SUPPORT SYSTEMS ASSOCIATED WITH ANTIRETROVIRAL THERAPY ADHERENCE AMONG ADOLESCENTS LIVING WITH HIV IN UASIN GISHU COUNTY, KENYA

By

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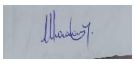
DECLARATION AND APPROVAL

Declaration

This thesis is my original work and has not been presented for an award of a diploma or conferment of degree in any other university or institution.

Signature.  Date.....03/02/2024.....

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DEDICATION

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LIST OF ABBREVIATIONS AND ACRONYMS

ALHIV:	Adolescents living with HIV
AMPATH:	Academic Model Providing Access to HealthCare
AMRS:	AMPATH Medical Records System
ART:	Anti-Retroviral Therapy
ARV:	Anti-Retroviral
EMR:	Electronic Medical Records
HCW:	Health Care Worker
HIV:	Human Immunodeficiency Virus
IREC:	Institutional Research and Ethics Committee
JOOUST:	Jaramogi Oginga Odinga University of Science and Technology
MMAS:	Morisky Medication Adherence Scale
MTRH:	Moi Teaching and Referral Hospital
NACOSTI:	National Commission for Science, Technology and Innovation
PCR:	Polymerase Chain Reaction
POC:	Point of Care
SSA:	Sub-Saharan Africa
VL:	Viral Load
VS:	Viral Suppression
WHO:	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Caregiver - Any person caring for the ALHIV and classified as a mother, father, grandparent, stepparent, aunt, uncle, guardian, foster parent or caretaker (Enane *et al*., 2021)

ART adherence- Having a Morisky score of at least six on the 8-item Morisky Medication Adherence Scale (MMAS-8).

Support systems- The interventions or strategies; classified as hospital and household-based interventions that adolescents are exposed to enhance optimal ART adherence.

Viral suppression- Having a viral load of <200 copies per ml of blood, by standard regarded as suppressed and un-transmissible.

Adolescent- Anyone between the ages of 10-19 years (UNICEF, 2018)

Evaluate- To describe the support systems and ART adherence to determine their frequency of use as a percentage.

ABSTRACT

Supporting Antiretroviral Therapy (ART) adherence is crucial in achieving, improving and maintaining viral suppression among people living with HIV. Hitherto, support systems have shown mixed intervention outcomes across the African region. Whereas an 85-95% level of ART adherence is critical to the success of treatment and maintaining viral suppression, the viral load suppression rate in Kenya is still suboptimal at 70%. Uasin Gishu County, previously a low HIV burden county, is currently classified among the top ten counties that contributes 53% of Kenya's new HIV infections. There was a need to determine the ART adherence and viral suppression level among adolescents living with HIV (ALHIV) in this County and to evaluate which of the support interventions in place are being implemented and their impact on ART adherence. The current study assessed the level of adherence to ART and viral load (VL) suppression; described the support systems for antiretroviral therapy adherence, and; determined the association between the support systems and ART adherence among ALHIV in Uasin Gishu County, Kenya. Using a descriptive cross-sectional survey design with a quantitative approach, data was collected from 277 respondents using a structured questionnaire, between February and April 2023. Viral suppression data was obtained from the AMPATH Medical Records System (AMRS). Respondents were identified using systematic random sampling technique, as they came for routine clinic visits at a large HIV comprehensive care clinic namely Rafiki Center and Module 4 both at Academic Model Providing Access to Healthcare (AMPATH) and domiciled within Moi Teaching and Referral Hospital. Rafiki Center and Module 4 clinics offer comprehensive care to over 800 ALHIV. Data was analyzed descriptively to determine frequency distributions and percentages. Bivariate and robust multivariate logistic regression analyses was used to examine variable associations. Of the 277 adolescents, 263 had complete data following data cleaning. Of the 263 adolescents, 201 (76.4%) were categorized as adherent to ART and 225 (85.6%) were virally suppressed. Of the hospital-based support systems components, individual counseling (OR=2.93, 95%CI= 1.15-7.46, p= 0.024) and receiving reminder messages/calls from the health facility (OR=2.72, 95%CI=1.21- 6.09, p= 0.015) were associated with higher ART adherence compared to those who did not receive. Conversely, counseling by clinical psychologists was linked to lower adherence (OR=0.45, 95%CI=0.25-0.81, p-value= 0.007) as compared to those not counseled by them. Regarding household-based support components, participants who freely discussed their HIV status with caregivers/parents (OR=3.13, 95%CI=1.56-6.29, p-value= 0.001); received reminders from caregivers to take ART (OR=1.99, 95%CI=1.03-3.83, p-value=0.039); had family members aware of their HIV status (OR=2.51, 95%CI=1.27-4.96, p-value=0.008) or; received financial support for travel to the facility (OR=2.37, 95%CI=1.19-4.71, p-value=0.014) were more likely to adhere to ART. The study concluded that there was a relatively high level of ART adherence and viral suppression. The hospital- and household-based support systems improved ART adherence differentially through individual counseling, use of reminders and within-family interpersonal support. Despite the programmatic efforts, approximately a quarter of the adolescents do not adhere to ART. The information obtained from this study is significant for guiding the design of policy and programmatic interventions on implementation mechanisms of ART adherence support systems. This study recommends that program interventions targeting improvement of provider as well as family capacities and resources to be put in place, which could further enhance the impact of hospital and household support systems on ART adherence among ALHIV.

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CHAPTER ONE

1.0 Introduction

This chapter outlines information on adolescent HIV, ART adherence, viral suppression, and the support interventions targeted towards improving ART adherence.

1.1 Background information

The scale-up of life-saving antiretroviral treatment (ART) globally is a critical turning point in the clinical management of HIV and reduction in AIDS-related deaths (Ombui *et al*., 2023) and as a result, more children living with HIV are surviving and developing into adolescence. The ability of countries to provide and sustain effective long-term HIV care with ART is essential and as such, there is a need for continued support for these teenagers to stay in care and maximize the benefits of ART (Odongo *et al*., 2023)

Adolescents between the ages of 10-19 years living with HIV (ALHIV) are approximated to be 1.65 million worldwide, with 85% being in sub-Saharan Africa. In 2020, about 32,000 adolescents who are 10-19 years died of AIDS-attributable causes globally. Subsequently, in Southern and Eastern Africa, HIV/AIDs is a leading killer among 10 to 19 years old adolescents and the outbreak of HIV in these regions is predicted to scale up by more than 20% by 2030 (UNICEF, 2021). This increase in mortality and morbidity in these regions implies that there are crucial gaps in the flow of treatment for ALHIV in developing countries that need to be addressed (Orth & Wyk, 2022). HIV is ranked second among the causes of death among ALHIV. Care retention levels in developing countries have been documented to steadily decline from 88% in the first year and 67% in the third year according to 2016 UNAIDS estimates. Additionally, Zhou *et al*., (2021) review indicates that the percentage of adolescents with virally suppressed immunity in the first year ranged from 27% to 89%.

Globally, young adults and adolescent ART adherence rates vary with Europe and South America at 62% and 52% in North America while Africa and Asia are the highest at 84%. ART adherence rates among ALHIV in sub-Saharan Africa are low as compared to adults at 6 months. During the period, it has been ascertained that ALHIV who achieve 100% ART adherence rate are 20% only while over 40% of adults achieve 100% ART adherence rates. An adherence rate of at least 95% is recommended by International guidelines to reduce the likelihood of virological failure (Villiera *et al*., 2022). Despite the global increase of antiretroviral therapy

(ART), ALHIV disproportionately experience poorer ART adherence results posing a formidable challenge to the global action towards the achievement of UNAIDS 95-95-95 goal and they are at high risk of loss to follow-up and care in comparison to the other age groups (Zhou *et al*., 2021). Different factors influence these poor ART adherence outcomes including non-acceptance of the diagnosis, little understanding of the benefits of treatment and the side effects which can lead to stigmatization, the need for lifelong therapy (Mwambenu *et al*., 2022) absence of social support and HIV status disclosure challenges (Kose *et al*., 2022).

In Kenya, there are approximately 110,000 ALHIV (Enane *et al*., 2021) and they account for 42% of all new HIV infections. About 40% of the 110,000 ALHIV in Kenya have not achieved viral suppression. Kenya has a HIV prevalence of approximately 0.9% among adolescents and is the fourth largest. ALHIV in Kenya experienced high HIV-related mortality with approximately 2,621 adolescents dying of AIDS in 2020. The viral suppression among the (10-19 years) ALHIV in Kenya is still sub-optimal at 70% and to bridge this 30% gap, strategies to improve care and treatment outcomes for this group are needed (NASCOP, 2020).

It has been recorded that obstacles to HIV care at all levels of the HIV cascade ha happen at the systems and individual levels. At the individual level, children majorly rely on caregivers. At the systems, health care professionals are involved. The synergy of both individual and systems-level obstacles contributes to minimal service delivery for children and adolescents (Wagner *et al*., 2022). Hospital-level support systems are largely implemented by trained healthcare workers and largely focus on increasing HIV awareness and addressing retention. Household-level support focuses on emotional aspects; developing self-management, capacity building and HIV-related stigma (Okonji *et al*., 2020)

Strengthening family relationships and promoting social support as well as adherence counseling have been observed to have positive outcomes on ART adherence at these levels (Damulira *et al*., 2019). Management of HIV prevalence in adolescents is dependent on how successful the strategies are implemented to avert new infections and to enhance better suppression results among people with HIV (Toromo *et al*., 2022). However, proven efforts to enhance care, retention and adherence to treatment have been less successful (Mimiaga *et al*., 2018). There is, therefore, a need to further understand which of the hospital and household support systems work and what elements can be attributable to the success of ART adherence.

1.2 Statement of the Problem

Reaching a high level of viral suppression at the population level is a good proxy for both ART effectiveness and transmission risk (Ombui *et al*., 2023). The viral load suppression to undetectable levels is important because the individuals cannot transmit the virus, reduces the likelihood of drug resistance and virological failure (Spreckelsen *et al*., 2021). In sub-Saharan Africa, those who achieve 100% ART adherence among ALHIV are only 20% while it is slightly higher with over 40% of adults achieving 100% adherence. (Villiera *et al*., 2022). The viral load suppression in Kenya is still suboptimal at 70% and the reasons why some ALHIV are well adherent while others do not vary contextually. Maintaining high adherence standards at 85-95% is critical to the success of treatment. Data shows that ALHIV have increased HIV mortality despite the global scale-up of ART. For instance, approximately 32,000 adolescents who are 10-19 years died of AIDS-attributable causes globally in 2020 (UNICEF, 2021) with Kenya accounting for 2,621 of the adolescent deaths (NASCOP, 2020).

