FACTORS ASSOCIATED WITH VIRAL NON-SUPPRESSION AMONG ADOLESCENTS 10-19 YEARS ACCESSING ANTI-RETROVIRAL THERAPY IN NWOYA DISTRICT-UGANDA

JAMES OKELLO

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DECLARATION

I Okello James hereby affirm that the work in this dissertation is entirely original and has never been submitted to a university or other higher education institution for the purpose of receiving a master's degree in public health or another academic credential. Although other information sources were used, as specified in the text and references, with the permission of the appropriate authorities, the study was totally my own independent investigation.

Signature: ..... Date: 30th April 2024

OKELLO JAMES

RJ21M21/024

Approval

This dissertation titled **"factors associated with viral non-suppression among adolescents 10-19 years accessing antiretroviral therapy in Nwoya district-Uganda"** was conducted under my supervision in accordance with the research Regulation of Uganda Christian University.

Signature..... Date..30/04/2024.....

SHALLON ATUHAIRE (PhD)

DEDICATION

This research is dedicated to my mother Joyce Oola, Father Oola Massimo, my brothers Henry, Paul, and Christopher, and Sisters Lucy, Alice, and Brenda who supported me financially throughout all the struggle and hardships. Not forgetting my spouse Tusiimemukama Anisia and our children Vian, Eleanor, and Edith for her continuous financial and moral support, prayers, and encouragement throughout my course of study.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	-	Acquired Immune Deficiency Syndrome
ART	-	Anti-Retroviral Therapy
ARVs	-	Antiretrovirals
CPHL	-	Central Public Health Laboratory
CVI	-	Control Validity Index
HIV	-	Human Immunodeficiency Virus
ICF	-	Informed Consent Form
MoH	-	Ministry of Health
SPSS	-	Statistical Package of Social Sciences
UCU-REC	-	Uganda Christian University- Research Ethical Committee
UNAIDS	-	United Nation Programme on HIV/AIDS
WHO	-	World Health Organization
IP	-	Implementing Partner

DEFINITION OF TERMS

The period of life between childhood and adulthood, known as adolescence, lasts from the ages of 10 to 19.

Viral load-Is the amount of HIV in the blood of someone who has HIV.

Suppressed – refer to viral load less than 1000 copies per milliliter of blood

Non-suppressed-Viral load greater than 1000 copies/ml.

Prevalence-Is the number of adolescents living with HIV at a given time.

Adolescent – a person aged 10-19years

Minor – a person below 18 years of age

Access- approach or enter a place

ABSTRACT

Introduction: In this study, adolescents accessing ART in the Nwoya District between the ages of 10 and 19 were examined for factors that may contribute to viral non-suppression. The study's specific objectives were to determine the prevalence of viral non-suppression among adolescents accessing ART in Nwoya district who are 10 to 19 years old, to identify health facility-related factors associated with this condition, to identify caregiver-related factors associated with viral non-suppression among adolescents accessing ART in Nwoya district, and to evaluate behavioral risk factors.

Method: This study used both qualitative and quantitative methodologies in a descriptive cross-sectional design. The study involved 225 young people in the Nwoya district who were HIV-positive and were aged 10 to 19. Data was collected using a questionnaire and key informant interview guide. The data was then analyzed at univariate, bivariate, and multivariate levels using SPSS version 20.

Results: The majority 122(54.2%) of the respondents were aged 14-19 years with the mean age being 15.2 years. At the bivariate level of analysis, it was found that age, duration on ART, and attitude of health care workers were correlated with viral con-suppression (X^2=14.711, df =1, P-value=0.000). The distance from home to health facility (X^2=19.045, df =4, P-value=0.001), ability to continuously receive counseling from counseling (X^2=9.741, df =1, P-value=0.002), the relationship between the adolescent and guardian; (X^2=2.610, df =2, P-value=0.000) also had a strong correlation with viral non-suppression among adolescents. Knowledge of the use of ARV drugs; (X^2=7.321, df =4, P-value=0.007) and Engagement in sexual activity since being diagnosed with HIV; (X^2=5.894, df =1, P-value=0.015) significantly influenced being non suppressed. P-value <0.05. At the multivariate level, the attitude of health workers; (AOR=5.11,95% CI:1.048-1.419, P=0.002), distance from home to health facility; (AOR=0.038, 95% CI:0.007-1.946,p=0.000), knowledge on the use of ARVs; (AOR=0.028,95%CI: 0.006-0.757, p=0.003) and the relationship between the adolescent and guardian; (AOR=7.401,95% CI: 0.328-1.673, P=0.012) were independently correlated with viral load non-suppression among adolescents in Nwoya district. Therefore, 61 (27.1%) teenagers accessing ART in Nwoya district had viral non-suppression. Also from the above findings, it can be deduced that there are many factors connected to viral non-suppression in adolescents accessing ART in Nwoya District who are 10 to 19 years old, including caregiver factors, behavioral factors, and healthcare facility factors like the attitude of healthcare workers. There is a need for a multi-sectoral approach to deal with barriers to viral suppression. there is a need for implementing partners (IPs) working in the district to support ART outreach to reduce the distance to the health facilities, health education, and counseling should be emphasized, and training of health workers on how to handle adolescents living with HIV to improve on their skills and attitude towards adolescents living with HIV.

CHAPTER ONE: INTRODUCTION

1.0 Introduction

This study sought to investigate viral non-suppression and associated factors among adolescents 10-19 years old accessing ART in Nwoya District. The researcher sought to determine health facility-related factors, caregiver-related factors, and behavioral-related factors and establish a relationship between these factors and viral non-suppression among adolescents living with HIV in Nwoya district. The key variables of this study included; viral non-suppression among adolescents as the outcome variable, and the independent variables will include health-facility-related factors such as the attitude of health workers, adequacy of drugs/ARVs, availability of youth-friendly corners, distance to the health facility, waiting time for drug refills and continuous counseling. Behavioral related factors such as attitude towards ARV consumption, engaging in sexual activity, alcohol use by adolescents, peer influence, and social media & technology influence; and caregiver related factors such as financial support, psychosocial support, caregivers' education, caregivers' occupation, and caregivers' relationship with adolescents aged 10-19 years. The study's background, problem statement, research aims, research questions, significance, justification, and conceptual framework were all examined in this chapter.

1.1 Background to the Study

1.1.1 Historical background

Not long ago, a remarkable stride was attained in expanding access and utilization to antiretroviral therapy (antiretroviral therapy) to persons living with Human Immunodeficiency Virus (HIV) (UNAIDS, 2019). The major goal of antiretroviral therapy is to suppress the replication of the Human immunodeficiency virus (viral load less than 1000 copies 6 months following initiation of antiretroviral therapy) and suppressed viral load helps in restoration of the immune function with ultimate effect of reduction in the risk of further HIV transmission (Kiragga .et al, 2018). In 2013, The World Health

Organization (WHO) introduced viral load monitoring procedure as a gold standard for following up on the treatment effectiveness (Rosenberg, 2018).

1.1.2 Conceptual background

The proportion of patients with HIV who have more than 1000 copies of the virus per milliliter of blood are known to be experiencing viral non-suppression. To achieve viral suppression, adolescents need to know their HIV status. Knowledge of HIV status should be accompanied by counselling on adherence to ART with good adherence the virus becomes undetectable (Chhim et al., 2018).

Moreso, adolescents face a number of challenges in taking Antiretroviral therapy which include; not being able to disclose their status because of stigma, the typical adolescent amnesia, and a lack of seriousness toward such matters. All of these have an impact on adherence, which leads to significant non-suppression rates. (Davies et al., 2011). Lately, there has been insufficient attention given to adolescent-friendly services and research and because of this insufficient attention there has been gross under-diagnosis, and disregard for their unique challenges (Nasuuna et al., 2018). There is a dearth of information on the factors that influence viral non-suppression in adolescents, according to Natukunda et al, because HIV research on adolescents has not been adequately conducted. (Natukunda et al, 2019).

Furthermore, HIV-related morbidity and mortality are more likely to affect adolescents with high viral loads. Intensive Adherence Counseling (IAC) and support in this situation can enhance adherence and, as a result, lead to a decrease in viral load (Chhim et al. 2018). Additionally, IAC reduces the likelihood of drug-resistant HIV strains, which necessitate costly second- or third-line therapies and are common among adolescents (Mbonye et al.,2023). Contextual information is necessary to inform corrective actions for teenagers because the impact of several factors of viral non-suppression differs among populations, age groups, and environments (Bulage et al., 2017). All interested parties will gain new knowledge about HIV infection among adolescents aged 10 to 19 by comprehending the distinctive factors correlated to viral non-suppression among adolescents.

1.1.3 Contextual background

The ambitious treatment goals established by the Joint UN Programme on HIV/AIDS in 2014, the 95-95-95 strategy to eliminate AIDS by 2030, represent a significant advancement in the fight against HIV/AIDS (Agolory et al., 2018). According to this target, 95% of all HIV-positive individuals will be aware of their status by the end of 2030, 95% of those who have been diagnosed with HIV will be receiving sustained antiretroviral therapy, and 95% of those who are already on it will have achieved viral suppression (UNAIDS, 2020). According to data on viral non-suppression in adolescents, antiretroviral therapy outcomes for adolescents from both high- and low-income settings typically result in worse outcomes than for adults (Goemaere et al., 2019). In a similar vein, various research comparing non-viral suppression in adolescents and adults from Europe and South America have found lower non-viral suppression rates in adolescents than in adults (Atuahene, 2019).

According to records from several African nations, six years after beginning antiretroviral therapy, about 30% of teenage patients experience viral non-suppression (Giordano et al., 2019). According to two South African studies, adolescents on antiretroviral therapy are more likely than adults to have unsuppressed viral load and experience virological failure (Evans et al., 2018; Nglazi et al., 2019). According to another study conducted in Uganda (Kamya et al., 2019), adolescents are nearly twice as likely as adults to experience virological failure. According to the Uganda viral load dashboard, 27% of adolescents nationwide have viral non-suppression (Owaraganise et al., 2019). Barriers to viral non-suppression have been identified so far, along with factors that encourage it.

1.2 Statement of the Problem

To eliminate HIV/AIDS by 2030, the Joint United Nations Programme established the 95-95-95 strategy in 2014 (Agolory et al., 2018). In accordance with this goal, 95% of all HIV-positive people will be aware of their status by the end of 2030, 95% of people with a confirmed HIV infection will be receiving sustained antiretroviral therapy, and 95% of people receiving antiretroviral therapy will have achieved viral suppression (UNAIDS,

2020). However, the statistics by Owaraganise et al., (2019), indicate that, the viral load suppression is at 84%, whereas statistics from Uganda's viral load dashboard as of December 2021 show the viral load suppression in Nwoya district for adolescents was at 76%, which are all way below the 95–95–95 strategy or goal to end HIV/AIDS by 2030. More so, Nwoya district has up to 281 adolescents (10-19 years) enrolled on antiretroviral therapy, however, more than 30% of these adolescent patients developed viral non-suppression within one year after starting antiretroviral therapy which has resulted in opportunistic infections and deaths of these adolescents.

Despite the different interventions put in place to fight viral non-suppression among these adolescents living with HIV such as counseling, involvement of family and schools in adolescent care, and ensuring availability of free ARVs among others, viral non-suppression among these adolescents in Nwoya district is still high at more than 30% (Kiweewa et al., 2019). Moreover, there is inadequate documentation on the factors connected to with the same especially among adolescents, which leaves an information and knowledge gap. This background formed the need for this study that sought to investigate the factors associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya District.

1.3 Research Objectives

1.3.1 General Objective

To investigate the factors associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya District and how these factors were dealt with to ensure that viral suppression among adolescents aged 10-19 years living with HIV was achieved.

1.3.2 Specific Objectives

i. To establish the prevalence of viral non-suppression among adolescents 10-19 years accessing ART in Nwoya district.
ii. To determine the health facility-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district.

iii. To establish the caregiver-related factors associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya district.
iv. To assess the behavioral-related factors associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya district.

1.4 Research Questions

i. What is the prevalence of viral non-suppression among adolescents 10-19 years accessing ART in Nwoya district?
ii. What health facility-related factors are associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district?
iii. What caregiver-related factors are associated with viral non-suppression among adolescents 10-19 accessing ART in Nwoya district?
iv. What behavioral-related factors are associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya district?

1.5. Study Hypothesis

The hypothesis of the study was

H_0: Behavioral factors have a greater impact on viral non-suppression than both caregiver-rated factors and health facility-related factors

1.6 Justification of the Study

Despite the numerous studies (Evans et al., 2018; Nglazi et al., 2019; Kamya et al., 2019 & Owaraganise et al., 2019) conducted on factors correlated with viral non-suppression among adolescents (10–19 years old) living with HIV, the lack of knowledge has significantly impacted treatment outcomes. Delays in identification and treatment optimization of failing clients have led to an increase in the number of adolescents with viral non-suppression. Furthermore, the average viral load suppression among adolescents in the Acholi sub-region from July to December 2021 is 79.6% while for Nwoya district is at 76% which is all way below the 95–95–95 strategy or goal to end HIV/AIDS by 2030 set by the Joint United Nations Programme (CPHL Dashboard, 2022).

