Depression and Adherence to Antiretroviral Therapy among Women Living with HIV in Ibadan, Nigeria

Samuel Adeyemi BANKOLE
LCU/PG/002258

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Certification

This is to certify that **Samuel Adeyemi, BANKOLE** with matriculation number LCU/PG/002258 carried out this research work titled "Depression and Adherence to Antiretroviral Therapy among Women Living with HIV In Ibadan, Nigeria "in the Department of Public Health, Faculty of Basic Medical & Health Sciences, Lead City University, Ibadan for the award of Master's Degree in Public Health (MPH) and this has not been previously submitted.

_____ _____

Dr. Folahanmi Akinsolu **Date**
Supervisor

_____ _____

Dr. Tubosun Olowolafe **Date**
Head of Department

Dedication

This work is dedicated to the ruler of the Universe, the custodian of great wisdom and the giver of knowledge, “Almighty”.

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Abstract

Antiretroviral therapy (ART) helps to keep women living with HIV healthy and prevents transmission and depression among other psychological factors, has been inversely linked independently with adherence to antiretroviral therapy among women living with HIV. This study aimed to examine depressive symptoms and adherence to anti-retroviral therapy among women living with HIV adherence to ART. A facility-based cross-sectional study was used with the sample size of 404 women living with HIV. An adopted questionnaire was used to collect data and the data was analyzed using Statistical Package for Social Sciences (SPSS) and statistical significance was set at $p < 0.05$. Among WLHIV (n=404), 72% have high depressive symptoms and the level of adherence WLHIV was 94.8%. Findings from this study shows that there is a significant association between depression and ART adherence ($p=0.048$). Psychosocial factors of been busy, fear of side effects, fear of drug was toxic/ harmful, been depressed, specific time use of drug and unavailability to refill drug show significant association to ART adherence ($p<0.05$) and are main reasons participants did not adhere to their medications. The reasons for adhering to prescribed medication among the participants (n= 303) that did not miss their medication in the past 3 days were assessed. The study found that family support, availability of food, Hospital staff attitude to patients and their desire to live show significant association to ART adherence ($p<0.05$). A statistically significant association was found between status disclosure, depression, receiving standard ART service, alcohol consumption and smoking among WLHIV and adherence to antiretroviral therapy. Based on the findings it was proven that depression is co-morbidity with ART adherence and there should efforts that needs to be in place to reduce the rate of depressive symptoms among women living with HIV.

Keywords: ART, Adherence, Depression, WLHIV, VLS, Psychological
Word Count: 289

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List of Acronyms

Abbreviation	Meaning
AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral Therapy
FSW	Female Sex Workers
HBM	Health Belief Model
HIV	Human immunodeficiency Virus
IDU	Injecting Drug Users
MSM	Men who have Sex with Men
NACA	National Agency for the Control of AIDS
NAIIS	National AIDS Indicator and Impact Survey
PLHIV	People Living with HIV
PMTCT	Preventing Mother-to-Child Transmission
PWD	Psychological Well-Being
SSA	Sub Saharan Africa
SCT	Social Cognitive Theory
SDG	Sustainable Development Goals
STD	Sexually Transmitted Diseases
STI	Sexually Transmitted Infection
UNAIDS	United Nations Programme on HIV /AIDS
USDHSO	United States Department of Health and Human Services, Office
VRL	Viral Load
VLS	Viral Load Suppression
WLHIV	Women living with HIV

Chapter One

Introduction

1.1 Background of the Study

The concept of wellbeing is complex and multidimensional. The term "standard of living" is often used to describe objective measurements of well-being. Subjective measures, on the other hand, are based on people's cognitive and affective assessments of their lives and include psychological, social, and spiritual dimensions[1]. These measurements are frequently referred to as measures of psychological well-being when they relate to psychological elements (such as happiness). Over the past few decades, there has been a massive increase in research demonstrating the effects of psychological well-being (PWB) on both mental and physical health. While some PWB dimensions, like life satisfaction, are frequently incorporated into "quality of life" measures, the latter multidimensional construct is much broader and includes additional factors that are connected to both physical and mental health, such as perceived stress, functioning/disability status, and physical symptoms. PWB is essential not only because of its potential effects on physical health but also as its own end[1]. The World Health Organization (WHO) defines health as a "state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Importantly, PWB reflects more than the mere absence of psychological distress, such as anxiety, stress or depressive symptoms. Although there is an inverse correlation between self-reported positive and negative psychological states, most coefficients vary from small to moderate but are generally not strong in magnitude[1].

Depression is significant comorbidity of HIV that has been shown to interfere with adherence to ART[3]. Depression is a frequent mental health condition characterized by a depressed mood, low self-esteem, unfavorable thoughts, poor concentration, and physical symptoms (such as irregular

food and sleep patterns), as well as a growing disengagement from social activities. In addition to anxiety disorder, these psychological problems might result in long-term deficits and even trigger suicidal thoughts.

Over 300 million people worldwide suffer from depression, and each year, 800,000 people commit suicide, according to World Health Organization (WHO) research. The number one cause of non-fatal health loss is depressive disorders, which have contributed to roughly 50 million years lived with disability (YLD) worldwide, or 7.5 percent of all YLD.

People with HIV may experience worse health outcomes due to depression, which can exacerbate existing illness conditions. According to a prior study, depression has been associated with higher HIV viral loads and lower CD4 cell counts, as well as hastening the development of AIDS and raising the risk of death[4]. 15% of the adult population in research done in four sub-Saharan African nations had significant levels of depression symptoms, and elevated depressive symptoms were linked to ART non-adherence[5]. Similarly, the stigma associated with HIV and psychological distress were widespread among HIV-positive individuals and had an impact on their adherence to ART[6,7,8,9].

Many HIV-positive people who could have died thanks to ART now have better health. Notably, consistently high levels of adherence to ART are necessary for any treatment to be effective[10]. Even though more people now have improved access to ART, It was suggested that access to medication does not guarantee adherence, as there are other barriers individuals may experience in taking ART[19]. Adherence is the key to the efficiency of antiretroviral medication as it ensures that the viral load in a patient is kept at undetectable levels[11,12].

HIV medication improves PLHIVs' quality of life, lowers their risk of transmitting the virus to others, and lowers mortality and morbidity. Nigeria accepted the most recent World Health

Organization test-and-treat guidelines and the unified recommendations for the use of antiretroviral therapy (ART) for the treatment and prevention of HIV.

The 2018 UNAIDS World AIDS Day report highlighted that women continue to bear the brunt of the HIV epidemic[17]. Nearly 71% of the world's estimated 24.7 million [23.5-26.1 million] HIV-positive individuals reside in sub-Saharan Africa. Eighty-one percent of the people living with HIV in the region are spread across ten countries, including Ethiopia, Kenya, Malawi, Mozambique, Nigeria, South Africa, Uganda, the United Republic of Tanzania, Zambia, and Zimbabwe, with only Nigeria and South Africa housing more than half of them. Despite advancements in treatment, Nigeria is thought to have accounted for 19% of AIDS-related fatalities in Sub-Saharan Africa. Nigeria is one of the three nations responsible for 48% of the SSA's new HIV load, and others include Uganda and South Africa. In 2014, Nigeria had the third highest population of people living with HIV in the world, with 2.95 million people being aware that they were infected with HIV [18].

More than half of the 36.7 million HIV-positive individuals worldwide, 18.8 million are women, and there are over 1.7 million HIV-positive individuals living in Nigeria[19].Women are most affected by HIV/AIDS: 58.3% of the infected people (which is a total of 1.72 million people) living with HIV in 2018 were females. According to the National Agency for the Control of AIDS' (NACA) 2018 analysis of the method of transmission, 62% of new infections in the general population, including married sexual partners, occur among people who are thought to engage in "low-risk sex." The remaining new infections (38%) are primarily caused by men who have sex with men (MSM), who make up around 3.5% of the adult population and injecting drug users (IDU), female sex workers (FSW), who account for the remaining 9%[20].

80% of all HIV infections in Nigeria are contracted through heterosexual interactions, which is the primary method of transmission. Mother-to-child transmission, transfusion of contaminated blood, and blood products account for 10% of all additional modes of transmission[21].

Nigeria, which has a population of over 200 million, discovered its first case of AIDS in a 13-year-old girl in 1986, bringing the pandemic's reality into sharper focus[22,23]. The Human Immunodeficiency Virus (HIV) has spread across the entire country since 1986, affecting both men and women as well as children and adults. Classified as a global epidemic with 1.9 million people living with HIV(PLHIV), no region of the nation, ethnic or religious group or sector was spared. The disease's combined effects and consequences had a negative impact on the nation's growth and development, particularly in terms of the socioeconomic, cultural, health, and general well-being of households and communities. This has been made worse by the newly discovered corona virus, COVID-19[24].

There is no doubt that the HIV and AIDS epidemic has had an impact on a number of aspects of Nigerian society, despite the fact that exact data is absent in terms of quantifying the impact of HIV in many spheres of national life[22].The influence on morbidity and death is the most noticeable. HIV and AIDS-related mortality have dropped 26% during the past ten years, from 72,000 to 53,000. The number of new HIV infections decreased by 37% between 2000 and 2018, while the number of HIV-related fatalities decreased by 45%, saving the lives of 13.6 million people. Better accessibility to antiretroviral therapy (ART) is the cause of this decline[29].

1.2 Statement of the Problem

Research has indicated that patients who adhere to therapy tend to have better clinical outcomes, which has been linked to an improved quality of life in persons living with HIV and AIDS. Therefore, adherence to ART is a primary predictor of the success of HIV/AIDS treatment[30].

Recent studies conducted in Nigeria shows adherence level as 80%, 56.2%, 87.5%, and 90% which falls below the standard set by the World Health Organization of 95%[31,32,33,34]. The number of individuals on ART has increased, though adherence is still a significant public health challenge [35].

Depression, among other psychological factors, has been inversely linked independently with adherence to antiretroviral therapy (ART) among women living with HIV[36].Moreover, depression increases are associated with poor adherence to antiretroviral therapy (ART), leading to immunological failure, and may independently increase HIVprogression[37]. It is, therefore, crucial to identify patients with depression for proper management of the disease.

It is essential to know the level of adherence among patients using ARV because doing so will help to formulate necessary policies to help improve or maintain adherence. It is equally important to have enough knowledge to comprehend the difficulties patients have adhering to their ART because doing so will help researchers come up with solutions to increase adherence. It is also necessary to know the influence of depression on adherence to ART among patients so as to know how to tackle it.

1.3 Aim and Objectives of the Study

The study examined the level of depressive symptoms and adherence to anti-retroviral therapy among women living with HIV (aged 18 years and older and analyzed the factors that constrain (barriers) and motivate (facilitators) adherence to ART

Specific Objectives

The specific objectives of the study were to:

i. identify the level of depressive symptoms among women living with HIV in Ibadan, Nigeria.

ii. measure the level of adherence to ART among women living with HIV in Ibadan, Nigeria.

iii. identify the barriers and facilitators to adherence to adequate ART among women living with HIV in Ibadan, Nigeria.

iv. examine the association between depression and adequate ART adherence among women living with HIV in Ibadan, Nigeria.

v. explore the factors that influence depression and adherence behaviour among women living with HIV in Ibadan, Nigeria.

1.4 Research Questions

The study answered the following research questions:

1. What is the level of depressive symptoms among women living with HIV in Ibadan, Nigeria?

2. What is the level of adherence among women living with HIV in Ibadan, Nigeria?
3. What are the barriers and facilitators to adherence to adequate ART among women living with HIV in Ibadan, Nigeria?
4. What is the association between depression and adequate ART adherence among women with HIV in Ibadan, Nigeria?
5. What are the factors that influence adherence behaviour among women with HIV in Ibadan, Nigeria?

1.5 Justification of the Study

Poor treatment adherence and retention, drug toxicity and resistance, and co-infections are the leading causes of low Viral Load Suppression (VLS) rates[37]. Although the causes of treatment default among HIV-positive individuals are unknown, this situation raises questions about adherence. It is essential to know the level of adherence among patients using ARV because doing so will help to formulate necessary policies to help improve or maintain adherence. It is equally important to have enough knowledge to comprehend the difficulties patients have adhering to their ART because doing so will help researchers come up with solutions to increase adherence. It is also necessary to know the influence of depression on adherence to ART among patients so as to know how to tackle it.

1.5 Significance of the Study

Findings from the current study will help to create efficient HIV management programs and policies to increase adherence by identifying context-specific factors influencing ART adherence

among women living with HIV in Nigeria. The current study's findings also teach medical professionals and other healthcare professionals about how interactions with patients and patient satisfaction impact WLWHIV's adherence to medication. The study also adds to the body of knowledge about ART adherence and how depression affects HIV clinical treatment in Nigeria.

1.7 Scope of the Study

This study was delimited to the followings:

i. Descriptive research design.

ii. WLHIV in Oyo State, Nigeria.

iii. Self-developed and expert-validated questionnaire

iv. Two (2) trained research assistants.

1.8. Limitation of the Study

Self-reported data were used, which may be affected by social desirability and recall bias.

The study only focused on women living with HIV and did not include men living with HIV, which limits the level of depression and adherence to ART of male partners of women living with HIV.

1.9 Operational Definitions of Terms

Viral Load: The term "viral load" refers to the quantity of virus present in a host's blood, expressed as the quantity (copies/ml) of viral particles in a milliliter of blood

ART: Antiretroviral therapy (ART) is a form of HIV treatment that entails taking medication as directed by a medical professional.

Adherence: Adherence refers to a patient's capacity to adhere to a treatment regimen and take medications at scheduled intervals.

CD4 Count: A blood test to check the amount of a type of white blood cell in the body.

Depression: Depression is a mood illness that results in a constant sense of melancholy and disinterest.

Psychological Well-being: This is a mental health characteristic that relates to interpersonal and intrapersonal levels of good functioning, including interpersonal connectedness and self-referential attitudes, such as self-mastery and personal development.

HIV: HIV is an immune system-targeting virus that makes people less resistant to various infections.

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Chapter Two

Literature Review

This chapter includes earlier research projects by researchers that are pertinent to this investigation under the guises of a theoretical framework, a theoretical review, an empirical review, a literature assessment, and a conceptual model, the review of the literature.

2.1 Conceptual Review

2.1.1 Human Immunodeficiency Virus (HIV)

HIV is a virus that gradually attacks the immune system, which is our body's natural defense against illness. If a person becomes infected with HIV, they will find it harder to fight off infections and diseases. The virus destroys a type of white blood cell called a T-helper cell and makes copies of itself inside them. T-helper cells are also referred to as CD4 cells[1].

There are numerous distinct HIV strains, and an infected person may have several different strains of the virus in their body. There are several groups and subtypes within the kinds into which they are divided. There are two primary types:

HIV-1: the most common type found worldwide

HIV-2: with a few examples in India and Europe, this is primarily prevalent in Western Africa.

Basic Information on HIV

- Human immunodeficiency virus is referred to as HIV, and if left untreated, it can take between 10 and 15 years for AIDS to manifest, which occurs when HIV has severely compromised the immune system.
- People with HIV can live an everyday, healthy life with early diagnosis and efficient antiretroviral therapy.

- Blood, vaginal and anal fluids, breast milk, semen, and vaginal and anal fluids are among the bodily fluids that contain HIV in an infected person.
- HIV cannot be spread by saliva, sweat, or urine.
- Statistics show that having anal or vaginal intercourse without using a condom is the most typical way for someone to get HIV[2].
- Other ways to get an illness include using contaminated needles, syringes, or other drug-taking tools (blood transmission), as well as passing from mother to child when pregnant, giving birth, or nursing[3].

2.1.1.2 The Immune System and HIV

The HIV virus affects white blood cells, which are termed T-helper cells or CD4 cells. These are vital when it comes to maintaining a robust immune system, as they help us fight off illnesses and infections[4]. HIV cannot develop or multiply on its own. Instead, it produces new copies of itself inside T-helper cells, which affects the immune system and eventually undermines our natural defenses. This process of T-helper cells replicating is called the HIV life cycle. How rapidly the virus grows depends on how early you are detected, your overall health and how effectively you take your medication. It is crucial to know that antiretroviral medication will maintain the immune system healthy if taken appropriately and thereby avoid AIDS[5].

2.1.1.3 The HIV Life Cycle

The many stages of the HIV life cycle might take several years to complete. Antiretroviral therapy functions by stopping the cycle and bolstering your immune system. Depending on the specific HIV life cycle stage, multiple medications are available[6].

Understanding the HIV life cycle enables researchers to target the virus when it is vulnerable and lowers the likelihood that medications will stop functioning (drug resistance). When medications fail to stop the virus from spreading, this occurs[7].

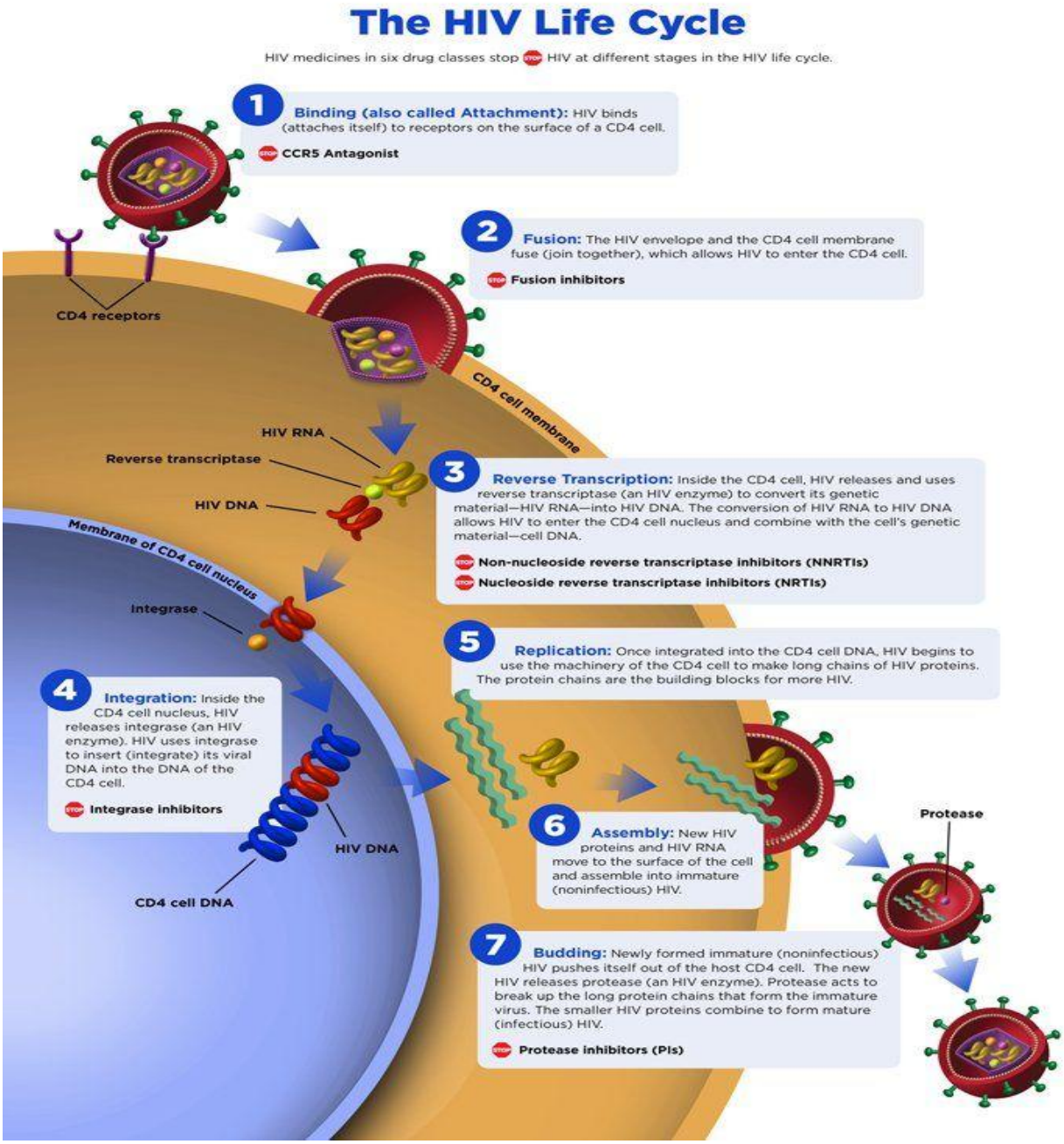

Fig 2.1: Lifecycle of HIV

Source[7]

2.1.1.4 HIV's Life Cycle Stages

Fusion And Binding

The HIV virus first fuses with a T-helper cell. The HIV particle's surface is covered in spikes that adhere to the cell and enable cell-to-cell interaction. The HIV particle then releases its contents into the cell. Fusion or Entry Inhibitors are the name of the class of medications that can halt this phase of the procedure.

Integrating Reverse Transcription

HIV uses an enzyme called transcriptase to convert its genetic material, HIV RNA, into HIV DNA after it has entered the cell. Once within the T-helper cell's nucleus, HIV DNA may regulate the DNA there. NRTIs, NNRTIs, and Integrase Inhibitors are the names of the class of medications that can halt this stage of the procedure.

Translating and Transcribed

The messenger RNA proteins are subsequently produced by the HIV DNA and transported to the cell's edge. This is then employed to increase HIV production.

Assemblage, Emergence, and Development

The messenger RNA strands contain copies of the HIV genetic material. New HIV particles are created as a result, and the T-helper cell releases them. These are then prepared to infect other cells and start the process over. Protease Inhibitors are the name of the class of medications that can stop this step in the process.

2.1.1.5 HIV Symptoms

HIV symptoms can vary from person to person, and some may experience no symptoms at all. If you do not get treatment, the virus will progressively worsen and weaken your immune system. We examine the three stages of HIV infection as well as potential outcomes.