Uasin Gishu County, previously a low HIV burden county, is currently classified among the top ten counties that contributes 53% of Kenya's new HIV infections (NSDCC report, 2022).

ART adherence is multifaceted and requires multidimensional approaches. To address ART adherence challenges, Kenya has implemented various support systems. The benefits of the support interventions have not been maximally realized because of barriers to the uptake of ART, social, interpersonal and system-level factors that many times do not pay attention to the particular needs of the adolescents (Sturke *et al*., 2020). Moreover, these strategies often lack a strategic and individualized approach tailored to meet the diverse needs of ALHIV. The effectiveness of support systems at scale remains uncertain, and there is a need to assess which elements contribute to success of ART adherence.

1.3 Objectives of the Study

1.3.1 Main Objective

To evaluate the support systems associated with ART adherence among ALHIV in Uasin Gishu County, Kenya

1.3.2 Specific Objectives

a) To determine the level of ART adherence and Viral Suppression among ALHIV in Uasin Gishu County, Kenya
b) To describe the available ART adherence hospital and household support systems among ALHIV in Uasin Gishu County, Kenya
c) To determine the association between the support systems and ART adherence among ALHIV in Uasin Gishu County, Kenya

1.4 Research Questions

a) What is the level of ART adherence and viral suppression among ALHIV in Uasin Gishu County, Kenya?
b) What are the available support systems for ART adherence among the ALHIV in Uasin Gishu County, Kenya?
c) What is the association between the support systems and ART adherence in ALHIV in Uasin Gishu County, Kenya?

1.5 Justification of the Study

To meet the 85-95% ART adherence level that is critical for maintaining viral suppression and reducing the risk of opportunistic infections, and to meet the global UNAIDS 95-95-95 targets by 2030, there is a need to assess current ART adherence and viral suppression rates among adolescents. Uasin Gishu County houses AMPATH, which offers robust and successful HIV care programs in Africa and different support systems have been put in place to improve the overall health of ALHIV. There is need to assess which of the support interventions implemented are working and contributing to better ART adherence among ALHIV. Assessing the support systems associated with ART adherence among ALHIV is important as it emphasizes the need of designing targeted programmatic interventions to support adolescents living with HIV.

1.6 Significance of the Study

This study highlights the need to strengthen combination of family and hospital support systems implementation among ALHIV, who are at risk of suboptimal adherence. Furthermore, the results from this study has identified the areas requiring future research in terms of supporting

ART adherence, to ensure better ART adherence and viral suppression rates in Uasin Gishu County.

1.7 Limitations of the Study

This study used self-reporting ART adherence, which is prone to social desirability bias, recall bias, and could have underestimated the true rate of non–adherence. Secondly, the study was conducted in one health facility in Uasin Gishu County, and could not reflect the situation nationwide. Thirdly, only the ALHIV receiving treatment had their viral suppression (VS) and ART adherence rates assessed and this could not be generalized to every adolescent affected by HIV in the country. To minimize the effects on the study results, the adolescents were assured of confidentiality of their responses and the use of unique identifiers. Additionally, the research was conducted in a high volume facility with wide catchment area that was good for the external validity to some extent.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter presents current existing literature on ART adherence and viral suppression as well as the support systems that have been associated with ART adherence among adolescents.

2.1 Antiretroviral Therapy Adherence and Viral Suppression

Retention of HIV-positive persons in HIV care and high levels of ART adherence is crucial for maintaining suppression of viral load levels, prevention of drug resistance strain and reducing the risk of opportunistic infections thereby improving the overall health of the ALHIV. ART adherence rate of about 95% is generally regarded desirable for viral suppression and ART resistance prevention, although levels as low as 80% of adherence have been linked with treatment success. Non-adherence leads to drug resistance and failure, as well as economic constraints among individuals and across health systems. Reduced retention adherence rates are especially a challenge among ALHIV, leading to deteriorated health outcomes (Spreckelsen *et al*., 2021).

Obstacles to success in therapy regimes include the requirement for life-long treatment, rejection of diagnosis outcome, and little appreciation of treatment benefits and treatment side effects that normally results in stigmatization. These elements may lead to sub-optimal treatment adherence and as a result lead to viral resistance and other health challenges (Mwambenu *et al*., 2022). ART adherence and viral suppression require one to continually adhere to medications and regularly visit health facilities for monitoring.

Across developing and developed countries, obstacles to ART adherence include pill burden, forgetting about medication, wariness of treatment, complex regimens, accessibility of medication, death of parents, inadequate adult support and resources, work and family responsibilities, disclosure challenges, stages of life, unpleasant experiences with ART, health illiteracy and health system delays. Facilitators of ART adherence include ART positive effects, reminder technology and tools, a non-complicated ARV regimen, a strong health support system, strong peer and family support systems, diagnosis acceptance, understanding why adherence is important, high self-worth and esteem, having both parents stay together, parents observing ART, high ART/HIV literacy levels and rewarding adherence (Dyer *et al*., 2022).

Studies done globally, including in sub-Saharan Africa, have pointed out that ALHIV are especially at risk of poor adherence and that adherence patterns in adolescents vary globally. Previous studies on adherence to ART in sub-Saharan Africa have concentrated on adherence behavior and the factors that determine them. (Adejumo *et al*., 2015)

WHO advocates for the provision of interventions to enhance adherence among adults and children with a detectable viral load and there is evidence that viral suppression can be enhanced to 70% (WHO, 2016). Increased usage and access to ART in HIV-infected children has in turn led to a reduction in HIV-attributable morbidity and enhanced survival among adolescents and children. This suggests the need to further strengthen and support adherence, especially among ALHIV who when compared to other age groups, are less likely to achieve viral load suppression which is internationally benchmarked at 62% (Dyer *et al*., 2022).

Various interventions have been put in place to enhance adherence to ART both in well and low-income settings. A systematic evaluation conducted in 2017 of about 17 studies associated with ART programs in adolescents and children from developing countries showed that poor adherence was linked to caregiver characteristics, stigma, and communication dynamics of child-caregiver and HIV status disclosure (Mavhu *et al*., 2017).

A majority of sub-Saharan African studies have highlighted the importance of adherence to ART, with some describing a strong correlation between ART adherence and caregiver supervision among adolescents with proof that caregivers contribute to ALHIV good adherence by use of reminders about their medications. Because of the distinctive adolescent behavioral characteristics, they are likely to be poorly adherent to ART, which may increase their chances of drug resistance and HIV-attributable morbidity. Because of this, it is important to measure ART adherence and virologic outcomes in this cohort. However, only a few programs for enhancing ART adherence exist for adolescents in the sub-Saharan African region, and there is a necessity to research the effectiveness of strategies to improve ART adherence for this age group (Nachega *et al*., 2009).

2.2 Hospital-Based Support Systems for ART Adherence

Hospital-based support systems aim to enhance adherence knowledge through teaching, motivation, change of adolescent behaviors and improving adolescent attitude thereby enhancing

a sense of self-worth, acceptance of diagnosis and understanding the need for adherence as well as timely collection and taking of medications. Some programs motivate adolescents by involving them in income-generating activities and teaching them skills that in turn help them in taking and getting drugs from the facility, thereby enhancing adherence (Okonji *et al*., 2020)

Hospital-based support, which is majorly implemented by trained healthcare professionals, aims to improve knowledge about HIV and address ART adherence and retention issues. Approaches used for adherence counseling are majorly patient-centered or motivation-centered interviews or peer counseling. Specific support groups for youths address issues concerning psychological requirements; capacity building, self-management development, sexual health; and HIV-related stigma (Okonji *et al*., 2020)

Hospital-based interventions include psychosocial education, adherence counseling, use of intervention agents such as clinical psychologists, relay of information using reminder messages and timely scheduling of appointments.

2.2.1 Psychosocial Education

Psychosocial support strategies promote ease of disclosure of HIV information, support adherence to ART and address the stress of being isolated, other psychological-related issues and sexuality emerging issues. Scoping reviews show that psychosocial support strategies are conveniently acceptable to clients and healthcare professionals. Conversely, further proof is required to understand the mechanisms that make these strategies work to enhance the accessibility of care to ALHIV (Okonji *et al*., 2020).

This development is consistent with a study done in Malawi in which adolescents who were going to teen clubs with readily available psychosocial services recorded improved ART adherence as compared to the adolescents who did not get that service. The idea of services and programs that are youth-friendly and promote adolescent health through teen clubs and psychosocial counseling to improve ART adherence needs to be strengthened. ALHIV can express themselves freely on challenges they encounter about adherence when they have friendly and accommodative healthcare professionals. This necessitates the need for more training and investment (Villiera *et al*., 2022)

Additionally, in a study done in Uganda, caregivers reported that the children came back feeling encouraged and energized any time they had support group meetings with their peers. They felt motivated and less isolated by the fact that they are not alone in the journey. The caregivers proposed that the health professionals create more such sessions for the children to encourage one another and to meet with those who are well adherent for encouragement (Nasuuna *et al*., 2019)

2.2.2. Individual or Group Adherence Counselling

Following adherence counseling, young people may still not without really having a resistant virus achieve viral re-suppression because of often challenging adherence issues, relating to social factors i.e. not having a consistent caregiver for children still under psycho-development stage like diagnosis acceptance and disclosure that may be against to modern forms support adherence (Jobanputra *et al*., 2015).

Systematic reviews have shown that peer and personal counseling is a typical method of treatment when concentrating on enhancing adherence to ART and retention in care. Equipping health professionals with the necessary skills and training could be essential in enhancing support targeting the adolescent's particular needs and ART care (Okonji *et al*., 2020).

2.2.3 Use of Intervention Agents

A study carried out in Uganda found that the availability of counselors and caring health professionals positively motivates adolescents to adhere to their medication (Nabukeera-Barungi *et al*., 2015). Caregivers from a study undertaken in Uganda proposed routine counseling that is child friendly and particular to the children's needs, which allows them to freely open up. More time should be allocated between the children and the counselors to touch on their needs. The sessions should touch on the importance of taking ARVs (Nasuuna *et al*., 2019).

2.2.4 Reminder Calls and Messages

The World Health Organization advocated for the use of mobile phone reminders to enhance ART adherence, emphasizing on observing it when dealing with adolescents for much implementation effectiveness (WHO, 2016). In a study conducted in Uganda, personal reminders have been reported to improve ART adherence. Adolescents and caregivers of younger adolescents mentioned using alarms, diaries and mobile phones to reduce the tendency to forget

to take their medications. While reminders have helped overcome forgetfulness, family support also played a role as some adolescents even had to share a room with an elder person to support in reminding them to take their medications leading to a suppressed VL (Izudi *et al*., 2024).