Therefore, once the study was completed, it will give an insight into how best to improve on the viral suppression rate among adolescents 10-19 years accessing ART in Nwoya district.

1.7 Significance of the Study

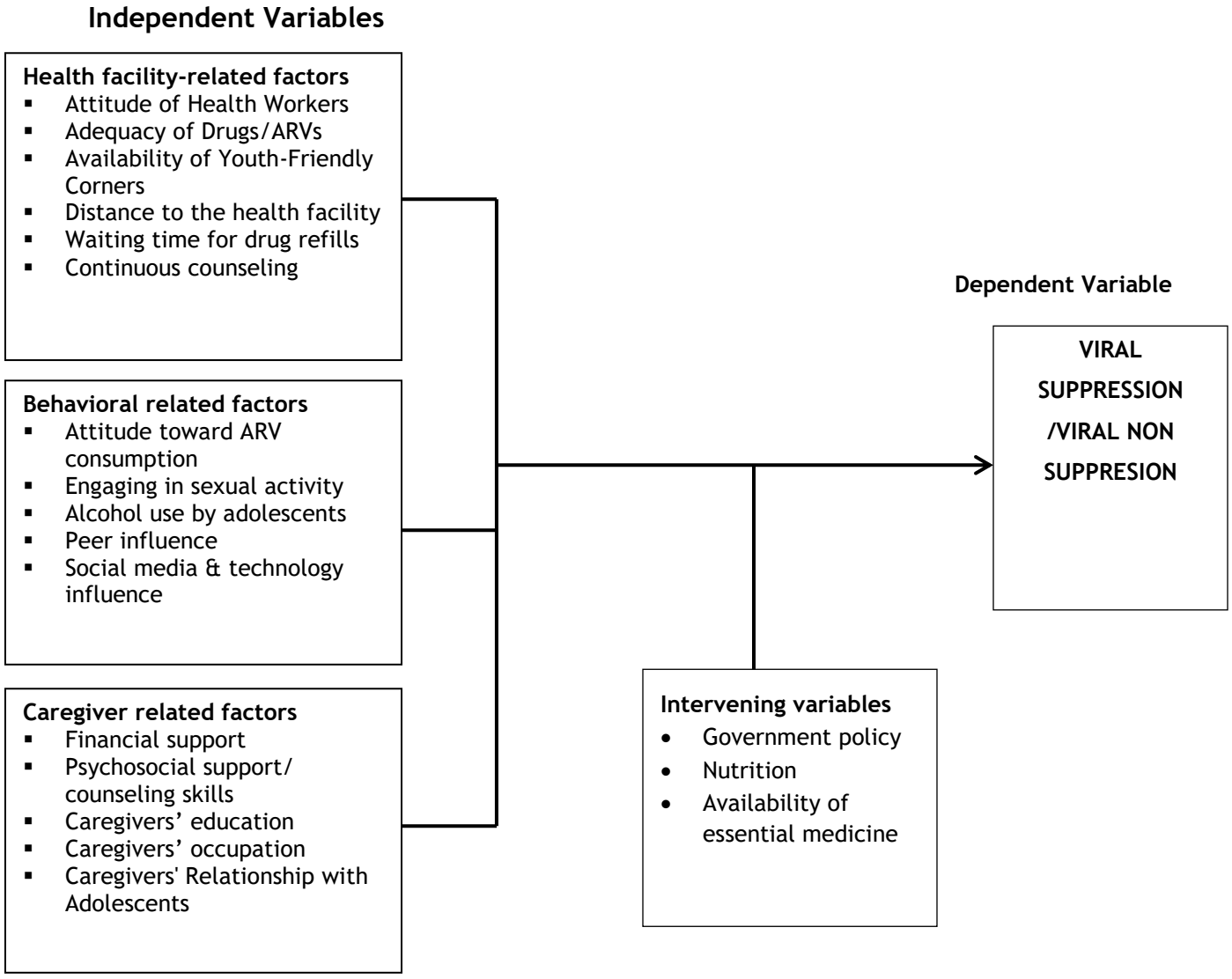
This study will add literature to studies on viral non-suppression and associated factors among adolescents 10-19 years accessing ART in the district of Nwoya. In addition to this, the study will also act as a source of literature for future researchers on studies related to this topic.

The study will also be of great help to the health workers, the government, and Non-Governmental Organizations as it will provide them with the necessary strategies that will help them in adopting new procedures that can be useful in ensuring viral suppression specifically among the adolescents in Uganda as a whole.

The information generated from this study will be useful to the adolescents on how they can handle themselves to ensure that they adhere to the antiretroviral therapy and support to enhance viral suppression.

1.8 Conceptual Framework

Figure 1: Conceptual framework



Source: *Adapted from the Brazilian Journal of Infectious Diseases by Abreu et al. (2018); and Journal of the International AIDS Society by Kwarisiima et al., (2019).*

Description of the conceptual framework

The conceptual framework aboveground demonstrates the relationship between the independent variable and dependent variable. The dependent variable is viral non-suppression among Adolescents. The independent variables are health facility-related

factors and behavioural factors. The health facility factors were measured by attitude of health workers, adequacy of drugs/ ARVs, availability of youth-friendly corners, distance to the health facilities, waiting time, and continuous counseling. Behavioral factors were measured by attitude towards ARV consumption, engaging in sexual activity, alcohol use by adolescents, peer influence, social media, and technology influence, and risk-taking; and finally, caregiver related factors such as financial support, psychosocial support, caregivers' education level, caregivers' occupation and their relationships with the adolescents.

CHAPTER TWO: LITERATURE REVIEW

2.0. Introduction

This chapter presents the literature related to factors associated with viral non-suppression among adolescents living with HIV as well as critically analyzes the deviations in the explanations to find out the research gap in the study variables. Literature was reviewed objectively and sources like newspaper articles, magazines, encyclopedias, and books related to the study were used.

2.1 HIV and Antiretroviral Therapy

The human immunodeficiency virus (HIV) is a retrovirus that affects people. It is a member of a vast family of ribonucleic acid (RNA) lentiviruses that are linked to illnesses that impair the immune system (Kumarasamy et al., 2019). There are two types of HIV, HIV-1, and HIV-2. HIV-1 is the most prevalent of the two types affecting most parts of the world East African and Uganda inclusive. HIV-2 is more prevalent f in West Africa with the most affected countries in west Africa being Guinea- Bissau and Senegal. HIV infection progressively destroys and weakens the CD4 T-cells which are responsible for providing immunity resulting in to the onset of acquired immunodeficiency syndrome (AIDS). AIDS is the result of advanced stages of HIV infection when the remaining CD4 T-cells are unable to further defend the body and prevent infections from pathogen that result from weakened immune system. It is a chronic potentially life-threatening condition (Mee et al., 2018).

Only 21.7 million (58.8%) of the 36.9 million persons living with HIV around the world had access to antiretroviral therapy (ART) in 2017. According to Mulu et al. (2018), in 2017 approximately 1.8 million people acquired new HIV infection, while one million people passed away from AIDS-related illnesses. According to Wang et al. (2017), Ethiopia saw 28,650 HIV/AIDS fatalities and 39,140 new HIV infections in 2015. In Ethiopia, there were 1% of adults (15–49 years old) who were HIV positive. In 2018, there were 23,000 fewer new HIV infections than there were in 2017 (UNAIDS, 2019).

The term "antiretroviral therapy" (ART) refers to the daily administration of a cocktail of HIV medications to treat HIV infection. Highly active antiretroviral therapy (HAART), a mix of three or more medications from different classes, is presently the recommended treatment for HIV/AIDS. Since there is no cure for HIV, these medications must be taken forever (Kenny, 2020). The prescribing physician or clinician should be knowledgeable about the side effects, how the medications function in the body, and the drug interaction profile of all antiretrovirals because the patient frequently receives additional treatment for opportunistic infections and complications of antiretroviral therapy itself in addition to ART. HIV can develop and acquire resistance easily, so only doctors who are skilled and aware of may be able to prescribe appropriate drugs. If not, HIV therapy will swiftly repeat the current situation with antibiotics and multi-drug resistance bacteria (Kiweewa et al., 2019).

Around the world, AIDS-related illnesses claim the lives of up to 150 teenagers every day. The rate of AIDS-related mortality among teenagers has not decreased, with 91% of adolescent deaths recorded in 2016 occurring in just sub-Saharan Africa (Zanoni et al., 2018). Several studies have established that adolescents on antiretroviral always have the worse viral suppression outcomes when compared to adults (Bulage et al., 2017). Adolescents should receive additional care in order to increase viral suppression.

According to Kamya et al. (2018), Uganda was one of the top 20 nations with a high burden, accounting for 5% of teenage fatalities caused by AIDS in 2014. The deaths are related to the inadequate availability to therapy and the delayed diagnosis, with the majority of perinatally infected teenagers beginning treatment late. Uganda pledged to meet the 95-95-95 standards by 2030, just like other nations. Despite this, the nation is still falling short of the ambitious goal, with the third 90 scoring the lowest along the cascade. About 73% of HIV-positive individuals in 2017 were aware of their status, 67% were taking antiretroviral medication, and nearly 60% had achieved viral suppression. The Uganda Ministry of Health suggested viral load testing for all patients who have been on antiretroviral therapy for at least six months or more in order to identify HIV-positive individuals who are likely to stop taking their medication (including teenagers) and to keep track of their quality of life. According to Bikaako-Kajura et al. (2019),

adolescents under the age of 15 continued to experience significantly lower rates of viral suppression than adults.

Although antiretroviral medication observance is crucial for viral suppression, some adolescents and young adults are satisfactorily compliant yet nevertheless have high viral loads, whereas others have suppressed viral loads despite insufficient observance (Duarte et al., 2019). There is a dearth of knowledge in Uganda about viral suppression in teenagers (10–19 years old). This is so that teenagers between the ages of 10-15 years can be grouped alongside those between the ages of 0 and 14, while those between the ages of 16 and 19 are classified as adults. Because of this, it is challenging to determine the results of adolescents receiving antiretroviral medication using the available data (Kamya et al., 2018).

2.2 Viral non-suppression status among adolescents 10-19 years living with HIV

The mortality rate among teenagers aged 10 to 19 years has increased from 18,000 per year in 2010 to 41,000 in 2015, despite a sustained global trend of fewer AIDS-related fatalities in children and adults (UNAIDS, 2018). In Sub-Saharan Africa, AIDS is currently the number one killer of teenagers, and according to UNAIDS, 1.8 million teenagers between the ages of 10 and 19 are infected with HIV globally (Patton et al., 2016). But as perinatally infected children enter puberty, additional problems are presented by the effectiveness of modern HIV antiretroviral medication. The medication is now widely accessible and capable of turning HIV disease into a chronic and manageable illness (Mofenson & Cotton, 2013).

Results on viral non-suppression amongst adolescents also propose that antiretroviral therapy outcomes for adolescents from high- and low-income settings regularly tend to be lower than for adults (Goemaere et al., 2019). Similar to these results, are studies comparing viral non-suppression in adolescents and adults from Europe and South America which found that adolescents had lower viral non-suppression rates than adults do (Atuahene, 2019).

According to records from several African nations, six years after beginning antiretroviral therapy, about 30% of teenage patients experience viral non-suppression (Giordano et al., 2019). According to two South African studies, adolescents on antiretroviral therapy are more likely than adults to have an unsuppressed viral load and experience virological failure. (Evans et al., 2018; Nglazi et al., 2019). According to another study conducted in Uganda (Kamya et al., 2019), adolescents are nearly twice as likely as adults to experience virological failure.

2.3 Health facility-related factors influencing viral non-suppression among adolescents living with HIV

2.3.1 Attitudes of health workers: A descriptive study conducted by Mujugira (2019) aimed at establishing whether the attitudes of health workers greatly influence viral non-suppression among adolescents living with HIV. The results displayed that adolescents' viral non-suppression is positively correlated with poor health workers' attitudes (AOR= 1.29; 95% CI= 1.04 - 1.59). In a survey of 100 teenagers, 70% of them said that nurses, in particular, occasionally treat patients or clients poorly. Health professionals frequently provide rapid and excellent care to people they know, they may abuse patients, and some nurses are impolite and abusive with patients. Another study conducted by Kolab et al. (2018) shows that the possibility of having viral non-suppression also kept significantly higher among adolescents even when they are receiving the right care from health workers with positive attitudes (AOR = 1.81, 95% CI 1.05–4.08).

Furthermore, Wambugu et al. (2017) found that while regular contact with counselors or time spent with healthcare providers was not associated with viral non-suppression among the adolescents, good caregiver-provider relationships and viral non-suppression among adolescents with healthcare services were positively associated with viral suppression among adolescents (AOR= 1.29; 95% CI= 1.04 - 1.59) in some settings. The study also demonstrated that HIV-positive teenagers had higher levels of viral suppression after receiving therapy for a longer period of time.