Primary Acute Infection

Approximately one to four weeks after contracting HIV, some people may experience symptoms that resemble the flu. This may not last long (a week or two), and you may only get some of the flu symptoms – or none at all. Experiencing these symptoms alone is not a reliable way of diagnosing HIV[8]. Symptoms can include: fever (raised temperature), body rash, sore throat, swollen glands, headache, upset stomach, body rash, joint aches and pains, muscle pain. These symptoms can happen because the body is reacting to the HIV virus. Cells that are infected with HIV circulate throughout your blood system, so your immune system then tries to attack the virus by producing HIV antibodies. This process is called seroconversion, and it usually happens within 45 days of infection and can take up to a few months to complete. It is essential that you always use a condom when having sex, especially if you think you have been exposed to HIV. It may be too early to get an accurate HIV test result at this stage (this can take anything from a few weeks to a few months), but the levels of the virus in your blood system are very high at this stage[9].

The Asymptomatic Stage

Once the seroconversion stage is over, many people start to feel better. In fact, the HIV virus may not reveal any other symptoms for many years. Health professionals say this could be

around 10 years. However, the virus will still be active, infecting new cells and making copies. Over time this will cause much damage to your immune system[10].

Symptomatic HIV Infection

During the third stage of HIV infection, there is usually much damage to your immune system. At this point, you are more likely to get serious infections or bacterial and fungal diseases that you otherwise would be able to fight off. These infections are referred to as 'opportunistic infections. If a person is experiencing opportunistic infections, they are now said to have AIDS[11]. Symptoms that you may have during this time can include: weight loss, chronic diarrhoea ,night sweats, a fever , persistent cough, mouth and skin problems , regular infections, serious illnesses or diseases. There is not a test for AIDS, and it cannot be inherited. AIDS is a syndrome, and this means it is diagnosed from a set of symptoms that happen when you become very ill from a severe infection or disease.

Taking treatment on a daily basis can be challenging to get used to, especially if you are suffering from any side-effects, so it is essential to access support from health professionals when you need it. Having AIDS also does not mean you will die from an AIDS-related illness – but getting the proper treatment is really important at this point[11].

2.1.1.6 HIV Treatment

HIV treatment involves taking medicines (ART/ARVs) that slow the progression of the virus and suppress the virus in the body. If untreated, most people infected with HIV eventually develop AIDS over time and may die without treatment. People on ART are prescribed specific treatment regimens depending on the stage of HIV infection and how well they tolerate the medication.

Often, patients take a combination of medications from at least two different HIV drug classes every day[12]. Adherence to prescribed medications is a significant component of effective clinical HIV treatment and care. Optimal adherence to ART is critical for prolonged HIV suppression, higher CD4 cell counts (a marker of a healthier and stronger immunological state), lower risk of HIV transmission, and better general health[13,14]. Poor adherence to HIV therapy is related to the lower effectiveness of viral suppression and increased risk of opportunistic infections, which may lead to progression to full-blown AIDS and mortality[15,16]. Antiretroviral therapy requires more than just taking medication in order to be effective. To guarantee the best viral suppression, patients must be regularly observed, and their medications must be followed consistently. Although there has been significant progress in making HIV medicine accessible and inexpensive for people who are infected, maintaining adherence to the ART regimen has been a significant obstacle to treating HIV-positive patients.

2.1.2 **HIV Response on a Global Scale**

As the access to antiretroviral therapy has increased globally, HIV patient survival has increased (ART). 40% of eligible HIV-infected individuals have begun ART globally by the year 2014. The 90-90-90 targets were introduced around the same time by the Joint United Nations Programme on HIV/AIDS (UNAIDS), which called for 90% of HIV-positive people to be aware of their status, 90% of people with HIV disease to receive ongoing ART services, and 90% of people receiving ART to have HIV viral suppression. A trend toward early ART initiation is emerging in many countries, as seen by the rising CD4 count in patients at the start of ART globally[17]. The reduction in early mortality that was observed in first-world countries more than 20 years ago has now become apparent in sub-Saharan Africa[18].

For instance, it was discovered in a study conducted in Botswana that mortality in the year following the start of ART decreased from 7% to 2% between 2002 and 2012[19].

2.1.3 **Nigeria's National Response to the HIV/AIDS Pandemic**

In 25 healthcare institutions across Nigeria, the antiretroviral therapy (ART) program was launched in January 2002[20]. Between February and June 2002, the facilities each enrolled 25 patients, although the National Institute for Medical Research (NIMR) recorded 50 cases. Based on the ability of the different centres to provide care for persons living with HIV, the program was eventually expanded to accommodate more patients (an extra 100 to 500). A conventional triple regimen of stavudine, lamivudine, and nevirapine was purchased from Cipla Pharmaceuticals for $350.00 as the result of negotiations between the federal government and the company. Each year, medical professionals, such as physicians, pharmacists, nurses, and lab workers, receive training to treat 10,000 adults and 5,000 children. In order to offer technical assistance for the creation of ART guidelines at the national level, an ART committee was established in 2004 to direct the implementation of the ART program [21]. Clinical professionals, pharmacists, and other healthcare professionals made up the committee.

In January 2006, the Federal Government commenced the free ART program. Records indicated that 166,374 patients received free antiretroviral drugs and treatment in 2007, and in 2008, the number increased to 247,815. A further scale-up to 309,800 patients was reported in 2009, which was increased to 380,182 patients in 2010 Supply Chain Management System (SCMS). From the estimated 3.1 million Nigerians living with HIV in 2010 (FMOH, 2010) 22, around 1.5 million still need ART.

Even though managing the pandemic presents tremendous obstacles, significant progress has been made in the war against HIV/AIDS. Over 150 locations across the country received financial assistance for ART services from international funders and development partners like the World Bank, Clinton HIV/AIDS Initiative, and Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM. Under the public-partnership model, private and faith-based groups are also offering ART services. Free anti-retroviral medications (adult 2nd line and pediatric 1st and 2nd line) and medications for treating a wide variety of opportunistic diseases were supplied by the Clinton HIV/AIDS initiative (CHAI). In the first four years of the programme (2004 to 2008), PEPFAR had intended to treat 350,000 patients, stop 1.7 million new infections, and care for 1.15 million patients and AIDS orphans. PEPFAR is the primary financier of ART efforts in Nigeria. The projected national prevalence rate of 4.1% may drop even lower when PEPFAR moves into the second phase of its collaboration with the government, which will focus on providing excellent healthcare. Additionally, the Federal Government set aside $24,307,729.00 USD for the purchase of antiretroviral drugs in 2010, which may help to enhance the ART program in Nigeria further and lower the epidemic's morbidity and death rates.

The Harvard/APIN PEPFAR initiative grew from six to thirty-six hospitals and clinics between 2004 and 2012, comprising nine tertiary referral hospitals, twenty-three secondary hospitals or introductory health clinics, and four non-governmental organizations (NGOs) in nine of Nigeria's thirty-six states (Benue, Borno, Enugu, Kaduna, Lagos, Ogun, Oyo, Plateau, and Yobe). For clinical management, laboratory testing, and pharmacy handling, standardized protocols were designed in accordance with an optimum standard of care aligned with Nigerian National ART and PMTCT recommendations. Large numbers of patients could receive ART thanks to renovated and expanded clinics, pharmacies, and laboratories[23]. The development and

implementation of computerized data entry of patient clinical, laboratory, and pharmacy records allowed for the electronic monitoring of site progress. About 100,000 adult patients had received ART as of March 2012, and 160,000 had received HIV-related care in some way. In addition, services for preventing mother-to-child transmission (PMTCT) have been delivered to around 400,000 women, with 20,000 mothers and children getting the intervention [24,25].

2.1.4 Risk Factors of HIV Infection in Nigeria

According to a 2009 mode of transmission study, heterosexual transmission accounts for 80% of new HIV infections in Nigeria, with mother-to-child transmission (MTCT) and transfusion of contaminated blood and blood products coming in second and third, respectively. However, there are signs that, at least among some population groups like teenagers and other young people, the proportion of new HIV infections owing to each of these routes of transmission may have altered recently. While early sexual encounters, unprotected sex with multiple partners at once, transactional sex, and intergenerational sex continue to be significant risk factors for HIV infection in young people, other risky behaviours such as drug injection and unprotected anal sexual practices are on the rise among this population, particularly in poor and rapidly urbanizing peri-urban areas[26].It is now necessary to take into account new factors in the dynamics of HIV transmission in Nigeria, such as the rising rate of rape, gender-based violence, and poor health-seeking B for non-HIV sexually transmitted illnesses. There is a group of teenagers and young adults who contracted HIV by MTCT, with the HIV epidemic in Nigeria already in its third decade. In Nigeria, mother-to-child transmission "may account for a very significant proportion of the infections among adolescents age 10–19 years," according to the 2016 National HIV Strategy for Adolescents and Young People 2016–2020 [27].

2.1.5 **HIV Among Women Living in Nigeria**

In Nigeria, women are disproportionately impacted by HIV/AIDS, with 56,03% of women infected in 2019 compared to just 43.97% of men. Women make up around 56% of all new infections, and heterosexual sexual activity is the primary method of HIV transmission[24]. Multiple risk variables, such as biological, social, behavioural, and socioeconomic vulnerabilities, may be to blame for the pandemic's disproportionate impact on women[28].

2.1.6 **The Anatomy of Women and HIV Infection**

According to biology, women are more likely than males to contract HIV through heterosexual interaction. The physical makeup of the female genitalia increases the likelihood that women may catch HIV and other STDs. Women are more vulnerable to germs from contaminated blood or semen due to the increased mucosal surface area of the vaginal tract. Semen can stay in the female vaginal canal for up to five days after sexual activity, increasing the risk of HIV transmission. The female genitalia is particularly susceptible to infections during a woman's menstrual cycle (about seven to ten days following ovulation), as the tissues of the vaginal tract are more delicate and prone to tearing[29]. Additionally, vaginal injuries that might happen during sexual activity enhance a woman's risk of contracting HIV.

2.1.7 **Adherence**

The degree to which a patient adheres to or complies with a treatment plan is known as Adherence. Adherence to medication demands that the prescription be received as soon as possible and that the medication be taken in accordance with the recommended dosage, interval between doses, length of treatment, and any additional specific instructions (e.g., taking the drug without food). This suggests that the patient and health care practitioner have an understanding

that the patient must take his or her prescriptions according to the precise directions provided, including the time of day, the number of pills to take, how to take pills, and when to cease taking them. Any failure on the patient's behalf to take the prescribed medications as directed by the medical professional is frequently viewed as poor or non-adherence to the treatment plan[30].

Non-adherence can manifest itself in a variety of ways, including not taking any medication at all, taking medication at the incorrect time, taking the incorrect dose due to a failure to comprehend the instructions for treatment, and stopping the medication too soon without first consulting a health professional [31].

2.1.7.1 **Adherence to ART**

Combination antiretroviral therapy (ART) has significantly reduced HIV-related illness, mortality, and transmissibility [32]. The two regions most impacted by the HIV illness, sub-Saharan Africa and Asia, were home to an average of 12 million and 2 million of the 17 million people expected to be taking ART globally, respectively. Adherence to ART must be maintained at consistently high levels if viral suppression and disease progression are to be achieved[33]. The 90-90-90 worldwide treatment target set by UNAIDS emphasizes the importance of sustained adherence and ongoing viral suppression. Achieving this goal will depend heavily on describing and comprehending the factors that influence adherence in areas with the most astounding disease burden[34]. Despite the positive short-term data on adherence in low-income countries, there are still concerns that long-term adherence may be subpar due to a variety of obstacles, such as the lack of fundamental health education and enrollment in large-scale ART programs with limited capacity in terms of patient monitoring and support[35].

A high level of antiretroviral therapy (ART) adherence is essential for successful long-term virologic suppression. Adherence entails taking the correct amount at a regular time and following dietary guidelines where applicable[36]. The implications of interrupted or inconsistent treatment adherence might lead to a high HIV viral load in an individual, resulting in increased morbidity and death [37,38]. Furthermore, ART adherence has significance for HIV prevention at the societal level because it not only decreases viral load in persons taking medicine but also protects their partners[39]. Despite this data, variables favoring and inhibiting ART adherence are incompletely understood and hence insufficiently addressed. Several measures have been used to assess ART adherence, and some writers have classified the measures into three groups:

(a) physical indicators of adherence (e.g., periodic, unannounced pill counts; measurement of plasma concentrations of ART; other forms of medication monitoring; and self-reporting),

(b) biological markers of adherence, such as levels of HIV RNA,

(c) the interaction of biological and physical indicators of compliance (such as changes in HIV-1 genotype linked to medication resistance)[40].

The most accurate way to assess ART adherence is yet unknown and may vary depending on the patient and their personal circumstances, the complexity of their treatment plan, and the medications they are taking. Adherence levels greater than 95% have typically been encouraged for virologic suppression. Evidence from a seminal 1999 study showed that virologic suppression required adherence levels of 95% and that lower adherence levels were linked to a higher percentage of people who failed to achieve virologic suppression (i.e., 81% of people with >95% adherence had virologic suppression, 64% with 90-95% adherence, 50% with 80-90% adherence, and 30% with 80% adherence). 36. In a study conducted on women in 2002,

virologic failure (>500 copies/mL) was noted in 17% of participants with >88% adherence, 28% of participants with 45-87% adherence, 43% of participants with 13-44% adherence, and 71% with 20% virologic failure (>500 copies/mL), whereas at least 75% of 12 adherences was associated with >10% failure rates, suggesting that different treatments are linked to different rates of virologic failure[41].Another 2006 study revealed that 54-100% adherence to NNRTI-based regimens was sufficient for 200 copies/mL at 2 consecutive visits) of 9, 45.6 (95% CI: 19.9-104.5), and 77.3 (95% CI: 34.2-174.9) had 80-89.9%, 70-79.9%, and 95% adherence, respectively, compared to three or more pills a day [42]. The type of ART regimen and its intricacy are just two of the many variables that affect how well people adhere to their treatment plans. Finding the method that would most accurately represent adherence for a particular demographic can make measuring adherence challenging. Access to medical care and other forms of support may also affect compliance.

2.1.7.2 **Measures of ART Adherence**

Various techniques, such as pill counting, biological testing, pharmacy refills, electronic monitoring, and self-reports, are typically used to gauge patient adherence to therapy. Every technique for gauging adherence has benefits and drawbacks[43].

Drug Counts

One of the simplest methods for determining adherence is this approach. A study claims that the actual pill containers are opened and examined in order to count the pills still present on the day of the inspection and compare that number to the anticipated number of pills still present when patients visit. The pill count can be completed in the health worker's office, making this method ideal for healthcare facilities with limited resources[43]. This system, which is easily manipulated

by patients throwing away some pills when they show up for their appointments, does not account for how and when the pills were consumed.

Biological Assessments

Due to the need for a health professional's skill and potential cost, this is rarely utilized approach[45]. In biological tests, the patient's blood or urine is typically used to measure the medication or substance concentration in the body[46]. This indicates that the patient will need to be present in the medical institution at a specific time following the administration of the medication in order to achieve the anticipated therapeutic blood level of the drug in a certain amount of time. Alcohol and other drugs can interact with one other in the body, changing the amount of the drug being measured in the blood or urine.

Drugstore Refills

When information from pharmacy records specifies the dates on which prescriptions were dispensed, pharmacy refill is utilized to assess medication adherence. This strategy is simple to apply because it uses dates to identify patients who forget to pick up their meds. A study shows that utilizing the pharmacy refill approach to gauge adherence can be problematic because it only provides an indirect indication of drug intake, making it difficult to determine if patients are taking their drugs excessively or inadequately[47].

Self-Report

Patients who are taking medicine must record their adherence habits at each clinic visit according to this technique [48]. Self-reporting is an affordable and adaptable method of gauging adherence; collected data can also be used to identify non-adherence causes.

Monitoring System for Medication Events (MEMS)

In this system, special bottle caps with embedded computer chips are used to keep track of when a bottle is opened and closed as well as the date and time. MEMS offers accurate adherence measurements and a researcher can quickly download adherence data onto a computer[49].This system's cost makes it limited to hospitals that can afford to use it, which is a drawback[70].

2.1.8 Country Profile

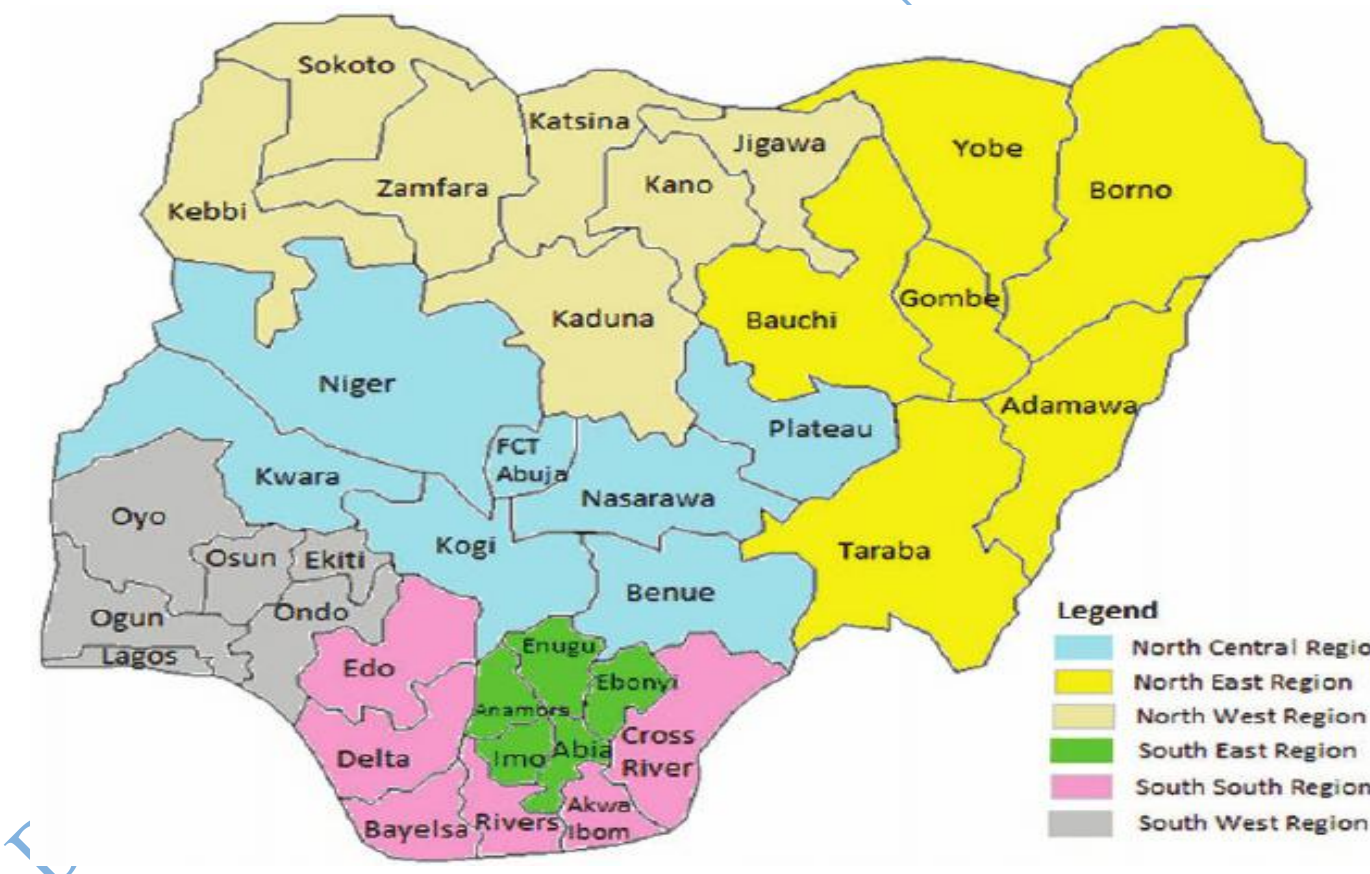

Fig 2.2: Nigeria map showing the states

Source[51]

The overall land area of Nigeria, including the Federal Capital Territory (FCT) and its 36 states, is approximately 923,768 square kilometres (Fig 2.2). It ranks as the 10th most populous country in the world, the 15th largest by geographical area in all of Africa, and the most populous country in sub-Saharan Africa. Although it was predicted that there would be 225,082,083 people living there as of June 2022, the population growth rate had decreased from 3.2% in 2006 to 2.5% in 201250. Over 54% of the population currently lives in urban areas, with the rate of urbanization increasing from 2.2% in 2006 to 3.9% in 2022, according to data. Nigeria has a young population, according to the population's age distribution. Those under the age of 14 made up 41.7% of the population, those between the ages of 15 and 64 (those who are economically active) made up 55%, and those 65 and more made up 3.3%, according to the National Bureau of Statistics [51]. GDP data show that, in comparison to the third quarter of 2020, Nigeria's economy grew by 7.86% instead of 7.40%[51]. The unemployment rate in Nigeria increased from 30.1% in 2010 to 19.7% in 2009 and will reach 33.3% by 2022[51]. The rate is higher in rural areas (25.6%) than in urban areas (17.1%), The socioeconomic and health metrics in Table 2.1 show that Nigeria has subpar health care delivery systems and that 70% of the population lives in poverty. The situation might deteriorate as the pandemic spreads unless current attempts to control it result in a decline in the public health problems caused by HIV/AIDS (including tuberculosis).