2.3 Household-Based Support Systems for ART Adherence

Household care strategies argue that taking care of ALHIV is a shared responsibility among the family. A current review done to determine the effectiveness and availability of household-based strategies to enhance adherence to ART and care retention expressed that; the strategies included aspects of HIV information dissemination, social support stimulation, better communication; stimulating and promoting psychological health (Okonji *et al*., 2020).

Household-based interventions include the dynamics of caregiver and child communication, involvement in social support groups, HIV status disclosure to the adolescents, acceptance and coping, financial incentives and aim to support adolescents' acceptance and coping, to relay information, help with curbing stigma and discrimination issues as well as to enhance knowledge.

2.3.1 Caregiver and Child Communication/Relationship

A study carried out in Uganda found that those who were staying with caregivers who are not biological parents had poor adherence, as some of the caregivers were not sensitive and would publicly disclose their HIV status. Some reported discrimination by siblings who are HIV-negative and that caregivers advanced in age can easily forget dates for clinical visits and appointments (Nabukeera-Barungi *et al*., 2015).

A similar study carried out in Kilifi Kenya, reported that adolescents mentioned instances where they were not accepted and were looked down upon by immediate family members partly because some of their siblings felt that they received 'special treatment' in the family (Nyongesa *et al*., 2022).

2.3.2 Social Support Groups

Having a support group has been proven to enhance life quality and ART adherence. Support by peers has been documented to be critical in enhancing information sharing and social support among ALHIV. Being social with peers is not a challenge to ALHIV if one has not disclosed their HIV status. Adolescents mention inadequate peer, parental, or sibling support as an obstacle

to ART adherence. Unsupportive parents and peers were reported as a challenge in adhering to medication (Villiera *et al*., 2022).

However, some adolescents find it challenging to socialize with other peers within the community for fear of rejection or being gossiped about if their HIV-positive status is made public and these results in them shying away from socializing with peers and living a lonely life (Nyongesa *et al*., 2022).

2.3.3 Household Reminders

Evidence suggests that daily reminders such as the use of alarms help adolescents to adhere to ART. The use of alarms, just as cell phones is a popular tool for monitoring adherence to ART thus it becomes easier for ALHIV to maintain ART adherence schedule.

Participants may not take their medication because of being forgetful. To eliminate this, participants can use several methods as a reminder to take medications such as the use of alarms. Mobile phones and alarms are mostly used because phones are readily available and are more portable than wall clock alarms in most households. Adolescents can also keep medications in places they can access with ease so that they take them without default. Some participants reported keeping their medication bottles in their shoes or under their pillows expressing that, the sound of the ARV bottles in the pillow reminded them to take the medication at night. This is similar to an explanation from those who keep the drugs in their shoes to act as a reminder to them in the morning before going to school (Villiera *et al*., 2022).

2.3.4 Acceptance and Coping

Accepting the HIV-positive status is challenging for some young people, as some do not want to be told they have HIV. Non-acceptance of HIV status leads to irregular ART adherence. To a section of adolescents, accepting of HIV-positive status is never a challenge from the beginning and it is like a leeway to help them devise methods of improving their life and health. Acceptance of HIV-positive status is easy if the reasons or ways like how one acquired the virus are communicated in the first place (Nyongesa *et al*., 2022).

2.3.5 Financial Incentives

Psychological and economic theories show that financial motivation can promote care engagement and has shown effectiveness in adherence to ART and viral suppression (Hémono *et*

al., 2022). Young adults face the challenges of footing the bills of seeking HIV-related care, for example, meeting regular transportation costs to the HIV facilities for ARV medication refills with some doing hard menial jobs to cater for the regular costs of care. At worst, some adolescents fail to take their medication until when they can get money to meet transportation costs (Nyongesa *et al*., 2022). A study carried out in Uganda recorded that infrequent meals and a lack of food made children stop taking drugs. Additionally, consistent demand for finances from the caregivers made them unable to give their children the standard of care that is expected of them to provide to their children (Nasuuna *et al*., 2019).

2.3.6 Disclosure of HIV Status

HIV status disclosure to adolescents is linked to better adherence to ART and care retention as well as enhanced psychological and emotional health for ALHIV and the caregivers. Prompt HIV status disclosure to adolescents is low in sub-Saharan Africa. Obstacles to the disclosure of HIV status include guilty feelings for the child's infection by the caregivers, challenges having discussions about disclosure with the children, the fear of negative outcomes and not adequately being prepared to manage the stigma, and challenges the adolescent may not understand due to young age, not being able to comprehend the disclosure cognitively, or inability to conceal their status (Toromo *et al*., 2022).

Additionally, disclosure remains a challenge because of mistrust, discrimination, fear of being interrogated concerning the disease, or the fear of propagation of the information to third parties. Disclosing to people who are not immediate caregiving families; such as friends and relatives remains particularly difficult. Disclosure is majorly a challenge especially if the adolescents have not accepted themselves (Nyongesa *et al*., 2022).

2.4 Influence of Support Systems on ART Adherence

Support systems are necessary but are varied in characteristics and mode of implementation.

Both facility-based and household-based interventions have shown evidence to reduce ART adherence challenges that people in HIV treatment experience. The strategies include individual or group adherence counseling, motivational interviewing, fast-tracking medication pick-ups, and financial incentives. Support groups led by peers and individual/group adherence counseling strategies are some of the most common strategies for ALHIV (Munyayi *et al*., 2022).

Systematic reviews have shown that individual/group counseling is a typical therapy method when concentrating on enhancing adherence to ART and care retention. Equipping health professionals with the required prerequisite skills necessary for providing support targeting the adolescent's particular needs and ART care, could be effective (Okonji *et al*., 2020).

Additionally, having a support group has been shown to improve adherence and quality of life. Support from peers has also been found as a major source of information and social support among ALHIV.

Household care strategies argue that taking care of ALHIV is a shared responsibility of the family. A current review done to explore the effectiveness and availability of household-based strategies to enhance adherence to ART and care retention reported that some of the strategies included information dissemination on HIV; stimulating social support, better communication; and enhancing mental well-being. The World Health Organization advocated for the use of mobile phone reminders to enhance ART adherence, noting that it should be strictly adhered to when focusing on effective implementation on adolescents. Scoping reviews show that psychosocial support strategies are convenient and acceptable to clients and healthcare professionals. However, for one to understand what makes these strategies to work, further evidence is needed to enhance the availability of care to ALHIV (Okonji *et al*., 2020).

2.5 Conceptual Framework

The independent variables investigated in this study included the hospital and household-based support received by the adolescents. They included individual and group counseling, the use of intervention agents such as nurses and clinical psychologists, the use of reminder messages or calls, caregiver emotional support through free talks and disclosure, financial support, household reminders and social support groups. The study sought to determine whether having a caregiver with the same positive status as the adolescent, the caregiver's level of education and the family structure (adolescent staying with either both/single parents or guardians) have an association with ART adherence. The outcome of this study was ART adherence, which was classified as adherent or non-adherent depending on the Morisky Medication Adherence Score (MMAS) of the adolescent. An objective measurement, viral suppression, which is an outcome of ART adherence was also evaluated in objective one and was classified as either virally suppressed or unsuppressed based on a cut of (standard guideline) of 200 copies/ml of blood.

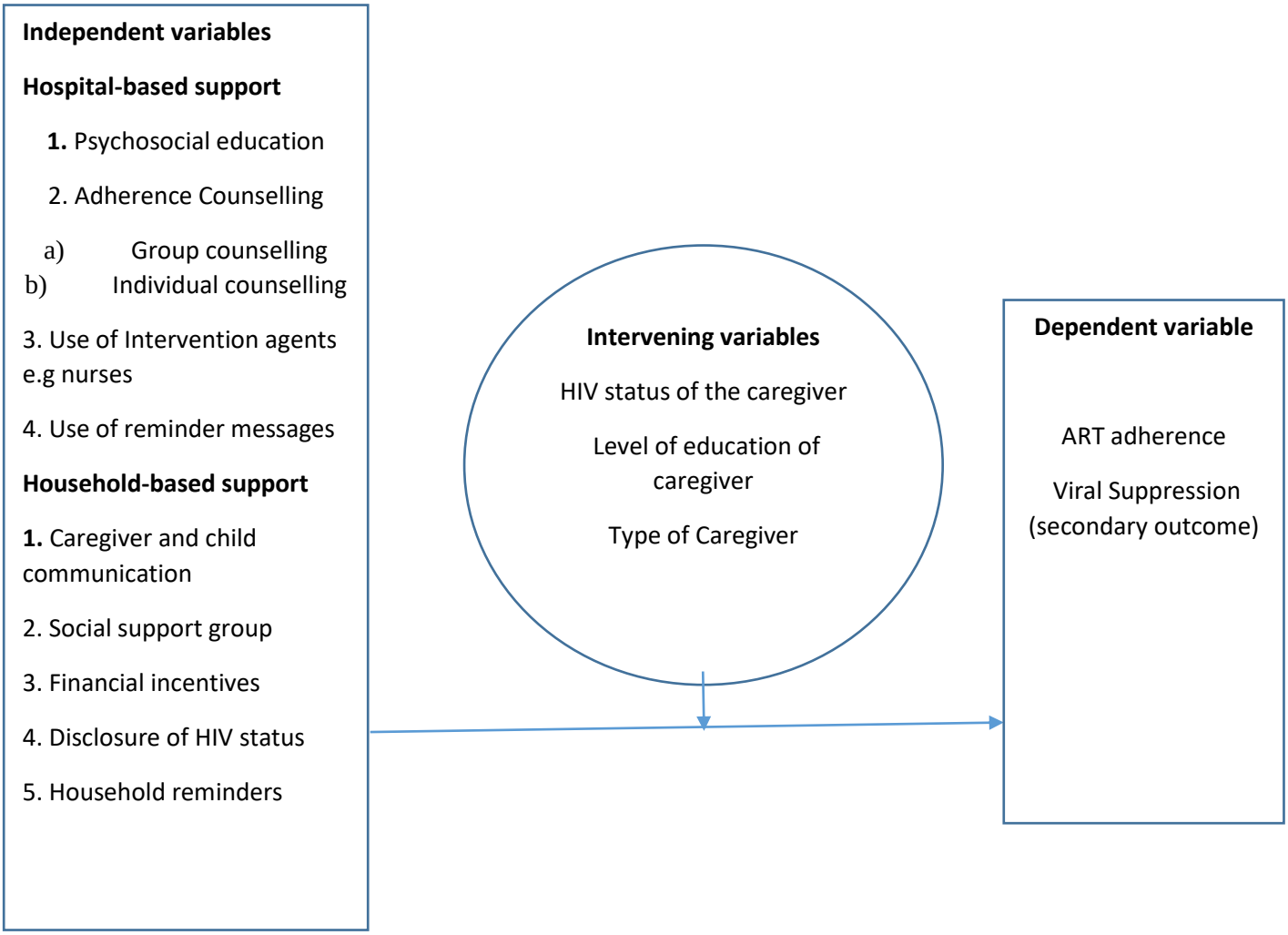


Figure 2.5.1 Conceptual Framework (Source-Literature Review)

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter entails the study site and design, description of the various variables, characteristics of the study population, sampling and sample size determination, data collection and management, data analysis and ethical considerations for this study.