2.2.2 Adequacy of drugs/ARVs: A study conducted by UNAIDS (2019) noted that at the start of the "test and treat" era in Cameroon, the overall prevalence of viral suppression among a population of 250 adolescents with HIV was < 1000 copies/ mL later after 12 months of ART was 79.4% (95% CI 77.6–81.2). About 11% was attributed to limited availability of ARVs. The study revealed that without access to adequate ARVs, adolescents living with HIV are susceptible to viral non-suppression. Low-income nations have low access to basic medical supplies in healthcare institutions, poor-quality care, frequent stock-outs, and inappropriate prescription and use of medications, all of which significantly worsen viral non-suppression among HIV-positive kids.

2.2.3 Distance to the health facility: A cross-sectional study conducted by Bunupuradah et al., (2018), among a population of 1000 adolescents with HIV from India, revealed that how far one stayed away from the care center positively correlated with a higher viral load among adolescents with HIV affirmed by r-0.895 (P=0.00<0.01) (Bunupuradah et al., 2018). People who stay nearer to the health facility had a higher odd to seek care and had a better health outcome compared to those who stayed far from the health facility (Huong et al., 2019). Makadzange in his study established that rural communities where people are poor, access to health care services remain a major challenge this is because in most rural areas, distance to the health facilities are quite longer hence increasing the cost of transport in addition to losing time (Makadzange. 2018)

2.2.4 Change of medication: Scully (2018) found that being receiving HIV treatment at the time of the VL was associated with a higher adjusted likelihood of viral non-suppression in adolescents (aOR = 3.32, 95% CI: 1.13 to 9.81), as well as caregiver ART regimen change prior to the VL (aOR = 1.82, 95% CI: 1.21 to 2.72). Adolescents who received an NNRTI-based regimen at the time of the VL had lower adjusted odds of viral non-suppression (aOR = 0.69, 95% CI 0.50 to 0.97). Similarly, was the case among those who were between the ages of 10 and 14 and those between the ages of 13 and 16 (aOR = 0.49, 95% CI 0.27 to 0.89) and 10 to 12 (aOR = 0.30, 95% CI 0.11 to 0.82).

More so, a study conducted by Yehia et al. in 2015, found that the possibility of developing viral non-suppression for adolescents who change medication of ARVs was almost 5 times more likely compared with the adolescent patients who continue taking the same medication since the medication is likely to weaken as the body gets used to the same medication. A similar study conducted in Uganda by Bulage et al. (2015) reported that adolescent patients who have changed their medication of ARVs were more likely to achieve viral suppression.

Waiting time for drug refills: According to a study by Wambugu et al. (2017) showed that there is a significant positive correlation between the waiting time for drug refills and viral non-suppression among adolescents in Kenya (r=0.255, p=0.003). The percentage of very stable patients who obtained 3-month ARV refills at the 8 regulating sites and the 8 intervention sites was compared by the researchers. After three months of increased support, 15% more patients were receiving a three-month supply of ARVs at the eight sites with the added support. Patient wait times decreased as a result of fewer daily appointments at the sites. It further revealed that the patients that were able to receive ARV refills in three months had attained viral suppression than those who had received ARV refills in eight months.

Continuous counseling: At a multivariate level, continuous counseling >95% (AOR 2.73, 95% CI 1.09 to 6.82) was connected to viral suppression, according to Natukunda et al. (2019). In addition, the majority of respondents in this study of teenage Ugandans on ART for five years or more but with inadequate viral suppression blamed their viral non-suppression on a lack of ongoing counseling. A crucial component of good ARV adherence is counseling. However, it was discovered that both between countries and among facilities within each, counseling frequency and quality varied substantially.

2.3 Caregiver-related factors associated with viral non-suppression among adolescents living with HIV

2.3.1 Financial support: According to a cross-sectional study by Chhim et al (2018), it was revealed that financial support from caregivers is associated with viral non-suppression and this was done using a multivariate logistic regression model.

Adolescents who receive HIV treatment from an adult ART clinic (aOR = 2.95, 95% CI 1.56-5.59) and those who had no financial support from their parents continued to have significantly greater odds of having viral non-suppression (aOR = 1.81, 95% CI 1.05-4.08).

2.3.2 Caregivers' psychosocial support: Several studies by (Knodel et al., 2018; Li et al., 2019; Rotheram-Borus et al., 2018) have identified social support as a contributing factor to viral non-suppression among adolescents. According to Shumaker and Brownell (2018), social support provision is characterized as a provider-receiver interaction in which resources are exchanged for the benefit of the recipient. Different types of social support including but not limited to instrumental support and emotional support, were found to be crucial to achieving viral suppression among adolescents who are HIV-positive (Scheurer et al., 2019). While emotional support involves encouraging words and useful information, instrumental support help consists of actions like picking up drugs, paying for prescriptions, or offering physical assistance.

In a study by Humphrey et al. (2019), 1698 of the 7667 adolescents treated at AMPATH during the study period were linked to caregivers who had HIV and were included as caregiver-adolescent dyads. In terms of caretakers, 94% of them were mothers, the median age of enrolment on ART was 32.8 years, the median CD4 count at that time was 164 cells/mm3, and 23% of them did not have viral suppression. Children were found to have a higher likelihood of not being virally suppressed in the multivariable model in case the caregivers were not themselves virally suppressed compared to children whose caregivers were suppressed (aOR = 2.40, 95% CI: 1.86 to 3.10). Other factors such as caregiver ART regimen change before the VL, caregiver receiving a non-NNRTI-based regimen at the time of the VL, lower child age at ART commencement, and teenage HIV therapy at the time of the VL were linked to child viral non-suppression.

According to a study by Cyrus et al (2016), in their study that aimed at assessing disparities in caregiver relationships with adolescents living with HIV and a higher viral load among adolescents in Caribbean immigrants living with HIV. In Florida, Studies showed that there is a positive association between caregiver relationship with

adolescents and viral non-suppression (aOR = 3.32, 95% CI: 1.13 to 9.81). Racial disparities significantly influenced viral suppression among adolescent. Cyrus et al showed that Caribbean born black were less likely to achieve viral suppression when compared to adolescents from other races (Cyrus et al 2016)

2.4 Behavioral-related factors associated with viral non-suppression among adolescents living with HIV

A study carried out in the United States of America by Cook et al, established that substance abuse such as smoking and excessive consumption of were associated with viral non-suppression among adolescents (Cook et al, 2017). This finding was comparable to one from a study conducted in Vietnam by Jordan et al., which showed that adolescents on ART who admitted to using alcohol on a regular basis had a higher likelihood of being virally unsuppressed than adolescents on ART who did not use alcohol (Jordan et al., 2018).

In a study carried out with a population of 50 adolescents to establish the determinants of adherence among adolescents taking antiretroviral treatment in the United States of America, it was found that, poor adherence by self-report was correlated with higher viral load (95%CI, 84.7% – 95.8%) (Chandwani et al, 2012) using a chi-square test in different studies demonstrated that peer pressure was a predictor for viral non-suppression (95%CI, 4.2% – 15.3%). According to Nachega et al. (2009), patients who maintained strong adherence for 12 months or longer were more likely to see viral load reduction. Numerous more studies on the variables influencing teenagers' viral non-suppression link alcohol use, psychosocial issues, stigmatization, and supportive factors to low viral loads in adolescents.

A multicenter cohort study in South Africa showed improved viral suppression among adolescents under the age of 16yrs on Antiretroviral therapy (ART) who had access to community-based adherence support (Fatti et al., 2014). In Malawi, a study by Umar et al established that social stigma was associated with virological non-suppression among adolescents (Umar et al., 2018), emotional support, self-efficacy, social support, counseling from peer groups and self-efficacy were reported to be as strong predictor

for adherence (Xu et al., 2017; Umaret al., 2018). In a case-control study conducted by Sithole et al, in Zimbabwe established that adolescent who consumed alcohol had higher odds of experiencing viral non suppression compared to their counter parts who did not consume alcohol (AOR = 0.69, 95% CI 0.50 to 0.97) (Sithole et al., 2018).

In their study to establish the determinant of viral load non-suppression among adolescents in the eastern district of Mbale in Uganda, Joel et al found out that adolescents had limited knowledge of the use of ARV drugs and this affected their adherence and resulting in high viremia (Joel et al 2017). Health-related knowledge and health literacy increase adherence to ARVs and empower adolescents to take full responsibility of their health (Yathiraj et.al, 2021). In his study of viral non-suppression among adolescents accessing care at the Joint Clinical Research Center in Kampala, lubowa branch, Joseph K.B found out that limited knowledge of the use and benefit of Antiretroviral therapy (AOR=2.23,95% CL 1.05-2.32; p<0.01) was associated with viral non-suppression among adolescents (Joseph, 2019).

Summery

Achieving viral suppression among adolescents with HIV remains a significant challenge, with non-adherence to ART, suboptimal treatment regimens, and the development of drug resistance among the factors associated with viral load non-suppression. Addressing these treatment factors requires a comprehensive approach that includes interventions to improve adherence to ART, optimize treatment regimens, and monitor for drug resistance. Further research is needed to better understand the complex interplay between these treatment factors and to develop targeted interventions that can improve viral suppression among adolescents aged 10-19years accessing HIV services in Nwoya district.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter presents the study design, setting, data sources, study population, sample size determination techniques, procedure of sampling, study variables, data collection methods and tools, data analysis plan, ethical consideration, among others.

3.1 Study design

This study used Mixed Methods Research involving quantitative and qualitative approaches in a cross-sectional retrospective study design. Cross-sectional; because information from respondents was gathered all at once (2015) Bhawna and Gobind. It was also employed because it made it easier for the researcher to record information depending on data gathered at a certain period. The information acquired came from a group of volunteers known as variables, each of whom had unique traits and demographics. Furthermore, by employing a cross-sectional research methodology, the research results contributed to the removal of assumptions and their replacement with information regarding the particular factors examined during the period taken into account.

3.2 Study setting

This study was conducted in four ART sites in Nwoya district health facilities which included Anaka Hospital, Purongo health centre III, Alero health centre III, and Koch Goma health centre III, all these health facilities have adolescent clinic days. Nwoya district is in the Northern Region of Uganda. The district bordered by Amuru in the north, Pakwach district in the west, Kiryandongo and Bullisa districts in the south and Omoro and Oyam districts to the East.

3.3. Data sources

This research study had both primary and secondary data sources

Primary source: Here data was obtained through face-to-face interviews and researcher-administered questionnaires to selected respondents to get their opinions.

Secondary source: included e-books, published articles, journals and books written in relation to the topic of the study The researcher also reviewed secondary data from the HIV adolescent patients' files to determine their levels of viral non-suppression.

3.4. Study population

This comprised of mainly of female and male adolescents aged between 10 to 19 years attending HIV care in the four ART sites in the district who have been enrolled in ART for more than six months, Using the health facility records, these participants were identified based on their demographic information and the period under which they have been on ART. According to the Nwoya district health system records (2021), of the 5228 people enrolled in care, 281 adolescents are attending the ART clinic at the facilities in Nwoya district for more than six months. Adolescents whose caretakers or guardians cannot consent to the study and those who did not assent to the study were excluded.

3.5 Sampling Method and sample size

Since the number of adolescents under HIV care and treatment in the four selected facilities were few, a census study was preferred as such each of the study participant had equal opportunity to participate in the study and the findings from the study was representative enough since only adolescents with characteristics of interest were included. Therefore, the census method was used on the 281 adolescents aged 10-19 years living with HIV attending the ART clinic in the four selected health facilities in Nwoya district.

A total of 5 health workers comprising of mainly clinical officers, counsellors and nurses were purposively selected and interviewed using the key informants interview guide. The above cadres were selected because in the view of a researcher they were knowledgeable and have a good understanding of adolescents living with HIV

3.6 Study variables and measurement

Variable	Operational Definition	Scale of measurement	Outcome
Dependent Variables			
Viral non-suppression	Viral non-suppression status	1. WHO disease/clinical stage of a patient when starting ART 2. WHO disease/clinical stage of a patient at current 3. Comorbid condition at current 4. Recorded initial Viral Load of a patient 5. The last/current patient's VL level recorded 6. The initial patient's CD4 level recorded 7. Last/current patients' CD4 count	Dichotomous
Independent variables			
Socio-demographic factors	Gender	1. Male 2. Female	Categorical ordinal
	Age	1. 10-13 years 2. 14-16 years 3. 17-19 years	Categorical ordinal
	Education level	1. Primary 2. Secondary 3. Tertiary 4. Never had schooling	Categorical nominal
	Religion	1. Catholic 2. Anglican 3. Muslim 4. Pentecostal	Categorical nominal

		5. Others specify	
	The period spent living with HIV	1. Less than 1 year 2. 1-5 years 3. 6-10 years 4. Above 10 years	Categorical ordinal
Health facility factors	Adequacy of ARVs	1. Yes 2. No	Dichotomous
	The attitude of health workers	1. Positive 2. Negative	Categorical ordinal
	Distance to the health facility	1. Less than 1 km 2. 1-3 km 3. 4-6 km 4. Above 6 km	Categorical ordinal
	Waiting time for drug refills	1. Less than 1 hour 2. 1-3 hours 3. 4-6 hours 4. Above 6 hours	Categorical ordinal
	Continuous counseling	1. Yes 2. No	Dichotomous
	Availability of youth-friendly corners	1. Yes 2. No	Dichotomous
Behavioral factors	Attitudes toward ARV consumption	1. Yes 2. No	Categorical nominal
	Engaging in sexual activity	1. Once 2. More than one time 3. None	Numerical continuous
	Alcohol use by adolescents	1. Daily 2. Once a week 3. Once a month	Categorical

		4. None	
	Peer influence	1. Yes 2. No	Dichotomous
	Social media and technology influence	1. Positive influence 2. Negative influence	Numerical continuous
Caregiver factors	Financial support	1. Yes 2. No	Dichotomous
	Psychosocial support	1. Yes 2. No	Dichotomous
	Caregivers' education	1. Yes 2. No	Dichotomous
	Caregivers' occupation	1. Yes 2. No	Dichotomous
	Caregivers' Relationship with Adolescents	1. Bad 2. Fair 3. Good	Categorical

3.7. Data collection method

3.7.1. Quantitative method

Quantitative data was collected using semi-structured questionnaires. In this method the question is asked and optional answers are given from which the respondent is supposed to tick from the options given what to him or her is the most suitable answer

3.7.2. Qualitative method

Key informant interview guide was used to collect data from the key informants. This comprised open ended questions which the study participants were supposed to use express their views in regards to viral non-suppression among adolescents aged 10-19 years. Data collection tools. The study included two different kinds of data collection tools. These included interview guidelines and questionnaires used by the researcher,

both of which are briefly described in the subsection that follows.