Indicators	Estimates
Life Expectancy at Birth: total population (in years) – 2022	61
Total fertility rate (children born per woman) – 2022	4.6
Total infant mortality rate (per 1,000 live births) – 2020	57
Death rate (per 1,000 population) -2020	8.7
Population growth rate -2020	2.53%
Adult Literacy (15 years & above) – 2020	
Total population	62%
Female (%)	52.7%
Male (%)	71.3%
People living with HIV mortality- 2020	49,000
HIV prevalence among adult-2020	1.3%

Table 2. 1: Nigeria's socioeconomic indicators

Source[52]

2.2 Theoretical Review

2.2.1 Social Cognitive Theory

The idea that humans are self-organizing, proactive, and self-regulating is recognized in social cognitive theory. The three main components of the idea are environment, people, and behaviour. Social cognitive theory, which recognized that people learn from their own experiences as well as by observing the experiences of others, gave rise to SCT[52]. Personal variables (age, cognitions, prior experience with the behaviour, etc.), environmental factors (access to resources, safety, support from family/friends, etc.), and characteristics of the behaviour itself are the three main components in SCT that interact to determine behaviour (vigour of the behaviour, outcomes achieved as a result of practising the behaviour, competence with the behaviour, etc.). Identification of the supporters and opponents in each of the three components is essential for behaviour change initiatives to be successful[53]. These three elements interact with one another. Just as the environment is not solely the product of the person and their surroundings, neither is behaviour solely the product of the person and their behaviour. Models of behaviour are provided by the environment. When a person observes another person's behaviour and the reinforcement they receive, observation learning takes place[54]. The idea of behaviour can be interpreted in a variety of ways, but generally speaking, it means that in order to demonstrate a behavior, a person must be aware of it and possess the necessary skills. According to social cognitive theory, individuals must possess the behavioural skills necessary to continue and adhere to ART usage as well as the knowledge and ability to accept new information based on their health situation.

2.2.2 The Health Belief Model (HBM)

One of the most frequently applied models in public health is the HBM. It was created in the 1950s by Hochbaum and colleagues from the US Public Health Service to justify why people took part in health exams. Its objective is to forecast whether or not people will make a healthy decision in order to avoid or lower the risk of contracting an illness or dying before their time. However, there are three broad groups into which the applications can be split:

1. Disease screening, treatment adherence, and other secondary prevention duties.
2. Developing behavioural research models and instruments.
3. Primary prevention is through health education regarding disease prevention or specific protection against diseases, such as immunization.

The model makes the assumption that a variety of factors, including the perceived seriousness of a health issue, perceived advantages, and perceived barriers preventing people from taking preventative measures, have an impact on attitudes and behaviours about health.[55] The HBM has been used to research a range of both long-term and short-term health behaviours, including self-care, weight control, and hearing health behaviours. Predicting behaviours, including risky sexual behaviour, exercise, consuming sweet and fried foods, smoking, and drunk driving, are just a few of the research that has used HBM[58]. Three components—threat perception, behavioural assessment, and sociodemographic and psychological variables—were the initial emphasis of the HBM. Health incentives and cues for action were included in a later stage of development. Health motivations refer to an individual's readiness to be concerned about health issues; cues to action refer to internal and external factors which influence action (mass media, family, illness symptoms); and finally, threat perception refers to beliefs on the impact

and consequences of illness (perceived severity and susceptibility to illness or health problem)[60]. It is possible to identify studies that used the HBM. Studies have revealed, for instance, that people living with endemic malaria do not view the illness as a serious condition and that mosquito nets are ineffective at preventing the disease because mosquitoes attack both during the day and at night [61,62]. The threat perception and behaviour evaluation parts of the HBM were used in this study to assist explain its results. HBM predicts that someone who considers HIV/AIDS to be a severe condition sees ART as having more benefits than drawbacks, and has confidence in taking the medication even in challenging circumstances, like when drinking or using drugs, will adhere to the regimen.

It is a cognitive and interpersonal strategy that sees people as rational beings that take actions to lessen what they perceive to be a threat (such as disease symptoms) and increase what they consider to be advantages (e.g., adherence to treatment)[63].

According to the Health Belief Model (HBM), a person's beliefs of the threat posed by a health problem and the perceived benefits of taking action to reduce that threat have an impact on their decision to seek health care. A person's beliefs regarding the potential costs and benefits of taking medications are described by the construct known as "Beliefs about Medicines," which was formed from the elaboration of HBM. The Beliefs about Medicines Questionnaire (BMQ), a tool designed to assess patients' attitudes toward medications, is used to grade patients' attitudes[64].

The approach has been used to examine preventative health behaviours, such as behaviours that promote health (such as diet and exercise) and behaviours that put people at risk for health (such as smoking), as well as vaccination and ART adherence. The idea places more emphasis on the notion that a person will engage in a health-related behaviour (such as using ART) if they believe

that a potentially harmful condition can be prevented (i.e., AIDS). Additionally, if a person believes that by following a recommendation, he or she would avoid a harmful health condition (AIDS), then they can take ART with comfort and assurance.

The central premise of this model is that for intended participants to adopt healthy behaviours, they must be informed of their risk for severe or life-threatening diseases and believe that the advantages of behavioural change outweigh any potential drawbacks. According to this study, HBM maintains that target participants (women living with HIV) are more likely to adopt and promote healthy behaviour if they are aware of it and believe it would enhance their health status. On the other hand, if women living with HIV are aware of and believe that by refusing to adopt the use of ART, they will be vulnerable to risks that are thought to be serious. The term "perceived severity" refers to one's personal assessment of the gravity or distress of the risk to which they are exposed (such as AIDS), which may influence how much attention they receive. The subjective real or assumed advantages of implementing advised actions are described by perceived benefits. The model attempts to capture people's barriers to taking recommended actions by capturing perceived barriers. The adoption of a healthy sexual attitude is referenced in cues to action. For instance, women living with HIV will be able to accept suggested changes if they have the necessary information about ART. It is closely related to the earlier list of perceived severity.

The year 1988 saw the addition of self-efficacy to the four HBM model constructs (perceived benefits, susceptibility, seriousness, and barriers). A person's perception of his or her abilities to successfully engage in or perform a behaviour is referred to as self-efficacy. This was added to HBM to explain the differences in individuals' health-associated behaviour and as a recognition of the fact that individuals' confidence in their ability to effect change in outcome plays a crucial

role in health behaviour change. The self-efficacy component of the HBM model depicts the self-assurances of an individual that women living with HIV could perform and sustain the recommended behaviour with little or no help from others.

ART adherence is influenced by self-efficacy, beliefs about medications, perceived severity of the disease and the individual's past experience. The cognitive perspective of health behaviour assisted the researcher in understanding how HIV-infected patients on ART interpret and evaluate situations around them as well as their self-conception as to whether they will have self-efficacy in adhering to treatment. Prediction of medication adherence is very complex, and health-related knowledge and beliefs alone are insufficient to achieve behaviour change, especially in a chronic condition like HIV/AIDS.

The Health Belief Model is essential in understanding why some people are adherent to medication (HAART), and others are not based on their perception of how severe the HIV disease is, how susceptible to opportunistic infections they are, as well as the benefits of taking ARVs and self-efficacy of the person.

2.2.3 Depression and Adherence Explained by the Modified Andersen-Newman Framework

Individual/population characteristics, environmental variables, health behaviours, and health outcomes make up the four parts of the modified Anderson-Newman Framework employed in this study[66]. Three categories were used to categorize the component individual and population characteristics. The first group is made up of sociocultural traits that existed before a disease. Socio-cultural traits may be related to:

(a) social structure, such as education, occupation, employment status, having children, ethnicity, social networks, and culture;

(b) health beliefs, such as attitudes, values, and knowledge that people have about the health care system; and

(c) cognitive resources that are specifically related to health (such as health literacy, communication, and prescription-taking skills); and

(d) demographic factors, such as age and gender.

Enabling resources, or the practical aspects of receiving care, are the second category in the component of individual/population characteristics. The availability and diversity of health service providers and facilities, waiting times, support, and relationships with service providers are examples of enabling resources that can be:

(a) personal, such as knowledge of and ability to access health care services, income or income support, health insurance, sources of care, and travel; or

(b), related to the community.

(c) The person's coping mechanisms and sources of support outside of their medical care and services.

An individual's perceived and assessed needs are reflected in the final category of the individual/population characteristics component. The perceived need for a service is influenced by how an individual perceives their health status, the severity of their sickness, and the likely results. Additionally, evaluated needs are distinct from perceived needs in that they could be related to the kind and volume of care received after examination by a healthcare professional[67].

The second component of the modified Andersen-Newman Framework was environment characteristics, which included the various contexts (such as the external environment, the health

care system, and the use of medications) that affect individual/population characteristics, which has an impact on the framework's final two components, health behaviour (such as medication adherence and health care utilization), and health outcomes (e.g., depression, stress, viral load). Environment characteristics in the framework were broken down into three categories, including (a) the external environment, which consists of the home and community and the support they provide (e.g., living conditions, nearby violence, and other life stressors); (b) the health care system, which includes the policies, resources, organization, and financial arrangements that have an impact on the availability, access, use, and appropriateness of services; and (c) the medication use system.

The Andersen-Newman Framework's components, such as the moderators (such as employment position, ethnicity, living alone, and age at interview) and mediator, offer flexibility to include pertinent factors affecting ART adherence (i.e., depression). Depression, the mediating variable, was classified as a need, whereas the moderators were classified as socio-cultural traits. When depression is self-diagnosed, it can be viewed as either an assessed need by a service provider or as a perceived need. When depression is viewed in this light, treatments for it may increase ART adherence, which would then result in a decrease or elimination of depressive symptoms. The elements of the modified Andersen Newman Framework's population/individual and environmental characteristics component interact with one another and have an impact on how people perceive life's stresses. Life stressors have an effect on health behaviours such as ART adherence and utilization of health services, which in turn affects health outcomes, as was previously mentioned (i.e., viral load).

2.3 Review of Empirical Studies

2.3.1 Factors Influencing ART Adherence

Age may have an impact on ART compliance. An examination of the effects of advanced age, cognitive decline, and substance abuse among 148 HIV-positive adults between the ages of 25 and 69 in Los Angeles revealed that older subjects had higher mean adherence than younger subjects (87.5% vs 78.3%; p=0.01). Additionally, it was discovered that older participants had a threefold higher likelihood of being good adherers than younger participants (OR = 3.1, 95% confidence interval: 1.40-6.76). In southern Africa, a cohort study found that adolescents and young adults taking ART had worse virologic results and worse adherence than adults. The justification offered for this was that younger person who depends on caregivers to administer their medications may have trouble adhering if the caregivers are not dedicated to doing so. Additionally, adults may pressure younger patients to conceal their medical care out of concern for stigmatization, which has an impact on the younger patients' adherence to ART. However, some studies did not discover a strong correlation between age and adherence[68].

Patients' financial hardships and poverty have a significant impact on how well they take their drugs. It was determined that poverty is becoming more prevalent in the HIV era, particularly in the third world, where a large number of people are living below the poverty line. The cost of getting to the clinic or, in certain situations, purchasing medications will be an additional strain for patients who are already suffering to feed their families or themselves. According to a study conducted in Uganda, poor ART patients avoid taking their medication on an empty stomach out of concern about the medication's exaggerated adverse effects. Instead, they prefer to wait until they have enough money to buy food. Argues that the lack of medical insurance and disability

grants for PLWA in the majority of affluent nations worsens their financial status and will have an impact on how they receive treatment [64,95,69].

Some studies have discovered a beneficial correlation between education and ART adherence. An educational intervention's effects on adherence to antiretroviral therapy (ART), knowledge, quality of life, and therapeutic response in a sizable cohort of chronic HIV-infected patients were examined in France in a prospective, multicentre, randomized clinical trial at three university-based hospitals. According to the study, the educational intervention improved adherence in the experimental individuals at 12 months and was still present after 18 months. In 56% of the experimental patients and 50% of the control subjects, the state of their health improved. The authors came to the conclusion that educational intervention increases health status and adherence to ART. Pinheiro and his team discovered that higher levels of education were favourably connected with improved medication adherence in Pelotas, Brazil (p=0.02) and that functional health literacy were strongly correlated with medication adherence [70,71,72]. According to these authors, people with low levels of education may struggle to identify their correct, current drugs, whereas people with higher levels of education gain crucial abilities (planning, organizing, and integration) that help them adhere to ART [73].

A patient's lifestyle choices may influence how they take their drugs. The biggest offenders that have an impact on adherence are alcoholism and substance misuse as a way of life. Similar to how drug addicts and alcoholics sometimes forget to take their meds since they may be impaired by other drugs when it is time to take them. In meta-analysis research conducted in Botswana, approximately 40% of the patients surveyed acknowledged skipping a dose due to alcohol use. Patients in Botswana who misuse alcohol to cope with the stress brought on by their disease

frequently forget to take their medications, whether they are intoxicated or not. Memory loss and behavioural disorders will later result from alcohol consumption and other drug abuse[74].

HIV-related stigma is a substantial impediment to receiving treatment and taking HIV medications, which raises the disease's transmission rates. Stereotyping, status loss, and discrimination are all documented social and structural components of HIV-related stigma that occur in communities. Governments from all across the world vowed to lessen stigma and prejudice in 2001 when the Declaration of Commitment on HIV/AIDS was released. A major obstacle to universal access to care is HIV-related stigma, which also undermines the efficacy of the international effort to combat the HIV epidemic, according to regional and continental consultations on the subject conducted in 2005–2006. The main deterrent for many people from visiting a doctor to find out their HIV status and to seek treatment if they are infected is still believed to be HIV-related stigma[75]. One of the reasons why HIV/AIDS continues to decimate so many countries and nations around the world is stigma, which is a major factor in making the disease a "silent killer"[75]. Numerous research has concentrated, in particular, on the connection between ART adherence and HIV-related stigma[70,71,72]. These studies' findings nearly universally revealed a link between poor adherence to antiretroviral therapy (ART) and high levels of HIV-related stigma. Researchers have attempted to look into the relationship between adherence and internalized, enacted, and perceived stigma. For instance, it was discovered that admission of HIV status might be more influenced by perceived stigma than by real and internalized stigma, which in turn influences adherence[73]. In their research on how stigmatization affects medication adherence in patients receiving care in rural Nigeria, patients who experienced little stigma and discrimination had high levels of medication adherence[74]. Additionally, a study to evaluate the effects of stigma and ethnicity on medication adherence[73]. They made use of 2,146 people who

had been identified as HIV-positive in the Chinese province of Guangxi. Patients with low internalized stigma were more adherent to antiretroviral therapy than those who reported high levels of internalized stigma, according to the results of their multiple binary regression. Patients who experienced enacted stigma were less adherent to antiretroviral therapy. [89,90,91,92,93].

Patients on ART frequently deal with difficulties like unforeseen travel to meet appointments or emergencies. Patients may stop taking ART depending on the length of stay or distance of these unforeseen travels. Patients find it challenging to follow treatment schedules when they are away from home or with strangers. According to WHO patients who take unforeseen vacations find it challenging to keep appointments and follow their treatment plans.

According to a study on the factors influencing antiretroviral therapy adherence in the Greater Accra region, treatment and self-efficacy factors, as well as individual and environmental factors, all play a role in medication adherence[76]. She consequently advocated for the continual education of HIV patients on the advantages of adherence to HAART. Additionally, a study on the impact of self-efficacy on adherence in patients with rheumatoid arthritis found that a patient's self-efficacy changed over time depending on how quickly or slowly they accepted their diagnosis[77]. A patient's position on the medication adherence spectrum, which runs from non-adherent to adherent, is significantly influenced by their level of self-efficacy, they also discovered. Additionally, study used 123 participants from four hospitals in Chicago to examine how patients' self-efficacy and reading proficiency affected their adherence to antiretroviral medication[79]. They claimed that regardless of the length of treatment, self-efficacy and a consistent reading ability significantly predicted medication adherence. They came to the conclusion that reading proficiency and self-efficacy are crucial considerations in antiretroviral medication adherence. In the southern region of the country, researchers from 78 also looked into

the effects of three different types of self-efficacy on medication adherence in HIV patients who use drugs. They enlisted 154 HIV-positive people who had been given a substance use disorder diagnosis. The three types of self-efficacy that the researchers considered were one's assurance that one can get support, manage their mood, and communicate effectively with healthcare providers. Additionally, they were interested in how depression's symptoms affected the relationship between the two. The study's findings demonstrated that among patients with potential depressive and anxiety symptoms, these three categories of self-efficacy each individually predicted medication adherence considerably. They came to the conclusion that better medication adherence is one advantage of raising self-efficacy in these patients. A study studied pregnant HIV-positive women in South-West Nigeria to determine how self-efficacy affected antiretroviral drug adherence. For the study, 126 women were recruited. They claimed that among pregnant women, medication non-adherence was linked to low levels of self-efficacy. They discovered that the pregnant women's motivation to follow antiretroviral medication was also influenced by their desire to appear better and protect their unborn children from HIV infection. They came to the conclusion that interventions aiming at improving pregnant women's adherence to HIV medication should centre on adherence self-efficacy.

There was a cross-sectional study done. Nine healthcare facilities with a total of 460 HIV+ adolescents receiving antiretroviral medication were randomly selected. The teenagers adhered to their antiretroviral therapy at an 83% rate. At the bivariate level, 12 out of the 30 independent factors investigated indicated a statistically significant association with adherence. Only two variables, however, substantially predicted adherence in the multivariable logistic regression analyses: side effects (AOR = 2.63; 95% CI = 1.14, 6.09; p = 0.02), and internalized stigma (AOR = 2.51; 95% CI = 1.04, 6.04; p = 0.04)[80].

In a mixed-methods study conducted in the Eastern Cape of South Africa, 1709 parturient women participated. In 2016, the mother-infant pair in the PMTCT electronic database underwent a multi-centre retrospective investigation. To further understand the significant obstacles to adherence, semi-structured interviews were undertaken with a sample of parturient women who had been purposefully chosen and who had self-reported poor adherence (n = 177). Women reported the highest percentage of perfect adherence (69.0%). The top causes of non-adherence to ART, according to an analysis of the qualitative data, included work-related demands, drug-related side effects, being away from home, forgetfulness, non-disclosure, stigma, and being unable to remember[85].

Between June and August 2016, a systematic review was carried out utilizing eight electronic databases, including Cochrane and PubMed. Thematic analysis was utilized to summarize findings from research that was undertaken in SSA between 2004 and 2016 and includes published, ongoing, and unpublished work. Between 2011 and 2016, eleven English-language research from eight SSA countries examined the variables affecting ART adherence in young people living with HIV (ALHIV). A complicated web of variables was represented by the identification of 44 barriers and 29 facilitators to adherence. Stigma, ART side effects, a lack of a support system, and amnesia were the most significant obstacles[86].

Using a 30-day visual analogue scale, patient-reported adherence was evaluated in a multicenter prospective trial of people beginning first-line ART. Using multivariable logistic regression with multiple imputations and generalized estimating equations, the causes of inadequate adherence (95%) were examined across intervals of six months. A potential effect modifier was considered to be the region of residency (Africa versus Asia).

6.4% (837) of the 13,001 adherence assessments completed by 3934 patients over the first 24 months of ART were deemed to be unsatisfactory, with the African cohort scoring 7.3% (619/8484) against the Asian cohort scoring 4.8% (218/4517) (p 0.001). Longer ART duration in both locations decreased the risk of inadequate adherence. Comparatively to participants in upper-middle or high-income countries, those in low- and lower-middle-income countries showed a higher probability of suboptimal adherence (OR 1.6, 1.3-2.0; p 0.001). In Africa (OR 5.8, 95% CI 4.3-7.7; p 0.001) and Asia (OR 9.0, 95% CI 5.0-16.2; p 0.001), poor adherence was highly linked to virological failure. African participants stated adherence difficulties to treatment included time constraints, prescription shortages, forgetfulness, illness or adverse events, stigma or depression, complicated treatment plans, and pill load.

The following databases were searched electronically: MEDLINE Complete (1916-Dec 2017), Embase (1947-Dec 2017), Global Health (1910-Dec 2017), and CINAHL Complete. A review was conducted using the following keywords: HIV AND (Pregnancy OR Pregnant) AND (PMTCT OR "PMTCT Cascade" OR "Vertical Transmission" OR "Mother-to-Child") AND (Prevent OR Prevention) AND (HAART OR "Antiretroviral (1937-Dec 2017). Out of the four databases that were searched, 401 studies were found, and 44 of them satisfied the inclusion requirements. After looking through reference lists of articles that were included, seven additional studies were added, making a total of 51 articles.

The review showed that stigma, the expense of transportation, a woman's inability to afford food, and whether or not she disclosed her HIV status to a partner, family, or the community could limit or define the extent of her adherence to the antiretroviral medications she was prescribed while she was pregnant. Additionally, the research found a substantial correlation between medication adherence and knowing one's HIV status, either before or during pregnancy. Women

who were aware of their HIV status before becoming pregnant showed strong adherence, but finding out about their HIV status after becoming pregnant was associated with non-adherence to ART[88].

A study did a systematic search for qualitative and quantitative literature across six databases (PubMed, Cochrane Library, EMBASE, Web of Science, Popline, and Global Health Library). Bias risk was evaluated. For pooled estimates of effect size on adherence determinants, a meta-analysis was carried out. A total of 146 papers, out of the 4052 that were evaluated, were chosen for the final analysis. These studies reported on the determinants of 161 922 HIV patients, with an average adherence score of 72.9%. Alcohol usage, male gender, traditional/herbal medicine use, dissatisfaction with the healthcare facility and healthcare staff, sadness, stigmatization and discrimination, and a lack of social support were the leading causes of non-adherence. Memory aids, counselling and education programs, and active disclosure among HIV-positive individuals were adherence promoters[89].

Participants from Africa noted that scheduling conflicts, medicine shortages, forgetfulness, illnesses or adverse events, stigma or despair, regimen complexity, and pill burden were obstacles to adhering to a regimen[90].

Between April and July 2014, a mixed-methods study was completed. 200 teenagers aged 15 to 19, who were previously aware of their HIV status, were enlisted. 25.3% of the 190 teenagers in the sample scored highly for depressive symptoms. Unsatisfactory connections with family, unsatisfactory interactions with medical professionals, and feelings of stigma were all factors linked to depressive symptoms. 94.2 percent of participants were taking ART, but 28.3 percent were non-adherent. Loss of a mother and ignorance of HIV basics were factors associated with

non-adherence to ART. The following barriers to ART adherence were discovered through qualitative research: medication management, adverse drug reactions, and psychosocial distress[91].