3.1 Study Area

This study was conducted at AMPATH adolescents' clinics; Rafiki Centre and Module 4 within Moi Teaching and Referral Hospital in Uasin Gishu County, Kenya. Uasin Gishu County is located in Kenya's central west Rift Valley and covers an area of 3,392.2 Km2 with a population of 1,163,186. It lies between longitudes 34 degrees 50' East and 35 degrees 37' West and latitudes 0 degrees 03' South and 0 degrees 55' North.

Uasin Gishu County is a child rich population, with children (0-14) years constituting 42% of the entire population. The major economic activity of people in this area is agricultural farming.

Uasin Gishu County has robust HIV care services with majority of the clinics collaborating with AMPATH. AMPATH is one of the programs implementing support systems at their respective clinics. However, there is scarce information on which of the support systems being implemented are performing, their successes, challenges as well as some of the lessons that have been learned. This area has not been systematically studied since the onset of the implementation of support systems. About 150,000 people living with HIV have been enrolled in AMPATH since 2001 across nearly500 health facilities in Kenya. AMPATH is the largest single HIV/AIDS treatment Centre in Africa offering one of Africa's most successful HIV prevention and treatment programs (*AMPATH Kenya, n.d.)*. This site is chosen as it represents a range of geographic and clinical settings and the provision of adolescent access and friendly services.

3.2 Study Design

A descriptive cross-sectional study design was employed with a quantitative approach. A validated structured questionnaire assessed the participant information concerning the support systems and ART adherence. The viral suppression data was obtained from the Ampath Medical Records System (AMRS).

3.3 Study Population

This study targeted 277 HIV-positive adolescents, both male and female, and between the ages 10-19 according to UNICEF definition of adolescents (UNICEF, 2018).The adolescents recruited in the study were those registered for care at the AMPATH adolescent clinics in MTRH in Uasin Gishu County, Kenya.

3.4 Inclusion Criteria

Adolescents who were actively on care for at least 6 months, with available viral load records in the Ampath Medical Records system and those who consent/assent to participate in the study.

3.5 Exclusion Criteria

Adolescents who are HIV positive but whose HIV status, according to hospital records has not been disclosed to them and those whose recent viral load test was not within 6 months from the time of data collection

3.6 Sample size

The study targeted 277 ALHIV who consented to participate in the study. Only 263 respondents completely and correctly filled out the questionnaire. The final sample size used was 263 following data cleaning.

The sample size was calculated using the Cochran formula (Uakarn, 2021). Rafiki Centre and Module 4 clinics in MTRH offer comprehensive care to about 800 adolescents.

The sample size is less than 10,000

A prevalence of 50% was used to estimate the maximum sample size required

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

n: Calculated sample size

Z: 1.96 standard normal value (95% Confidence level)

p: Proportion of ART adherence-prevalence among adolescents (50% used)

q=1-p

e: margin of error (5%)

$$n = \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.5^2} = 385 \text{ Respondents}$$

The study population was less than 10,000. Therefore, the final sample was estimated (nf) using the formula:

$$nf = \frac{n}{(\frac{1+n}{N})}$$

Where nf = final sample size of the population less than 10,000

n=the desired sample size when the population is more than 10,000

N is the estimated study population

nf =263 + 14 =277 (14 represents a 5% nonresponse adjustment on the sample size which was pegged on the loss to follow up adolescents at the clinics. The loss to follow up was approximately 4.5%). A 50% prevalence was used to maximize the sample size and due to the variations in adherence measurement tools and thus a local prevalence of ART adherence using MMAS was unavailable).

3.7 Sampling Procedure

The 277 participants were selected using systematic random sampling method as they visited the clinic for their routine visits. Every 3rd adolescent was recruited as they came into the facility until the sample size was accrued. The Nth was determined by dividing the total population of 800 to the sample size of 277 giving an interval of 3.

3.8 Data Collection Tools

The primary outcome of interest was ART adherence, which was assessed using a standard structured questionnaire of Morisky Medication Assessment Score tool (MMAS-8). Scores ranged from 0 to 8, with a score of 8 reflecting high adherence, 6 to 7 as moderate adherence, and less than 6 reflecting low adherence (Tegegne *et al*., 2022). Since the outcome was binary, a minimum MMAS of 6 was classified as ART adherent while a score of less than 6 was classified as non- adherent (Biney *et al*., 2021). Viral suppression, which is an outcome of ART adherence,

was additionally assessed for objective 1. Viral suppression was obtained from results of viral load Polymerase Chain Reaction (PCR) tests, which was obtained from the AMPATH Medical Records System. The most recent viral load data done not later than 6 months at the time of data collection was abstracted. Viral suppression was defined as having a viral load of <200 copies /ml of blood. Data on hospital and household-based support was collected using a structured questionnaire. The questionnaire included questions on demographic information, adherence to ART and types of support systems.

3.9 Data collection Procedures

Research Assistants, who were peer mentors working with the adolescents on a daily basis conducted face-to-face interviews in closed secure rooms. The adolescents were assigned study identification numbers to uniquely identify them. The data was collected using a structured questionnaire, which had been designed in Kobotoolbox software. The Research Assistants signed into the KoboToolbox account, and then proceeded to administer the questions to the adolescent. The data was then saved following completion of the data collection. This data was then exported to Excel for data cleaning.

3.10 Validity Data Collection Tools

The questionnaires were shared with the supervisors and the program staff dealing with the adolescents to review and comment on whether they aligned to the study objectives and research questions as well as if they could be easily understood by the adolescents. A quality questionnaire was then formulated and used for data collection.

3.11 Reliability of the data collection tools

A pre-test was done to a smaller sample size (10%) to ascertain the reliability of the data tools. Twenty-eight respondents from Uasin Gishu District Hospital with similar inclusion characteristics from the selected AMPATH clinics were interviewed before the main study. The pre-test aimed to: 1) test familiarity with the design of the instruments; 2) evaluate potential issues entailed in the study settings; 3) affirm the validity and reliability of the instruments, and; 4) familiarize the data collection staff with the questionnaires and procedures. Data generated from the pre-test was used to improve the instruments and processes for the main study. The researcher employed Cronbach's alpha test method to establish the internal consistency of the

questionnaire and the questions were found to be consistent (α=0.74) with average interim covariance of 0.051. The pretest data was not included in the actual study data.

3.12 Data Management

A 3 days intensive training was done to Research Assistants before data collection. The Research Assistants were peer mentors who worked with the adolescents on a daily basis at Rafiki center and Module 4 clinics. The training consisted of going through the protocol to discuss the purpose, objectives and goal of the Study, use of Kobotoolbox software, creating rapport, study procedures, collection of quality data and adherence to ethics in every study activity.

Unique study identification numbers were used to identify participants. Data was collected using Kobo toolbox software and was exported to Excel for cleaning. Hard copy documents including consent and assent forms and some hard copy study questionnaires were stored under lock and key in well-secured cabinets until the end of the study period. The data was encrypted and only authorized study personnel had access to the data.

3.13 Data Analysis

Objective one and two, descriptive statistics were used to show the level of ART adherence and description of the support systems. Descriptive statistics was also used to show the sociodemographic characteristics of the adolescents and their caregivers. The level of ART adherence and viral suppression were presented in percentages and bar graphs. Objective 3- Data on the association between hospital and household support systems and ART adherence was analyzed inferentially using bivariate and robust multivariate regression analyses. The level of significance was fixed at 0.05. Stata version 16.0 was used for analysis. The data was presented in tables.

3.14 Ethical Considerations

This study was reviewed and approved by the Institutional Review and Ethics Committee at MTRH, Moi University and the Board of Postgraduate Studies at JOOUST. Permission to conduct the study was granted by NACOSTI. Written informed consent was obtained from the adolescents, 18 and 19 years. The caregivers of participants who were below 18 years and who did not accompany the adolescents to the clinic were consented through the phone. Participants who were 18 years and below assented to the study. All study participants consented/assented

before participating in the study. Unique study identifiers were used to conceal the identity of the participants.

Research assistants who were peer mentors were trained on research conduct, integrity, accuracy, completeness, privacy and confidentiality of participants and data collection communication skills such as clarity, audibility, and interpersonal skills and various ethical standards. Participants were advised that their participation was voluntary and that they could opt-out at any time if they no longer wanted to participate.

CHAPTER FOUR: RESULTS

4.0 Introduction

This chapter presents the results regarding the socio-demographic characteristics of the adolescents, the ART and viral suppression level, description of the support systems and the association between the support systems and ART adherence.

4.1.1 Demographic characteristics of the respondents and their caregivers

A total of 263 ALHIV participated in this study with a median age of 17 years (IQR (15- 18). The results in Table 4.1.1 shows that female adolescents constituted 52.9% (n=139) of the respondents. The majority (98.8%, n=260) of the participants were of Christian faith; Most of the study participants (71.5%, n=188) had at least a secondary level of education. However, (35.8%, n=94) of them did not know their caregivers' level of education. About 40.7% (n=107) of the respondents lived with both parents.