3.8 Data collection tools

3.8.1 Researcher-administered questionnaires

Here, a questionnaire that was administered by the researcher was used to collect data. Quantitative evidence was gathered from teenagers living with HIV aged 10 to 19 who were receiving medical care from the four ART facilities in the Nwoya district using questionnaires that were administered by researchers. For this group of respondents—whose number is too large to interview—researchers employed questionnaires that were administered by researchers in order to save time. The typical questionnaire has a list of potential answers from which respondents choose the one that best fits the circumstance. For each of the four objectives, there were closed-ended questions in the survey, and the respondents were asked to check the response that best met their needs.

3.8.2 Key informant interview (KII) guide

This instrument was used to gather data that was useful for the study problem, which solely depended on the opinions of the respondents, but that could not be immediately viewed. Additionally, it was advantageous because it provided the researcher control over the course of inquiry, saving time (Haradhan, 2021). The information gathered through the interview added to the information gathered through the questionnaire.

3.9 Data Processing

This was accomplished by categorizing the respondents into groups. Data was tabulated and analyzed using the computer program; Statistical Package for Social Sciences (SPSS) version 20 after sorting, modifying, and coding responses. The preparation of the data, analysis, and compilation of the study report required tabulation of the findings, which was done after editing to check for mistakes and omissions and to condense the data to a meaningful pattern of replies.

3.10 Validity and Reliability of the data collection tools

The scientific method is founded on the essential tenets of validity and dependability (Kent, 2001). The absence of bias and distortion is a need for sound judgments. For the purpose of establishing and quantifying bias and distortion, reliability and validity are two key notions. How validity and reliability were established for this study are described in the following subsections.

3.10.1. Validity

The degree to which the scores accurately reflect the variable they are supposed to is known as validity. To determine whether the questions were capable of gathering the desired data, validity was performed. The research tools were pretested to allow necessary adjustments in the questionnaires. Irrelevant and vague questions were removed, some questions were rephrased so that they would collect the intended data. To determine the validity of the study instrument, a Content Validity Index (CVI) was generated. The formula employed by the researcher to determine the reliability of the research instruments is as follows:

$$\text{Content validity Index (CVI)} = \frac{\text{Relevant items by all judges as suitable}}{\text{The total number of items judged.}}$$

From the calculation, the CVI was 0.91 which was greater than the recommended 0.70 (Kent, 2001), implying that the questionnaire was valid for data collection.

3.10.2 Reliability

This gauges how consistently and steadily an evaluation instrument generates outcomes. If the technique consistently yields comparable results when used to gauge a specific character from the same respondents, it is called dependable. The researcher employed the test-retest procedure to make sure the instrument was reliable. Eight randomly chosen Anaka Hospital healthcare professionals were given the questionnaire, and the same participants were given the same questionnaire again a week later to compare their answers. This was accomplished during the pre-testing phase.

Experienced research assistants were hired and instructed by the researcher in all areas of the study.

3.11 Data analysis

Data was analyzed qualitatively and quantitatively as described below

3.11.1. Quantitative data analysis

For univariate analysis, descriptive analysis was done using SPSS version 20. Frequencies and percentages for different variables were (percentage) in tables for each response category.

In bivariate analysis, to determine the factors correlated with viral non-suppression among adolescents living with HIV, a chi-square test was used for categorical variables and the student's t-test for numerical data. Variables were considered significant at 95%CI (p-value - 0.15).

In order to ascertain the extent and significance of the factors connected to viral non-suppression in young HIV-positive individuals, a multivariate regression analysis was conducted. Only the significant variables at the bivariate level of analysis were considered for multivariate analysis where the odds ratios and their respective confidence intervals were determined. The level of statistical significance was determined at (p-value - 0.05).

3.11.2. Qualitative data analysis

Data from the qualitative category underwent content analysis. Data was gathered, written down, coded, and examined. Emerging themes were found, and their contributions to solving the research problem were examined in relation to the study objectives. The participants' perspectives were revealed by this. It was easier to understand the topic under research after reading direct statements and comments from the key informants.

3.12. Ethical consideration

The research sought ethical clearance from Uganda Christian University Research Ethics Committee (UCU-REC). However, administrative approvals were obtained from the district health office and the medical superintendent of Anaka Hospital, in charge of Purongo, Alero, and Kochgoma health centre III.

Informed consent was obtained from respondents' whereas some were from the parents or caretakers of the adolescents from 10-19 years since these adolescents are still minors and cannot decide for themselves. The benefits and risks of the study were also explained to the respondents and participants.

The study participants were informed of their right to withdraw from the study at any stage and that by doing so, it will not affect them or the services they receive at the health facility.

The study participants/respondents were assured of confidentiality. They were told not to write their names on the questionnaires so that the answers given cannot be linked to a particular respondent, they were also told that the data collected from them shall be kept securely only be accessed by authorized person and the data collected shall only be used for this academic research.

3.13 Plan for Dissemination of Results

The findings from this study were submitted as a dissertation to Uganda Christian University and the ART Clinic records office in Anaka Hospital. A copy of the study report was disseminated through local and international conferences, short health facility reports, and patient brochures at ART clinics. The researcher also wrote and submitted a manuscript for publication in a credible peer-reviewed journal.

3.14 Limitations of the Study and the solutions undertaken

The research was limited by a small sample size of adolescents attending HIV care and has been on ART for more than 6 months although this was mitigated by doing a census study to ensure that all the adolescents are included in the study.

CHAPTER FOUR: STUDY FINDINGS

4.0 Introduction

The study's findings are presented in this chapter. It includes descriptions of the background elements, the prevalence of viral non-suppression among adolescents 10 to 19 years of age accessing ART in Nwoya District, the health facility-related factors correlated with viral non-suppression among adolescents 10 to 19 years of age accessing ART in the same area, the caregiver factors associated, and the behavioral-related factors.

4.1. Response rate

The number of adolescents that were included in the study was 281. However, a total of 225 adolescents aged 10-19 years accessing antiretroviral therapyadolescents aged 10-19 years attending the ART clinic in the health facilities in Nwoya participated in the study while 56 adolescents did not participate as indicated in Table 1:

Table 1: Showing response rate

Number of respondents	**Frequency**	**Percentage**
Participated	225	80.1
Did not participate	56	19.9
Total	**281**	**100.0**

Source: *Primary data*

Only 225 of the 281 adolescents who were aged 10-19 years accessing antiretroviral therapyattending ART clinic in health facilities in Nwoya participated in the study. This represented a response rate of 80.1%. this response rate according to Ahuja (2009), was excellent since it was way over 70%

4.2. Descriptive Analysis of the socio-demographic characteristics of the respondents

Table 2: Showing of socio-demographic characteristics respondents

Variable	Frequency	Percentage (%)
Gender n=225		
Male	110	48.9
Female	115	51.1
Age n=225		
10-13 years	103	45.8
14-16 years	64	28.4
17-19 years	58	25.8
Educational level n=225		
Primary	188	83.6
Secondary	28	12.4
Tertiary	3	1.3
Never had schooling	6	2.7
Religion n=225		
Catholic	118	52.4
Anglican	73	32.4
Muslim	3	1.3
Pentecostal	31	13.8
Health facility n=225		
Anaka Hospital	94	41.8
Purongo Health Center III	21	9.3
Alero Health Center III	24	10.7
Koch Goma Health Center III	86	38.2
Duration on ARTn=225		
Less than 1 year	6	2.7
1-5 years	12	5.3
6-10 years	115	51.1
More than 10 years	75	33.3
From birth	17	7.6

Source: *Primary data*

From Table 2 above, 115(51.1%) of the respondents are female, whereas 110(48.9%) of the respondents are male. The reason why there are more female adolescents with HIV than males could be that female adolescents are more willing to seek medical checkups concerning HIV than their male counterparts. Both males and females were included in the study so as to get the varied views of both genders.

The table also shows that 103(45.8%) of the respondents are between 10-13 years, followed by those who are 14-16 years represented by 64(28.4%), whereas 58(25.8%) of the respondents are 17-19 years. This implies that the majority of the respondents with HIV are those in their late adolescence years which makes the study valid and reliable since these are the exact categories of respondents the study intended to capture.

The table above also shows that 188 (83.6%) of the respondents have attained primary education, 28(12.4%) have attained secondary education, 6(2.7%) have never attended school, and 3(1.3%) reported having attained tertiary education. This shows that all the respondents were able to respond to the questionnaire easily because they have attained different levels of education. However, questionnaire interpretation was done for those with no educational background.

Majority 118(52.4%) of the respondents were Catholics, 73(32.4%) were Anglicans, 31(13.8%) were of the Pentecostal religion and only 3(1.3%) of the respondents reported being Muslim. The inclusion of adolescents from different religious denominations helped in getting different views concerning the topic under study.

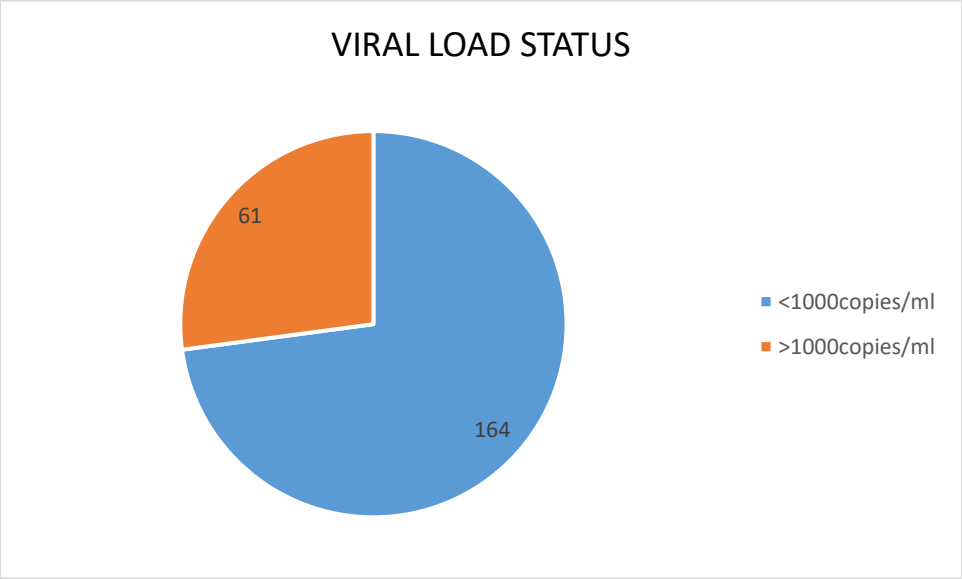
Last but not least, 94(41.8%) of the adolescents noted that they receive their medication from Anaka Hospital, followed by 86(38.2%) of the adolescents who receive their medication from Koch Goma Health Center III, followed by 24(10.7%) of the respondents who receive their medication from Alero Health Center III, whereas23(9.3%) receive their medication from Purongo Health Center III.

Finally, the table above shows that 115(51.1%) of the respondents noted that they have spent 6-10 years living with HIV/AIDS, 75(33.3%) have spent more than 10 years living with HIV, 17(7.6%) have lived with HIV from birth, 12(5.3%) have spent 1-5 years living

with HIV/AIDS, whereas 6(2.7%) of the respondents had spent less than a year living with HIV/AIDS.

4.3. viral non-suppression status among adolescents accessing ART in Nwoya district.