This observational study was carried out on repeat samples of HIV-positive individuals who had just begun antiretroviral medication. Participants were chosen from the local Centers for Disease Control and Prevention and Infectious Diseases hospital in a major city in central China between March 1, 2013, and August 31, 2014. The Community Programs for Clinical Research on AIDS Antiretroviral Medications and Self-Report Questionnaire (CPCRA), the Patient Health Questionnaire-9 (PHQ-9) and the 7-item were all adopted as standard questionnaires. Scale for Generalized Anxiety Disorder (GAD-7). To investigate variables that could affect medication adherence, T-tests, Chi-square tests, and multivariate logistic regression analysis with backward stepwise were conducted. 85.5% of the 207 participants (177/207) were classified as having good adherence, and 14.5% (30/207) as having poor adherence. The results of the multivariate logistic regression analysis demonstrated that people who did not disclose their HIV status to others and those with positive depression were more likely to have poor adherence[92] (OR = 2.62, 95% CI: 1.06-6.50 and 5.95, respectively).

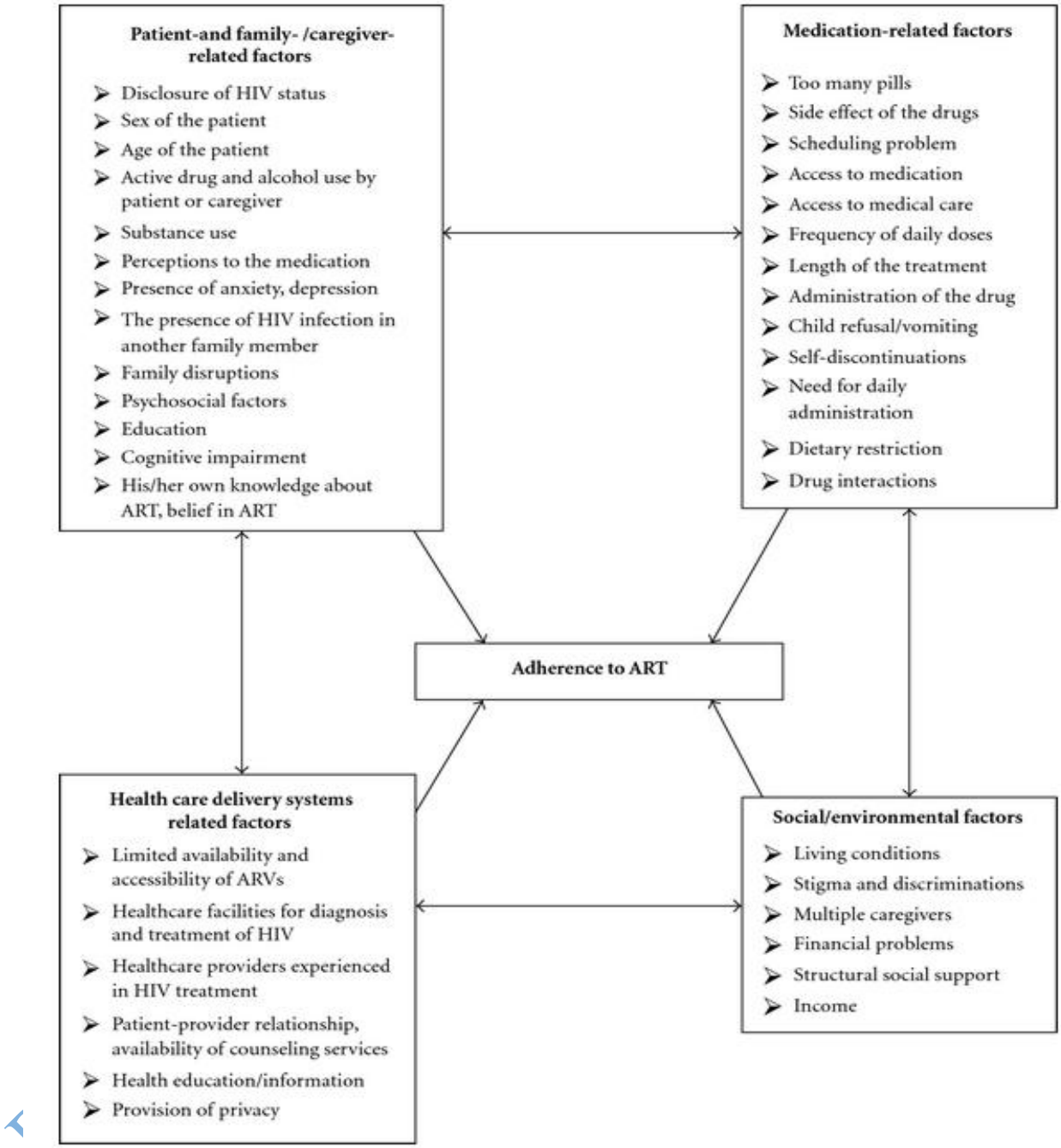

Fig 2.3: Linkage of ART Adherence to Different Factors

Source[46]

2.3.2 **Barriers and Facilitators to ART Adherence**

Four sub-types of self-reported adherence barriers were identified using data from 151 ART patients: medication and health concerns (MHC), stigma (S), family responsibilities (FR), and issues with schedule and routine (PSR). To examine how barriers affect adherence over time, generalized linear models with generalized estimating equations (GEE) were used. A quarter of the population was female, the average age was 42 years, and 26% of the population was Hispanic. The average level of adherence was 73% overall. In 66% of study visits, patients reported at least one PSR barrier, followed by MHC (40%), S (17%), and FR (6%). Patients reported two or more barrier subtypes in 40% of visits. For MHC, PSR, and S, respectively, there were statistically significant (p B 0.05) decreases in percent adherence of 3.9, 2.5, and 2.4 per unit increase in barrier score[93].

In-depth interviews with 20 formerly incarcerated HIV-positive people were conducted by 94 in New York City. The findings revealed four overarching themes: pharmaceutical burden, forgetfulness, mental health and emotional challenges, and perceived conflict between drug use and medication adherence. These themes had an impact on research participants' attempts to follow their ART regimen. These obstacles were most frequently mentioned and were still present to a great extent after three months[94].

600 adult patients from 6 primary healthcare ARV clinics in the greater Cape Town area participated in the case-control research. Between 1147 and 2343 adult patients were receiving free ARV treatment from these facilities at the time of data collection (Western Cape Department of Health, unpublished data). The Western Cape's primary health care clinics implemented "adherence groups" and offered individual counselling as strategies to encourage ARV adherence. Overall, behavioural skill deficiencies and information-related hurdles were the most often cited.

The least amount of structural barriers was reported. Gender, behaviour skill deficit scores, SBCA scores, and SBMT scores all predicted non-adherence, according to logistic regression studies. Structural barriers to medication taking had the most significant impact on adherence (OR: 2.32, 95% CI: 1.73 to 3.12), followed by structural barriers to clinic attendance (OR: 2.06, 95% CI: 1.58 to 2.69) and behavioural skill deficits (OR: 1.34, 95% CI: 1.05 to 1.71), despite the experience of structural barriers being reported the least frequently[95].

Data from a cross-sectional survey was collected during an intervention experiment with a randomized control in northern and northeastern Thailand. We examined 386 antiretroviral therapy patients out of the 507 study participants to look at the obstacles to adherence. HIV disclosure and family communication were looked at in addition to demographic traits, mental symptoms, physical health, access to care, social support, and internalized shame. According to correlation analysis, internalized guilt, availability to care, depressive symptoms, and family communication are all substantially correlated with adherence. According to the results of the multiple logistic regression analysis, family communication (p .03), access to care (p.02), HIV disclosure (p.03), and depressive symptoms (p.03) were all highly significant predictors of adherence. Access to care, HIV disclosure, and family communication all play critical roles in promoting adherence, but having depressive symptoms continues to be a significant barrier to it[96].

A study on 253 hypertensive patients receiving care at a military hospital in Dhaka to ascertain the impact of physician communication with patients on medication adherence. They found, among other things, that the amount of time a doctor spends with a patient had a significant impact on how well the patient took their medication. Additionally, they discovered a highly significant link between medication adherence and doctor-patient communication. When participants responded positively to the item "The doctor gave me as much information as I

needed," their binary logistic regression revealed that they were 3.23 times more likely to take their HIV medication as directed. They came to the conclusion that it was critical to creating policies to assist physicians in honing their communication abilities. This study highlighted the significance of physicians' communication abilities for patient adherence to medication[97]. Considerably to the adherence to medicine. Conducted research on how patients' utilization of HIV/AIDS facilities in Ghana was impacted by the attitudes and behaviours of health service workers. He focused on the communication and conduct of healthcare professionals who manage HIV patients. He gathered information from patients and health service providers involved in HIV management through in-depth patient interviews, casual interactions, and observational approaches for the study. With the exception of a few who were impolite, he discovered that the majority of healthcare professionals displayed a favourable attitude toward the patients. Some healthcare professionals even helped the patients financially and gave them valuable counsel. Patients expressed satisfaction with the behaviour of the healthcare professionals and high levels of compliance with what was instructed.

The majority of obstacles patients face come from the service delivery point, according to study results on the facilitators and barriers to antiretroviral medication adherence among HIV and AIDS patients, which found [97]. The majority of respondents waste much time at the facility and are hesitant to visit for service as a result. Before entering the consulting room, patients must go through several stages of the therapy process. The majority of patients believe that they are initially healthier and do not require ongoing urgent care. Patients often believe that they only need medical care when their health begins to deteriorate. Patients were discovered not to like monthly medication attention visits to health facilities. According to a study, some patients are forced to travel for care to nearby towns and countries like Togo and Cote D'Ivoire due to

stigmatization. Clients taking HIV and AIDS medication must remain at the same facility so that staff members can track their level of adherence. This implies that patients will not go and seek services if they have no money in their reporting month. The study discovered that health personnel' reporting times had a significant impact on patients' adherence, particularly for individuals who have not disclosed their employment status. Such patients must sneak services and leave early for employment.

In some African nations, there have been reports of optimal adherence rates. A study also recorded 95% in South Africa, and it was stated that a higher than 90% rate in a study reported a 99% rate in South Africa. These findings and others were used to support the claim that adherence to ART is not an issue in Africa. Africans Outdo US Patients in Following AIDS Therapy, according to the New York Times, which reported this fantastic achievement. However, some African nations have reported having subpar levels of adherence: 86% and 80% of the population overall adhered in Cameroon and Senegal, respectively; 54% of the population overall adhered in Botswana; and 80% of the population overall adhered in South Africa.

Additionally, 100 people commented that the high adherence rates reported in the majority of African studies were exaggerated, suggesting that it is unknown what the actual adherence rates are in the majority of African nations. Researchers are worried that suboptimal adherence in Africa may be comparable to that in western nations, where studies showed that between 100% and 28% of HIV/AIDS patients on ART failed to reach the 95% adherence threshold necessary for viral suppression. The low rates of adherence in Africa could have four different causes. First off, even in wealthy western nations, maintaining medication compliance for the treatment of chronic conditions like cancer, diabetes, and hypertension has proven to be very difficult. Because HIV/AIDS is a chronic disease, it can be challenging to follow the combination ART

regimen. In addition, ART regimens are frequently complex and may involve different dose schedules, food restrictions, and side effects. Thirdly, many African countries have documented the existence of adherence difficulties (such as a lack of medication, forgetfulness, and adverse drug effects). According to studies, these barriers lead to lower adherence to ART. Fourth, research indicates that adherence declines over time. For instance, Laurent and his colleagues discovered that 95% of their patients had adherence levels above 80% after one month of therapy, but only 80% of the patients maintained those levels after 18 months. This has the implication that measuring adherence in patients who have been receiving therapy for shorter amounts of time may result in overstated adherence rates since the patients may not have received therapy for long enough for adherence to begin to decline. For this reason, only patients who had been receiving therapy for at least 12 months were included in the current study's adherence evaluation[100,101,105].

Six ART clinicians and 24 ART patients were interviewed as part of a descriptive qualitative method using in-depth interviews with persons who either defaulted or were kept in HIV care in two privately owned facilities in Malawi from March to July 2017. Thematic analysis was used to analyze the data manually. Participants overall identified four elements that help people stay in care and four general categories of barriers, including personal, psychological, drug-related and resource-related factors. Follow-up visits after a missed appointment, sufficient information, education, counselling, and supportive connections were the characteristics that aided retention in care[103,104].

The results showed that the obstacles to adherence to HAART included over dosage (high pill burden), fear of prejudice and stigma, expense and access to transportation, ignorance of the benefits of taking the drug, domestic financial difficulties, and a lack of dietary support. Among

the facilitators were the presence of a mobile or wall alarm, follow-up counselling, the child's better health, the organization of an ART clinic, and the revelation of HIV serostatus[105].

The 60 patients receiving HIV primary care at the nongovernmental organization YRG CARE in Chennai, India (49 men, 11 women; 33 taking ART, 27 not now taking ART) were the subjects of this formative qualitative study that looked at the facilitators and challenges of ART adherence. The cost of ART was mentioned by almost all of the participants as a barrier, and several of them reported extended drug holidays, resorting to family or friends for support, or going to extreme lengths (such as selling up family jewels or property) to raise money. Other obstacles were privacy and stigma issues, such as how disclosing one's HIV prevents taking medication and receiving social assistance. Perceived benefits of ART and appropriate adherence, beliefs about the negative effects of non-adherence, and social support, if available, were frequently brought up as adherence facilitators.

2.3.3 ART Adherence

The few studies that assessed the level of adherence to anti-retroviral therapy in Nigeria revealed poor adherence despite the fact that Nigeria is among the nations with the worst HIV/AIDS epidemics[107,108,109,110]. The important research was carried out in Nigeria's geopolitical zones of the South-West, North-Central, and South-East. A study in the South-West examined the level of adherence in two groups of HIV-positive individuals in Sagamu: those using privately purchased meds and those receiving free medications. They only included 53 patients who had been on ART between September 1 and November 30, 2003 (40 receiving free meds and 13 on self-purchased medications). Overall, they discovered a 79.2% adherence rate; however, the difference between those receiving free medication and those receiving paid medication was not

statistically significant [111]. A study in the North-Central region evaluated patient self-report and adherence using pharmacy refill records at the University of Abuja Teaching Hospital. They enlisted 529 adult patients who were just starting ART, and they monitored their compliance for six months. Only 305 (58%) had a refill rate of under 95%, they discovered. A 27% adherence rate was noted for the South-East. Through a cross-sectional descriptive analysis, they evaluated the adherence rate among 174 patients over the course of 12 months. The aforementioned studies all found below-optimal adherence rates in Nigeria's three geographic zones, despite the sample sizes' limitations; this suggests that ART adherence in Nigeria is a problem. These studies also identified adherence hurdles, which has made the issue of ART adherence in Nigeria even more difficult. For instance, socioeconomic issues such as poverty and psychosocial variables such as forgetting to take medications have been reported to be the root of poor adherence to ART in Nigeria. Prior to the Federal government's implementation of the free drug program, structural issues were thought to be the main reason for poor adherence, but with the program's implementation, psychosocial and socioeconomic variables have taken the lead[112].

A cross-sectional study that involves administering an altered and previously tested questionnaire to 601 willing patients at the Federal Medical Centre in Yenagoa and the Niger-Delta University Teaching Hospital in Okolobiri, Bayelsa State, Nigeria. The patient's medical records were consulted to determine their CD4+ T cells count. Patients were asked to recollect taking the prescribed doses over the previous 14 days, and participants who remembered taking 95–100% of the prescribed antiretroviral medications were considered adherent[113].

The majority of them, 557 (92.7%), scored at least 70.0% on a test that assessed their knowledge of HIV and combination anti-retroviral therapy. Four hundred and eleven responders, or 73.4%, had adherence rates under 95%. 'Simply forgot' (said as a reason for skipping doses 147 times, or

24.5%) and 'wanted to avoid the negative effects of medications,' cited 33 times, or 5.5%, are two of the most significant excuses. With an increase in the percentage of participants with CD4+ T cells count of greater than 350 cells/mm3 from 33 (5.5%) at therapy commencement to 338 (56.3%) during the study period, there were notable improvements in the subjects' immunological status[112].

According to one study, there is no significant correlation between adherence to ART and Marital status, Concurrent diseases, Additional medications, and Religion[114]. However, there is a significant correlation between non-adherence and age, sex, occupation, distance to hospital, cost of transport to the hospital, duration of treatment, reaction to HAART, hospital charges, and confidentiality.

In research, HIV patients' adherence rates were 92.6%. Lack of funds for transportation to the hospital (75%), travel (68.8%), forgetting (66.7%), avoiding side effects (66.7%), and avoiding seeing a doctor (63.6%) are all factors that affect adherence[113].

In a cross-sectional study, 268 HIV-positive pregnant women were enrolled from the PMTCT clinic of the Federal Teaching Hospital Abakaliki using a systematic sampling approach. Data gathering employed a pre-tested interviewer-administered questionnaire. The most frequent excuses for non-adherence were worried about being diagnosed as HIV + (21%), fear of pregnancy-related disease (13.7%), and forgetfulness (12.5%). In a bivariate analysis, it was discovered that good adherence was substantially correlated with partner support and the length of ART. After accounting for cofounders, the partners' support maintained the association with good adherence. The study found that stigmatization and illnesses associated with pregnancy were linked to low adherence, but partner support increased adherence to HAART [114].

2.3.4 ART Failure

Treatment failure is defined by the Nigerian national treatment guideline based on three criteria: virological, immunological, and clinical[116]. Viral load not suppressed to undetectable levels after 6 months on ART, viral load not lowered by at least 2 to 2.5 log10 in HIV RNA level after 24 weeks on ART, or continuous increase in viral load after a period of acceptable suppression are all considered to be instances of virological failure. When an immunological test reveals a return of CD4 cell count to pre-therapy baseline level, a 50% fall from on-therapy CD4 cell peak level, or failure to achieve a CD4 cell count rise of 50 to 100 cells/l3 each year, this is referred to as an immunological treatment failure. When new opportunistic infections arise, malignancy (signifying clinical disease progression), or recurrence of WHO Stage 3 defining diseases (e.g., Kaposi's sarcoma), treatment fails clinically.

2.3.5 Depression and ART Adherence

While some research has linked ART non-adherence to the emergence of mental health illnesses, other studies have indicated that people with mental health conditions are capable of adhering to their therapy. A person's chance of dying was nearly six times higher for those with depressed symptoms and low ART adherence than for those without such symptoms. Because there is little knowledge about depression in women living with HIV, it is relevant to our study because depression has been linked to decreased ART adherence. Suboptimal ART adherence and non-adherence were linked to depressive symptoms in studies that mostly involved men 17 (between 70% and 85%). Psychological distress (defined as emotional suffering characterized by depressive and anxiety-related symptoms, as well as by somatic symptoms with gender and cross-cultural differences) was found to mediate the patient-physician relationship and optimism toward treatment in a sample that was 74% male and mostly crack cocaine users. Increased

psychological discomfort and non-adherence to psychiatric drugs were linked to non-adherence to ART, according to another research of adults (60 percent of whom were men) with mental and substance use disorders. Additionally, depression was the main factor in patients (of whom 76% were men) who were evaluated for both post-traumatic stress disorder and ART non-adherence. The lack of data on ART adherence and depression in women makes it difficult to establish all-encompassing plans and interventions for enhancing their adherence to ART[116].

2.3.6 **Women's Adherence to ART**

Overall, it is uncertain how much and in what ways women with HIV adhere to their ART regimens. The bulk of research involved mostly men and lacked gender-specific analyses, despite some studies showing minimal variations in ART use between men and women. Drug and alcohol usage, greater treatment dosages, younger age, a lower starting CD4 cell count, and living with children were all associated with low ART adherence, according to two trials that only included women [117]. There has not been much research done on the range of socio-demographic and psycho-socio-behavioural aspects that affect women with HIV. These aspects are crucial to comprehending how women's intersectional identities impact their experiences with stress, depression, and adherence-related problems, all of which may exacerbate unfavourable health consequences.

2.3.7 **Failure to Comply with ART**

Expanding access to highly active antiretroviral medication (HAART) is becoming more and more important as HIV/AIDS rates in underdeveloped nations continue to grow, particularly in Africa, where 95% of all new HIV infections take place [111]. The two biggest problems ART programs 118 encounters are poor adherence to treatment and defaulting from treatment in resource-constrained regions with underdeveloped health care providers. Virulence, immunological dysfunction, clinical disease progression, and medication resistance are all linked to non-adherence, one of the main causes of treatment failure. Depending on how adherence is defined and assessed, it has been demonstrated that non-adherence to ART in the adult population can range from 33 to 88%. According to research, HAART-receiving individuals must maintain adherence rates of at least 95% in order to treat their viral infections successfully. The factors influencing patient adherence have been the subject of numerous studies. 119 categorized the factors into four main categories: patient-related (examples: fear of disclosure, forgetfulness, depression); beliefs about medication (examples: confidence in the efficacy of the drugs); daily schedules (examples: using reminder tools, disruptions to routine); and interpersonal relationships (e.g. trusting relationship with the health care provider, social isolation). It has been determined that the type of therapy regimen is crucial to comprehending non-adherence. Additionally, non-adherence has been linked to aspects of the healthcare system, such as provider-patient relationships and particular features of the healthcare environment. Side effects, a high number of daily doses, a variety of pills, food restrictions, a lack of education, a demanding job, mental incapacity, substance abuse other than intravenous drugs, homelessness, and the clinical state of HIV are additional factors that contribute to non-adherence, according to the literature.

A cross-sectional study in which the Federal Teaching Hospital Abakaliki PMTCT clinic was used to recruit 268 HIV-positive pregnant women using a systematic sampling method. A pre-tested interviewer-administered questionnaire was used for data collection. Fear of being identified as HIV positive (21%), pregnancy-related illness (13.7%) and forgetfulness (12.5%) were the most common reasons for non-adherence. Partner's support (OR=.03, 95% CI=0.01-0.09, p=0.001) and duration of ART (OR=4.39, 95% CI=1.3-14.5, p=0.019) at bivariate analysis were found to be significantly associated with good adherence. Partner's support (OR=0.027, 95%CI=0.01-0.09) retained the association with good adherence after controlling for cofounders. The study identified that stigmatization and pregnancy-related illnesses were related to poor adherence while having Partners support to improve adherence to HAART[119].