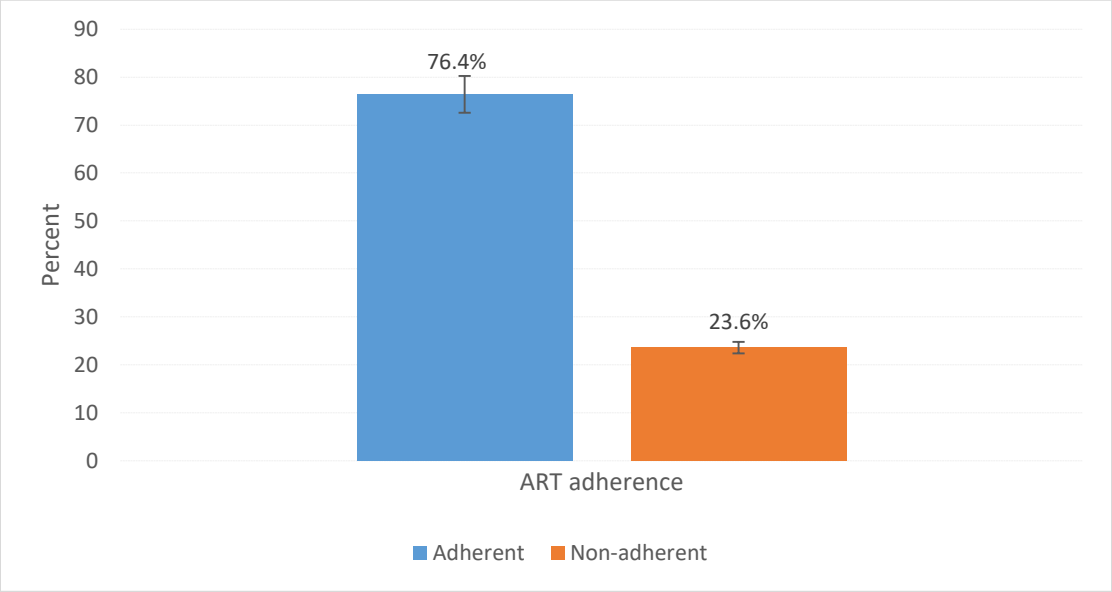
Table 4.1. 1 Demographic characteristics of the participants and their caregivers

Characteristics	Frequency (n)	Percentage (%)
Age		
Median (IQR) = 17 (15,18)		
Gender		
Male	124	47.1
Female	139	52.9
Religion		
Christian	260	98.8
Other	3	1.2
Participant's level of education		
None/primary	75	28.5
At least secondary	188	71.5
Time to facility		
0-60 minutes	180	68.4
>60 minutes	93	31.6
Clinic attendance		
Moi Teaching and Referral Hospital	263	100
Other	0	0
Caregiver's level of education		
None	10	3.8
Primary	44	16.7
Secondary	64	24.3
University/ college	51	19.4
Don't know	94	35.8
Participant's caregiver		
Both parents	107	40.7
Single parent	90	34.2
Guardian	57	21.7
Other	9	3.4

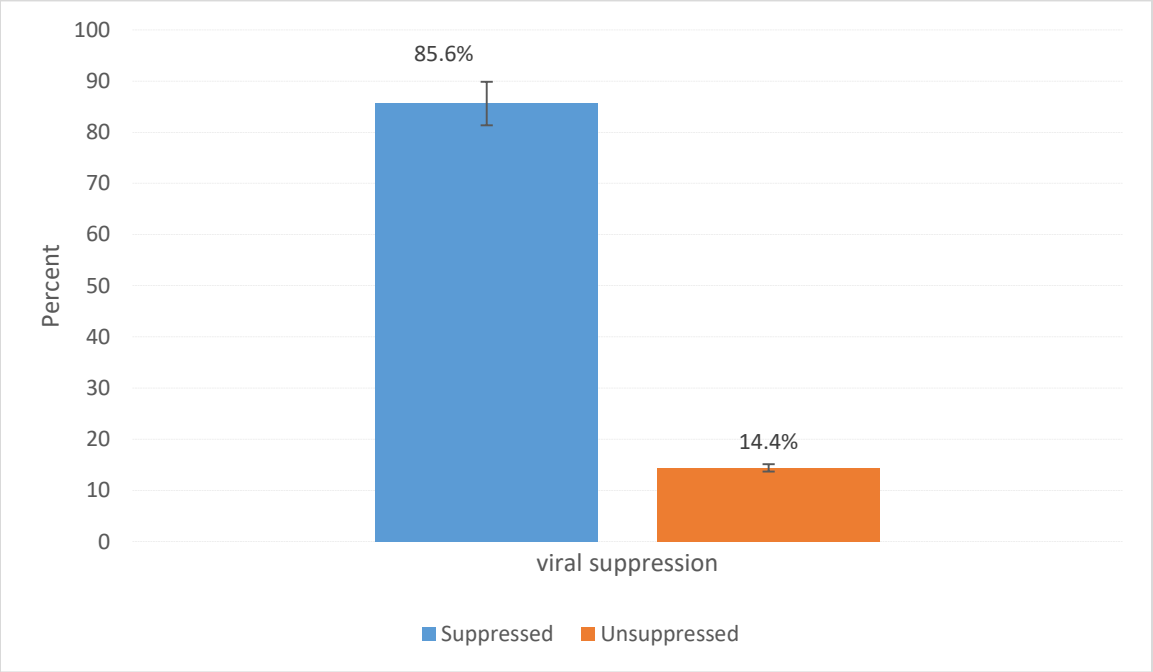
Legend: n=263 represents adolescents. The caregiver characteristics were provided by the adolescents.

4.1.2 ART adherence and Viral suppression

ART adherence level was found to be 76.4% (n=201) as shown in figure 4.1. The viral suppression level was found to be 85.6% (n=225) if < 200 viral copies per milliliter of blood were used as the VL suppression cut-off as shown in figure 4.2.



Legend: The error bars represent the standard error Figure 4. 1 Prevalence of ART adherence among ALHIV in Uasin Gishu County –Kenya



Legend: The error bars represent the standard error

Figure 4. 2 Prevalence of viral suppression among ALHIV in Uasin Gishu County-Kenya

4.1.3 Association between Viral Suppression and ART Adherence

The results in Table 4.1.2 show that there was a statistically significant association between viral suppression and ART adherence (P-value<0.05). Participants with high Morisky score (> 87.5%) had higher odds of becoming virally suppressed as compared to those with low Morisky score (<75%) [OR=5.41, 95%CI=2.43-12.04, P-value <0.001]

Table 4.1. 2 Association between viral suppression and ART adherence

		VL < 200 copies/ml		**Univariate analysis**	
	n	No	Yes	OR(95%CI)	P-value
Morisky score		n (%)	n (%)		
High (87.5% - 100%)	159	12(7.6)	147(92.4)	5.41(2.43-12.04)	<0.001
Moderate(75%-87.5%)	42	7(16.7)	35(83.3)	2.21 (0.83-5.87)	0.112
Low (<75%)	62	19(30.7)	43(69.3)	ref	-

Legend: Morisky scores were categorized into high, moderate and low. The Low was used as the reference category.

4.2 Description of Support Systems among ALHIV

This objective 2 sought to describe the various types of support systems available for ALHIV. The description of the support systems was based on the frequency of those ART adherent and non-adherent under each support variable. The results are as outlined;

4.2.1 Hospital-based Support Systems of ALHIV

In Table 4.2.1, 92.4% of the participants got individual guidance and counseling at the health facility and most (78.2%) of them were reported to be adherent to ART. More than half (60.5%) of the participants were getting group guidance and counselling from the health facility and 31.2% were counselled by clinical psychologists, 60.8% counselled by nurse, 7.2% counselled by lay counselors and 31.9% counselled by other health practitioner. Majority (86.7%) of the participants reported to getting reminder messages/calls and 79.4% of them adhered to ART.

Table 4.2. 1 Hospital-based Support Systems for ALHIV

	ART adherence		
	Non-adherent, n=62	Adherent, n=201	Overall, n=263
Hospital-based support	n (%)	n (%)	n (%)
Individual guidance and counseling			
No	9(45.0)	11(55.0)	20(7.6)
Yes	53(21.8)	190(78.2)	243(92.4)
Group guidance and counseling			
No	23(22.8)	78(77.2)	101(38.4)
Yes	37(23.3)	122(76.7)	159(60.5)
Sometimes	2(66.7)	1(33.3)	3(1.1)
Counseled by clinical psychologists			
No	34(18.8)	147(81.2)	181(68.8)
Yes	28(34.2)	54(65.9)	82(31.2)
Counseled by a nurse			
No	22(21.4)	81(78.6)	103(39.2)
Yes	40(25.0)	120(75.0)	160(60.8)
Counseled by community health volunteer			
No	56(23.0)	187(77.0)	243(92.4)
Yes	6(30.0)	14(70.0)	20(7.6)
Counseled by a lay counselor			
No	59(24.2)	185(75.8)	244(92.8)
Yes	3(15.8)	16(84.2)	19(7.2)
Counseled by other			
No	40(22.4)	139(77.6)	179(68.1)
Yes	22(26.2)	62(73.8)	84(31.9)
Get reminder messages/calls			
No	12(41.4)	17(58.6)	29(11.0)
Yes	47(20.6)	181(79.4)	228(86.7)
Sometimes	3(50.0)	3(50.0)	6(2.3)

Legend: Group adherence and counselling are scheduled for specific days and entail variety of group activities. Individual counselling are done at personal level during each clinic visit.

4.2.1 Household-based support system for ALHIV

In Table 4.2.2, the majority of the participants (81.3%) who talked freely with their parents/caregivers adhered to ART, 74.1% of the participants reported that they got reminders from their caregivers to take their medication and 79.5% of them adhered to ART. About eighty percent (79.6%) of the participants who reported that their family members were aware of their HIV status, adhered to ART. About 77.6% of the participants who got financial support to facilitate them to pick ART drugs adhered to ART. Some participants (29.7%) reported that they joined social support groups of people who were HIV positive and majority (80.8%) of them adhered to ART.

Table 4.2. 2 Household-based Support Systems for ALHIV

	ART adherence		
Household-based support	Non-adherent, n=62 n (%)	Adherent, n=201 n (%)	Overall, n=263 n (%)
Talk freely with the parent/caretaker			
No	18(41.9)	25(58.1)	43(16.3)
Yes	40(18.7)	174(81.3)	214(81.4)
Sometimes	4(66.7)	2(33.3)	6(2.3)
Get reminders from the caregiver to take their medications			
No	19(33.9)	37(66.1)	56(21.3)
Yes	40(20.5)	155(79.5)	195(74.1)
Sometimes	3(25.0)	9(75.0)	12(4.6)
Family members aware of HIV status			
No	18(39.1)	28(60.9)	46(17.5)
Yes	44(20.4)	172(79.6)	216(82.1)
Don't know	0	1(100.0)	1(0.4)
Get financial support to facilitate them picking drugs			
No	14(29.2)	34(70.8)	48(18.3)
Yes	41(22.4)	142(77.6)	183(69.6)
Sometimes	7(21.8)	25(78.1)	32(12.2)
Joined any social support groups of people who are of the same status			
No	47(25.4)	138(74.6)	185(70.3)
Yes	15(19.2)	63(80.8)	78(29.7)

Legend: The social support group included groups linked with the household.