Figure 2 below shows the viral non-suppression status among adolescents accessing ART in Nwoya district



Source: primary data

In figure 2 above, respondents were asked about their viral non-suppression status and this was also obtained by looking at the last/ current patient's Viral Load level recorded by the four health facilities where these adolescents get their medication from. Majority 164(72.9%) of the respondents had a viral load of <1000copies/ml implying they were suppressed and 61(27.1%) of the respondents had a viral load >1000 which implies they were non-suppressed

from the Art Clinic show that of the HIV-positive adolescents noted that their viral loads are currently not detected/less than 1000 copies/ml and 61(27.1%) of HIV-positive adolescents had their viral loads that are more than 1000 copies/ml

As noted by Peabody (2017) that a viral load of < 1000 copies/ml would be considered suppressed whereas a viral load that greater than 1000 copies/ml would be considered high and hence non-suppressed.

4.4 Health facility-related factors associated with viral non-suppression among adolescents aged 10-19 years accessing ART in Nwoya district.

Table 3: Descriptive analysis of the health facility factors associated with viral-non suppression among adolescents accessing ART in Nwoya district.

Variable	Frequency (N=225)	Percentage (%)
Are you able to get enough ARVs to take care of your health from the health facility?		
Yes	215	95.6
No	10	4.4
What is the attitude of health care workers that take care of you at the health facility?		
Positive	213	94.7
Negative	12	5.3
What is the distance from your home to the health facility where you get medication?		
1-5 Km	161	71.6
6-10 Km	41	18.2
11-15 Km	12	5.3
More than 15 Km	9	4.0
I don't know	2	0.9
After reaching the health facility, how long do you take to get the drugs (ARVs)?		

Less than 1 hour	18	8.0
1-2 hours	120	53.3
3-4 hours	72	32.0
More than 4 hours	13	5.8
I don't know	2	0.9
Have you been able to receive continuous counseling from the counselors?		
Yes	193	85.8
No	32	14.2
Does the health facility have youth-friendly corners where you can interact with peers?		
Yes	4	1.8
No	221	98.2

Source: *Primary data*

In Table 4 above, the respondents were asked whether they can get enough ARVs to take care of their health from the health facility. Most of the respondents represented by215(95.6%) noted that they can get enough ARVs to take care of their health from the health facility, whereas10(4.4%) of the respondents also noted that they are not able to get enough ARVs to take care of their health from the health facility.

Also, the key informants reported that ARVs are enough for all the patients at the facility

"…… ARVs are enough for all our clients, rarely have we had stockouts of ARVs because we make projections and drug orders based on the number of clients we have under our care. so, all the clients get ARVs that is enough until the period they are to return to the facility……" **(**A 26- year-old female enrolled nurse)

Furthermore, the respondents were asked about the attitude of the healthcare workers that take care of them at the health facility. The majority of the respondents represented 213

213(94.7%) noted that the attitude of the health care workers that take care of them at the health facility is positive, whereas 12(5.3%) noted that the attitude of the health care workers that take care of them at the health facility is negative.

Similarly. Most of the key informants reported that the majority of health workers had a positive attitude towards their work however, they also noted that some health workers still have a negative attitude towards work and adolescents living positively

"Some of us the health workers still have negative attitudes towards adolescents living with HIV, we are rude to them, we do not give them enough time and information and this has made some of them scared of health workers and many times miss out on information that should have helped them adhere hence the non-suppression among some of them" (A 36-year-old male clinical officers.)

More so the respondents were asked about the distance from their homes to the health facility where they get medication, 161(71.6%) of the respondents reported that there is a distance of 1-5 kilometers from their homes to the health facility where they get medication. 41(18.2%) noted that there is a distance of 6-10 kilometers from their homes to the health facility where they get medication. 12(5.3%) of the respondents noted that there is a distance of 11-15 kilometers from their homes to the health facility where they get medication, 9(4%) of the respondents noted that there is a distance of more than 15 kilometers from their homes to the health facility where they get medication and only 2(0.9%) reported that they do not know the distance from their homes to the health facility where they get medication.

To the above, the respondents were also asked about how long they take to get the drugs (ARVs) after reaching the health facility, 53.3% of the respondents revealed that they take 1-2 hours to get the drugs (ARVs) after reaching the health facility. 32% noted that they take 3-4 hours to get the drugs (ARVs) after reaching the health facility. Findings indicate that 8% of the respondents noted that they take less than 1 hour to get the drugs (ARVs) after reaching the health facility, 5.8% of the respondents noted that they take more than 4 hours to get the drugs (ARVs) after reaching the health

facility, whereas 0.9% of the respondents noted that they do not know how long it takes them to get the drugs (ARVs) after reaching the health facility.

The respondents were also asked whether they have been able to receive continuous counseling from the counselors. The majority of the respondents represented by 85.8% noted that they have been able to receive continuous counseling from the counselors, whereas 14.2% noted that they have not been able to receive continuous counseling from the counselors.

Finally, the respondents were asked whether their respective health facilities have youth-friendly corners where they can interact with their peers. The majority of the respondents represented by 98.2% noted that their respective health facilities do not have youth-friendly corners where they can interact with their peers, whereas 1.8% noted that their health facilities have youth-friendly corners where they can interact with their peers.

The same observation was made by most of the key informants who observed that the majority of their health facilities do not have youth-friendly corners which is much need to offer services in the best possible ways tailored to the needs of the adolescents

*"……. Most adolescents especially female adolescents find it difficult to share the same waiting area, health education, and counseling sessions with the adults. They feel shy to ask any question and this has affected most of them from attending clinic days as scheduled by health workers. however, what we have tried to do, is to give them appointment dates different from the adults so that they feel more comfortable…" (*A 32- year-old female counselor)

4.5: Caregiver-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

Table 4: Descriptive analysis of the caregiver-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

Variable	Frequency (N=225)	Percentage (%)
Do you receive financial support from your guardian to take care of your health condition?		
Yes	184	81.8
No	41	18.2
Do you receive psychosocial support from your guardian to comfort and encourage you?		
Yes	202	89.8
No	23	10.2
] \Does your caregiver have enough knowledge on how to take care of you in your healthcare condition?		
Yes	204	90.7
No	21	9.3
Does the occupation of your guardian allow him or her to get enough time to take care of you and your needs?		
Yes	203	90.2
No	22	9.8
What is the relationship between you and your guardian?		
Bad	5	2.2
Fair	26	11.6
Good	194	86.2

Source: *Primary data*

In Table 8 above, the respondents were asked whether they receive financial support from their guardians to take care of their health conditions. Most of the respondents

represented by184(81.8%) noted that they receive financial support from their guardians to take care of their health conditions, whereas 41(18.2%) of the respondents also noted that they do not receive financial support from their guardians to take care of their health conditions.

The respondents were also asked whether they receive psychosocial support from their guardians to comfort and encourage them. The majority of the respondents represented by 202 (89.8%) noted that they receive psychosocial support from their guardians to comfort and encourage them, whereas 23(10.2%) noted that they do not receive psychosocial support from their guardians to comfort and encourage them.

Furthermore, the respondents were asked whether their caregivers have enough knowledge on how to take care of them in their healthcare condition. The majority of the respondents represented by 204(90.7%) noted that their caregivers have enough knowledge on how to take care of them in their healthcare condition, whereas 21 (9.3%) noted that their caregivers do not have enough knowledge on how to take care of them in their healthcare condition.

However, one of the key informants noted that the lack of knowledge by some caregivers on how to take care of these HIV-positive adolescents on ARVs has greatly influenced viral non-suppression among adolescents.

> ***"….I have realized that most of the caregivers especially the parents in rural areas do not have enough knowledge on how to take care of their adolescents that are HIV positive and are on ARVs, which has made them fail to offer the required support we prescribe hence contributing to viral non-suppression…..."*** (A 41-year-old female Assistant nursing officer nursing)

More so, the respondents were asked whether the occupations of their guardians allow them to get enough time to take care of themselves and their needs. The majority of the respondents represented by 202(90.2%) noted that the occupations of their guardians allow them to get enough time to take care of them and their needs, whereas

23(9.8%) noted that the occupations of their guardians do not allow them to get enough time to take care of them and their needs.

Finally, the respondents were asked about the relationship between them and their guardians. The majority of the respondents represented by 194 (86.2%) noted that the relationship between them and their guardians is good, 26 (11.6%) noted that the relationship between them and their guardians is fair, whereas 5 (2.2%) noted that the relationship between them and their guardians is bad.

4.6 The behavioral-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

Table 5: Descriptive analysis of the behavioral-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

Variable	Frequency (N=225)	Percentage (%)
In your view what are ARV drugs (medication) used for?		
Curing	5	2.2
Reducing pain	17	7.6
Reducing or stopping replication and progression of HIV	171	76.0
I do not know	24	10.7
Others	8	3.6
Do you think that ARVs have brought a positive outcome on your health?		
Yes	205	91.1
No	20	8.9
How do you feel while taking this medication (ARVs)?		

I feel it will have a positive impact on my life	192	85.3
If I had another option, I wouldn't take the medication	24	10.7
I feel the medication is too much for me to take every time	9	4.0
Do you engage in any sexual activity since you were diagnosed with HIV?		
Yes	27	12.0
No	198	88.0
If yes, how many times have you engaged in any sexual activity?		
Once	8	3.6
Twice	4	1.8
More than two times	15	6.7
None	198	88.0
Do you drink alcohol?		
No	225	100.0
Are you usually influenced by what your peers do when they are with you?		
Yes	25	11.1
No	200	88.9
Are you on any social media platform?		
Yes	12	5.3
No	213	94.7
If yes, how have these social media platforms influenced your life? (No: 12)		
Positively	4	33.3
Negatively	8	66.7

Source: *Primary data*

In Table 6, the respondents were asked what ARV drugs (medication) are used for in their views. Most of the respondents represented by 76% noted that ARV drugs are used for reducing or stopping replication and progression of HIV, 10.7% noted that they do not know, 7.6% noted that ARV drugs are used for reducing pain, 3.6% noted that ARV drugs are used for other things, whereas 2.2% noted that ARV drugs are used for curing HIV.

Furthermore, the respondents were asked whether they think that ARVs have brought a positive outcome on their health. The majority of the respondents represented by 91.1% noted that ARVs have brought a positive outcome on their health, whereas 8.9% noted that ARVs have not brought a positive outcome on their health.

More so the respondents were asked how they feel while taking the medication (ARVs), 85.3% of the respondents revealed that they feel the medication (ARVs) will have a positive impact on their lives. 10.7% noted that if they had another option, they wouldn't take the medication (ARVs), whereas 4% of the respondents noted that they feel the medication is too much for them to take every time.

However, most of the key informants noted that some adolescents have a negative attitude towards taking their medication; they went ahead and noted that these adolescents do not take their medication on time as prescribed by the health workers which has greatly influenced viral non-suppression among these adolescents.

> ***"…..some adolescents have a negative attitude toward taking their medication; he went ahead and noted that these adolescents do not take their medication on time as prescribed by the health workers which has greatly influenced viral non-suppression among these adolescents….."*** (A 32-year-old female counselor)

The respondents were also asked whether they engage in any sexual activity since they were diagnosed with HIV, 88% of the respondents noted that they were not sexually activite, whereas 12% noted that they engage in sexual activity. Those that engage in sexual activity were further asked the number of times they have engaged in any sexual

activity. 6.7% indicated that they have engaged in sexual activity more than two times, 3.6% indicated that they have engaged in sexual activity once, whereas 1.7% pointed out that they have engaged in sexual activity twice.

The respondents were further asked whether they are usually influenced by what their peers do when they are with them. The majority of the respondents represented by 88.9% noted that they are not usually influenced by what their peers do when they are with them, whereas 11.1% noted that they are usually influenced by what their peers do when they are with them.

Finally, the respondents were asked whether they are on any social media platform. The majority of the respondents represented by 94.7% noted that they are not on any social media platforms, whereas 5.3% noted that they are on various social media platforms. Those who noted that they were on various social media platforms were asked how the various social media platforms have impacted their lives. The majority of the respondents represented by 66.7% noted that these social media platforms have impacted their lives negatively, whereas 33.3% noted that the social media platforms have impacted their lives positively.