Researched that Age, Sex, Occupation, Distance to hospital, cost of transport to the hospital, Duration of treatment, Reaction to HAART, Hospital charges and Confidentiality are the factor affecting good adherence. The mean age of respondents was 39.9±10 years. The adherence rate for HIV patients was 92.6%. Factors affecting adherence include lack of money for transportation to the hospital (75%), travelling (68.8%), forgetting (66.7%), avoiding side effects (66.7%), and avoiding being seen (63.6%)[120].

A cross-sectional analysis of patients who had been receiving antiretroviral therapy for at least a full year. To gather data on patient adherence to treatment and retention in care, a structured questionnaire and patient record review were used. Patient self-reports of missed medications in the 30 days preceding the date of the interview were used to determine treatment adherence. Using the 3-month visit constancy approach and a 12-month window previous to the investigation, retention in care was determined. As a result, we discovered similar rates of care retention (private 81.1%; public 80.3%; p = 0.722). However, participants in private hospitals

adhered to their treatment significantly more than those in public hospitals (private: 95.3%; public: 90.7%; p = 0.001). Disclosure of HIV status and use of a first-line regimen were factors that predicted good retention in private hospitals (AOR: 1.94, 95% CI: 1.09-3.46; 3.07, 1.27-7.41); however, use of a once-daily regimen and marital status (AOR: 0.54, 95% CI: 0.32-0.91) predicted poor retention. Only disclosure (AOR: 3.12 95% CI: 1.81-5.56) determined good retention in public hospitals while spending less than N1000 on transportation (AOR: 0.230 95% CI: 0.07-0.78) and living in a rural area (AOR: 0.64 95% CI: 0.41-0.99) and having a lower income determined poor retention. Adherence 120 was not determined by any of the factors.

A study included 300 HIV-positive patients who received ART at the Central Hospital in Agbor, Delta State, Nigeria. A questionnaire was used to evaluate self-reported adherence to ART in the month prior to the study, as well as factors that influence adherence. Results: The most popular ART treatment combination was zidovudine, lamivudine, and nevirapine. 33 (11%) respondents overall reported missing 3 doses or less in the month prior to the survey. Marriage status, source of income, and occupation were statistically significantly associated with adherence to ART (P .05. Forgetfulness (60.4%), busy daily tasks (18.3%), and avoiding being seen while taking medications (11%) were the most frequently cited causes of missed doses[121].

An adaptable and pretested questionnaire was administered to 601 willing patients enrolled in a cross-sectional study at the Federal Medical Centre in Yenagoa and the Niger-Delta University Teaching Hospital in Okolobiri, Bayelsa State, Nigeria. The tool was segmented into sections for sociodemographic information, knowledge of HIV, and compliance with combination antiretroviral medication. The patient's medical records were consulted to determine their CD4+ T cells count. Patients were questioned about their consumption of prescribed doses over the previous 14 days to determine their level of adherence, and those who reported taking 95–100%

of the recommended antiretroviral medications were deemed adherent. Results: Of the respondents, 338 (57.9%) were female, and 253 (42.1%) were male. With a score of 70.0% or above, 557 of them, or 92.7%, had a strong understanding of HIV and combination anti-retroviral therapy. Four hundred and eleven responders, or 73.4%, had adherence rates under 95%. Among the top explanations given for missing doses are "just forgot" (cited by 147 people, or 24.5%) and "wanted to minimize the negative effects of medications." 33(5.5%)[112]

2.3.8 Psychological well-being and HIV

2.3.8.1 Mental Health

There is considerable overlap between HIV and mental health conditions (also called psychiatric disorders). According to the World Health Organization and the Canadian Mental Health Association, mental health is defined as the state of physical, mental and social well-being and includes both the absence and presence of serious mental illnesses. Mental health is affected by life stressors and characterized by the ability to enjoy life, resiliency, balance in managing many aspects of one's life, self-actualization and flexibility in adapting to situations and expressing a range of emotions. Mental health and well-being are deeply inter-correlated and dependent on how life stressors are managed and manifested within the person[123]. The occurrence of psychiatric co-morbidities with HIV may amplify the effect of stressors accompanying an HIV diagnosis and usual life stressors; therefore, the dual effect of psychiatric disorders with HIV requires further investigation[124].

2.3.8.2 Stress

Life stressors can be detrimental to mental health. Stress is a normal biological response to negative and positive events in life, and it is characterized as "any uncomfortable emotional experience accompanied by predictable biochemical, physiological and behavioural changes".

These negative and positive life events can also be described as life stressors[125]. We experience stressors daily and adjust to, modify or manage them to modulate our stress response. However, in the absence of skills or resources to address the stressor or in the presence of maladaptive coping mechanisms, the stress response to everyday life stressors becomes sustained and chronic. Chronic stress has deleterious systemic health consequences; by interacting with disease factors, it affects the immune, cardiovascular, neuro-endocrine and central nervous systems and influences the pathophysiology of diseases. Serious health conditions associated with untreated chronic stress include anxiety, insomnia, muscle pain, arthritis, headaches and high blood pressure. Other consequences may include the development or progression of mental health concerns such as substance use, depression and schizophrenia and other illnesses such as heart disease, HIV and obesity. Although the expression of stress is a normal biological process, poorly managed life stressors due to absent or maladaptive coping mechanisms can lead to chronic stress, which in turn promotes the development or the progression of deleterious health conditions, including depression and HIV.

2.3.8.3 **Depression**

The relationship between depression and acute and chronic life stressors is complex. Depression, also referred to as clinical depression, major depressive disorder or unipolar disorder, is a serious medical illness understood as severe despondency and dejection, with feelings of hopelessness and inadequacy typically felt over a period of time. The condition results in changes to a person's thoughts, behaviours, feelings and sense of well-being. Depression is a mental affliction with symptoms ranging from anxiety and restlessness, sadness and loss, to guilt and worthlessness, feelings of extreme impatience, irritability or short temper, loss of interest or pleasure in usually enjoyed activities, withdrawal from family and friends and suicide ideation.

In addition, depression includes physical symptoms ranging from changes in weight and appetite, insomnia, difficulties thinking clearly and concentrating, memory loss, fatigue, joint and muscle pain, stomach complaints and headaches[126].

Although chronic stress can lead to depression, as described above, the three most recognized causes and predictors of depression include a recent major life event, a positive family history of depression, and a personal history of depressive episodes. Some individuals experiencing a recent major life event, ranging from a difficult or abusive relationship to adverse socio-economic factors, are 2.5 to 12 times more susceptible to depression. Although recent major life events have been described as a factor in initial depressive episodes, recent major life events have not been linked to the recurrence of depression. However, people with a first-degree relative with a history of depression are 2.8 to 10 times more likely to develop depression and experience a recurrence of depression. In addition, about 40% to 60% of people experiencing their first-lifetime episode of depression will experience another episode. Where a personal history of depression exists, the risk of an episode rises. Chronic stress, recent major life events, a family and personal history of depression and living with a chronic medical condition (e.g. heart disease, obesity, Parkinson's disease, HIV) are associated with an increased prevalence of depression. The associated pathophysiological changes of diseases, disability, poor quality of life and even medications may lead to depression.

The mental health section of the 2012 Canadian Community Health Survey (CCHS), administered to adults aged 15 years and older, reported on six mental health conditions, including major depressive disorder, bipolar disorder, generalized anxiety disorder, and alcohol, cannabis or other drug use. The survey found that approximately 2.8 million people (10.1%) living in Canada experienced one of the six mental health conditions. As previously mentioned,

major depressive disorder was the most common disorder, experienced by 4.7% of the population. In addition, 1.5% of Canadians experienced bipolar disorder, 2.6% experienced generalized anxiety disorder, and 4.4% met the criteria for substance use disorders, particularly alcohol use or dependence (3.2%). According to the CCHS, in 2012, women had a higher rate of depression (5.8%) compared to men (3.6%) in all age groups investigated in the survey, except among those aged 65 and older (in which case men and women had similar rates of depression).

Furthermore, a review of the literature supports that the lifetime prevalence of depression in women is two times higher than in men. Promoting the understanding and recognition of risk factors for depression in women enhances opportunities for diagnosis and management and could be particularly impactful for women living with HIV[127].

2.3.8.4 HIV and Depression

The life stressors that women living with HIV experience may have a negative impact on mental health. As previously described, the development of stress from life events into chronic stress can lead to depression, and both stress and depression can influence the pathophysiology of HIV disease[114]. In addition, poor mental health conditions may hinder someone with HIV from accessing health care services, despite a worsening HIV disease. As a result, interventions to prevent or slow the onset of depression are necessary to avoid adverse HIV and mental health outcomes.

Depression is the most common psychiatric diagnosis reported in people living with HIV, occurring four to seven times more often in people with HIV than in the general population. Moreover, women living with HIV are more likely to experience depressive symptoms compared to men living with HIV and four times more likely to experience symptoms compared to HIV-

negative women. Hence, it is critical to specifically examine the experience of stress and depression for women living with HIV.

A community-based cross-sectional study was carried out in seven districts of Tamil Nadu, India, among 400 PLHA in the year 2009. The following scales were used for stigma, depression and quality of life, the Berger scale, the Major Depression Inventory (MDI) scale and the WHO BREF scale. Both Stigma and QOL were classified as none, moderate or severe/poor based on the tertile cut-off values of the scale scores. Depression was classified as none, mild, moderate and severe. Logistic regression analyses were performed to study the risk factors. Twenty-seven per cent of PLHA had experienced severe forms of stigma. These were severe forms of personalized stigma (28.8%), negative self-image (30.3%), perceived public attitude (18.2%) and disclosure concerns (26%). PLHA experiencing severe depression were 12%, and those experiencing poor quality of life were 34%. Poor QOL reported in the physical, psychological, social and environmental domains was 42.5%, 40%, 51.2% and 34%, respectively. PLHA who had a severe personalized stigma and negative self-image had 3.4 (1.6-7.0) and 2.1 (1.0-4.1) times higher risk of severe depression, respectively ($p<.001$). PLHA who had severe depression experienced 2.7 (1.1-7.7) times significantly poorer QOL[128].

A cross-sectional study was conducted among HIV patients attending the HIV/AIDS clinic of the Ekiti State University Teaching Hospital, Ado-Ekiti, Nigeria. A semi-structured questionnaire was administered to collect sociodemographic characteristics with the incorporation of a hospital anxiety depression questionnaire to assess the prevalence of depression and anxiety in the study and control groups. A total of 424 HIV-positive study participants were recruited. A corresponding age and sex-matched 429 control subjects were also enrolled. The mean age of HIV-positive patients and controls are 42.2 ± 9.5 years and 43.4 ± 12.4 years, respectively. There

was a female preponderance among both study populations. The prevalence of depression among PLHIV was 39.6%, whereas depression was lower in the (22.0%) control group. Likewise, anxiety was reported in PLHIV and control group as 32.6% and 28.7%, respectively. Female gender, illiteracy, being divorced/widowed, unemployed, and low income and low CD4 count were associated with depression, while factors associated with anxiety disorder included lower age, female gender, low income, and low CD4 count[129].

A survey of 1187 participants aged 18 years and above was conducted within three HIV treatment centres in Abuja, Nigeria. Depression, suicidality, and alcohol use disorder modules of the WHO World Mental Health Composite International Diagnostic Interview questionnaire were used for this study. A socio-demographic questionnaire was also used to collect other health and demographic data. Descriptive statistics (frequency distribution, percentage, mean, median, mode, and standard deviation) and regression analyses were conducted to explore associations between mental health problems and demographic and other health-related factors. Twelve-month prevalence rates were 28.2% for major depressive episodes, 2.9% for suicidal ideation, 2.3% for suicide attempts, 7.8% for harmful alcohol use, 7.0% for alcohol abuse, and 2.2% for alcohol dependence. Major depressive episodes were significantly associated with having planned suicide and marital status. Suicidal ideation was significantly associated with major depressive episodes, marital status, and religion. Females were less likely to be diagnosed with alcohol disorders[130].

2.3.8.5 **Depression Among Women Living with HIV**

For women living with HIV, depression and stressful life events are associated with increased mortality and worsening of HIV disease (e.g., reduced CD4 count, poor virologic suppression and increased occurrence of AIDS-defining illnesses) [131,132,133]. To improve health outcomes for women living with HIV, part of the solution is to identify correlates of depression and to clearly articulate potential stressors of women. Correlates of depression include socioeconomic disadvantages (e.g., low income and unemployment), stressful life events (e.g., intimate partner violence, familial and child concerns), and social alienation factors (e.g., HIV-related stigma and gender and racial discrimination). Women living with HIV who have experienced intimate partner violence in the past year and used cocaine or heroin sometime in their lives are almost seven times more likely to have depressive symptoms compared to those who have never experienced intimate partner violence or drug use[135]. Elevated levels of depression in women are also associated with higher stress, fewer coping strategies and perceived less social support. In addition, ageing has been associated with higher levels of depression and longer-lived experiences of various stressors compounded by HIV. Of great concern, women living with HIV and chronic depressive symptoms have a mortality rate two times greater than those with no or fewer depressive symptoms. The serious implications of depression and factors leading to stress (e.g., variables identified as HIV risk factors, adverse determinants of health, and life stressors) and how they relate to improving HIV health outcomes for women require more in-depth analysis[135].

2.4 Theoretical Framework

Research on medication adherence is increasingly focusing on how health behaviour can be changed to achieve the desired outcome. Health behaviour theories provide the foundation for targeted interventions aimed at changing behaviour or establishing healthy habits. [136] This study's broad overarching theoretical framework aimed to explain how HIV patients receiving antiretroviral therapy (ART) conceptualize threats to their health (HIV/AIDS disease); how they conceptualize one particular remedy (treatment or medication use); and why actual medication use behaviour may or may not occur[137]. To describe and direct interventions relating to cognitive factors and medication adherence in HIV-infected individuals, a number of theories related to health behaviour that apply to an individual could be used[136]. This study was directed by the cognitive viewpoint on health behaviour, and theories that place emphasis on cognitive factors and processes were used to comprehend health behaviour in ART patients[137]. The meta-theoretical premise of this study is that individuals who have high levels of self-efficacy regarding adherence to ART and positive ideas about medications are more likely to be actively motivated to attain high adherence to ART and favourable clinical outcomes. In this study, the Anderson-Newman Framework, one theory from the cognitive perspective of health behaviour, were used. The model was selected for this study because they include the cognitive characteristics that are now the focus of inquiry

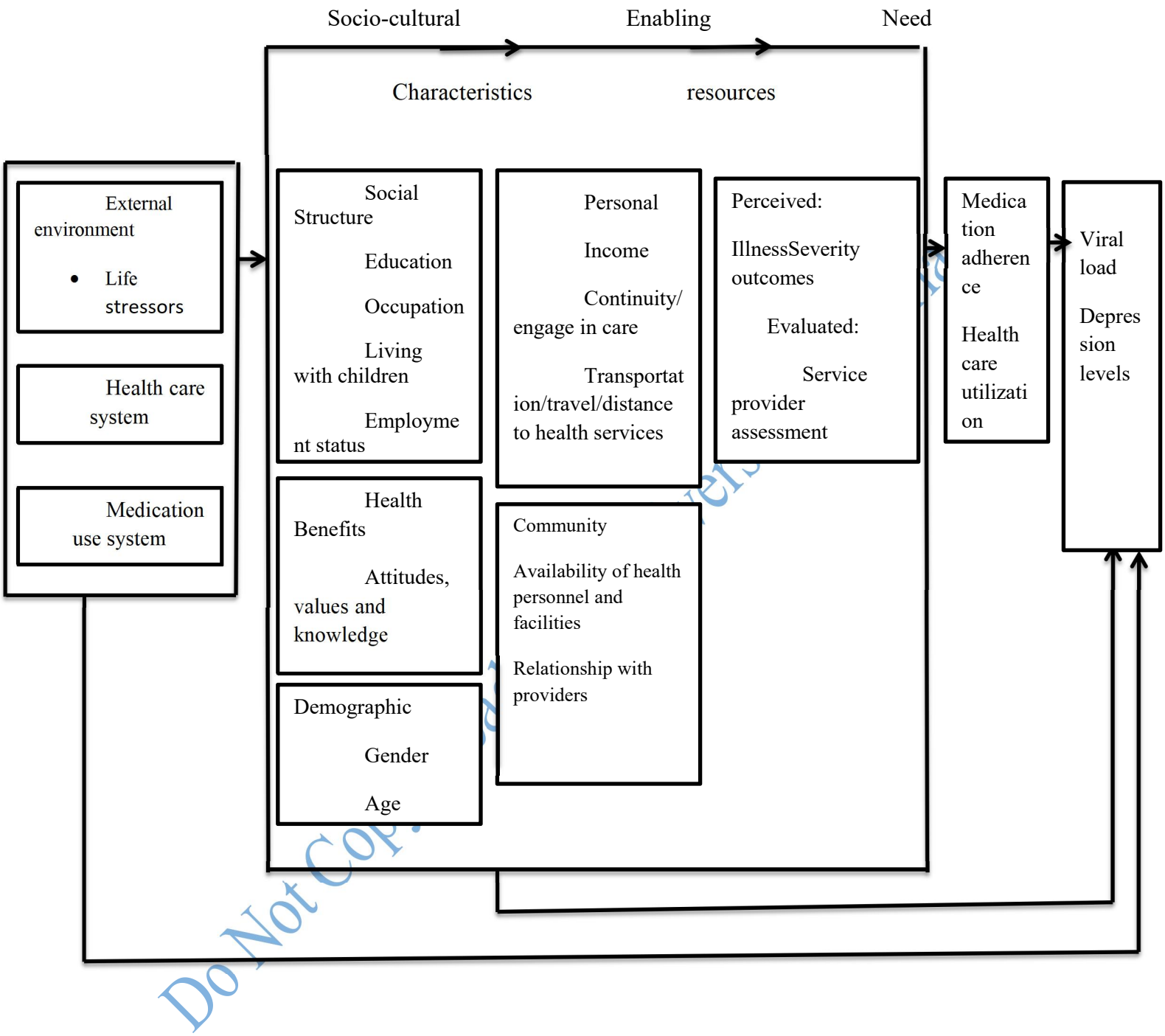

Fig 2.4: Conceptual Framework for Depression and Adherence Modified from Andersen Newman Framework

Source [104]

2.5 Summary of Gaps in Literature Reviewed

HIV medication improves PLHIVs' quality of life, lowers their risk of transmitting the virus to others, and lowers mortality and morbidity. Nigeria accepted the most recent World Health Organization test-and-treat guidelines and the unified recommendations for the use of antiretroviral therapy (ART) for the treatment and prevention of HIV. People with HIV may experience worse health outcomes due to depression, which can exacerbate existing disease states. Depression has been associated with higher HIV viral loads, lower CD4 cell counts, an accelerated progression to AIDS, and an increased risk of death. The theoretical framework used to guide this study is the Modified Andersen-Newman Framework, which provides the fundamental guidelines for comprehending the perceptions and problems related to ART adherence and depression.

A conceptual framework can be used to summarize the patient, socioeconomic, health service, and clinical characteristics factors, factors that affect adherence to anti-retroviral therapy identified in the preceding literature review (Figure 2.4). The conceptual underpinnings of the current study are these interrelated factors which lead to patients' poor adherence to anti-retroviral therapy. The goal of this study was to create a conceptual framework (HBM) that would allow study participants to communicate their personal stories and offer suggestions for improving their adherence to antiretroviral therapy. Understanding the difficulties patients have taking their ART was also essential because doing so will help researchers come up with solutions to overcome these obstacles and increase adherence to ART. Therefore, this study aimed to fill in the knowledge gap on the impact of depression on ART adherence and contribute to the provision of the necessary information on how to address it. Therefore, the goal of this study was to investigate suggestions for increasing ART adherence among HIV-positive women.

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Chapter Three

Methodology

3.1 Research Design

A cross-sectional study was adopted to examine depressive symptoms and ART adherence among women living with HIV in Ibadan, Nigeria.

3.2 Study Site

Nigeria is divided into 36 states and the Federal Capital Territory (FCT), covering a total land area of about 923,768 square kilometres. It is the most populated country in sub-Saharan Africa, the 10th most populous nation in the world, and the 15th largest nation by geographical area in all of Africa. According to projections, Nigeria's population will increase from more than 186 million in 2016 to 392 million in 2050, ranking it as the fourth most populated nation on Earth. Nigeria's strong birth rate and population momentum will ensure that its continued high population growth rate lasts for the foreseeable future. The anticipated 214,028,302 population were reached in July 2020; however, the population growth rate has slowed from 3.2% in 2006 to 2.53% in 2020[1]. According to figures from 2012, urban regions were home to 51.2% of the world's population, a rise from 2.2% in 2006 and 3.5% in 2012[1]. Age distribution in the population suggests that Nigeria has a young population. The economically active population, or those aged between 15 and 64, made up 55% of the population in 2021, according to the National Bureau of Statistics (NBS), while those 65 years of age and over made up 3.3%[1]. The NBS report also reveals that 71% of people are living in poverty[2].

The capital and largest city of Oyo State in Nigeria in Ibadan. With a population of 3,649,000 as of 2021 and more than 6 million people living in its metropolitan area, it is the third-largest city in Nigeria by population, after Lagos and Kano. By area, it is the biggest city in the nation. Ibadan was the biggest and most populated metropolis in Nigeria and the second-most populous city in all of Africa in 1960, behind Cairo. Ibadan is a city in southwest Nigeria, 128 miles (80

kilometres) inland from Lagos and 530 miles (330 kilometres) southwest of Abuja, the nation's capital. It serves as a crucial hub for travel between the country's heartland and coastal districts. Since the early days of the British colonial administration, Ibadan had served as the administrative hub of the former Western Region. Today, some of the city's historic protective walls still survive[3].

Eleven Local Governments make up the Ibadan Metropolitan Area, including six Semi-Urban Local Governments in the less populated area and five Urban Local Governments in the city. The third tier of government in Nigeria is currently represented by local governments, which were entities established by the military regimes but recognized by the constitution of 1999. The Executive Arm of local government councils is made up of the Executive Chairman, Vice Chairman, Secretary, and Supervisory Councilors[4].

3.2.1 Study Location

This study was conducted in HIV treatment centres in the Ibadan metropolis, Oyo State. The study sites are treatment centres where study participants have access to care and offer comprehensive HIV care, including ART and the selected centres have the most numbers of potentials respondents in the metropolis.

1. Adeoyo Maternity Health Centre, Yemetu
2. St Mary Catholic Hospital, Eleta
3. Adeoyo State Hospital, Ringroad and
4. St Annes Anglican Hospital, Molete

3.2.3 Population of the Study

This is the complete group of individuals, people, or things that the researcher has identified as being of interest[6].The study population for this study was made up of all adult (18 years and older) women who were receiving ART health care services in Ibadan, Nigeria.

Inclusion Criteria

Female adults who are HIV-positive (18 years of age and older), who have been receiving ART for at least three months and who have given their consent to participate in the trial.

Exclusion Criteria

Female adults who are HIV positive and who are not on ART for at least three months at the time of study and also those that do not consent to the study will be excluded.

3.3 Sample and Sampling Method/Technique

A purposive sampling method was adopted in selecting the health facilities because ART treatment is not available in all health facilities. The participants for the study were randomly selected from each of the health facilities. Study participants were selected by random sampling technique with the replacement daily appointment list of all female clients who have been on ART for at least 3 months.

When determining the sample size for descriptive studies with populations bigger than 10,000, Fishers' formula was used to establish the minimum sample size. The following variables were taken into account when calculating the sample size for this study[5]:

- Estimated population of women living with HIV in Ibadan
- A standard normal deviate of 1.96,

❖ 95% confidence interval

❖ The acceptable margin of error is 5%.

Based on Fisher's formula, that is

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

Where: n - minimum sample size required

d - Is the margin of error 5%

z - Confidence level 95%

p - The estimated proportion of depressive symptoms among women living with HIV,56.2% [6]

$$n = \frac{(1.96)^2 * 0.562(1- 0.562)}{(0.050)^2}$$

$$n = \frac{3.8416 * 0.56*0.44}{0.0025}$$

$$n = \frac{0.947}{0.0025}$$

n = 379

Correcting for a possible non-response rate of 10%, the final calculation was 316/0.9 = **421**

So, a total of 404 women living with HIV were interviewed.

3.4 Description of the Research Instrument

There are numerous approaches to gathering the necessary data, and they vary greatly in terms of cost, duration, and additional tools at the researcher's disposal, such as questionnaires[7].

A structured questionnaire comprising closed-ended questions was used to collect the data. When questions were posed in languages that participants could understand utilizing a face-to-face method (interview administered), a questionnaire schedule was employed.

Each potential client was given an explanation of the study's plan and privacy-preserving techniques. The interviewer delivered a summary outlining the benefits and hazards to each participant, along with a choice to give consent or decline.

The depressive symptoms were measured using the short form of the Center for Epidemiologic Studies Depression Scale[8]. The CESD-10 was validated in the South African population. [9] The short form of CES-D is a 10-item widely used self-report instrument designed to measure depressive symptomatology. The CES-D emphasizes the affective component of depressive symptomatology, namely depressed mood. It contains 10 items asking about the frequency with which participants experienced a number of depressive symptoms over the past week, including feeling bored, feeling blue, feeling hopeless, feeling fearful, feeling unhappy, feeling lonely, a lack of concentration, lack of passion for work, having difficulty in doing things, and experiencing sleep disturbances. At baseline and at each follow-up, a mean score was computed for the scale, and a higher score indicated higher levels of depression. The reliability of the measures was satisfactory, with Cronbach's ranging from 0.69 to 0.89 across the waves.

Each item comprises a Likert scale ranging from 0 to 3, and 1 added to be No and 2 and 3 added to be Yes. A total score for the 10 items is obtained, with the lowest possible score being 0 and

the highest possible score is 30. Any score equal to or above 10 is considered depressive (high depressive symptoms).

ART Adherence was measured using SMAQ (Simplified Medication Adherence Questionnaire). SMAQ is a validated instrument which consists of six question[9]: 1. Do you ever forget to take your medicine? 2. Are you careless at times about taking your medicine? 3. If, at times, you feel worse, do you stop taking your medicine? 4. Did you not take any of your medicine over the last weekend? 5.Thinking about the last week. How often have you not taken your medicine? 6. Over the past 3 months, how many days have you not taken any medicine at all?

A patient is considered to be non-adherent if one or more of the four first questions were answered YES if the participants missed more than 2 days without medication during the past 3 months[9].

Patient's viral load and clinical characteristics were obtained from patients' folders

The study instrument used to measure the barriers and facilitators of ART adherence was adopted from the ACTG Adherence Follow-Up Questionnaire (ACTG), and the reliability of the measures was satisfactory with Cronbach's 0.89 across the waves [12].

3.5 Validity and Reliability of Simplified Modified Adherence Questionnaire

The SMAQ is one of the self-report questionnaires which is increasingly used globally to assess adherence to ART and non-HIV-related medications. SMAQ is a validated instrument which consists of six questions: 1. Do you ever forget to take your medicine? 2. Are you careless at times about taking your medicine? 3. If, at times, you feel worse, do you stop taking your medicine? 4. Did you not take any of your medicine over the last weekend? 5.Thinking about the last week. How often have you not taken your medicine? 6. Over the past 3 months, how many days have you not taken any medicine at all?

Adherence was scored as a "no" response to questions 1, 2, 3 and 5, zero response for question 4 and any response less than 2 for question 6. The six questions/items constituted the un-dimensional model for the measurement of adherence. The six questions assess three components of adherence to ART: intentional (question three), unintentional (questions one and two) and frequency or quantity (questions 4, 5 and 6). Intentional non-adherence refers to when a patient deliberately decides not to take their medication because of various reasons, for example, feeling worse. In contrast, unintentional non-adherence occurs when a patient wishes to adhere to medication but is prevented by some reason. Questions four to six assess various aspects of the frequency of non-adherence.

Values of α in the range of 0.6 to 0.8 ($0.6 \leq \alpha \leq 0.8$) are considered adequate, while 0.8 or higher is considered a high value of internal consistency. Based on thresholds from previous studies, correlation coefficients less than or equal to 0.25 suggest a weak relationship. Those between 0.25 and 0.50 have a moderate relationship. Those between 0.50 and 0.75 have a strong relationship and values greater than 0.75 have a very strong correlation

Cronbach's alphas for the six items of the SMAQ were 0.66, 0.68, 0.75 and 0.75. Pearson correlation coefficients were 0.78, 0.49, 0.52, 0.48, 0.76 and 0.80 for items 1 to 6, respectively, which shows the study instrument to be reliable and valid[9].

3.6 Validity and Reliability Center for Epidemiologic Studies Depression Scale

The short form of CES-D is a 10-item widely used self-report instrument designed to measure depressive symptomatology. The CES-D-10 is a 10-item Likert scale questionnaire assessing depressive symptoms in the past week. It includes three items on depressed affect, five items on somatic symptoms, and two on positive affect. Options for each item range from "rarely or none of the time" (score of 0) to "all of the time" (score of 3). Scoring is reversed for items 5 and 8, which are positive affect statements. Total scores can range from 0 to 30. Higher scores suggest a greater severity of symptoms.

The psychometric properties of the CESD-10 derived were: 84.6 % sensitivity (correctly identifying true cases), 84 % specificity (correctly identifying people without the condition), correctly classifying 84.1%and 53.7 % positive predictive value (proportion of respondents scoring positive in the test who had a mental disorder diagnosed by study)[10].

3.7 Administration of Research Instrument and Methods of Data Collection

The two instruments, the Center for Epidemiologic Studies Depression Scale Simplified Modified Adherence Questionnaire, were administered to the study participants in the form of a self-report questionnaire.

Data on fundamental characteristics, psychological traits, and adherence to ART were gathered. The study team helps those with low literacy levels by reading out the questions and guiding them as they fill in their answers. Gender, age, educational background, and partner status were listed as basic qualities.

Depressive symptoms were one of the psychosocial qualities mentioned. Information on adherence to ART was collected by multiple-choice questions and included answers to the following: current status for taking ART, time since starting ART, three-day adherence to ART,

and reasons for missing their drug intake. A question regarding the causes of adherence difficulties was posed.

An introduction letter and ethical approval were given to the Chief Medical Officer of each ART centre before proceeding to collect data. Data collection took place between July to August 2022. After the approval, the study plan and methods for maintaining privacy were explained to each client. This was done to increase efficiency and privacy during data collection. The selected participants were those who voluntarily consented to participate. The Research Assistants translated the questionnaires into the language participants understood, Yoruba, for ease of communication. The participants were for sampling at the facilities during the health talk hour, which usually occurs 8-9 am, which is compulsory for all patients visiting the ART clinic to refill their medications. During the health talk, the study aims, eligibility criteria, confidentiality and benefits of the study were explained to the patients by the nurses. The patients were presented with the informed consent to sign.

3.8 Data Analysis

- Data collected with the questionnaires were crosschecked for errors and cleaned.
- Information obtained from the questionnaire was entered into Statistical Package for Social Sciences (SPSS) version 28.0 for analysis and statistical calculation.
- Descriptive Statistics: Socio-demographic characteristics, clinical and behavioural characteristics for all respondents, ART adherence and depressive symptoms

- ❖ Chi square: to ascertain the association of independent depressive symptoms and ART adherence accordingly. Significance was set at a 5% alpha level. Also to ascertain the association between the facilitators and barriers and ART adherence.

- ❖ Logistic regression was done to ascertain the factors of ART adherence.

3.9 **Ethical Approval and Consideration**

Ethical approval for this study was obtained from the University Research Ethics Committee (HREC) of Lead City University, Ibadan, Oyo State (LUC-REC/22/128), and Oyo State Ministry of Health Department of Planning Research & Statistics Division (AD 13/479/ 44537^{B}). Official permission was obtained from hospitals included in this study. An information statement was provided to all participants prior to obtaining informed verbal consent. To ensure informed verbal consent from participants, the information statement was read in the local language, Yoruba. The Study contained women who had formal education and women with no formal education, so informed verbal consent was more appropriate and was approved by both ethics committees. In addition, it was a survey, and the research involved no more than low risk. Participants were given the opportunity to ask questions prior to the interview. The consent procedure took place in a separate private room by a trained data collector after WLHIV had finished their routine clinical care appointment. Participants were informed that their participation was voluntary and that they were free to decline participation or withdraw their consent at any time. It was made clear that participation in this study had no bearing on their receipt of clinical care. The participants were also informed that the survey involved some questions that they might find embarrassing or too personal. Further, participants were informed

that they did not have to answer any question that they did not feel comfortable with, and they could withdraw at any time or simply choose not to answer a particular question. Female nurses were prepared to provide psychological support if the need arose. Anonymized data were stored on password-protected Laptops during data collection. Data were stored on secure and password-protected computers.

Endnotes

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Chapter Four

Results and Discussion of Findings

A total of 420 women living with HIV consented to be interviewed, out of which 5 did not have information on their viral load test. Also, it was observed during the data cleaning process that 11 out of the remaining 415 had incomplete questionnaires. Thus, 16 participants were excluded leaving a total of 404 subjects entered into the analysis.

4.1 Socio-Demographic Characteristics of Participants

Table 4.1 shows that the mean age of the participants was 40.72 ± 9.70. Most of them were married (78.5%), had a spouse (78.7 %), were part of the Yoruba ethnic group (86.6%), Christians (55.4%), had received at least secondary education (43.8%) and were employed (73.8%). Most of their monthly income was less than <20,000 (43.8%).

Table 4. 1: Socio-Demographic Characteristics of Respondents

Variables	Frequency	Percent (%)
Age (n = 404)	404	
Mean ± SD	40.72 ± 9.70	
Marital Status (n = 404)		
Married	317	78.5
Divorce	7	1.5
Widowed	41	10.1
Separated	17	4.2
Single	22	5.4
Ethnic Group (n = 404)		
Yoruba	350	86.6
Igbo	40	9.9
Hausa	11	2.7
Others	3	0.7
Religion (n = 404)		

Christianity	224	55.4
Islam	180	44.6
Others	0	0
Educational Level (n =404)		
Primary level	118	29.2
Secondary level	177	43.8
Tertiary level	68	16.8
None	41	10.1
Employment Status		
Unemployed	106	26.2
Employed	298	73.8
Type of Partner		
Spouse	318	78.7
Steady	24	5.9
Causal	23	5.7
None	39	9.7
What Is Your Monthly Income		
<20,000	177	43.8
20,000 – 30,000	100	24.8
31,000 – 40,000	66	16.3
41,000 – 50,000	44	10.9
>51,000	17	4.2

Source: Field Survey 2022

4.1.1 Clinical Characteristics of Participants

Table 4.2 shows that 237 (58.7 %) of the participants have been on Antiretroviral Therapy for at least 1 to 5 years, 363 (89.9 %) of them had undetected viral load.) and 363 (89.9%) had an undetectable viral load, and just 9.9 % of them has been diagnosed of hypertension.

Table 4.2 Clinical Characteristics of Participants

Variable	Frequency	Percent (%)
Art Duration		
< 1 year	17	4.2
1 to 5 years	237	58.7
6 to 10 years	106	26.2
>10 years	44	10.9
Viral Load		
Target Not Detectable (TND)	27	6.7
Detectable (>75 copies/ml)	14	3.5
Undetectable (20 to 75 copies/ml)	363	89.9
Diagnosis of Hypertension		
Yes	40	9.9
No	364	90.1

Source: Field Survey 2022

4.1.2: Behavioral Characteristics of Participants

Table 4.3 shows that 358 (88.6 %) of the participants had never consumed alcohol before, 396 (98 %) of them had never smoked before, 271 (67.1 %) had disclosed their status to their partner, and 304 (75.2%) know their partner status

Table 4.3: Behavioral characteristics of participants.

Variable	Frequency	Percent (%)
Alcohol Consumption		
Yes, Currently	13	3.2
Yes, Stopped	33	8.2
Never	358	88.6
Ever Smoked		
Yes	8	2.0
No	396	98.0
Status Disclosure		
Yes	271	67.1
No	133	32.9
Know Partner Status		
Yes	304	75.2
No	70	17.3
Not Applicable	30	7.4

Source: Field Survey 2022

4.2 Presentation of Data

4.2.1 **Research Question One:** The level of depressive symptoms among women living with HIV in Ibadan, Nigeria

Table 4.4 shows the various depressive symptoms among women living with HIV; most of the participants were usually bothered by things that do not usually bother them (86.6), had trouble keeping their mind on what they were doing (83.7), were depressed (51%), felt thing they did was an effort (63.9%), felt hopeful about the future (55.7%) and fearful (60.6%). 46.8 % were restless, 42.8% were happy, 45.3% felt lonely, and 46.8 % could not get going.

Table 4.4 Depression Symptoms among Women Living with HIV

Variable	Frequency	Percent (%)
I Was Bothered by Things That Usually Do not Bother Me.		
Yes	350	86.6
No	54	13.4
I Had Trouble Keeping My Mind on What I Was Doing.		
Yes	338	83.7
No	66	17.3
I Felt Depressed		
Yes	206	51
No	198	49
I Felt That Everything		

I Did Was an Effort.

Yes	258	63.9
No	146	37.1
I Felt Hopeful about the Future		
Yes	225	55.7
No	179	44.3
I Felt Fearful		
Yes	245	60.6
No	159	39.4
My Sleep Was Restless		
Yes	189	46.8
No	215	53.2
I Was Happy		
Yes	173	42.8
No	231	57.2
I Felt Lonely		
Yes	183	45.3
No	221	54.7
I Could Not "Get Going"		
Yes	189	46.8
No	215	53.2

Source: Field Survey 2022

4.2.2 Level of Depression

Each item comprises a Likert scale ranging from 0 to 3. 0 and 1 are added to be. No, and 2, and 3 are added to be Yes. A total score for the 10 items is obtained, with the lowest possible score being 0 and the highest possible score being 30. Any score equal to or above 10 is considered depressive (high depressive symptoms).

The table below shows that 71.5% of the participants showed high depressive symptoms, and 28.5% showed low depressive symptoms.

Table 4.3: Level of Depression among Women Living with HIV

Level Of Depression	Frequency	Percent (%)
Low Depressive Symptoms	115	28.5
High Depressive Symptoms	289	71.5

Source: Field Survey 2022

Table 4.4: Bivariate Analysis of Demographic Characteristics and Depressive Symptoms among Women Living with HIV

The table below showed that monthly income, body mass index, number of children after HIV diagnosis, receiving standard ART service and alcohol consumption all showed significant associations with high depressive symptoms.

Variable	Low Depressive Symptoms (n=115)	High Depressive Symptoms (n= 289)	P-Value
Religion			
Christianity	66(28.2)	158(71.8)	0.620
Muslim	49(27.2)	131(72.8)	
Tribe			
Yoruba	105(30)	245(70)	0.260
Igbo	6(15)	34(85)	
Hausa	3(27.3)	8(72.7)	
Others	1(33.3)	2(66.7)	
Educational Level			
Primary	28(23.7)	90(76.3)	0.377
Secondary	58(32.8)	119(67.2)	
Tertiary	18(26.5)	50(73.5)	
None	11(26.8)	30(73.2)	
Marital Status			
Married	89(23)	298(77)	0.390
Divorce	2(28.6)	5(71.4)	
Widowed	15(36.3)	26(63.4)	
Separated	6(35.3)	11(64.7)	
Single	3(13.6)	19(86.4)	
Type Of Partner			
Spouse	90(28.3)	228(71.7)	0.981
Steady	7(29.2)	17(70.8)	
Casual	6(26.1)	17(73.9)	
None	12(30.8)	27(69.2)	
Employment Status			
Unemployed	32(30.2)	74(69.8)	0.647
Employed	83(27.8)	216(72.2)	
Monthly Income			
<20,000	43(24.3)	134(75.7)	0.064
20,000 to 30,000	25(25)	75(75)	
31,000 to 40,000	26(39.4)	40(60.6)	
41,000 to 50,000	13(29.5)	31(70.5)	
>51,000	8(47.1)	9(52.9)	
ART Duration			
< 1 year	6(35.3)	11(64.7)	0.542
1 to 5years	63(26.6)	174(73.4)	
6 to 10 years	30(28.3)	76(71.7)	
> 10 years	16(94.2)	1(5.8)	
Viral Load			
Detectable	7(50)	7(50)	0.187
TND	8(29.7)	19(70.3)	
Undetectable	100(27.5)	263(72.5)	

Hypertension Diagnosis			
Yes	9(22.5)	31(77.5)	0.378
No	106(29.1)	258(70.9)	
Number of Children After HIV Diagnosis			
0	62(24.2)	192(75.6)	0.042*
1	38(34.9)	71(65.1)	
2	7(29.2)	17(70.8)	
3	4(36.4)	7(63.6)	
4	4(80)	1(20)	
5	0(0)	1(100)	
Alcohol Consumption			
Yes, Currently	2(15.4)	11(84.6)	0.047*
Yes, Stopped	4(12.1)	29(87.9)	
Never	109(30.4)	249(69.6)	
Ever Smoked			
Yes	3(12)	22(88)	0.060
No	112(28.1)	287(71.9)	
Do You Pay for Services At The Health Facility			
Yes	2(16.2)	10(83.3)	0.069
No	19(4.8)	373(95.2)	
Receiving Standard ART Service			
Yes	19(4.8)	378(95.2)	0.005*
No	2(28.6)	5(71.4)	
Status Disclosure			
Yes	72(26.6)	199(73.4)	0.228
No	43(37.1)	90(62.9)	
Receives Adequate Support			
Yes	90(32.1)	190(67.9)	0.014*
No	15(13.2)	99(86.8)	

Source: Field Survey 2022

4.2.2 Research Question Two: The level of adherence among Women Living with HIV in Ibadan, Nigeria?

The six questions below were used to test for adherence among the participants.

4.2.2 Level of ART Adherence among Women Living with HIV

Variable	Frequency	Percent%
Do you ever forget to take your medicine in the last 3 days?		
Yes	0	0
No	404	100
Are you careless at times about taking your medicine?		
Yes	13	3.2
No	391	96.8
If, at times, you feel worse, do you stop taking your medicine?		
Yes	0	0
No	404	100
Thinking about the last week. How often have you not taken your medicine?		
Never	383	94.8
1-2times	21	5.2
3-5times	0	0
6-10times	0	0
Did you not take any of your medicine over the last weekend?		
Yes	0	0
No	404	100
Over the past 3 months, how many days have you not taken any medicine at all?		
<2	387	95.8
>2	17	4.2

Source: Field Survey 2022

Level of Adherence

A patient is considered to be non-adherent if one or more of the four first questions are answered. YES, if the participants missed more than 2 days without medication during the past 3 months. Table 4.5.1 shows that among women living with HIV in Ibadan 94.8% adhere to antiretroviral therapy.

Table 4.5.1: ART Adherence among Women Living with HIV

Variable	Frequency	Percent%
Adherence		
Adherence	383	94.8
Non-Adherent	21	5.2

Source: Field Survey 2022

Bivariate Analysis of Demographic Characteristics and Adherence among Women Living with HIV

Table 4.2.3 shows a bivariate analysis of socio-demographic, clinical and behavioural factors and adherence to ART among women living with HIV. The study observed that 213 (95%) Christians and 170 (94,4%) Muslims had optimal adherence, while 11 (5%) Christians of WLWHIV and 10 (95.6%) had sub-optimal adherence to ART (P,0.878) which shows no

significant association between religion and adherence to ART among WLWHIV. 331 (94.5%) of the Yoruba tribe,38 (95%) of the Igbo tribe, all of Hausa and Other tribes had optimal adherence, while 19 (95.5%) of the Yoruba tribe, 2 (5%) and none of the Hausa and Other tribes had sub-optimal adherence to ART (P,0,847) which shows no significant association between Ethnic groups and adherence to ART. Respondents who are married show 94.3% (299), 97.6 %(40) of those are widowed, 88.2%(15) all of those that had divorced and single optimal adherence to ART while5.7%(18) of those that are married, 2.4%(10 of those that are widowed, 11.8%92) of those that are separated and none of the those that are separated or single had sub-optimal adherence to adherence to ART (P,0.425) which also shows no significant association between marital status and adherence to ART.

The study shows that women who have a spouse 94.3%(300), those that had a casual relationship 95.7% (22), those without a partner 94.8% (37), and all with a steady partner have optimal adherence with no ART meanwhile 5.7%(18), those with casual partners 4.3%(1) and those with no partner 5.2%(2) have sub-optimal adherence to ART.(P,0.685) which indicate no significant association between type of partner and adherence to ART. 98% (97) of participants who were unemployed and 96%(286) who were employed had optimal adherence to ART, while 2%(9) who were unemployed and 4%(12) who were employed had sub-optimal adherence to ART with a P value 0.075 which show a significant association between employment status and adherence to ART. It was revealed that women living with HIV whose income is below <20,000 had 92.7% (164) optimal adherence and 7.3% (13) sub-optimal adherence, those whose income is between 20,000 to 30,000 had 95% (95) optimal adherence and 5% (5) sub-optimal adherence, those whose income is between 31,000 to 40,000 had 94.5% (65) optimal adherence and 5.5% (1) sub-optimal adherence, those whose income is between 41,000 to 50,000 had 97.7% (43) optimal

adherence and 2.3% (1) sub-optimal adherence while those whose income was greater than 50,000 had 94.1% (16) optimal adherence and 5.9% (1) sub-optimal adherence (P value 0.372) which means a no significant association between monthly income and ART adherence.

The p-value of the duration of ART and adherence to ART is 0.605; the Blood pressure is 0.750. The viral load is 0.891, the body mass index happened to be 0.288, the number of children after HIV status is 0.174, the distance of health facility to their home is 0.2886, payment of services is 0.069, the status disclosure is 0.967, and that is receiving adequate support is 0.829 all shows a non-significant association them to adherence to antiretroviral therapy.

Receiving standard ART service (p-value 0.005), depression among WLWHIV (P value 0.048), alcohol consumption (P value 0.000) and smoking among WLWHIV (P value 0.000) all show a significant association between them and adherence to antiretroviral therapy.

Table 4.2.3 **Bivariate Analysis of Demographic Characteristics and Adherence among Women Living with HIV**

Variable	Adherent (n=21)	Non-Adherent(n=383)	P-Value
Religion			
Christianity	11(5%)	213(95%)	0.878
Muslim	10(95.6%)	170(94.4)	
Tribe			

Yoruba	19(95.5%)	331(94.5%)	0.847
Igbo	2(5%)	38(95%)	
Hausa	0(0%)	11(100%)	
Others	0(0%)	3(100%)	
Educational Level			
Primary	7(6%)	111(94%)	0.311
Secondary	12(6.8%)	165(93.2)	
Tertiary	1(1.5%)	67(98.5%)	
None	1(2.4%)	40(97.6)	
Marital Status			
Married	18(5.7%)	299(94.3%)	0.425
Divorce	0(0%)	7(100%)	
Widowed	1(2.4%)	40(97.6)	
Separated	2(11.8%)	15(88.2%)	
Single	0(0%)	229100%)	
Type of Partner			
Spouse	18(5.7%)	300(94.3%)	0.685
Steady	0(0%)	24(100%)	
Casual	1(4.3%)	22(95.7%)	
None	2(5.2%)	37(94.8%)	
Employment Status			
Unemployed	9(2%)	97(98%)	0.075
Employed	12(4%)	286(96%)	
Monthly Income			
<20,000	13(7.3%)	164(92.7)	0.372
20,000 to 30,000	5(5%)	95(95%)	
31,000 to 40,000	1(5.5%)	65(94.5%)	
41,000 to 50,000	1(2.3%)	43(97.7%)	
>51,000	1(5.9%)	16(94.1%)	
ART Duration			
< 1 year	0(0%)	17(100%)	0.605
1 to 5years	14(5.9%)	223(94.1)	
6 to 10 years	4(3.8%)	102(96.2%)	
> 10 years	3(6.9%)	41(93.1%)	
Blood Pressure			
Normal BP	16(4.7%)	323(95.3%)	0.750
Elevate BP	2(8.3%)	22(91.7%)	
High BP	1(5.6%)	17(94.4%)	
Hypertensive	2(8.7%)	21(91.3%)	
Viral Load			
Detectable	1(7.1%)	13(92.9%)	0.891
TND	1(3.7%)	26(96.3%)	
Undetectable	19(5.2%)	344(94.8%)	
Hypertension			

Diagnosis			
Yes	69(15%)	34(85%)	0.003*
No	15(4.1%)	349(95.9)	
Number of Children After HIV Diagnosis			
0	9(3.6%)	245(96.4%)	0.174
1	11(10.1%)	98(89.9%)	
2	1(4.2%)	23(95.8%)	
3	0(0%)	11(100%)	
4	0(0%)	5(100%)	
5	0(0%)	1(100%)	
Depression			
Low Depressive Symptoms	2(1.7%)	113(98.3%)	0.048*
High Depressive Symptoms	19(6.7%0	270(93.4%)	
Alcohol Consumption			
Yes, Currently	0(0%)	13(100%)	0.000*
Yes, Stopped	10(31.3%)	23(69.7%)	
Never	11(3.1%)	347(96.9%)	
Ever Smoked			
Yes	6(24%)	19(76%)	0.000*
No	15(4%)	364(96%)	
How Far Is Health Facility from Your Home			
0.5 to 1 km	6(8.6%)	64(91.4%)	0.286
2 to 3 km	9(5.4%)	158(94.6%)	
4 to 5 km	6(3.6%)	161(96.4%)	
Do You Pay for Services at The Health Facility			
Yes	2(16.7%)	10(83.3%)	0.069
No	19(4.8%)	373(95.2%)	
Receiving Standard ART Service			
Yes	19(4.8%)	378(95.2%)	0.005*
No	2(29.6%)	5(71.4%)	

Status Disclosure			
Yes	14(5.2%)	257(94.8%)	0.967
No	7(5.3%)	126(94.7%)	
Receives Adequate Support			
Yes	15(5.4%)	265(94.6%)	0.829
No	6(4.8%)	118(95.2%)	

Source: Field Survey 2022

Research Question Three: The barriers and facilitators to adherence to ART among Women Living with HIV in Ibadan, Nigeria

Barriers to ART Adherence

The reasons for WLWHIV not adhering to prescribed medication among the participants (n= 101) that missed taking medication were assessed. The study found that being busy, fear of side

effects, fear of toxic effects, being depressed, specific time use of drugs and unavailability to refill medications were the major reasons for most of them been non adhering to their medications.

So, therefore, the psychosocial factors of being busy (p=0.019), fear of side effects (p=0.022), fear of toxic effects (p=0.020), being depressed (p=0.028), specific time use of drugs (p=0.000) and unavailability to refill drug (p=0.027) show significant association to ART adherence and are main reasons participants did not adhere to their medications.

Table 4.6: Respondent Reasons for Miss Medication

Variable	No (%)	Yes (%)	P-Value
Were you away from home?	75(74.3)	26(25.7)	0.342
Were you busy with other things?	58(57.4)	43(42.6)	0.019*
Simply forgot?	60(59.4)	41(40.6)	0.135

Had too many pills to take?	84(69.4)	17(30.6)	0.145
Want to avoid side effects?	73(72.3)	28(27.7)	0.022*
Did not want others to notice taking medications?	72(71.3)	29(28.7)	0.250
Had a change in daily routine?	71(70.3)	30(29.7)	0.248
Feel like the drug was toxic/ harmful?	82(81.2)	19(18.8)	0.020*
Fell asleep / slept through dose time?	75(74.3)	26(25.7)	0.162
Felt depressed / overwhelmed?	76(75.2)	25(24.8)	0.028*
Felt sick or ill?	68(67.3)	33(32.7)	0.107
Had problems taking pills at specified times (with meals, on an empty stomach, etc.)?	62(61.4)	39(38.6)	0.000*
Run out of pills?	71(70.1)	30(29.9)	0.175
Felt good?	54(53.4)	47(46.6)	0.082
Were discriminated against in a gathering?	62(61.4)	39(38.6)	0.952
Financial unstable?	59(58.4)	42(41.6)	0.336
Were you not attended to well by your healthcare provider?	84(83.2)	17(16.2)	0.397
Unable to refill as a result of distance of clinic?	70(69.3)	31(30.7)	0.027*

Source: Field Survey 2022

4.2.5 Facilitators of ART Adherence

The reasons for adhering to prescribed medication among the participants (n= 303) that did not miss their medication in the past 3 days were assessed. The study found that family support (p=0.000), availability of food (p=0.000), Hospital staff attitude to patients (p=0.000), and their desire to live (p=0.000) show significant association to ART adherence, and these are the main facilitators to ART adherence among women living with HIV.

Table 4.7: Patients facilitators to art adherence

Variable	Yes (%)	No (%)	P-Value
Questions			
Family support (husband/wife/children)	262(86.5)	41(13.5)	0.000*
Dependent on treatment support group	274(90.4)	29(9.6)	0.092
Availability of food	275(90.8)	28(9.2)	0.000*
The hospital staff treated me kindly and compassion	275(90.8)	28(9.2)	0.000*
Having a business/ employment	289(95.4)	14(4.6)	0.114
Calls reminders from hospital staff	290(95.7)	13(4.3)	0.293
Using adherence reminders (alarm clock/taking pills apps)	281(92.7)	22(7.3)	0.660
The desire to live	220(72.6)	83(27.4)	0.000*

Source: Field Survey 2022

Research Question Four: The association between depression and adequate ART adherence among Women Living with HIV in Ibadan, Nigeria

The table below shows a p-value of 0.048 shows that there is a significant association between depressive symptoms and adherence to ART. Those with low depressive symptoms are 0.252 times more likely to have optimal adherence compared to those that have high depressive symptoms

Table 4.8: Association between depression and ART adherence

Depression	Adherent	Non-Adherent	Odd Ratio (95% CI)	P value
Low Depressive Symptoms	2(1.7%)	113(98.38)	0.252(0.58,1.09	0.048 *
High Depressive Symptoms	19(6.7%)	270(93.4%)		

Source: Field Survey 2022

Research Question Five: The factors influencing adherence behaviour among Women Living with HIV in Ibadan, Nigeria

The table 4.9 below shows a positively statistically significant association was found between status disclosure and adherence participants that have disclosed their status to their partner are 4.5 times more likely to adhere to their medication compared to those that haven't (OR=4.56;95% CI=1.0,20.643, p =0.049). The study also shows a significant positive association between depression and adherence to ART among the participants, such that those that are not depressed are 0.134 times more likely to adhere to their medication than those that are depressed (OR=0.134;95% CI=0.019,0.964, p =0.046).

Receiving standard ART service (OR=1.750;95%CI 0.080-38.469, p=0.005), Alcohol consumption (OR=1.7500;95% CI=0.80-38.469, P = 0.000) and smoking among WLWHIV (OR=0.130 95% CI=0.046-3.774, P=0.000) all show a significant association between them and adherence to antiretroviral therapy.

However, no statistically significant association was found between religion (p=0.308); ethnic group (p=0.999;0.999,0.904); educational levels(p=0.670;0.452;0.699); marital status (p=0.998;0.864;0.771;0.998), employment status (p=0.224); monthly income (p=0.960;0.173;0.757;0.808), were not significantly associated with adherence.

Table 4.9: Factors Influencing Adherence Behavior Among Women Living with HIV

Variable	Adjusted Odd Ratio (CI)	P-Value	COR(CI)	P-Value
Depression				
Low Depressive Symptoms	0.134(0.019,0.964)	0.046*	0.228(0.098,0.646)	0.043*
High Depressive Symptoms	Ref		Ref	
Christianity	0.478(0.115,1.979)	0.308		
Muslim	Ref			
Tribe				
Yoruba	0.875(0.101,7.596)	0.904		
Igbo	1017(0.000)	0.999		
Hausa	2232(0.000)	0.999		
Others	Ref			
Educational Level				
Primary	1.369(0.323,5.814)	0.670		
Secondary	3.523(0.132,93.778)	0.452		
Tertiary	1.76(0.132,23.438)	0.669		
None	Ref			
Marital Status				
Married	23133031.177(0.000)	0.998		
Divorce	1.563(0.010,255.175)	0.864		
Widowed	0.458(0.002,87.823)	0.771		
Separated	40587389.930(0.000)	0.998		
Single	Ref			
Type of				

Partner				
Spouse		35584317.742(0		0.
Steady	.000)		998	
Casual		0.217(0.001,36.		0.
None	389)		559	
		0.066(0.000,23.		0.
	484)		365	
		Ref		
Employme nt Status				
Unemploy		2.289(0.602,8.7		0.
ed	08)		224	
Employed		Ref		
Monthly Income				
<20,000		0.958(0.181,5.0		0.
20,000 to	62)		960	
30,000		5.958(0.457,77.		0.
31,000 to	644)		173	
40,000		1.694(0.060,47.		0.
41,000 to	581)		757	
50,000		1.464(0.067,31.		0.
>51,000	977)		808	
		Ref		
Status Disclosure				
Yes		4.560(1.007,20.		0.
No	643)		049*	
		Ref		
Receives Adequate Support				
Yes		0.970(0.226,4.1		0.
No	73)		967	
		Ref		
Hypertensi on Diagnosis				
Yes		0.511(0.077,3.3		0.
No	94)		487	
		Ref		
Alcohol Consumption				
Yes,		0.000(0.000)		0.
Currently		0.000(0.000)		000*
Yes,		Ref		

Stopped			
Never			
Ever Smoked			
Yes	0.130(0.046,3.74)	000*	0.
No	Ref		
How Far Is Health Facility from Your Home			
0.5 to 1 km	3.219(0.588,17.633)	178	0.
2 to 3 km	2.483(0.529,15.272)	223	0.
4 to 5 km	Ref		
Do You Pay for Services At The Health Facility			
Yes	0.247(0.014,4.214)	334	0.
No	Ref		
Receiving Standard ART Service			
Yes	1.750(0.080,38.469)	05*	0.
No	Ref		

Source: Field Survey 2022

4.3 **Discussion of Findings**

Findings from this study revealed that depressive symptoms are high among the participants; the depressive symptoms were high in 71.5% of the participants. This finding is in agreement with a study done in Ethiopia with depressive symptoms to be 76.7% and also similar to a study done in South India with depression at around 51.1% among the women living with HIV[1,2].

Findings from this study show a 95% adherence to ART among the participants, which implies that most of the participants adhere to their treatment and its schedules. This study is in agreement with studies done in China and Zambia, which show an 85.5 % adherence, and this study contradicts low adherence in a study conducted in Nigeria, which shows a level of adherence to be 56.7% [3,4].

Findings from this study show the reasons for WLWHIV not adhering to prescribed medication among the participants (n= 101) that missed taking medication were assessed. The study found that being busy, fear of side effects, fear of toxic effects, depression, specific time use of drug, and unavailability to refill medications were the major reasons for most of them been non adhering to their medications. This study is in agreement with a study conducted in New York. The results identified four overarching themes that affected study participants' efforts to adhere to their ART regimen: medication burden, forgetfulness, mental health and emotional difficulties, and perceived conflict between substance use and medication adherence[4]. Findings from another study revealed that over-dosage (heavy pill burden), fear of stigma and discrimination, cost and access to transportation, lack of understanding of the benefit of taking the medication, economic problems in the household, and lack of nutritional support were the barriers to adherence to ART[6].

Findings from this study also showed family support, availability of food, Hospital staff attitude to patients and their desire to live. This corroborates a study done in Ethiopia. The presence of mobile/wall alarms, the presence of follow-up counselling, improved health of the child, ART clinic setups, and disclosure of HIV serostatus were among the thefacilitators[6].

The study also revealed a significant association between depressive symptoms and adherence to ART(p=0.048). Those with low depressive symptoms are 0.252 times more likely to have optimal adherence compared to those that have high depressive symptoms. This study is in agreement with Thailand; correlation analysis from the study revealed that adherence is significantly associated with internalized shame, access to care, depressive symptoms, and family communication. Based on the multiple logistic regression analysis, depressive symptoms ($p < .03$), access to care ($p < .02$), HIV disclosure ($p < .03$), and family communication ($p < .03$) were significant predictors of adherence. Having depressive symptoms remains a significant barrier to adherence, while access to care, HIV disclosure, and family communication play important positive roles[7].

Findings from this study revealed a positive statistically significant association was found between status disclosure and adherence participants that have disclosed their status to their partner are 4.5 times more likely to adhere to their medication compared to those that haven't (OR=4.56;95% CI=1.0,20.643, p=0.049). The study also shows a significant positive association between depression and adherence to ART among the participants, such that those that are not depressed are 0.134 times more likely to adhere to their medication than those that are depressed (OR=0.134;95% CI=0.019,0.964, p =0.046). Receiving standard ART service (OR=1.750;95%CI 0.080-38.469,p=0.005), Alcohol consumption (OR=1.7500;95% CI=0.80-38.469,P = 0.000) and smoking among WLWHIV (OR=0.130 95% CI=0.046-3.774, P=0.000) all show a significant association between them and adherence to antiretroviral therapy. This study is in agreement with a study conducted in South Africa. There was a significant treatment-by-time interaction for ART adherence (OR = 0.287 [95% CI = 0.507, 0.066]), revealing a 6.4 percentage point increase in ART adherence in South Africa and a 22.3 percentage point decline

in ETAU. Both groups evidenced significant reductions in alcohol use measured using phosphatidyl ethanol (PETH) ($F(2,101) = 4.16$, $p = 0.01$), significantly decreased likelihood of self-reported moderate or severe AOD ($F(2,104) = 7.02$, $p = 0.001$), and significant declines in alcohol use quantity on the timeline follow-back ($F(2,102) = 21.53$, $p < 0.001$). Among individuals using drugs and alcohol, there was a greater reduction in alcohol use quantity in Khanya compared to ETAU over six months ($F(2,31) = 3.28$, $p = 0.05$)[8].

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Chapter Five

Conclusion

5.1. Summary of the Findings

This study examined the level of depressive symptoms and adherence to antiretroviral therapy among women living with HIV (aged 18 years and older and analyzed the factors that constrain

and motivate adherence to ART. This study adopted a cross-sectional survey design which recruited 420 women living with HIV in the selected ART health facilities. The research instrument used were adopted and the name of the instruments are the Simplified Modified Adherence Questionnaire (SMAQ), Short Form of Centre for Epidemiology Studies-Depression scale (CES-D10) and Adherence Follow-Up Questionnaire (ACTG). The data obtained was inputted, and 16 were not used, making it a total of 404 participants in all.

The result of the analysis showed that 71.5% of the participants exhibited high depressive symptoms, and 22% showed low depressive symptoms. Most women living with HIV in Ibadan are probably depressed.95% adherence to antiretroviral therapy among the participants, which implies a high rate of compliance with their treatment regimen. The barriers to adherence to ART were being busy, fear of side effects, fear of toxic effects, being depressed, specific time use of drug and unavailability to refill medications. The facilitators of adherence to ART identified were family support, availability of food, hospital staff attitude to patients and their desire to live A significant association between depression and adherence to antiretroviral therapy, which implies that women living with HIV that show high depressive symptoms are likely not to adhere to their treatment. The factors that showed significant association with adherence to ART were status disclosure, especially to partner, alcohol consumption, receiving standard ART services and depression.

5.2 **Conclusion**

In conclusion, the ART adherence rate among women living with HIV in Ibadan is high, with high virologic suppression. To help patients manage a lifelong adherence to ART, emphasis on the correct use of medication is necessary, and effort should be made to help maintain the

adherence level. Psychosocial factors constrain and motivate adherence to ART; they must be addressed in order to improve adherence among women living with HIV and also among people living with HIV in Nigeria at large.

Depression, according to this study, has a significant association with adherence. Also, there should be efforts that will be put in place to reduce the rate of depressive symptoms among women living with HIV.

5.3 Recommendations

Recommendations from this study are based on findings that emerged during the research.

1. **Psychologist and Counsellors**

Therapists and counsellors should be employed full-time or scheduled for regular visits to all ART centres. These experts will deal with the social and psychological issues that lead to ART patients not taking their medication.

2. **Education and Training**

In order to help patients, overcome their fears and stigmas around ART and mental health treatment, healthcare providers must be properly educated. In order to improve ART adherence in their clinic and decrease depressive symptoms among WLWHIV, this training may cover how to cope with variables that affect adherence, notably depression. As clinicians' communication with HIV patients has a significant impact on the patient's compliance with their drug regimen, there should be a regular workshop teaching them how to enhance their skills.

3. Assessing and Monitoring Adherence

Problems with identifying and monitoring ART patients have arisen due to a subpar clinical environment and a lack of resources in certain areas of the healthcare system. Every ART clinic needs an efficient and trustworthy patient tracking and tracing system that can immediately identify and trace patients who have missed their clinic visits. Upgrading the current electronic medical records system, making sure it never breaks down and having a speedy mending team of professionals on hand in case it does are all necessary steps toward this goal. Make sure every ART clinic has up-to-date electronic medical records and trained staff to use them. Using cutting-edge technology, such as a global positioning system (GPS), to track down a patient's residence and ensure that they have not relocated or passed away. Medical personnel staffing the ART clinic with dedicated medical professionals is essential. Staff members who have a history of not being committed to treating WLWHIV patients should be transferred to other units in the hospital or clinic. For this reason, it is important to implement a time management system for health professionals that prevent them from being overworked due to a lack of staff. Overworking medical personnel might reduce care quality.

4. Community Education / Enlightenment

Better health outcomes for WLWHIV can be achieved, and the benefits of adherence to ART can be better understood if the community is engaged in these concerns. Participation from the community increases confidence in the efficacy of ART and decreases prejudice and discrimination. Seminars, plays, and music performances can all be used for community outreach and education on WLWHIV, highlighting issues of stigma and adherence.

5. Tackling Barriers to Adherence ART by Family Support

Adherence to ART can be facilitated by educating families of patients who are positive for HIV. Support from families has a way of helping patients to adhere to their medications.

6. **Diet and Nutrition**

As an incentive for WLWHIV to complete their treatment, the government should guarantee their access to adequate nutrition. If the government wanted to help, they might provide free food supplements to ART clinics for patients who show up regularly for their monthly sessions.

7. **Help for the Disabled**

The government should institute a reliable disability grant program that will help WLWHIV with their finances no matter what their clinical stage or viral load is. This is intended for WLWHIV who are on ART but are unemployed or low-income and hence unable to provide for themselves.

5.4 Contribution to Knowledge

This study has provided answers to the specific objectives, and it was discovered that there are high depressive symptoms among women living with HIV in Ibadan.

5.5 Suggested Areas for Further Research

Depressive Symptoms

High Depressive symptoms were reported. There is a need to design a mental health model to address the high depressive symptoms among patients with the incorporation of mental health services.

Also, the study can be done on factors associated with depression among women living with HIV.

Quality of Life

This study did not look into the quality of life of women living with HIV, and it has been shown to be a major predictor in accessing the psychological well-being of people living with HIV.

Disclosure

This study did not provide answers to whom most people living with HIV disclose their status. This would have helped to health educate the participants on who best to disclose to.

Stress, Anxiety, Stigma and Discrimination

These variables have been identified as other psychological factors that affect adherence to ART.

The study can be done using other study areas

A study can be done using People living with HIV as a study population

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Appendix I

Informed Consent

Title of Study

Depression and Adherence to Antiretroviral Therapy among Women Living with HIV in Ibadan Nigeria

Principal Investigator
BANKOLE Samuel Adeyemi

Public Health Department, Lead City University

Lead City University, Toll Gate, Ibadan,

08169262652

samuelbankole01@yahoo.com

Purpose of Study

My name is Bankole Samuel Adeyemi, a master of public health student at the Faculty of public health, Lead City University, Ibadan. This study aimed to examine depressive symptoms and adherence to anti-retroviral therapy among women living with HIV (aged 18 years and older and analyze the factors that constrain (barriers) and motivate (facilitators) adherence to ART.

I am interested in determining the association between depression and adequate ART adherence, measure the level of adherence to ART among women living with HIV in Ibadan and also analyze the determinants of adherence to antiretroviral therapy (ART).

I equally want to know various patient, socio-economic, health service and medical regime factors that influence adherence behavior among women living with HIV in Ibadan. At the end of this study, I want to give recommendations that can improve ART adherence among women living with HIV in Ibadan.

Study Procedures

If you agree to be in this study, this study requires you to fill the structured questionnaire presented to them and filling this questionnaire will take about five minutes of their time.

Risks

This study tends to pose no risk on participants your comments will not be anonymous. Every effort will be made by the researcher to preserve your confidentiality

Benefits

The main benefit of this study is that this study will help in making recommendations on how improve adherence to ART. There are also no incentives but the information you provide will help you improve on your health and that of your loved ones.

Confidentiality

Like it is stated above, your comments will not be anonymous. Every effort will be made by the researcher to preserve your confidentiality. Only the research team will have access to the answered questionnaires. Confidentiality and privacy will be maintained by keeping all materials under lock and key. Your name will not be recorded.

Compensation

There is no monetary compensation or incentive for this study. Participation is voluntary.

Contact Information

If you have questions at any time about this study, or you experience adverse effects as the result of participating in this study, you may contact the researcher whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the Primary Investigator, please contact the Institutional Review Board at lcu.hrec@lcu.edu.ng .

Voluntary Participation

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

Consent

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

Questionnaire

Depression and Art Adherence among Women Living with HIV In Ibadan, Nigeria

Dear Respondent,

I am a postgraduate student of Lead City University, carrying out research on the above topic

Acceptance to answer the questionnaire will be taken as consent to participate in the study. All information will be treated confidentially and your name is not required on the questionnaire.

Instructions

Please tick (.) the appropriate box option applicable in question below. You tick on or more boxes as appropriate

Section A: Socio – Demographic Characteristics.

Kindly tick (√) or fill in the space provided in the statements below;

1. Age: _____
2. Religion: Christianity ( ) Islam ( ) Other (Specify)_____
3. Tribe: Yoruba()Igbo ( ) Hausa ( ) Other (Specify)_____
4. Educational level: Primary level ( ) Secondary level ( ) Tertiary level ( ) None ( )
5. Marital status: Married ( ) Divorce ( ) Widowed ( ) Separated ( ) Single ( )
6. Type of partner: Spouse ( ) Steady ( ) Causal ( ) None ( )
7. Do you know your partners status: Yes ( ) No ( )

8. If yes: Positive ( ) Negative ( )

9. Employment status: Unemployed ( ) Employed ( )

10. In what year did you first test positive for HIV?

11. Are you taking antiretroviral drugs? Yes ( ) No( )

12. How long have you been on ARVS …….

13. Have you been diagnosed of hypertension?.....

14. Number of children after learning about HIV status ……

15. What is your monthly income?

<20,000

20,000 – 30,000

31,000 – 40,000

41,000 – 50,000

>51,000

16. Status disclosure to partner Yes ( ) No ( )

17. Receives adequate support from family and friends Yes ( ) No ( )

18. Have you ever consumed any alcohol such as Beer, wine and spirits? Yes Currently() Yes Stopped ( ) Never ( )

19. Have you ever smoked any tobacco products, such as Pipes, Cigarettes, and Cigars etc?

Section B: Depression among Women Living With HIV

Tell us how you have felt in the past months.

20. I was bothered by things that usually don't bother me
- ☐ Rarely
- ☐ A little of the time
- ☐ Occasionally
- ☐ All of the time

21. I had trouble keeping my mind on what I was doing
- ☐ Rarely
- ☐ A little of time
- ☐ Occassionally
- ☐ All of the time

22. I felt depressed
- Rarely
- A little of the time
- Occasionally
- All of the time

23. I felt everything I did was an effort
- Rarely
- A little of the time
- Occasionally
- All of the time

24. I felt hopeful about the future
- Rarely
- A little of the time
- Occasionally
- All of the time

25. I felt fearful
- Rarely
- A little of the time
- Occasionally
- All of the time

26. My sleep was restless
- Rarely
- A little of the time
- Occasionally
- All of the time

27. I was happy
- Rarely
- A little of the time
- Occasionally

All of the time

28. I was lonely

Rarely

A little of the time

Occasionally

All of the time

29. I could not get going

Rarely

A little of the time

Occasionally

All of the time

Section C: Adherence to Medication Among Women Living With HIV

30. Do you ever forget to take your medicine? YES ( ) NO ( )
31. Are you careless at times about taking your medicine? YES ( ) NO ( )
32. If at times you feel worse, do you stop taking your medicine? YES ( ) NO ( )
33. Thinking about the last week. How often have you not taken your medicine? NEVER ( ) 1-2 times ( ) 3-5 times ( ) 6-10 times ( ) > 10 times ( )
34. Did you not take any of your medicine over the last weekend? YES ( )NO ( )
35. Over the past 3 months, how many days have you not taken any medicine at all?≤2( )>2()

People may miss taking their medications for various reasons. Here is a list of possible reasons why you may miss taking your medications. How often have you missed taking your medications because you: (Tick one response for each question.)

S/N		Never	Rarely	Sometimes	Often
36.	Were away from home?				
37.	Were busy with other things?				
38.	Simply forgot?				
39.	Had too many pills to take?				
40.	Wanted to avoid side effects?				
41.	Did not want others to notice taking medications?				
42.	Had a change in daily routine?				
43.	Felt like the drug was toxic/ harmful?				
44.	Fell asleep / slept through dose time?				
45.	Felt depressed / overwhelmed?				
46.	Felt sick or ill?				
47.	Had problems taking pills at specified times (with meals, on empty stomach, etc.)?				
48.	Ran out of pills?				
49.	Felt good?				
50.	Were discrimated in a gathering?				
51.	Financial unstable?				
52.	Were not attended well by your healthcare provider?				
53.	Unable to refill as a result of distance of clinic?				

54. If No to 30, which factors encouraged you or helped you to take your medicines without missing any doses?

Family support (husband/wife/children) ( )

Dependent on treatment support group ( )

Availability of food ( )

Hospital staff treating me kindly compassion with support group ( )

Having a business/ employment ( )

Calls reminder from hospital staff ( )

Using adherence reminders (alarm clock/taking pills apps) ( )

The desire to live ( )

Others specify …….

VRL:

Biodata

A. Personal Data

Full name:	Samuel Adeyemi BANKOLE
Address:	14, Ore Ofe estate, Gbonogun, Obantoko, Abeokuta Ogun state
E-mail Address:	samuelbankole01@yahoo.com
Phone no:	+2348169262652
Date of birth:	2nd September, 1997
Place of birth:	Abeokuta, Ogun State
Nationality:	Nigeria
Marital Status:	Single
Name of Next of Kin:	Bankole Esther
Address of Next of Kin:	14, Ore Ofe estate, Gbonogun, Obantoko, Abeokuta Ogun state

B. Educational Background

Educational Institutions Attended with Dates and Qualification:

First leaving School Certificate 2002- 2008

Motef Int'l Nursery & Primary School

West African Senior School Certificate

Taidob College 2008- 2014

Diploma Computer Engineering 2014-2015

Femnik Computer Institute of Technology, Abeokuta

Bachelor of Science; (Biochemistry) 2015-2019

Olabisi Onabanjo University, Osun State.

Masters of Public Health 2021- current

Lead City University, Ibadan, Oyo State.

C. Work Experiences with Dates

Society for Family Health **2017-2020**
Role: Interpersonal Communication Consultant/ Health Educator

- House to house daily health education talk to people about health issue focusing on malaria
- Identifying community health problems
- Monthly review meeting and visualization of report and way forward.

Owerri City School, Owerri **2020-2021**

Role: Educator (NYSC)

Abeokuta North Local Government, Ogun State. **2022**
Department: Primary Health Care
Role: Post graduate intern

- Assisted in augment health care to pregnant women through the provision of preventive health services.
- Screened for sexually transmitted disease such as HIV and hepatitis
- Health educated the youth about family planning
- Environmental sanitation
- Community diagnosis
- Report writing; writing a good term paper

Odeda Local Government, Ogun State. **2021**
Department: Primary Health Care
Role: Post graduate intern

- Monitored the health status of the community
- Investigated and diagnose health problems and hazards
- Nutritional assessment
- Disease surveillance
- Health education and promotion

- Maternal and Child health care
- Daily activities report writing

D. Awards and Fellowships: None

E. Professional Membership: Health Education Practitioners of Nigeria

F. Publications

Dissertations

BANKOLE SAMUEL ADEYEMI: Hypolipidemic effect of bioactive peptides extracted from Nuad melon (cucumeropsismanni) on male wistar rats. Unpublish Bachelor of Science final year project. Department of Biochemistry, Olabisi Onabanjo University. September, 2019.

G. Major Conferences Attended with Dates

- ADEGBITE O. Zainab, **BANKOLE A. Samuel**, ADEWOLE E. Ifeoluwa, LAWALE A. Abisola, RASHEED Abdul Aziz, ADEOYE Enitan, BULUS-EJOGA Afiniki, ADEGBITE B. Saidat, AKINSOLU T. Folahanmi Contraceptive Use among Sexually Active Women living with HIV in Oyo State, Nigeria. Faculty of Natural and Applied Science Abstracts. Poster presentation delivered at the FASCON 3rd international conference, Lead City University Ibadan, Oyo State. November 2022.

- **BANKOLE A. Samuel**, LAWALE A. Adedamola, ADEOYE Enitan, ADEGBITE O. Zainab, ADEWOLE E. Ifeoluwa, RASHEED Abdul Aziz, BULUS-EJOGA Afiniki, AKINSOLU T. Folahanmi Psychological Well-being and Adherence to Antiretroviral Therapy Among Women Living with HIV in Ibadan, Nigeria. Faculty of Natural and Applied Science Abstracts. Poster presentation delivered at the FASCON 3rd international conference, Lead City University Ibadan, Oyo State. November 2022.

- LAWALE A. Adedamola, **BANKOLE A. Samuel**, ADEOYE Enitan, ADEGBITE O. Zainab, RASHEED Abdul Aziz, BULUS-EJOGA Afiniki, ADEWOLE E. Ifeoluwa, AKINSOLU T. Folahanmi Psychological Challenges experienced by Women Living with HIV during the perinatal period in Ibadan, Nigeria. Faculty of Natural and Applied Science Abstracts. Poster presentation delivered at the FASCON 3rd international conference, Lead City University Ibadan, Oyo State. November 2022.

Conferences Attended

- Attended and completed the Faculty of Natural and Applied Science (FASCON) 3rd International Conference at Lead City University, Ibadan. Themed: Translation Research in Science and Technology for Sustainable Development Circa COVID-19 Era

Certification

Leadership & Management in Health **2019**
University of Washington E-Learning

Introduction to Epidemiology for Global Health **2020**
University of Washington E-Learning

Nigerian National Code for Health Research Ethics **2021**
Collaborative Institutional Training Initiative

Responsible Conduct of Biomedical Research **2021**
Collaborative Institutional Training Initiative

Essentials of Grant Proposal Development **2022**
Collaborative Institutional Training Initiative

Public Health Research **2022**
Collaborative Institutional Training Initiative

Essentials of Statistical Analysis **2022**
Collaborative Institutional Training Initiative

Basic and Advance Certificate in Microsoft Packages **2012-2013**
National Institute of Information Technology (NIIT)

Extra-Curricular Activities

Volunteer works
Independent Monitor (NIPDS, SIA, OBR) 2015- 2022

Organization: WHO Nigeria

Independent Monitor 2016

Organization: USAID

Social Mobilizer/Reproductive health for Youth & Adolescents 2017-2020

Organization: Youth Savers Initiative Foundation (YSIF)

Social Mobilizer/ Life Planning and Contraceptive use Adolescents & Youth 2018-2020

Organization: The Challenge Initiative (TCI)

Independent Monitor/Measles Vaccination. 2018

Organization: National Primary Health Care Development Agency

Presiding Officer 2020

Organization: INEC

Leadership Experience

Time keeper 2008

Motef Int'l Nursery & Primary School

Hostel Prefect 2013

Taidob College, Asero, Ogun

Chief Whip (Senate) 2017

National Association of Biochemistry Student

State Provost& House Administrator 2020

National Association of Catholic Corp Members, Imo State Chapter

H. Referees:

Dr Folahanmi T Akinsolu

Lead City University, Ibadan
07033171050, folahanmi.tomiwa@gmail.com

Dr Wale Famiyesi
Zonal Consultant, WHO Office, Nigeria
08023094026, walefami@yahoo.co.uk

_____ _____

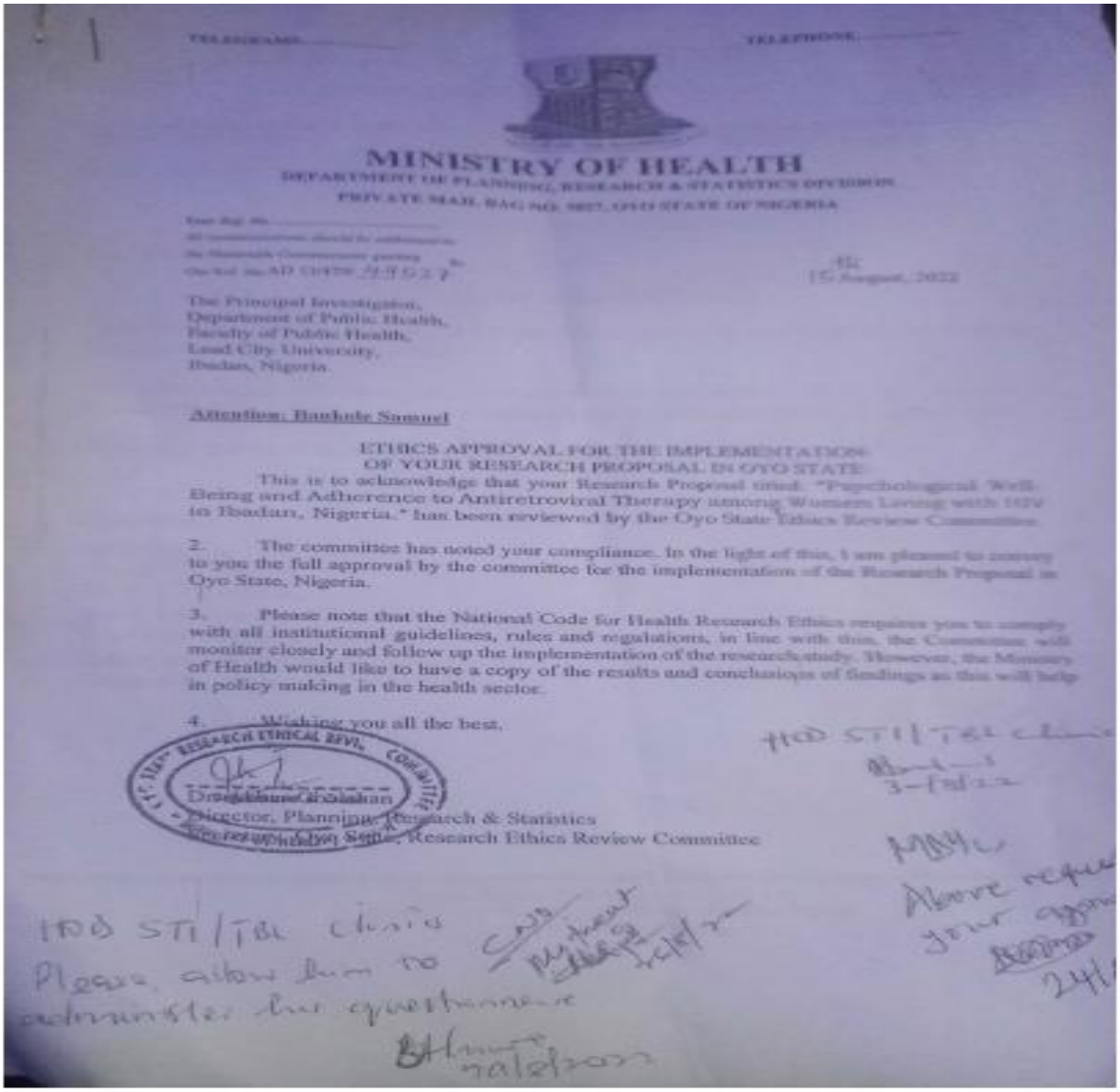
Signature Date

The University Compliance Certification

This is to certify that this thesis by Samuel Adeyemi BANKOLE, with Matric No. LCU/PG/002258 in the Department of Public Health, Faculty of Allied and Health Sciences, Lead City University, Ibadan is in full compliance with the approved University format and style.

_____ _____

Signature Date



MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5057, OYO STATE OF NIGERIA

15th August, 2022

The Principal Investigator,
Department of Public Health,
Faculty of Public Health,
Lead City University,
Ibadan, Nigeria.

Attention: Ibaduke Samuel

ETHICS APPROVAL FOR THE IMPLEMENTATION
OF YOUR RESEARCH PROPOSAL IN OYO STATE

This is to acknowledge that your Research Proposal titled: "Psychological Well-Being and Adherence to Antiretroviral Therapy among Women Living with HIV in Ibadan, Nigeria." has been reviewed by the Oyo State Ethics Review Committee.

2. The committee has noted your compliance. In the light of this, I am pleased to convey to you the full approval by the committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations, in line with this, the Committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of findings as this will help in policy making in the health sector.

4. Wishing you all the best.

RESEARCH ETHICAL REVIEW COMMITTEE

Director, Planning, Research & Statistics
Secretary, Research Ethics Review Committee

HOD STI/TBL clinic
Please allow him to administer the questionnaire

Lead City University (LCU)

Home: Knowledge for Self-reliance

Lagos – Ibadan Expressway, Toll Gate Area, Ibadan, Oyo State, Nigeria

Email: lcu.hrec@lcu.edu.ng

University Research Ethics Committee

NHREC

PROJECT TITTLE: PSYCHOLOGICAL WELLBEING AND ANTIRETROVIRAL THERAPY (ART) ADHERANCE AMONG WOMEN LIVING WITH HIV IN IBADAN, NIGERIA

PROJECT NUMBER: LCU-REC/21/128.

APPROVAL LETTER

The above named proposal has been adequately reviewed; the protocol and safety guidelines satisfy the conditions of *LCU-REC* policies regarding experiments that use human subjects.

Therefore, the study under its reviewed state is hereby approved by the LCU - Research Ethics Committee.

Prof. Olusola Ladokun .....

Name of LCU-REC Chairman *Signature of LCU-REC Chairman*

Dr. Folahanmi Akinsolu .....

Name of LCU-REC Secretary *Signature of LCU-REC Secretary*

This approval is given with the investigator's Declaration as stated below;

By signing below I agree/certify that:

1. I have reviewed this protocol submission in its entirety and that I am fully cognizant of, and in agreement with all submitted statements.
2. I will conduct this research study in strict accordance with all submitted statements except where a change may be necessary to eliminate apparent immediate hazard to a given research subject.
   - I will notify the REC promptly of any change in research procedures necessitated in the interest of the safety of a given research subject.
   - I will request and obtain REC approval of any proposed modification to the research protocol or informed consent document(s) prior to implementing such modifications.

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