4.3 Association between Support Systems and ART adherence among ALHIV

Objective 3 sought to determine the association between support systems and ART adherence among ALHIV. The results are as outlined;

4.3.1 Association between Hospital-based Support System and ART adherence

In bivariate logistic regression analysis (Table 4.3.1), individual guidance and counseling, counseling by clinical psychologists and getting reminder messages/calls were found to be statistically significant at 5% level of significance. Participants who reported that they were individually counseled on HIV were more likely to adhere to ART (OR=2.93, 95%CI=1.15-7.46 P=0.024) compared to those who were not getting individual guidance and counselling. For the type of the counselor, participants counseled by clinical psychologists were less likely to adhere to ART (OR=0.45, 95%CI=0.25-0.81, P=0.007) compared to those who were not being counselled by the clinical psychologists. The results also reveal that participants who were getting reminder messages/call from the health facilities to take ART were 2.72 times more likely to adhere to ART as compared to those who were not getting messages/calls (OR=2.72, 95%CI=1.21-6.09, P=0.015)

Table 4.3. 1 Association between hospital-based support and ART adherence

	Bivariate logistic regression		
Hospital-based support	OR	95%CI	P-value
Individual guidance and counseling			
No	Ref		
Yes	2.93	1.15-7.46	**0.024**
Group guidance and counseling			
No	Ref		
Yes	0.97	0.54-1.76	0.926
Sometimes	0.15	0.01-1.71	0.126
Counseled by clinical psychologists			
No	Ref		
Yes	0.45	0.25-0.81	**0.007**
Counseled by nurses			
No	Ref		
Yes	0.81	0.45-1.47	0.498
Counseled by community health volunteers			
No	Ref		
Yes	0.70	0.26-1.91	0.484
Counseled lay counsellors			
No	Ref		
Yes	1.70	0.48-6.06	0.412
Get reminder massages/calls			
No	Ref		
Yes	2.72	1.21-6.09	**0.015**
Sometimes	0.71	0.12-4.13	0.699

Legend: Bivariate logistic regression of association between hospital support systems and ART adherence

Ref- Reference category, OR- Odds Ratio, CI- Confidence Interval

4.3.2 Association between Household-based support system and ART Adherence

Bivariate analysis was done to determine household support system factors that are associated with ART adherence among adolescents living with HIV and the results are presented in Table 4.3.2 Talking freely with the caregiver/parent, getting reminders from the caregiver to take ART, family members aware of HIV status, financial support to facilitate the picking of ART drugs were household factors found to be significantly associated with ART adherence. Participants who talked freely with caregivers/parents about HIV status were found to be more likely to adhere to ART (OR=3.13, 95%CI=1.56-6.29, P-value=0.001); those who were getting reminders from their caregivers to take ART were more likely to adhere to ART (OR=1.99, 95%CI=1.03-3.83, P-value=0.039).

The results also revealed participants whose family members aware of their HIV status were 2.51 times more likely to adhere to ART (OR=2.51, 95%CI=1.27-4.96, P-value=0.008. Participants who received financial support to facilitate travelling to pick ART at the hospital were more likely to adhere to ART as compared to those who were not supported financially (OR= 2.37, 95%CI=1.19-4.71, P-value=0.014)

Table 4.3. 2 Association between household-based support and ART adherence

	Bivariate logistic regression		
	OR	95%CI	P-value
Talk freely with the parent/caretaker			
No	Ref		
Yes	3.13	1.56-6.29	**0.001**
Sometimes	0.36	0.06-2.19	0.267
Get reminders from the caregiver to take medications			
No	Ref		
Yes	1.99	1.03-3.83	**0.039**
Sometimes	1.54	0.37-6.38	0.551
Family members aware of HIV status			
No	Ref		
Yes	2.51	1.27-4.96	**0.008**
Don't know	1.00		
Financial support to facilitate picking of drugs			
No	Ref		
Yes	2.37	1.19-4.71	**0.014**
Sometimes	2.14	0.77-5.96	0.144
Joined social support			
No	Ref		
Yes	1.43	0.74-2.75	0.284
Caregiver's HIV status			
Positive	Ref		
Negative	0.57	0.28-1.14	0.113
Don't know	0.65	0.23-1.84	0.415
Parental status			
Relative/Other	Ref		
Both parents	2.23	1.12-4.45	**0.023**
Single parent	2.76	1.31-5.83	**0.008**
Caregiver's level of education			
None	Ref		
Primary	1.13	0.20-6.36	0.894
Secondary	1.08	0.20-5.78	0.925
University/college	1.17	0.21-6.46	0.860
Don't know	0.51	0.10-2.54	0.410

Legend: Bivariate logistic regression of association between household support systems and ART adherence

Ref- Reference category, OR- Odds Ratio, CI- Confidence Interval

Multivariate logistic regression was done to determine the adjusted odds ratio of adherence when other predictors were held constant. The backward elimination method was used to determine the best model and Akaike Information Criteria (AIC) was used to compare the model's fitness for multiple logistic regression. In Table 4.3.3, getting reminder messages/calls from the hospital to take ART was found to be positively associated with ART adherence (AOR=2.49, 95%CI=1.04-5.93, P-value=0.040). It was also found that participants who talked freely with their parents/caregivers about their health status were more likely to adhere to ART (AOR=2.61, 95%CI=1.21-5.65, P-value=0.014). Individuals who got counseling and guidance (AOR=2.83, 95%CI=0.96-8.37, P-value=0.060) and had family members aware of their HIV status (AOR=1.77, 95%CI=0.87-3.58, P-value=0.113) had higher odds of ART adherence however they were insignificant at 5% level of significance.

Table 4.3. 3 Association between support systems and ART adherence among ALHIV

	Multivariate logistic regression		
Support system	AOR	95%CI	P-value
Individual guidance and counseling			
No	Ref		
Yes	2.83	0.96-8.37	**0.060**
Get reminder messages/calls			
No	Ref		
Yes	2.49	1.04-5.93	**0.040**
Sometimes	1.28	0.27-6.20	0.756
Talk freely with the parent/caretaker			
No	Ref		
Yes	2.61	1.21-5.65	**0.014**
Sometimes	0.31	0.05-2.06	0.227
Get reminders from the caregiver to take medications			
No	Ref		
Yes	0.89	0.40-2.01	0.783
Sometimes	1.17	0.28-4.90	0.833
Family members aware of HIV status			
No	Ref		
Yes	1.77	0.87-3.58	0.113
Don't know	1.00		
Financial support to facilitate picking of drugs			
No	Ref		
Yes	1.87	0.88-3.97	0.102
Sometimes	2.26	0.80-6.42	0.126
Parental status			
Both parents	Ref		
Single parent	1.34	0.58-3.12	0.497
Other	0.15	0.05-0.49	**0.002**

Legend: Multivariate logistic regression of association between support systems and ART adherence

Only factors that were significant in bivariate table were included in multivariate analysis

CHAPTER FIVE: DISCUSSION

5.0 Introduction

This study aimed at investigating the level of ART adherence and viral suppression, the description of support systems available as well as the association between support systems and ART adherence. The findings of this study revealed that individual counseling, reminder messages, talking freely to caregivers, getting reminders from caregivers, family being aware of HIV status and financial support to the facility were positively associated with ART adherence.

5.1 ART Adherence and Viral Suppression among ALHIV

This study reported an ART adherence level of 76.4%. This ART adherence level is higher than the global adherence estimate of young people at 62.3% (Hudelson & Cluver, 2015). Similarly, a meta-analysis by Hlophe *et al*., (2023) conducted across sub-Saharan African countries observed a 65%ART adherence level. However, this meta-analysis did not account for the variations in the adherence assessment tools as only a few studies report using the same self-reported adherence measure, which makes it difficult to compare results across studies (Zhou *et al*., 2023).

The ART adherence level reported in this study is also consistent with a rate of 78.67% in a study conducted in Ghana using the same adherence measurement tool (Biney *et al*., 2021) as well as in a study conducted in South Africa that found self-reported non-adherence rate to be between 15% and 23% (Zhou *et al*., 2023). However, this level is lower than the 84% reported in Africa. Whereas other medication adherence assessment tools measure self-reported adherence spanning a period of a few days (1–3 days) to three months and is dose adherent, the MMAS-8 as used in this study, measures behavior adherence from when the individual began ART (Biney *et al*., 2021). It is noteworthy that, although the ART adherence level was lower than the viral suppression level, those who were ART adherent were more likely to be virally suppressed. Those who are not adherent and suppressed are at higher risk of transmitting the HIV virus. The global target requires at least 95% of those who are on ART to be virally suppressed.

Additionally, the study found that 85.6% of adolescents were virally suppressed. This was higher than the national prevalence of Viral suppression at 70% (NASCOP, 2020) but lower than the UNAIDS 95% viral suppression goal of people living with HIV by 2030. This level of viral suppression is consistent with a nationally representative study findings of Onyango *et al*.,

(2023) conducted across 34 counties in Kenya that also obtained a viral suppression of 85.9 % among Children and Adolescents Living with HIV. Comparatively, a study conducted in Homa Bay County, a high HIV-burden region, observed a viral suppression of 80% (Mwangi & van Wyk, 2021). Such high viral suppression level is still below the required 95% viral suppression target by 2030 but indicates extensive efforts towards achieving the global target.

5.2 The Support Systems for ALHIV

This study found that hospital-based support systems including the use of individual counseling and the use of reminders were strongly associated with ART adherence. Different studies have reported different available support systems. A systematic review by Hlophe *et al*., (2023) on barriers and facilitators of ART adherence in sub-Saharan Africa showed that support interventions such as the use of reminders, family financial support, enhanced counseling and adolescent support groups were the more effective components of the support systems. The current study showed that individual counseling and reminder messages/calls were the most common type of hospital-based support systems. This is plausible because counselling and reminders target individual and interpersonal level context. Family members being aware of the HIV status of the adolescent and caregiver reminders to take medication were the most common type of household-based support observed in this study. Some of the adolescents in this setting who had vertical transmission of HIV and staying with at least one of the parents had better ART adherence. This reinforces the importance of parental support.

The use of social support group was the least common support intervention among the ALHIV in this study. However, there are widespread variations across African regions on what combination of components of the support systems are effective as observed from a systematic review by Hlophe *et al*., (2023). This implies the need for program implementers to consider contextual issues. From the current study, it is apparent that integrating individual counselling and use of reminders in the context of family and facility support systems are more effective.

5.3. Association between Support Systems and ART Adherence among ALHIV

The findings that hospital-based support, in particular, individual counseling and the use of reminder messages/calls were positively associated with ART adherence emphasizes the importance of supporting adolescents' psychological well-being through individual as well as interpersonal level support. Support from healthcare workers has been mentioned to be a top

facilitator of good adherence among adolescents in different regions, a pointer to the mechanisms or channels of communication interaction (Ankrah *et al*., 2016; Okonji *et al*., 2020). Counseling addresses psycho-cognitive barriers to facilitate adherence behavior change through prompts, self-efficacy and perceived ability, nudging intentions, willingness and motivation to take up desired behavior (Haberer *et al*., 2017). Systematic reviews have shown that personal counseling is a typical method of treatment when concentrating on enhancing adherence to ART and retention in care (Okonji *et al*., 2020).

The findings of this study pointed out that counseling by clinical psychologists was associated with lower adherence. In this setting and program, different healthcare workers including nurses and peer mentors do counseling and those with poor ART adherence are referred to clinical psychologists for further counseling as they require attention and time that is more specialized. This might explain the reason for poor adherence in those counseled by clinical psychologists.

In this study, the significance of both household and the hospital support on ART adherence was further highlighted through use of reminders. Use of phone for text messages are largely preferable because of considered privacy, is discreet and personalizable, which might explain why it emerges as a strong facilitator of ART adherence (Denison *et al*., 2015; Hlophe *et al*., 2023). Similarly, the importance of family support through use of repeated reminders has been shown to help the adolescents to stick to their treatment plans, fosters optimism and enhances healthy behavior (Odongo *et al*., 2023). This finding is important because it addresses 'forgetting to take medication' shown to be a major barrier to good adherence among adolescent in various studies (Ankrah *et al*., 2016). However, understanding other dimensions of messages as reminders such as frequency/ scheduling, channel, confidentiality and contents is critical for their effectiveness in helping adolescents to adhere to ART (Villiera *et al*., 2022).

Financial support which was positively associated with ART adherence in this study is similar to other studies in Africa such from Ghana (Ankrah *et al*., 2016) and South Africa. This is plausible as it makes it easy to pay for the additional costs of travel for medication purposes. Psychological and economic theories show that financial motivation can promote care engagement, consistent with the current study finding of effectiveness in enabling adherence to ART and viral suppression (Hémono *et al*., 2022). Young adults face the challenges of footing the bills of seeking HIV-related care for example meeting regular transportation costs to the HIV

facilities for ARV medication refills with some doing hard menial jobs to cater for the regular costs of care. At worst, some adolescents fail to take their medication until when they can get money to meet transportation costs. (Nyongesa *et al*., 2022). In the current study, participants were largely commuting over distance and needed motorized transport. However, there might be more to financial support than was observed.

Having a family member aware of the adolescent's HIV status and talking freely with the caregiver about the HIV status had a strong association with optimal ART adherence. This is in line with findings from Audi *et al*., (2021) from Tanzania that reported that some adolescents, who had family members aware of their HIV status, would be reminded to take their medication and were encouraged to adhere to treatment, which in turn improved their ART adherence. Additionally, the study noted that having treatment supporters who could be parents or relatives was observed to provide adolescents with emotional support, encouragement and advice. Additionally, according to a meta-analysis by Hlophe *et al*., (2023) status disclosure was reported to positively influence ART adherence. Other reports show that adolescents must disclose their HIV status as disclosure and adherence to care and treatment go hand in hand. Disclosure creates opportunities for adolescents to access adherence support and other forms of psychosocial support from family members, peers, and healthcare providers (Odongo *et al*., 2023). Damulira *et al*., (2019) noted that parental support, family togetherness, information sharing and emotional support have all improved the adolescents' behavior towards taking medication.

In summary, whereas multiple components were investigated, only a few were found to be more effective. However, the cross-relationships among these variables were not established, yet this might be critical in combination interventions. In addition, as much as the study investigated both self-reported adherence and clinical adherence, this study had limitations that should be considered when interpreting the findings. First, self-reported adherence was probably subject to recall and self-desirability bias. Secondly, the study was conducted in one urban health facility and could not reflect the situation nationwide. Thirdly, this study has estimated VS and adherence rate only among ALHIV receiving treatment, and could not be extrapolated to all adolescents affected by HIV in the country.

Despite all these limitations, the use of more than one method of adherence assessment was a strength and, the facility selected is a high-volume facility with wide catchment areas, making the findings externally valid to a good extent.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

Having analyzed the data collected from the sampled population, the researcher made the following conclusions and recommendations;

6.1 Conclusions

Antiretroviral therapy adherence and viral suppression were suboptimal based on the 2030 targets. Sustained optimum adherence among ALHIV is key in attaining and maintaining viral suppression. Support systems are available and vary both at the family level and hospital levels. Individual counseling and the use of reminders were the most commonly applied components of the support systems. Family and hospital support is key to achieving the recommended targets of ART adherence that in turn leads to viral suppression. The use of reminder messages and talking freely with caregivers, were positively associated with ART adherence. These findings further highlighted the importance of strengthening family relationships and health facility support to achieve and maintain optimal ART adherence. Reminder messages and talking freely to caregivers are of utmost importance.

6.2 Recommendations for Practice

1. The HIV care and treatment programming should introduce personalized follow up intervals for the non-adherent adolescents.
2. Strengthening the use of reminders and individual counselling sessions to align with the individual needs.
3. Interventions targeting family empowerment and motivation as well as hospital capacities should be put in place to support adolescents on ART.

6.3 Recommendations for future study

1. Future research should explore reasons for persistent non-adherence among ALHIV.
2. Further research to explore improvement needs for individual counselling and use of reminder as well as the other components of the support systems.
3. To explore the kind of interaction between family level communication and individual counselling.

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APPENDIX I: INFORMED CONSENT FORM

JARAMOGI ODINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

INFORMED CONSENT FORM

Study Title: Support Systems and Anti-Retroviral Therapy adherence among adolescents living with HIV in Uasin Gishu County

Name of Principal Investigator: Emily Abuonji

Co investigators: Dr. George Ayodo, Dr. Dickens Omondi and Dr. Irene Marete

Name of Organization: Jaramogi Oginga Odinga University of Science and Technology

Name of Sponsor: Self

Informed consent for: Caregivers and their children enrolled for care at AMPATH clinic in Moi Teaching and Referral Hospital.

This informed consent has two parts:

- Information Sheet (to share information about the study with you)
- Certificate of Consent (for signatures if you choose to participate)

Part I: Information Sheet

You and your child are being asked to take part in this research study. This information provided is to tell you about the study. Please read this form carefully. You will be given a chance to ask questions. If you decide to allow your child to be in the study, you will be given a copy of this consent form for your records.

Taking part in this research study is voluntary. You and your child may choose not to take part in the study. Your child could still receive other treatments. Saying no will not affect his/her rights to health care or services. You are also free to withdraw from this study at any time. If after data collection you choose to quit, you can request that the information provided by you or your child be destroyed under supervision- and thus not used in the research study. You will be notified if new information becomes available about the risks or benefits of this research. Then you can decide if you want your child to stay in the study.

Purpose of the Study:

The purpose of the study is to create questions that can tell us whether your child receives support interventions either from the hospital or from the household that helps them take their medications as recommended.

Why have I been identified to participate in this study?

Your child has been chosen for this study because he/she is an adolescent between 10-19 years old and seeks comprehensive care at the AMPATH based clinic in Moi Teaching and Referral Hospital in Uasin Gishu County.

How long will the study last?

This study will last for one day, for up to 1 hour.

What will happen to my child or me during the study?

During the study, we will primarily be asking your child to participate. If there is some information about their health, home or other details that they responded to, we may ask you to help us clarify more.

The questions will be about whether your child has a support system (household and hospital) and whether this helps them to take and get their medications as required.

For caregivers- we shall be asking you questions to learn more about your relationship and experience with your child on medication adherence. This will be a one-time questionnaire and it will take approximately 20 minutes.

What side effects or risks I can expect for my child from being in the study?

There are no risks or side effect that you or your child should expect from being in this study. If you or your child feel uncomfortable at any part of the study, you may stop participating. There is a small chance that there might be a loss of confidentiality from participating in this study, but we will try to avoid this by having study activities take place within private spaces. All study procedures may be stopped at any time by your request.

Are there benefits of taking part in this study?

There may not be any direct benefits for you and your child for participating in this study. However, if we are made aware that your child is need of any services, we shall refer you to appropriate services.

The information we gain from this study can benefit the society by helping us understand how to support and improve ART adherence among adolescents living within your community and hopefully to improve ART adherence for many in the future.

Alternative to taking part in the study:

If you or your child do not want to take part in this study, you will be able to continue receiving your usual care without further disruption. You may stop participating in the study at any time without penalty.

Reimbursements:

There will be no direct monetary compensation to the adolescents for participating in the study. The caregivers and HCWs who will be invited for interviews outside their homes will be reimbursed a maximum of 500 shillings for transport. Snacks will equally be provided during the interviews.

Whom do I call if I have questions about the study?

Contact Information:

Study Site-PI: Emily Abuonji-0702 581 771

Study Co-investigators: Dr. George Ayodo 0737 773 914 or Dr. Dickens Omondi 0722 385 291 or Dr. Irene Marete 0720458695

Questions about your child's rights as a research subject:

Questions about your rights as a research subject: you may contact the Institutional Review Ethics Committee (IREC) at 053 33471 Ext3008 Or the Board of Postgraduate Studies, Jaramogi Oginga Odinga University P.O. Box 1578, Kisumu. Tel 0718916978. These groups review studies for safety and to protect the rights of study subjects. If you believe you have been injured in any way as a result of taking part in this study, please call IREC, JOOUST and the Study PI, noted above.

Will the information provided be kept private?

All research efforts will be made to keep you and your protected information private and confidential. We cannot guarantee absolute confidentiality. Your name and identifying information will not be shared with others outside this study unless mandated by law. The information we gather from you and your child will not contain your names. By signing the consent document for this study, you are giving permission ('authorization") for the use and disclosure of the information we gather from the questionnaires and assessments. A decision to take part in this research means that you agree to let the research team use and share this information.

Your treatment, payment or enrollment in any health plans or eligibility for benefits will not be affected if you decide not to take part. You will receive a copy of this form after it is signed.

Part II Consent of Subject:

I have read or have been read to the descriptions of the research study. The investigator or his/her representative has explained the study to me and has answered all of the questions I have at this time. I have been told of the potential risks, discomforts and side effects as well as the possible benefits (if any) of the study. I freely volunteer to take part in this study.

Name of Participant

Name of Representative/ Witness (witness to print if the Subject is unable to write)

Relationship with the participant

APPENDIX II: RESEARCH QUESTIONNAIRE

STUDY ID_____

SECTION A: Socio-demographic characteristics of the adolescent

SECTION B: ART adherence

SECTION C: Types and characteristics of support systems

SECTION A

DEMOGRAPHIC INFORMATION

1. Adolescent Comprehensive Care Clinic (CCC) number_____

   AMRS number_____

   Other Clinic identification number_____

2. Age of adolescent in year's _____

3. Gender of adolescent

   Male

   Female

4. Religion of the adolescent

   Christian

   Muslim

   Hindu

   Pagan

   Other (Specify)

5. Do you attend clinic elsewhere apart from MTRH?

   Yes

   No

   If Yes, specify_____

6. Whom do you live with?

   a. Both parents
   b. Single parent
   c. Guardian
   d. Other (specify) _____

7. How long does it take you to reach the facility?
    a) Less than 30 minutes
    b) 31-60 minutes
    c) 61- 90 minutes
    d) 90 minutes
8. What means of transport do you use to get to the facility?

    On foot

    By road

9. What is your Level of education?

    Primary

    Secondary

    University/ college

    None of the above
10. Is your caregiver also taking HIV drugs?

    Yes

    No

Do not know

11. What is the Level of education of? (Caregiver)

    Primary

    Secondary

    University/ college

    None of the above

    Do not know

SECTION B

PART A: MORISKY QUESTIONS

1. Do you ever forget to take your medicine?

    Yes

    No

2. Are you careless at times about taking your medicine?

   Yes

   No

3. Sometimes if you feel worse when you take the medicine, do you stop taking it?

   Yes

   No

4. When you feel better, do you sometimes stop taking your medicine?

   Yes

   No

   If any of the questions was answered YES, proceed to question 5-8

5. Did you take your medicine yesterday?

   Yes

   No

6. When you feel like symptoms are under control, do you sometimes stop taking your medicine?

   Yes

   No

7. Taking medication every day is a real convenience for some people. Do you ever feel under pressure about sticking to your treatment plan?

   Yes

   No

8. How often do you have difficulty remembering to take all your medications?

   Never

   Once in a while

   Sometimes

   Usually

   All the time

   Morisky score _____

PART B: VIRAL LOAD QUESTIONS (for research assistant administering the questionnaire only)

1. When was the most recent viral load done? _____

2. What was the viral load number? _____

SECTION C: TYPES AND CHARACTERISTICS OF SUPPORT SYSTEMS

PART A: HOSPITAL BASED SUPPORT SYSTEMS

1. I get personal guidance from the hospital on how to ensure I take drugs every day.

a) Yes

b) No

After being guided, have you ever failed to pick up drugs from the facility as required?

a) Yes

b) No

After taking these sessions, have you ever missed taking your medications as required?

a) Yes

b) No

c) Sometimes

2. As a group, we get guided and counselled at the hospital on how to take drugs

a) Yes

b) No

After being guided as a group, have you ever failed to pick up drugs from the facility as required?

a) Yes

b) No

After being guided as a group, have you ever missed taking your medications?

a) Yes

b) No

3. Who takes you through the counselling sessions? Tick all that apply

a) Clinical psychologists

b) Nurses

c) Community health Volunteers

d) Lay counsellors

e) Other _____ specify

After receiving these sessions, have you ever failed to pick up drugs from the facility as required?

a) Yes

b) No

After taking these sessions, have you ever missed taking your medications?

A) Yes

b) No

4. Do you ever get reminder messages/calls from the hospital facility to pick up or take drugs?

a) Yes

b) No

After receiving these messages, have you ever failed to pick up drugs from the facility as required?

a) Yes

b) No

After receiving these messages, have you ever missed taking your medications?

a) Yes

b) No

PART B: HOUSEHOLD BASED SUPPORT

1. I can talk freely with my parent/guardian regarding any issue relating taking my medication

a) Yes

b) No

Does the free talking with your caregiver encourage you to pick up drugs from the facility?

a) Yes

b) No

Do you get encouraged to take your medications because of the free talks?

a) Yes

b) No

2. Do you ever get reminders from your caregiver to take your medications in the house?

Do these reminders help you to pick up drugs from the facility as required?

a) Yes

b) No

With these reminders, have you ever missed taking your medications?

a) Yes

b) No

3. My family members are aware of my HIV status

a) Yes

b) No

Does this encourage you to pick up drugs from the facility?

a) Yes

b) No

Does this encourage you to take your medications?

a) Yes

b) No

4. Do you get financial support to facilitate you picking drugs at the facility?

Yes

No

Sometimes

Does this encourage you to pick up drugs from the facility?

a) Yes

b) No

Does this encourage you to take your medications?

a) Yes

b) No

5. Have you joined any social support group of people who are of the same status?

a) Yes

b) No

Does this encourage you to pick up drugs from the facility?

a) Yes

b) No

Does this encourage you to take your medications?

a) Yes

b) No

APPENDIX III: RESEARCH APPROVAL DOCUMENTS

JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

DIVISION OF RESEARCH, INNOVATION AND OUTREACHJOOUST-ETHICS REVIEW OFFICE

Tel. 057-2501804

Email: erc@jooust.ac.ke

Website: www.jooust.ac.ke

P.O. BOX 210 - 40601

BONDO

OUR REF: JOOUST/DVC-RIO/ERC/E4

9th December, 2022

Emily Awuor Abuonji

H153/4190/2020

JOOUST

Dear Emily,

RE: APPROVAL TO CONDUCT RESEARCH TITLED "SUPPORT SYSTEMS AND ANTIRETROVIRAL THERAPY ADHERENCE AMONG ADOLESCENTS LIVING WITH HIV IN UASIN GISHU COUNTY, KENYA"

This is to inform you that JOOUST ERC has reviewed and approved your above research proposal. Your application approval number is **ERC 22/12/09-30.**The approval period is from 9th December, 2022– 30th November, 2023.

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) willbe used.
ii. All changes including (amendments, deviations and violations) are submitted for reviewand approval by JOOUST IERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to NACOSTI IERC within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks of affected safety or welfare of study participants and others or affect the integrity of the research must be reported to NACOSTI IERC within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the studyto JOOUST IERC.

Prior to commencing your study, you will be expected to obtain a research permit from National Commission for Science, Technology and Innovation (NACOSTI) https:oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

For

Prof. Francis Anga'wa

Chairman, JOOUST ERC

Copy to: Deputy Vice-Chancellor, RIO Director, BPS DEAN, SHS

An ISO 9001:2015 Certified Hospital

MOI TEACHING AND REFERRAL HOSPITAL

Telephone: (+254)-0532033471/2/3/4
Fax: 0532061749
Email: ceo@mtrh.go.ke/ceosoffice@mtrh.go.ke

NANDI ROAD
P.O. BOX 3-30100
ELDORET,KENYA

Ref: ELD/MTRH/R&P/10/2/V.2/2010

20th January, 2023

Emily Awuor Abuonji,
Jaramogi Oginga Odinga University of Sciences & Technology,
School of Health Sciences,
P.O Box 210-40601,
BONDO-KENYA.

SUPPORT SYSTEMS AND ANTIRETROVIRAL THERAPY ADHERENCE AMONG ADOLESCENTS LIVING WITH HIV IN UASIN GISHU COUNTY, KENYA

You have been authorised to conduct research within the jurisdiction of Moi Teaching and Referral Hospital (MTRH) and its satellites sites. You are required to strictly adhere to the regulations stated below in order to safeguard the safety and well-being of staff, patients and study participants seen at MTRH.

1. The study shall be under Moi Teaching and Referral Hospital regulation.
2. A copy of MTRH/MU-IREC approval shall be a prerequisite to conducting the study.
3. Studies intending to export human bio-specimens must provide a permit from MOH at the recommendation of NACOSTI for each shipment.
4. No data collection will be allowed without an approved consent form(s) to participants unless waiver of written consent has been granted by MTRH/MU-IREC.
5. Take note that **data** collected must be treated with due confidentiality and anonymity.

The continued permission to conduct research shall only be sustained subject to fulfilling all the requirements stated above.

The approval period is **20th January, 2023 – 19th January, 2024.**

19/01/2023
DR. WILSON K. ARUASA, *MBS, EBS*
CHIEF EXECUTIVE OFFICER
MOI TEACHING AND REFERRAL HOSPITAL

MOI TEACHING AND REFERRAL HOSPITAL
CEO
APPROVED
20 JAN 2023
SIGN.....
P. O. Box 3-30100, ELDORET

c.c. - Senior Director, Clinical Services
- Director, Nursing Services
- HOD, HRISM

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **605893**

Date of Issue: **12/January/2023**

RESEARCH LICENSE

This is to Certify that Miss.. EMILY Awuor ABUONJI of Jaramogi Oginga Odinga University of Science and Technology, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Uasin-Gishu on the topic: SUPPORT SYSTEMS AND ANTIRETROVIRAL THERAPY ADHERENCE AMONG ADOLESCENTS LIVING WITH HIV IN UASIN GISHU COUNTY KENYA for the period ending : 12/January/2024.

License No: **NACOSTI/P/23/22748**

605893

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)

Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
    i. Endanger national security
    ii. Adversely affect the lives of Kenyans
    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
    vi. Adversely affect the rights of communities
    vii. Endanger public safety and national cohesion
    viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and Innovation(NACOSTI),
Off Waiyaki Way, Upper Kabete,
P. O. Box 30623 - 00100 Nairobi, KENYA
Telephone: 020 4007000, 0713788787, 0735404245
E-mail: dg@nacosti.go.ke
Website: www.nacosti.go.ke

MTRH/MU-INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471//2/3

MOI UNIVERSITY
COLLEGE OF HEALTH SCIENCES
P.O. BOX 4606
ELDORET
Tel: 33471/2/3

Reference: IREC/349/2022
Approval Number: 0004327

12th January, 2023

Emily Awuor Abuonji,
Jaramogi Oginga Odinga University of Science & Technology,
School of Health Sciences,
P.O. Box 210-40601,
BONDO-KENYA.

Dear Ms. Abuonji,

SUPPORT SYSTEMS AND ANTIRETROVIRAL THERAPY ADHERENCE AMONG ADOLESCENTS LIVING WITH HIV IN UASIN GISHU COUNTY, KENYA

This is to inform you that ***MTRH/MU-IREC*** has reviewed and approved the above referenced research proposal. Your application approval number is ***FAN: 0004327.*** The approval period is **12th January, *2023- 11th January, 2024.***
This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, Material Transfer Agreements (MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MTRH/MU-IREC***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MTRH/MU-IREC*** within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MTRH/MU-IREC*** within 72 hours.
v. Clearance for export of biological specimens must be obtained from ***MOH at the recommendation of NACOSTI*** for each batch of shipment.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MTRH/ MU-IREC.***

Prior to commencing your study; you will be required to obtain a research license from the National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and other relevant clearances from study sites including a written approval from the CEO-MTRH which is mandatory for studies to be undertaken within the jurisdiction of Moi Teaching & Referral Hospital (MTRH) and its satellites sites.

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
12 JAN 2023
APPROVED
P. O. Box 4606 - 30100 ELDORET

Sincerely,

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc CEO - MTRH Dean - SOP Dean - SOM
Principal - CHS Dean - SON Dean - SOD