4.7. Bivariate analysis on health facility factors associated with viral-non suppression among adolescents accessing ART in Nwoya district

Table 6: Bivariate analysis of health facility factors associated with viral-non suppression among adolescents accessing ART in Nwoya district

Variable	Viral load suppression status		Chi-square	df	P-value (at 95% confidence level)
	<1000 copies n=164 (72.9%)	>1000 copies n=61 (27.1%)			
Ability to get enough ARVs to take care of their health					

Yes	161 (71.6)	54 (24.0)	0.323	1	0.570
No	3 (1.3)	7 (3.1)			
Attitude of the healthcare workers					
Positive	161 (71.6)	52 (23.1)	14.711	1	0.000*
Negative	3 (1.3)	9 (4.0)			
Distance from home to the health facility					
1-5 Km	116 (51.6)	45 (20.0)	19.045	4	0.001*
6-10 Km	37 (16.4)	4 (1.8)			
11-15 Km	8 (3.6)	4 (1.8)			
More than 15 Km	3 (1.3)	6 (2.7)			
I don't know	0 (0.0)	2 (0.9)			
The period spent in the health facility takes to get the ARVs					
Less than 1 hour	12 (5.3)	6 (2.7)	8.216	4	0.084
1-2 hours	85 (37.8)	35 (15.6)			
3-4 hours	58 (25.8)	14 (6.2)			
More than 4 hours	9 (4.0)	4 (1.8)			
I don't know	0 (0.0)	2 (0.9)			
Ability to receive continuous counseling from counselors					
Yes	142 (63.1)	51 (22.7)	9.741	1	0.002*
No	22 (9.8)	10 (4.4)			
Availability of youth-friendly corners					
Yes	4 (1.8)	0 (0.0)	1.515	1	0.218
No	160 (71.1)	61 (27.1)			

Source: *Primary data*

From Table 5 above, the attitude of health care workers (X^2=14.711, df =1, P-value=0.000), distance from home to health facility (X^2=19.045, df =4, P-value=0.001), and ability to continuously receive counseling from counseling (X^2=9.741, df =1, P-value=0.002) were found to significantly influence non-suppression p-value <0.05

4.8 Bivariate analysis of Caregiver related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

Table 7: Bivariate analysis on the caregiver-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

Variable	Viral load suppression status		Chi-square	df	P-value (at 95% confidence level)
	<1000 copies n=164 (72.9%)	>1000 copies n=61 (27.1%)			
Financial support from guardians					
Yes	134 (59.6)	50 (22.2)	3.750	1	0.053
No	30 (13.3)	11 (10.8)			
Psychosocial support from guardians					
Yes	148 (65.8)	54 (24.0)	0.143	1	0.705
No	16 (7.1)	7 (3.1)			
Caregiver knowledge on how to take care of the patient					
Yes	150 (66.7)	54 (24.0)	0.174	1	0.677
No	14 (6.2)	7 (3.1)			

Occupation of the guardian					
Yes	149 (66.2)	54 (24.0)	0.273	1	0.601
No	15 (6.7)	7 (3.1)			
Relationship between the adolescent and guardian					
Bad	5 (2.2)	0 (0.0)	2.610	2	0.000*
Fair	17 (7.6)	9 (4.0)			
Good	142 (63.1)	52 (23.1)			

Source: *Primary data*

According to Table 9 above, the relationship between the adolescent and guardian; (X^2=2.610, df =2, P-value=0.000) was one of the caregivers' factors that were significantly associated with viral-non suppression among adolescents p-value <0.05

While financial support from the guardian, psychosocial support from the guardian, caregivers' knowledge on how to take care of the patient, and occupation of the guardian did not significantly influence non-suppression among adolescents. P-value >0.05

4.9: Bivariate analysis on the behavioral-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

Table 8: Bivariate analysis of the behavioral-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

Variable	**Viral load suppression status**		**Chi-square**	**df**	**p-value (at 95% confidence level)**
	<1000 copies	**>1000 copies**			

	n=164 (72.9%)	n=61 (27.1%)			
Knowledge of the use of ARV drugs (medication)					
Curing	5 (2.2)	0 (0.0)	7.321	4	0.007*
Reducing pain	15 (6.7)	2 (0.9)			
Reducing or stopping replication and progression of HIV	125 (55.6)	46 (20.4)			
I do not know	15 (6.7)	9 (4.0)			
Others	4 (1.8)	4 (1.8)			
Have ARVs brought a positive outcome on your health?					
Yes	151 (67.1)	54 (24.0)	0.691	1	0.406
No	13 (5.8)	7 (3.1)			
The feeling while taking ARVs					
I feel it will have a positive impact on my life	142 (67.1)	50 (22.2)	3.850	2	0.076
If I had another option, I wouldn't take the medication	18 (8.0)	6 (2.7)			
I feel the medication is too much for me to take every time	4 (1.8)	5 (2.2)			
Engagement in sexual activity since being diagnosed with HIV					
Yes	17 (7.6)	10 (4.4)	5.894	1	0.015*
No	147 (65.3)	51 (22.7)			

Peer influence					
Yes	17 (7.6)	8 (3.6)	0.340	1	0.561
No	147 (65.3)	53 (23.6)			
Use of social media platforms					
Yes	6 (2.7)	6 (2.7)	3.361	1	0.067
No	158 (70.2)	55 (24.4)			

Source: *Primary data*

According to Table 9 above, Knowledge of the use of ARV drugs; (X^2=7.321, df =4, P-value=0.007) and Engagement in sexual activity since being diagnosed with HIV; (X^2=5.894, df =1, P-value=0.015) significantly influenced being non suppressed. P-value <0.05

While the feeling of if ARV brought a positive impact on health, peer influence and use of social media platforms did not influence the non-suppression status of adolescents p-value >0.05

4.10. Multivariate analysis on factors associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya district

Table 9: Showing Multivariate analysis on factors associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya district

Variable	**COR**	**AOR (CI)**	**P-value**
Duration on ART			
The attitude of health workers			
Negative	1.010(0.46-	5.11 (1.048-	0.002*
Positive	1.263)	1.419)	

		1(Reference group)		
Distance from home to the health facility				
1-5 Km	0.020(0.001-	0.038	(0.007-	**0.000**
6-10 Km	1.663)	1.946)		
11-15 Km	0.001(0.004-	0.033	(0.007-	
More than 15 Km	0.059)	0.084)		
	0.032(0.012-	0.059	(0.029-	
	0.331)	0.662)		
		1(Reference group)		
Ability to receive continuous counseling from counselors				
Yes	0.024(0.002-	0.034	(0.030-	0.016
No	0.576)	0.765)		
		1(Reference group)		
Knowledge of the use of ARV drugs				
Curing	0.011(0.003-	0.028	(0.006-	0.003*
Reducing pain	0.654)	0.757)		
Reducing or stopping replication and progression of HIV	0.027(0.011-	0.033	(0.026-	
	1.604)	1.645)		
I do not know	0.040(0.039-	0.066	(0.063-	
	1.744)	1.962)		
		1(Reference group)		

Engagement in sexual activity since being diagnosed with HIV				
Yes	1.101(0.635-	1.400	(0.730-	0.065
No	1.998)	2.687)		
		1(Reference group)		
Relationship between the adolescent and guardian				
Bad	2.382(0.209-	7.401	(0.328-	0.012*
Fair	1.641)	1.673)		
Good	0.453(0.367-	0.946	(0.644-	
	1.299)	1.390)		
		1(Reference group)		

Source: *Primary data*

From the multivariate analysis table 10, the attitude of health workers (AOR=5.11; 95% CI: 1.048-1.419; p= 0.002), distance from home to health facility (AOR=0.038; 95% CI: 0.007-1.946; p= 0.000), knowledge on the use of ARVs (AOR=0.028; 95% CI: 0.006-0.757; p= 0.003) and the relationship between the adolescent and guardian (AOR=7.401; 95% CI: 0.328-1.673; p= 0.012) were independently found to be associated with viral load non-suppression among adolescents in Nwoya district.

Health workers with negative attitudes were 5.11 times more likely to contribute to viral load non-suppression among adolescents compared to health workers with positive attitudes, adolescents who lived 1-5km away from the health facility were 0.038 times less likely to be non-suppressed compared to those who lived more than 15km away from the health facility, adolescents who knew the use of ARVs were 0.028 times less likely to be virally non-suppressed compared to adolescents who did not have any knowledge of ARVs. Finally, adolescents whose relationship with their guardians was bad were 7.401 times more likely to be non-suppressed compared to adolescents who enjoyed a good relationship with their guardians.

CHAPTER FIVE: DISCUSSION OF STUDY FINDINGS

5.0 Introduction

This chapter discusses the study findings in relation to the reviewed literature and as per study objectives.

5.1 Health facility-related factors correlated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

This study established that the distance from home to the health facility (AOR=0.038; 95% CI: 0.007-1.946; p= 0.000) significantly influenced the viral load status of adolescents accessing antiretroviral therapy such that, adolescents who lived 1-5km away from the health facility were 0.038 times less likely to be non-suppressed compared to those who lived more than 15km away from the health facility. This finding consistently aligns with a finding in a study carried out by Bunupuradah et al., (2018) who found that among a population of 1000 adolescents with HIV from India, it revealed that geographic distance from residence to health facility positively correlated with viral non-suppression among adolescents with HIV affirmed by r-0.895 (P=0.00<0.01). Individuals who live closer to health facilities are more likely to seek healthcare and hence attain viral load suppression than those who live farther away, also Huong et al. established that those with easier access to healthcare because of reduced distance to the health facility often have better health outcomes (Huong et al., 2019).

Furthermore, in a descriptive study conducted by Mujugira aimed at establishing whether attitudes of health workers greatly influence viral non-suppression among adolescents living with HIV, the findings revealed that poor health workers' attitudes were positively associated with viral non-suppression among adolescents (AOR= 1.29; 95% CI= 1.04 – 1.59), (Mujugira,2009). This finding consistently aligns with the finding of this study that attitude of health workers (AOR=5.11; 95% CI: 1.048-1.419; p= 0.002) significantly influenced viral non-suppression among adolescents. This is to the extent that health workers with a negative attitude where 5.11 times more likely to contribute

to viral non-suppression among adolescents accessing antiretroviral therapycompared to health workers with a positive attitude,

5.2 Caregiver-related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

This study established that the relationship between the adolescent and guardian (AOR=7.401; 95% CI: 0.328-1.673; p= 0.012) was independently associated with viral load non-suppression among adolescents in Nwoya district. adolescents whose relationship with their guardians was bad were 7.401 times more likely to be non-suppressed compared to adolescents who enjoyed a good relationship with their guardians. This finding is in agreement with a finding in a descriptive study conducted by Cyrus et al (2016) that established that there is a positive association between caregiver relationship with adolescents and viral non-suppression (aOR = 3.32, 95% CI: 1.13 to 9.81) implying that children that had a good relationship with their caregivers were 3.32 times more likely to achieve viral suppression compared to adolescents who reported a bad relationship between them and the caregivers

5.3 Behavioral-related factors associated with viral-non suppression among adolescents 10-19 years accessing HIV services in Nwoya district

This study established that the majority of the respondents were knowledgeable about the use of ARVs and there was a significant relationship between knowledge of the use of ARVs and viral non-suppression (AOR=0.028; 95% CI: 0.006-0.757; p= 0.003). adolescents who knew the use of ARVs were 0.028 times less likely to be virally non-suppressed compared to adolescents who did not have any knowledge of the use of ARVs. This finding is contrary to the findings by Joel et al a study that established the determinant of viral load non-suppression among adolescents in the eastern district of Mbale in Uganda. The study indicated that adolescents had limited knowledge of the use of ARV drugs and this affected their adherence and resulting in high viremia (Joel et al 2017). Similarly, in his study of factors correlated with viral non-suppression among adolescents at the joint clinical research center in Lubowa, Kampala Uganda, joseph K.B. Matovu established that limited knowledge on use and benefit of ARVs

(AOR = 2.23, 95% CI 1.05–2.32; $p < 0.01$), was associated with viral non-suppression among adolescents (Joseph, 2019).

CHAPTER SIX: SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

6.0 Introduction

This chapter provides conclusions and makes recommendations for the study. These were made based on the study objectives and study findings. The chapter also proposes some areas for further study.

6.1: Conclusion

The study found that the prevalence of non-suppression among adolescents in Nwoya district stood at 61(27.1%).

This study also concluded that, the predictors for viral load non-suppression among adolescents were the attitude of health workers, distance from home to health facility, knowledge on the use of ARVs and relationship between the adolescent and their guardians.

6.3 Recommendations

The study established that the prevalence of viral non-suppression among adolescents in Nwoya district stood at 27.1%. this prevalence is high therefore, there is a need for the district health officer to adopt a multi-sectoral approach including but not limited to mass sensitization to address, the social, cultural, and health sector factors correlated with viral non-suppression among adolescents

The study also established that there is a significant association between the distance from home to the health facility and viral non-suppression therefore, there is a need for implementing partners to support the health facilities in Nwoya district to carry out ART outreach with the aim of reducing distance and cost of transport to the health facility. This will go a long way in taking services nearer with resultant improvement in suppression rate

There is a need for a deliberate effort by health workers to continuously provide health education and counseling of adolescents on the use and benefit of ART this will enhance

their knowledge that will go a long way in improving adherence with a resultant benefit in reducing viral non-suppression as established by this study

Health services must be modified to be more teen-friendly in terms of health providers, appointment times, and privacy. In addition, early disclosure, ongoing psychological support, and involvement of family and school "buddies" are necessary for adolescent care, particularly for those who attend boarding schools.

There is a need to prioritize the training of healthcare providers in psychological counseling and management of adolescents on ART. This will improve the skills and attitude of health workers in dealing with adolescents living with HIV

6.4 Areas for further research

The study highlights areas for further research. To begin with, the study's focus was solely on teenagers in the Nwoya district between the ages of 10 and 19 years. This may not be an actual representation of all the adolescents in the other parts of Uganda to make a generalization of the factors correlated with viral non-suppression among adolescents 10-19 years living with HIV. The study thus recommends further studies to be conducted in other districts in the different regions of Uganda and this time, also the youths aged 18-35 years should be involved in this study to permit comparison of the study findings. The study also only focused on only three factors namely; health facility-related factors, behavioral-related factors, and caregiver-related factors. This is not an exhaustive list of all the factors correlated with viral non-suppression among adolescents 10-19 years living with HIV. To enable comprehensive determination of the phenomenon that exists, it is suggested further studies be undertaken on other factors correlated with viral non-suppression among adolescents 10-19 years living with HIV

REFERENCES

ATUAHENE K. 2019. *Current status of HIV in Ghana*. 13th International Conference on HIV Treatment, Pathogenesis and Prevention Research in Resource-Limited Settings.

AZMERAW D, WASIE B. 2018. *Factors associated with adherence to highly active antiretroviral therapy among children in two referral hospitals, northwest Ethiopia*. Ethiop Med J. 50(2):115-124.

BEER, L., MATTSON, C. L., SHORT, W. R. & SKARBINSKI, J. 2018. *Gender disparities in non-viral suppression and antiretroviral therapy use by racial and ethnic group-Medical Monitoring Project*.

BIKAAKO-KAJURA W, et al. 2019. *Disclosure of HIV status and adherence to daily drug regimens among HIV-infected children in Uganda*. AIDS Behav;10(1):85.

BONNER K, et al. 2019. *Viral load monitoring as a tool to reinforce adherence: a systematic review*. J Acquir Immune Defic Syndr; 64(1):74–8.

BULAGE, L., SSEWANYANA, I., NANKABIRWA, V., NSUBUGA, F., KIHEMBO, C., PANDE, G., ARIO, AR., MATOVU, J.K., WANYENZE, R.K. & KIYAGA, C. 2017. Factors associated with virological non-suppression among HIV-positive patients on antiretroviral therapy in Uganda. *BMC Infectious Diseases*, 17(1):326.

BUNUPURADAH, T., SRICHAROENCHAI, S., HANSUDEWECHAKUL, R., KLINBUAYAEM, V., TEERAANANCHAI, S., WITTAWATMONGKOL, 0., AKARATHUM, N. & PRASITHSIRIKUL, W., et al. 2018. Risk of first-line antiretroviral therapy failure in HIV-infected Thai children and adolescents. *Pediatric Infectious Disease Journal*, 34(3):e58-62.

CHHIM K, MBURU G, TUOT S, SOPHA R, KHOL V, CHHOUN P, et al. 2018. *Factors associ- ated with viral non-suppression among adolescents accessing antiretroviral therapyin Cambodia: a cross-sectional study*. AIDS Res Ther. 15(1):20.

DAHOUROU DL, BENGHEZAL M, AMORISSANI-FOLQUET M, YONABA C, MALATESTE K, TONI T, et al. 2017. Longitudinal cluster analysis of non-viral suppression during 25 months on antiretroviral therapy, adherence and factors associated in young West-African children, in the MONOD ANRS 12206 cohort. 9th IAS Conference on HIV Science.

DAVIES M-A, MOULTRIE H, ELEY B, RABIE H, VAN CUTSEM G, GIDDY J, et al. 2011. *Viro- logic failure and second-line antiretroviral therapy in children in South Africa-The IeDEA Southern Africa Collaboration*. J Acquired Immune Defc Syndr. 56(3):270.

DAVIES MA, PINTO J, BRAS M. 2019. *Getting to 90-90-90 in paediatric HIV: What is needed*? J Int AIDS Soc; 18(7Suppl 6):20770.

DUARTE HA, HARRIS DR, TASSIOPOLOUS K, LEISTER E, FABIANA S, FERREIRA FF, et al. 2019. *Relationship between viral load and behavioral measures of adherence to antiretroviral therapy in children living with human immunodeficiency virus in Latin America*. Braz J Infect Dis; 19:263-7.

ESBJORNSSON J., MANSSON F., KVISTETAL A., 2019. Long-term follow- up of HIV-2-related AIDS and mortality in Guinea-Bissau: a prospective open cohort study, *The Lancet HIV*, vol. 6, no.1, pp. e25–e31.

EVANS, D., MENEZES, C., MAHOMED, K., MACDONALD, P., UNTIEDT, S., LEVIN, L., JAFFRAY, I., BHANA, N., FIRNHABER, C. & MASKEW, M. 2013. Treatment outcomes of HIV-infected adolescents attending public-sector HIV clinics across Gauteng and Mpumalanga, South Africa. *AIDS Research and Human Retroviruses*, 23.

FOX MP, CUTSEM G VAN, GIDDY J, MASKEW M, KEISER O, et al. 2018. *Rates and predictors of failure of first-line antiretroviral therapy and switch to second-line ART in South Africa*. J Acquir Immune Defic Syndr; 60(4):428–37.

IDELE, P., GILLESPIE, A., PORTH, T., SUZUKI, C., MAHY, M., KASEDDE, S. & LUO, C. 2014. Epidemiology of HIV and AIDS among adolescents: current status, inequities, and data gaps. *Acquired Immune Deficiency Syndrome*. 66:S144–S153, Volume 66.

KIKUCHI K, POUDEL KC, MUGANDA J, MAJYAMBERE A, OTSUKA K, SATO T, et al. 2018. *High risk of ART non-adherence and delay of ART initiation among HIV positive double orphans in Kigali*, Rwanda. PLoS One; 7(7):e41998.

KIRAGGA A., 2019. *Application of machine-learning models in prediction of PrEP retention among high-risk persons in Uganda*. 13th International Conference on HIV Treatment, Pathogenesis and Prevention Research in Resource- Limited Settings.

KWARISIIMA D., KAMYA M. R., OWARAGANISE A. et al., 2019. High rates of viral suppression in adults and children with high CD4+ counts using a streamlined ART delivery model in the SEARCH trial in rural Uganda and Kenya, *Journal of the International AIDS Society*, vol. 20, no. 4, p. 21673.

LEE PK, KIEFFER TL, SILICIANO RF, NETTLES RE 2019. *HIV-1 viral load blips are of limited clinical significance*. J Antimicrob Chemother; 57(5):803-5.

MAKADZANGE, AT., HIGGINS-BIDDLE, M., CHIMUKANGARA, B., BIRRI, R., GORDON, M., MAHLANZA, T., MCHUGH, G., VAN DIJK, J.H., BWAKURA-DANGAREMBIZI, M., NDUNG'U, T., MASIMIREMBWA, C., PHELPS, B., AMZEL, A., OJIKUTU, B.O., WALKER, B.D. & NDHLOVU, C.E. 2018. *Clinical, virologic, immunologic outcomes and emerging HIV drug resistance patterns in children and adolescents in public ART care in Zimbabwe*. PLoS ONE, 10(12):e0144057.

MANNHEIMER S, et al. 2017. *The consistency of adherence to antiretroviral therapy predicts biologic outcomes for human immunodeficiency virus-infected persons in clinical trials*. Clin Infect Dis; 34(8):1115–21.

MBONYE M, SEELEY J, SSEMBAJJA F, BIRUNGI J, JAFAR S. 2013. Adherence to antiret- roviral therapy in Jinja, Uganda: a six-year follow-up study. *PLoS ONE*. 8(10):e78243.

MINISTRY OF HEALTH 2016. *Consolidated Guidelines for the Prevention and Treatment of HIV in Uganda*. Kampala: Ministry of Health; p. 88-98.

MUJUGIRA A., CELUM C., TAPPERO J. W., RONALD A., MUGO N., AND BAETEN J. M., 2019. Younger age predicts failure to achieve viral suppression and virological rebound among HIV-1-infected persons in serodiscordant partnerships, *AIDS Research and Human Retroviruses*, vol. 32, no. 2, pp. 148–154.

MUTWA PR, et al. 2018. Long-term effectiveness of combination antiretroviral therapy and prevalence of HIV drug resistance in HIV-1–infected children and adolescents in Rwanda. *Pediatr Infect Dis J*; 33(1):63-9.

NASUUNA E, KIGOZI J, BABIRYE L, MUGANZI A, SEWANKAMBO NK, NAKANJAKO D. 2018. Low HIV viral suppression rates following the intensive adherence counseling (IAC) program for children and adolescents with viral failure in public health facilities in Uganda. *BMC Public Health*. 18(1):1048.

NATUKUNDA J, KIRABIRA P, ONG KIC, SHIBANUMA A, JIMBA M. 2019. Virologic failure in HIV-positive adolescents with perfect adherence in Uganda: a cross-sectional study. *Trop Med Health*. 47(1):8.

NGLAZI, M. D., KRANZER, K., HOLELE, P., KAPLAN, R., MARK, D., JASPAN, H., LAWN, S. D., WOOD, R. & BEKKER, L.-G. 2019. Treatment outcomes in HIV- infected adolescents attending a community-based antiretroviral therapy clinic in South Africa. *BMC Infectious Diseases*.

PENAZZATO M. 2019. *WHO HIV Drug resistance surveillance in children less than 18 months old newly diagnosed with HIV: results from Swaziland and Zimbabwe*. 5th International Workshop on HIV Paediatrics.

REIS C., HEISLER M., AMOWITZ L. L. et al., (2018). “Discriminatory attitudes and practices by health workers toward patients with HIV/AIDS in Nigeria,” *PLoS Medicine*, vol. 2, no. 8, pp. 743–752.

UNAIDS-the Joint United Nations Programme on HIV/AIDS. Global report 2019. *UNAIDS report on the global AIDS epidemic 2019*. Geneva: UNAIDS; 12.

VAN DYKE RB, et al. 2017. Reported adherence as a determinant of response to highly active antiretroviral therapy in children who have human immunodeficiency virus infection. *Pediatrics*; 109(4):e61.

VAN GRIENSVEN J, DE NAEYER L, UWERA J, ASIIMWE A, GAZILLE C, et al. 2018. Success with antiretroviral treatment for children in Kigali, Rwanda: experience with health center/nurse-based care. *BMC Pediatr*; 8:39.

VON ELM E, ALTMAN DG, EGGER M, POCOCK SJ, GØTZSCHE PC, et al 2019. *The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies*. Rev Esp Salud Publica; 82(3):251–9.

VREEMAN RC, AYAYA SO, MUSICK BS, YIANNOUTSOS CT, COHEN CR, NASH D, et al. 2018. *Adherence to antiretroviral therapy in a clinical cohort of HIV-infected children in East Africa*. PLoS One; 13(2):e0191848.

WORLD HEALTH ORGANIZATION 2018. *Health for the world’s adolescents: a second chance in the second decade*. Geneva: WHO.

ZANONI BC, SIBAYA T, CAIRNS C, LAMMERT S, HABERER JE 2018. *Higher retention and viral suppression with adolescent-focused HIV clinic in South Africa*. PLoS One; 12:e0190260.

APPENDICES

Appendix 1: Questionnaire

For adolescents accessing antiretroviral therapyin from selected health centers in Nwoya district

Dear sir/madam,

I, Okello James a Master of Public Health student from Uganda Christian University, am conducting research on "The factors associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya District". You have been chosen to take part in this study because the information you will provide will enrich this study. Also note that the information you provide will solely be used for academic purposes and will be treated with utmost confidentiality.

SECTION A: BIO DATA

Please tick in box the appropriate responses:

1. Sex

a) Male ☐ b) Female ☐

2. Age in complete years

a) ……..years old.

3. Educational level

a) Primary ☐ b) Secondary ☐

c) Tertiary ☐ d) Never had scho☐

4. Religion

a) Catholic ☐ b) Anglican ☐

c) Muslim ☐ d) Pentecostal ☐

e) Others specify……..

5. From which health center do you receive your medication from?

a) Anaka hospital ☐ b) Purongo health centre III ☐

c) Alero health centre III ☐ d) Koch Goma health centre III ☐

6. How long have you lived with HIV/AIDS?

a) ……..years

Section B: The viral non-suppression status among adolescents living accessing ART in Nwoya district

(*Data to be obtained from the patients' register at the hospital*)

7.	Last/current patient's VL level recorded	…….	Date……..

Section C: The health facility related factors correlated with viral-non suppression among adolescents 10-19 years accessing antiretroviral therapyin Nwoya district

8. Are you able to get enough drugs (ARVs) to take care of your health from the health facility?

a) Yes ☐ b) No ☐

9. How is the attitude of the health care workers that take care of you at the health facility?

a) Positive ☐ b) Negative ☐

10. What is the distance from your home to the health facility where you get your medication?

a)…… Kilo meters

11. After reaching the health facility, how long do you take to get the drugs (ARVs)?

a)…… hours

12. Have you been able to receive continuous counseling from the counselors at the health facility?

a) Yes ☐ b) No ☐

13. Does the health facility have youth friendly corners where you can interact with your peers?

a) Yes ☐ b) No ☐

Section D: The behavioral related factors correlated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

14. In your own view what are ARV drugs (medication) used for?

a) Curing ☐

b) Reducing pain ☐

c) Reducing or stop replication and progression of HIV ☐

d) I do not know ☐

e) Others specify…….

15. Do you think that ARVs have brought a positive outcome on your health?

a) Yes ☐ b) No ☐

16. How do you feel while taking this medication (ARVs)?

a) I feel it will have a positive impact on my life ☐

b) If I had another option, I wouldn't take the medicati… ☐

c) I feel the medication is too much for me to take ever☐e

17. Do you engage in any sexual activity since you were diagnosed with HIV?

a) Yes ☐ b) No ☐

18. If yes, how many times have you engaged in any sexual activity?

a). ……. times

19. Do you drink alcohol?

a) Yes ☐ b) No ☐

20. If yes, how often do you drink alcohol in a week?

a). …….. times

21. Are you usually influenced by what your peers do when they are with you?

a) Yes ☐ b) No ☐

22. Are you on any social media platform?

a) Yes ☐ b) No ☐

23. If yes, how have these social media platforms influenced your life?

a) Positively ☐ b) Negatively ☐

Section E: The caregiver related factors associated with viral-non suppression among adolescents 10-19 years accessing ART in Nwoya district

24. Do you receive financial support from your guardian to take care of your health condition?

a) Yes ☐ b) No ☐

25. Do you receive psychosocial support from your guardian to comfort and encourage you?

a) Yes ☐ b) No ☐

26. Does your caregiver have enough knowledge on how to take care of you in your healthcare condition?

a) Yes ☐ b) No ☐

27. Does the occupation of your guardian allow him or her to get enough time to take care of you and your needs?

a) Yes ☐ b) No ☐

28. What is the relationship between you and your guardian?

a). Bad ☐ b). Fair ☐

c). Good ☐

Thank you for your cooperation

Appendix 2: Interview Guide

For key informants (selected health professionals in Nwoya district in the ART clinics)

Dear Respondent,

I am Okello James a Master's student of Public Health from Uganda Christian University conducting research on "The factors associated with viral non-suppression among adolescents 10-19 years accessing ART in Nwoya District". Due to the importance of the contribution you provide to your company to the type of information needed, you have been chosen to take part in this study. The information you provide will be handled with the highest secrecy and used only for academic reasons.

1. When were you born?

2. What is your highest level of education?

3. Tell me about your marital status?

4. Which health facility do you work with?

5. How long have you worked with this health facility?

6. Describe for me the viral non-suppression status among adolescents 10-19 years accessing antiretroviral therapyin your health facility?

7. Tell me more about the health facility related factors you think could be associated with viral non-suppression among adolescents 10-19 years accessing antiretroviral therapyin your health facility?

8. Tell me more about the caregiver related factors you think could be associated with viral non-suppression among adolescents accessing antiretroviral therapyin your health facility?

9. Tell me more about the behavioral related factors you think could be associated with viral non-suppression among adolescents accessing antiretroviral therapyin your health facility?

Thank you for your participation

Appendix 3: Informed consent form (ICF)

Dear sir/madam,

I am ……..... a student of Uganda Christian University located in Mukono district, Uganda.

Introduction

You are kindly requested to take part in this study, you will be interviewed and the interview will last for only about 25 to 30 minutes. In this interview, I will be asking you questions related to why there is poor ART adherence among adolescents 10-19 years and what the possible causes for viral non-suppression are.

Title of the Study:

Factors associated with viral non-suppression among adolescents 10-19 years accessing ART services in Nwoya district.

Purpose of the study:

The purpose of this study is to investigate the factors associated with viral non-suppression among adolescents 10-19 years accessing ART services in Nwoya district. In our discussion, I will be asking you questions related to justifications why some children aged 19 years and below in Nwoya district do not virally suppress.

Study procedures:

In this dialogue, the researcher and his assistants presented the documents with questions that were answered honestly. It took about 25 minutes to complete this process. The questionnaire included all the responses. In order to verify the accuracy of the statements, the researcher recorded the information in the form of field notes.

Voluntary Consent:

Participation in this study is voluntary, therefore it not by force and you are free to say you do not want to take part in this discussion. You can leave if you so wish.

Confidentiality:

Your response to this study will be anonymous and the information you provide is confidential and will be used purely for the intended purpose and it will not be shown to anyone else. The research assistant will ensure that your identity and the answers you provide remain unknown to anyone else and this will be done through some of the following:

- ✓ Keeping interview notes and any other identifying participant information in a lockable file cabinet in the researcher's possession will help protect participant confidentiality.
- ✓ Other methods include assigning participants code names or numbers that will be used on all research notes and documents that include information from this discussion.

Benefits:

The information generated from this study will be useful to you especially learning about various ways on how you can handle yourself in regards to positive living as well as ensuring that you adhere to the antiretroviral therapy and support to enhance viral suppression.

Risks:

Taking part in this discussion may lead to not being liked by your fellow adolescents especially those that think that the study is a waste of time. In addition, it might be challenging for some of the adolescents not able to disclose key important information due to stigmatization

Compensation:

If you take part in this discussion, no money or any other gifts will be given to you during the study. However, the information you share will help to draw strategies on how to deal with adherence among adolescents of your age and in the long run support to address viral non-suppression.

You can get answers to your concerns or complains through the contacts below:

Contact the researcher on 0774641150 should you have any questions, complaints, or concerns regarding this study.

Assessment of understanding:

I have understood the information provided to me to take part in this discussion. I have also fully understood the good things that I may get out of taking part in this discussion and some of the dangers I may come across. I agree to take part in this discussion and I will sign the document.

_____ _____

Name and Signature/Thumb Print of Person participating in the Study Date

_____ _____

Name and Signature of Person Obtaining Informed Consent/Researcher Date

Appendix 4: Adolescents' Assent Form

I am Okello James from Uganda Christian University. I am conducting research on the factors associated with viral non-suppression in HIV-positive adolescents aged 10 to 19 accessing ART s in the Nwoya district. Your teacher recommended you for this project, thus we are requesting you to participate in the research study.

You will be questioned about your general life and how you feel about it for the purpose of this study. All of your responses are confidential, and neither your teacher nor your parent(s) or guardian will see them. They will only be visible to study participants.

Although we don't anticipate any significant issues arising from this study for you, you could experience sadness when we inquire about negative events in your life.

By improving conditions for other adolescents in the Nwoya district who may be experiencing issues, you can feel good about it. You will receive a pencil in return for taking part in the study!

You should be aware that participation in the study is optional. If you respond "no," its is very okay with us.

In case you choose to leave the study at any time, please do.

You can contact us on the following contacts at any time.

The Research Ethics Committee; Mr. Osborn Ahimibisibwe (REC, UCU) oahimbisibiwe@ucu.ac.ug 0775737627, Okello James 0774641150 okellojames77@gmail.com

Sign this form only if you wish to participate:

I…… have understood what you will be doing for this study, and have had all your questions answered. I am therefore willing to participate in this study.

Your Signature……

Date……

Witness

Signature…….

Date ……..

Appendix 5: REC Approval

UGANDA CHRISTIAN UNIVERSITY
A Centre of Excellence in the Heart of Africa

29th September 2022

Okello James,
C/o, Uganda Christian University,
P. O. Box 4, Mukono
Tel. +256 774641150
okellojames77@gmail.com

UG-REC-026 APPROVAL NOTICE

To: Okello James, Principal Investigator
Re: UCU-REC Application entitled; ***Factors associated with viral non-suppression among adolescents 10-19 years living with HIV in Nwoya District-Uganda.***

Application Number: **UCUREC-2022-335**
Version: 4.0

Type: [ ] Initial Review
[ ] Protocol Amendment
[ ] Letter of Amendment (LOA)
[ ] Continuing Review
[ ] Material Transfer Agreement
[ ] Other, Specify:

I am please to inform you that the **UG-REC-026;** UCUREC approved the above referenced application.

Approval of the research is for the period from 27th September, 2022, to 27th September, 2023.

This research is considered minimal risk category.
As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and additions to the protocol or the consent form must be submitted to the REC for re-review and approval prior to the activation of the changes. The REC application number assigned to the research should be cited in any correspondence.

3. Reports of unanticipated problems involving risks to participants or other must be submitted to the REC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for REC review.

4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by subjects and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.

5. Regulations require review of an approved study not less than once per 12-month period. **Therefore, a continuing review application must be submitted to the REC eight weeks prior to the above expiration date of 27th September, 2023 in order to continue the study beyond the approved period.** Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.

The following is the list of all documents approved in this application by UG-REC _026:

	Document Title	Language	Version	Version Date
1.	Research Proposal	English	1.0	1st September, 2022
2.	Informed Consent Form	English	1.0	1st September, 2022
3.	Data Collection Tools	English	1.0	1st September, 2022

Signed and Stamped

.....

Prof. Peter Waiswa.
UCUREC Chairperson,
pwaiswa@musph.ac.ug

UGANDA CHRISTIAN UNIVERSITY
APPROVED
UNTIL
27 SEP 2023
RESEARCH ETHICS COMMITTEE

Appendix 6: Permission

THE REPUBLIC OF UGANDA

NWOYA DISTRICT LOCAL GOVERNMENT

OFFICE OF THE DISTRICT HEALTH OFFICER
P.O. BOX 1033, GULU/NWOYA

Contact: Tel: 0782762244 Alt: 0776568726; E-mail: wonyima@gmail.com Alt: okotsamu@gmail.com

Date: 14th November, 2022

To: Medical Superintendent, Anaka General Hospital.
In-charge Purongo HC III
In-charge Alero HC III
In-charge Koch Goma HC III

RE: PERMISSION TO ALLOW OKELLO JAMES COLLECT DATA FOR RESEARCH

The above captioned subject matter refers. Dr. Okello James is a student undertaking Masters of Public Health at Uganda Christian University. He is doing a research on "***Factors associated with viral non suppression among adolescents 10-19 years in Nwoya district***". We have noted that his research proposal has been approved by the Research Ethics Committee of Uganda Christian University (UG-REC-026).

The purpose of this letter is twofold: Firstly to permit him to conduct his study in Nwoya District and secondly to request you to accord him all the necessary assistance as he collects data in your respective Health Facilities while taking into consideration the ethical issues relating to conducting a research.

DISTRICT HEALTH OFFICER
14 NOV 2022
NWOYA DISTRICT LOCAL GOVERNMENT

Okello Isaac Wonyima
Ag. DISTRICT HEALTH OFFICER

Copies: The Resident District Commissioner, **Nwoya**
The District Chairperson, **Nwoya**
The Chief Administrative Officer, **Nwoya**
File

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SCHOOL OF RESEARCH & POSTGRADUATE STUDIES

DISSERTATION CORRECTION COMPLIANCE REPORT BY THE CANDIDATE (POST VIVA FORM)

Date:30/4/2024

Name of Candidate: OKELLO JAMES **Reg. No:** RJ21M21/024

Title of Dissertation FACTORS ASSOCIATED WITH VIRAL NON-SUPPRESSION AMONG ADOLESCENTS AGED 10-19 YEARS ACCESSING ANTIRETRO VIRAL THERAPY IN NWOYA DISTRICT-UGANDA.

SN	COMMENTS BY EXTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	There were 61(27.1) teenagers in Nwoya district with viral non-suppression. What 61 represent was from a sample and not the whole district	This was a census study therefore, the 61(27.1%) non-suppressed was for the adolescents accessing ART services in Nwoya district	
2	Pay attention to the appropriate use of tenses	Tenses corrected to report language	Throughout the document

3	There is need to write a summary of literature coverage at the bottom and should also point out the research gap	Summary of literature indicating the gap is written at the bottom of chapter two	Page 20
4	Under methodology within 3.5. health facility to be written in plural form	Plural form of health facility i.e. health facilities inserted in the report	Page 22
5			

SN	COMMENTS BY INTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	There were comments by the internal supervisor before external examination.	ALL the comments by the internal supervisor were addressed before submission for external examination.	

SN	COMMENTS BY VIVA VOCE PANNEL	ACTION TAKEN	INDICATOR
1	Where did you find adolescents?	At the ART facilities when they came for their ART refill. Line listed adolescents in ART care and appointment reminders via phone calls were made before the appointment date to ensure that every adolescent kept an appointment.	Abstract page xii
2	There is a need to include the sample of health facilities in the title and not say it was done in the whole district	The title was adjusted to include only adolescents accessing ART in Nwoya district.	Title page and used throughout
3	How can the mean age be 15.2 and yet the age was 10-13 it is better to say the majority was14-19 years	The mean age remained at 15.2 and the majority age group was taken to be 14-19 years	Abstract page xii
4	How did you define adolescents from minors?	Adolescents are those aged 10-19 years. Minors are those aged below 18 years	Definition of terms page xi

5	How did you obtain consent from the minors and majors? There should be a witness available as the minor is being interviewed	Witnesses were available for all minors interviewed	provision for witness signature in the assent form page 72
6	Results are statistics and they should have been put in the power point	In subsequent dissemination of findings, statistical tables will be included in the PowerPoint	
7	Why use "correlated factors"	"Correlated factors" was replaced by "factors associated with"	Used through out
8	What is the contribution of this study to the ministry, to the body of knowledge and policy, etc.?	The contribution of this study is well articulated in 1.7 (significance of the study)	Page7

James OKELLO  **Shallon ATUHAIRE (PhD)** 

Candidate's Name Signature Supervisor's Name Signature