPHIC BACKGROUND.	
1.1	What sex is the Respondent? [Circle from observation]	Male 1 Female 2	
1.2	How old are you? [Age at last birthday]	Age in years [___|___] Don't Know 88 No response 99	
1.3	Marital Status	Single 1 Married 2 Divorced 3 Widowed 4 No response 99	
1.4	What is your highest level of education?	Primary 1 Junior High 2 Senior High 3 College / University 4 No Response 99	
1.5	Employment status	Publicly Employed 1 Employed-private sector 2 Self-employed 3 Unemployed 4 Retired 5	
1.6	What is your religion?	Christian 1 Traditional 2 Muslim 3 Other 4 No Response 99	

2.0	SECTION 2: SOCIO-ECONOMIC CHARACTERISTICS	THE QUESTIONS IN THIS SECTION IS ABOUT YOUR SOCIO-ECONOMIC BACKGROUND.	
2.1	What is your monthly income – minus all other non-monetary gifts?	Below Gh₵ 500 1 Gh₵ 500-1000 2 Gh₵ 1,000 - Gh₵ 2000 3 Above Gh₵ 2000 4 No income 5 Don't know 6	
2.2	What is your monthly expenditure?	Below Gh₵ 500 1 Gh₵ 500-1000 2 Gh₵ 1,000 - Gh₵ 2000 3 Above Gh₵ 2000 4 Don't know 5	
2.5	How would you describe the availability of social support for you?	Poor 1 Moderate 2 Strong 3	
2.6	Do you agree or disagree that people will talk badly about you if they knew your HIV status?	Strongly Agree 1 Agree 2 Disagree 3	
2.7	Have you experienced people talking bad about you in the past because of your HIV status?	Yes 1 No 2 Don't know 3	
2.8	Do you think people will avoid you if they knew your HIV status?	Strongly Agree 1 Agree 2 Disagree 3 Strongly Disagree 4	
3.0	SECTION 3: CLINICAL CHARACTERISTICS	THE QUESTIONS IN THIS SECTION IS ABOUT YOUR KNOWLEDGE ON YOUR HEALTH-RELATED ISSUES.	

3.1	How long has it been since you knew your HIV status?	< 1 year 1 1 – 5 years 2 5 – 10 years 3 >10 years 4	
3.2	Have you started ART treatment?	Yes 1 No 2 Don't know 3	No, skip 3.3 to 3.7
3.3	What type of ART are you on?	Non-nucleoside reverse transcriptase inhibitor (NNRTI) 1 Nucleoside analog reverse transcriptase inhibitors (NRTI) 2 Protease inhibitors (PI) 3	
3.4	How long have been on that particular treatment?	< 1 year 1 1 – 5 years 2 5 – 10 years 3 >10 years 4	
3.5	How regular do you take your ARV drugs?	Always 1 Not always 2 No Response 99	
3.6	Are you aware of any possible side effects of the ART you are currently on?	Yes 1 No 2 No Response 99	
3.7	Do you any other chronic illness in addition to HIV (comorbidity)?	Yes 1 No 2 No Response 99	
3.8	If yes to 3.7, does it bother you that you have this other condition in addition to HIV?	Yes 1 No 2 No Response 99	

THIS SECTION ASSESS THE DEGREE OF DEPRESSION BASED ON THE PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

In this section, I am going to ask you a set of questions about yourself. Pleas be frank in your responses so that we can know exactly what you feel in order to know how to help maintain or the kind of interventions that may be required for you or people like you. Thank you in advance for your understanding.

Over the <u>past 2 weeks</u>, how often have you been bothered by any of the following problems? *(Please circle the appropriate answer the respondent gives)*	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Having little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Having trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Having a poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Having trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly 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	0	1	2	3
9. Having thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

Total Score: _____

APPENDIX II: Ethical Approval

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

My Ref. GHS/RDD/ERC/Admin/App | 22 | 495
Your Ref. No.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-681109
Email: ethics.research@ghs.gov.gh
24th October, 2022

Prince Agyeman
Finney Hospital and Fertility Centre,
Box AN 11895, Accra

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC: 083/09/22**
Study Title	Determinants of Depression among HIV Patients on Highly Active Antiretroviral Therapy in the Accra Metropolis
Approval Date	24th October, 2022
Expiry Date	23rd October, 2023
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
Dr. Naa-Korkor Allotey
(Ag. Head, Ethics & Research Management Department)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra