DETERMINANTS OF ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG HIV POSITIVE CHILDREN AT KENYATTA NATIONAL HOSPITAL

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A thesis submitted in partial fulfilment of the requirements for the award of the Master of Pharmacy in Pharmacoepidemiology and Pharmacovigilance of the University of Nairobi

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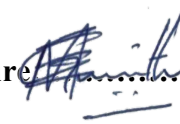
Signature  **Date**2nd November 2023

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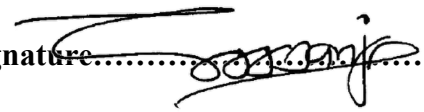
Signature  **Date**03.11.2023

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ABBREVIATIONS AND ACRONYMS

AIDS Acquired immunodeficiency Syndrome

ART Anti-Retroviral Therapy

ARV Anti-Retroviral

CCC Comprehensive Care Centre

CD4 T-Lymphocyte cell bearing CD4 receptor

CLHIV Child Living With HIV

DHIS District Health Information Software

HIV Human Immunodeficiency Virus

LMIC Low- and Middle-Income Countries

LPV/r Lopinavir/Ritonavir

NASCOP National AIDS and STIs Control Programme

PENTA Paediatric European Network for Treatment of AIDS

PLHIV People Living With HIV

W.H.O World Health Organization

TCA to Come Again

OPERATION DEFINITION OF TERMS

Adherence: The process by which patients take their medicines as prescribed including the right dose and right time

Children: For this study, a child is a patient aged below 18 years

Determinants: Factors that are affecting patient adherence to antiretroviral therapy

Emancipated Minor: Is a minor who assumes most adult responsibilities before reaching the age of majority including medical decisions.

Prevalence: Proportion of children who adhere to antiretroviral therapy among HIV positive children from the total sample size.

Sero Positive: Having detectable antibodies to HIV

Unemployed: An individual who is actively looking for employment but unable to secure any.

Viral Load: Amount of HIV viral copies per millilitre of plasma

Virological failure: Having a viral load result of more than 400 copies/ml on 2 consecutive tests

DEDICATION

I dedicate this research thesis work to my daughter, Nadine Mchana.

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First and foremost I wish to thank the Almighty God for strengthening me through it all . I have experienced God's guidance day by day.

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ABSTRACT

Background: HIV-AIDS is the sixth highest cause of mortality in the world and the leading cause of death in Sub-Saharan Africa. In 2018, there were 1.3 million people living with HIV in Kenya, with an incidence rate of 0.14% adults (15-64 years) annually. The prevalence among adults aged 15-49 years was 4.9%. The prevalence of HIV among children is 0.7% accounting for about 139,000 children aged between 0-14 years. Antiretroviral drugs are currently in use for the management of HIV. In Kenya, HIV remains poorly controlled among children and adolescents (0-18 years) with Viral Load Suppression achieved in only 48.3% of them, which is way below the 90% target which prompts the need to assess common determinants of adherence to antiretroviral therapy.

Objective: To examine the extent and determinants of adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital.

Methods: A hospital-based cross-sectional study was carried out at the KNH Comprehensive Care Centre. Consecutive sampling technique was utilized to recruit 126 HIV positive children. Data was abstracted from patient files using a data abstraction tool, where information on appointment keeping, viral load and adverse events was obtained using a structured questionnaire. Microsoft Excel was used for data entry and then exported to STATA version 13.0. Data analysis included both descriptive and inferential analysis. Categorical data was analyzed using frequencies and percentages and represented in graphs and charts. Continuous data was analyzed using mean (SD) and median (IQR). A binary logistic regression was conducted to determine factors associated with adherence. Adjusted odds ratios were calculated to determine independent factors associated with adherence to ART therapy.

Results: Seventy-one (56.3%) of the respondents were female, 44(34.9%) were aged between 15 to 18 years. The duration of disease established that 57(45.2%) had duration of 5 to 10 years while 39(31%) had less than five years of HIV disease. The findings showed that 122(96.8%) were on first line treatment with 91(72.2%) were on CF4E TDF + 3TC + DTG treatment regimen. Four (3.2%) of the respondents were on second line treatment. Adherence to antiretroviral therapy was 112(88.9%), 95%CI: 82.1 – 93.8%. Multivariate analysis showed that being female (AOR = 7.7, 95%CI: 1.07 – 55.93, p=0.043), first line treatment (AOR =2.31, 95%CI: 1.03 – 5.71, p =0.007) and not refusing to take medicines (AOR = 8.11,

95%CI: 3.87 – 20.11, p =0.007) were independent determinants of adherence to antiretroviral therapy.

Conclusion: The findings have indicated adherence to be 88.9% which is lower than recommended 95% adherent level. It has also been established that adherence was associated with viral load suppression. Therefore, it is essential to provide a positive social support system that will encourage sharing of responsibility for remembering medication within households if optimum adherence level is to be attained.

1. CHAPTER ONE: INTRODUCTION

1.1.Background

HIV-AIDS is the sixth highest cause of mortality in the world and the leading cause of death in Sub-Saharan Africa. In 2019, World Health Organization (W.H.O) estimated that 38.0 million people were living with HIV globally. Actually, 0.7% of adults aged 15-49 years worldwide are living with HIV. During the same year, 2019, 690,000 people are estimated to have died of HIV-related illness worldwide (1).

In 2018, there were 1.3 million people living with HIV in Kenya, with an incidence rate of 0.14% adults (15-64 years) annually. The prevalence among adults aged 15-49 years was 4.9%. The prevalence of HIV among children is 0.7% accounting for about 139,000 children aged between 0-14 years (2) .

The trends of the epidemic vary considerably between regions. These trends have enabled governments and global health institutions to implement different programmes and strategies in the management of the epidemic. For example, the Government of Kenya set up the National AIDS and STI Control Programme (NASCOP) which was tasked with the management of the HIV burden. The programme has set up the Kenya AIDS Strategic Framework adopting different strategies in the management of the epidemic as well as capacity building of health care workers in the country (3).

The 90-90-90 strategy, that 90% of people living with HIV (PLHIV) know their status, 90% of diagnosed PLHIV are on treatment and 90% of PLHIV on treatment achieve an undetectable viral load, by 2020 was announced by Joint United Nations Programme on HIV/AIDS (UNAIDS) in 2014 with the aim of reducing HIV from a high burden epidemic to low level epidemic by 2030 (4). This strategy has been adopted in Kenya despite the various challenges experienced in the country owing to the fact that Kenya is a Low middle-income country (LMIC).

Antiretroviral drugs are currently in use for the management of HIV. Adherence rate to antiretroviral medication should be >95% in order to achieve the third 90% of the 90-90-90 strategy, that 90% of PLHIV on treatment achieve an undetectable viral load (4). W.H.O defines adherence as the process by which patients take their medicines as prescribed including, the right dose and right time (1).

In Kenya, patients can access antiretroviral therapy free of charge at the Public Health Facilities. Despite the availability of free antiretroviral drugs adherence still remains a major challenge due to various factors that may be classified as; patient factors, drug factors as well as health system factors (5). Patient factors such as substance abuse, low level of education, socio-economic status could be attributed to low levels of adherence. Drug factors affecting adherence include bitter taste especially Lopinavir/ritonavir syrup, high pill burden, unsuitable dosing schedules among school going children and adverse drug reactions (6). Health system factors range from accessibility and distance to the healthcare facility to the service providers, where patients may fail to be satisfied with the services provided leading to a negative attitude toward the advice given on adherence or even failure to honour clinic appointment dates (5).

Important cautions and considerations must be considered when selecting treatment regimens. Treatment resistance arising from either maternally transmitted vertical resistance or drug non-adherence should be taken into consideration during drug selection for initiation (7). Abacavir is contraindicated in patients with Human leucocyte Antigen HLA-B5701 as it has been proven to cause severe hypersensitivity to Abacavir within the first 6 weeks of therapy (8). PENTA focuses on key populations such as; girls of child bearing age who need prior counselling on the neural tube defects associated with DTG, Hepatitis B co-infection as these patients require Tenofovir Disoproxyl Fumarate (TDF) /Tenofovir Alafenamide (TAF) as part of their backbone therapy (9).

1.2.Statement of the problem

The prevalence of HIV in Kenya is high, ranking the country fifth in the world (10). In 2018, the prevalence of HIV in Kenya was 4.9%. Women had twice the prevalence compared to men at 6.6% and 3.1% respectively (11). The government of Kenya has initiated free Comprehensive Care Centre (CCC) services around the country to mitigate the HIV problem, and also offers free Anti-Retroviral Therapy (ART) as well as maintains a District Health Information Software (DHIS) database to monitor HIV and manage the drugs used for therapy.

Despite the availability of free medicines, HIV remains poorly controlled among children and adolescents (0-18years) with Viral Load Suppression achieved in only 48.3% of them, which is way below the 90% target (10). The National Policy of 90-90-90 target where 90% of people living with HIV know their status, 90% of all people diagnosed with HIV receive

therapy and 90% of all people receiving therapy have viral suppression is currently not being met for children. Currently for children aged 0-14 years the values are 78.9% of children living with HIV know their status, 93.2% of those who know their status are treatment and 48.3% of those on treatment have viral suppression (2).

This poor viral load suppression may be attributed to a variety of factors such as loss of potency of the antiretroviral formulations (due to poor storage), improper dosing (due to incorrect estimation of weight-based doses) or poor adherence to antiretroviral medications (12). Poor adherence may not only lead to poor viral load suppression but also lead to resistance to different classes of drugs (13). Considering the limited therapeutic regimens for HIV, it may lead to treatment complexities and increase in treatment costs.

Viral load suppression and pill counts are some of the methods used to determine adherence among HIV patients. Failure to visit the clinic for viral load monitoring and improper dosing of the drugs may lead to high viral load which indicates treatment failure or non-adherence. Viral load suppression, pill counts and other indicators of adherence ought to be routinely assessed though this is generally not the case particularly in children as established in Western Kenya (14). In addition, the factors that influence adherence, particularly in children, are inadequately studied and need to be understood in order for appropriate measures to be put in place to ensure proper adherence to treatment. We therefore seek to establish the extent of non-adherence as well as the determinants of adherence to ART in children in Kenya, a low middle-income country.

1.3.Study Justification

There is scarcity of data on adherence and determinants of adherence among paediatric patients in sub-Saharan Africa. Most of the work done focuses on adults. A study in Kenya by Wakibi *et al* estimated the prevalence of non-adherence among adults to be 18% (15), and identified three main factors associated with non-adherence among the respondents: proximity to the clinic, where people living closer to the clinics where they receive care were more likely to be non-adherent; difficulty in fitting therapy in their own schedule; and hiding their disease/treatment status from colleagues resulting in missed doses.

A systematic review by Heestermans *et al* on determinants of adherence to ART among adults in Sub Saharan Africa revealed poor social support, stigmatisation, poor relationship between patients and healthcare workers, use of herbal medicines and male gender as some of

the significant determinants of non-adherence in Sub –Saharan Africa. Drugs stock outs were also associated with non- adherence (16).

It is reasonable to expect that these and more challenges to adherence to ART also apply to children. To enable us improve adherence in children, we need to understand the extent of the problem of non-adherence in this demographic, as well as the factors influencing adherence among them. It is this knowledge gap that the present study intends to fill. This is essential in supporting the development of suitable approaches of ensuring proper adherence to treatment that are child-friendly. The interventions currently put in place hardly consider children, considering that they are highly dependent.

1.4.Research Questions

The study seeks to answer the following research questions:

i. What is the prevalence of adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital?

ii. What are the determinants of adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital?

iii. Is there an association between adherence to antiretroviral therapy and viral load suppression among HIV positive children receiving treatment at Kenyatta National Hospital?

1.5.Research Objectives

1.5.1. Primary Objective

To determine the prevalence, determinants and selected outcomes of adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital.

1.5.2. Secondary objectives

i. To determine the prevalence of adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital.

ii. To identify the determinants of adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital.

iii. To establish the association between adherence to antiretroviral therapy and

viral load suppression among HIV positive children receiving treatment at Kenyatta National Hospital.

1.6.Significance of the study

The study findings therefore contribute to improved adherence which in turn leads to increased viral load suppression. The findings of this study may contribute to the overall better management of HIV among children in Kenya and lead to improved disease management.

The study findings are of interest to the Ministry of Health as it highlights the main factors associated with non-adherence to antiretroviral medication among children that need to be addressed. The findings will also be of benefit to NASCOP as it guides in the development of guidelines that are child-friendly. The findings of this study will also be disseminated to healthcare providers at Kenyatta National Hospital CCC and it assist in improving adherence among their paediatric clients.

2. CHAPTER TWO: LITERATURE REVIEW

2.1.Epidemiology of HIV

The Joint United Nations Programme on HIV/AIDS(UNAIDS) estimated that 38.0 million people were living with HIV globally in 2019. There are about 1.7 million children (0-14 years) living with HIV globally. New infection of HIV among children have declined by 52% since 2010 from 310,000 to 150,000 in 2019 (17).

Approximately 20.7 million people living with HIV reside in East and Southern Africa. This is the largest number of people with HIV living in a region hence East and Southern Africa is heavily burdened by HIV. The incidence of HIV in this region in 2018 was 800,000 new HIV infections, with South Africa having the highest rate at 240,000 new HIV infections (18).

In 2018, the prevalence of HIV among children (0-14 years) living in East and Southern Africa was 1.1million. Transmission of HIV among these is mainly by birth. Cultural practices like early child marriages are still practised in the region, increasing the risk of HIV transmission. In Sub-Saharan Africa, 5 out of every 6 infections among 15-19 year olds are among girls (17).

In 2018, Kenya Population-based HIV Impact Assessment (KENPHIA) conducted a survey in Kenya and estimated that the number of PLHIV was 1.3 million (2). Children (0-14 years) had a prevalence of 0.7%(95% CI: 0.4 to 1.0), while adolescents (10-19 years) had a 0.9% prevalence (95% CI: 0.6-1.3) (2).

Among the PLHIV globally in 2019, 25.4 million (67%) had access to ART which was a significant growth from 6.4 million in 2009. However, the number of children (0-14 years) with access to ART still remains low at 53% (13). In Kenya, 93.2% of the children living with HIV had access to treatment as estimated by KENPHIA in 2018 but only 48.3% are virally suppressed (2). Waudo *et al* estimated that only 48.1% of the children aged 0- to 59 months in Naivasha County Referral hospital had optimum adherence (19).

2.1.Management of HIV in Children

2.1.1. Drugs and treatment regimens recommended for children

There are four main classes of medicines used as ARVs in children. These are: nucleoside and nucleotide analogue reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse

transcriptase inhibitors (NNRTIs), protease inhibitors (PIs) and fusion inhibitors as indicated in Table 2.1 below (20).

Table 2.1: Classification of Antiretroviral Drugs

Mechanism of Action	**Drugs**
NRTIs	Tenofovir, Zidovudine, Lamivudine, Abacavir
NNRTIs	Nevirapine, Efavirenz
Protease Inhibitors PIs	Lopinavir, Ritonavir, Darunavir
Fusion Inhibitors FIs	Enfuviritide, Maraviroc
Integrase Inhibitors	Raltegravir, Dolutegravir

Note: NRTIs- Nucleoside and Nucleotide Reverse Transcriptase Inhibitors; NNRTIs- Non-Nucleoside Reverse Transcriptase Inhibitors

W.H.O has simplified ARV dosing in children where it uses dosing per weight- band instead of per-kilogram, taking into consideration the nutrition status of children from low- and middle-income countries. The mandate of developing guidelines for ARVs in children is given to the Paediatric Antiretroviral Working Group (PAWG) (21).

Despite scarcity of data on pharmacokinetic properties of drugs in children and infants, PAWG strives to consolidate registration trial data and recommends suitable formulations for paediatric use. In 2018, PAWG recommended the use of Dolutegravir (DTG) in the 20-24 kg weight band. Raltegravir (RAL) is currently in use in the form of granules for neonates. RAL has also been formulated as chewable/dispersible tablets for older children (21).

One of the principles used by PAWG is to avoid the used of liquid dosage forms as they pose dosing and administration challenges, which may lead to under dosing/overdosing resulting in undesirable treatment outcomes. Dispersible tablets and granules such as Abacavir/Lamivudine/Lopinavir/ritonavir (ABC/3TC/LPV/r) granules as well as Abacavir/Lamivudine/Efavirenz (ABC/3TC/EFV) and DTG 10 mg scored dispersible tablets are recently emerging formulations (21).

The Paediatric European Network for Treatment of AIDS (PENTA) has implemented HIV treatment guidelines with a focus of improving immunity and increasing the quality of life, shifting focus from minimizing morbidity and mortality. Initiation of treatment is done for all

HIV positive children in spite of their age, CD4 count and viral load (18). First line therapy includes two nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs) together with a third drug from a different class like Protease Inhibitor (PI) on Integrase Inhibitor. Patients are switched to second line treatment as a result of virological failure, which can be as a result of non-adherence. Adequate adherence counselling is required during the switch of regimen. The PENTA guideline recommends individualization of adolescents' doses in preparation for transition into adulthood. Newer drug regimens and formulations have been included to cater for the wide spectrum of paediatric patients. Considering this newly added molecules, there is need for pharmacovigilance to monitor long term toxicities of the drugs (8).

In Kenya, treatment is initiated for all HIV positive individuals who are ready to adhere to treatment with the aim of viral suppression (7). Several regimens are used as first line drugs and are categorized on the basis of age bands.

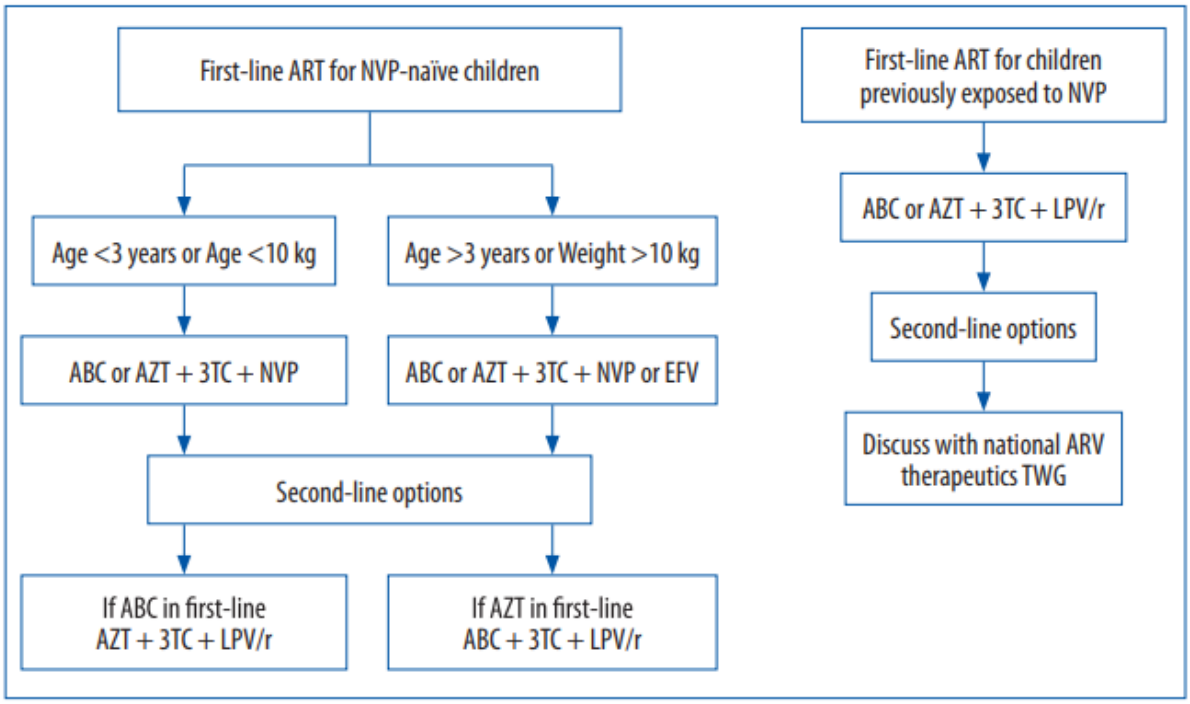

Figure 2.1: Classification of Antiretroviral Drugs

2.1.Prevalence of adherence to antiretroviral therapy among HIV positive children

Adherence to antiretroviral medication among children has been varied across different regions in the world. It is known that adherence to treatment regimens is a criterion for the efficacy as well as the durability of any ART. Recent published studies have shown that for

effective ART regimen, there is 70 to 90% adherence required although some studies have indicated that viral suppression for patients treated with the (22) non-nucleoside reverse transcriptase inhibitors (NNRTI) is possible with around 54 to 100 percent adherence (23). In a cross sectional study conducted in Ghana investigating adherence to ART in children, it was found that the median adherence was 93.2% although further analysis showed that 47.5% of the children had ≥95% adherence (22).

A mixed method design study conducted in rural Tanzania investigating adherence of ART among HIV positive children and teenagers found that out of 116 participants, 70% of the respondents reported optimal adherence levels while the average adherence level was 84%. The level of adherence was determined with living with a non-parent caretaker (12). This is mainly as a result of lack of commitment and focus on ensuring that children take their medications without fail. Similarly, another descriptive cross-sectional study conducted to determine the adherence to ART among HIV positive adolescents at comprehensive care clinic in Gertrude's children's hospital Nairobi involving 185 patients showed that the estimated level of adherence was 67.34 percent and the main reason for missing therapy was forgetting. It was revealed that, long waiting time in the clinic and stigmatization were other factors found to affect adherence (24). The findings from this study show that the level of adherence to ART among the respondents falls significantly below the optimum adherence level of 95%.

A prospective cohort study conducted in sites from Tanzania, Kenya and Uganda investigating the level of adherence to ART treatment revealed that all of the children who were enrolled in the study recorded good adherence with an average above 90% throughout all the years of follow up. It was also determined that longer time on ART was associated with increased likelihood of higher adherence (25). Self-reported adherence to ART remained high although there was variation in relation to patient level and site level factors. Thus, it is essential to ensure consistent monitoring of adherence with more validated measures to help in effectively assessing the adherence levels which might more accurate as compared to self-reported which is subjective.

Kim et al. conducted a systematic review involving adolescents living with HIV. In the study, searches included Embasse, Medline and Psych INFO databases eligible studies included adherence measurement level of about 85% on self-report. A total of 50 eligible articles from 53 countries were extracted including 10,725 patients. The findings revealed that the lowest

adherence to ART was in North America with reported 53%, Europe with 62%, South Africa reported 63% while sub-Saharan Africa recorded 84% adherence level. Further the findings showed that, more than 70% of HIV-positive patients on ART were adherent (26). The differences in the level of adherence as observed in the study show the underlying differences in access to care and funding.

In addition, a cross sectional study conducted in Uganda investigating adherent to ART among children infected with HIV, it was found that he rates of adherence was 79% with caregiver forgetfulness being the most common reason for missing ART doses. Other reasons that were identified in the study included transportation cost (27). Support for providers to identify clues or reminders to take drugs, extending HIV testing to caregivers and innovative models of ART delivery that alleviate transport costs to caregivers and allow sufficient drugs for children in school could enhance drug adherence among children.

2.2 Adherence to antiretroviral therapy

2.2.1. Adherence classification

W.H.O has adopted the Haynes and Rand definition of adherence as the extent to which a person's behaviour corresponds to the recommendations from a health care provider. These recommendations can either be medical such as following instructions given on frequency, route of administration and quantity of a drug to take or non-medical such as lifestyle changes including diet modification and exercise (1).

The process of adherence is further divided into three quantifiable steps: Initiation, Implementation and Discontinuation. Initiation is the first step. It is when the patient takes the first dose of a prescribed medicine. It is followed by implementation which is the extent to which a patient's dosing schedule corresponds to the prescription issued. This process lasts till when the last dose is taken. Discontinuation is the last step and it is when the last dose of the medication is taken (28).

Non-adherence is said to occur if any of the three mentioned processes is not followed as expected. It could be as a result of late initiation, where a patient obtains a prescription but does not buy the medication. It could also occur at the implementation stage where the frequency, dose and regimen of the medicine do not correspond with the instructions given. It could be at the discontinuation stage, where there is early or late discontinuation (29).

In 2016, less than 61% Sero-positive children below the age of 15 had access to treatment. This may be attributed to stigma and discrimination since the levels of awareness of HIV are high in Kenya and there is lack of social support among people, hence the fear of one being seen taking their child for HIV treatment (11).

HIV regimens have been greatly modified to ease administration and reduce pill burden. Paediatric formulations have been made available like dispersible tablets and syrups. Despite the stated efforts, adherence to medication among paediatric population is still less than 95% (30).

In the management of HIV, adherence levels ought to be above 95% for therapy to be effective (22). There is limited data on adherence among HIV positive children in LMICs. This study will seek to obtain data on adherence among HIV positive children which can be used in the development of policies and guidelines that are child-friendly (31).

2.2.2. Measurement of Adherence

Adherence is measured using various methods such as; Therapeutic Drug monitoring, Medical Events Monitoring System (MEMS), pill counts, clinic appointment dates, questionnaires and interviews (32).

Therapeutic Drug Monitoring may be done to establish the amount of drug in the body. Several specimens such as dry blood sample, hair or saliva may be used. This method may be invasive causing anxiety in children especially in instances where blood is drawn. It is also expensive to carry out and there may be challenges in the interpretation of results especially due to the difference in pharmacokinetics among children (33).

Parameters such as viral load suppression and CD4 count may be used as indirect methods to determine the rate of adherence to ART. However, failure to achieve the set thresholds may not necessarily translate to non-adherence as it could also be due to resistance, improper dosing, thus leading to treatment failure (30) .

Medical Events Monitoring Systems detect each time a bottle cap is opened but this does not translate to the medicine being taken. Pill count does assess the number of pills remaining, but this does not mean that all pills were taken as patients could take pills out of the container to account for non-adherence. Clinic appointment dates may be used as a method to determine adherence; however this does not translate to the medicine collected being administered (32).

Questionnaires and interviews are subject to response bias and caution should be taken when using this method (32). There are six standardized and validated questionnaires used to assess adherence. These questionnaires include; Brief Medication questionnaire, Hill-bone compliance scale (Hill-Bone), Eight item Morisky Medication Adherence Scale (MMAS-8), Medication Adherence Questionnaire (MAQ),the Self-Efficacy for Appropriate Medication Use Scale (SEAMS) as well as Medication Adherence Report Scale (MARS) (34).

The Brief Medication Questionnaire assesses the medication taking behaviour as well as the barriers to adherence. It is divided into three main sections evaluating the regimen, patient beliefs and patient recall each with a scale of five, two and two respectively. The Hill-Bone compliance scale looks into the medication taking behaviour as well as barriers to adherence. This scale is adopted to assess adherence among black patients with hypertension thus limiting its generalizability and is divided into three sections, behaviour in taking medication, clinic appointment keeping and reduction in sodium intake (34).

Dr. Morisky developed the 4 –item Morisky Medication Adherence scale (MMAS-4) which is also called the Medication Adherence Questionnaire (MAQ) that had dichotomous yes /no answers and later improved the tool to an 8-item scale (MMAS-8). The Morisky scale has seven yes/no questions and one last question that has a 5-point Likert scale. MMAS-8 scale focuses on how patients take their medication but it doesn't look into the factors affecting adherence. It has been translated to various languages (35).

The Self-Efficacy for Appropriate Medication Use Scale (SEAMS) consists of thirteen questions with a three-point Likert scale. This tool is highly reliable in assessing medication adherence among patients as it is easy to understand making it suitable for use among patients with low literacy levels (36).

The Medication Adherence Rating Scale (MARS) has ten questions. The scale assesses three key areas; the patient beliefs towards medication, patient's attitude as well as disease condition in the past seven days (34). Adherence is crucial in achieving viral load suppression. It is important to acknowledge that there is no standard method to determine adherence. All the methods applied have advantages and disadvantages and the best thing to do is combine at least two methods.

2.3. The determinants of adherence to antiretroviral therapy in children

There are several factors associated with adherence in children. These factors can be grouped in four main Categories as: child characteristics, regimen characteristics, caregiver characteristics, family and society characteristics (37).The relationship between patients and health care providers also affects adherence (38).

2.3.1. Child characteristics

Children are not small adults and their pharmacokinetics (Absorption, Distribution, Metabolism and Excretion) differ greatly from that of adults. There is lack of clinical trials data on children resulting in off-label use of many drugs in children. Children cover a wide spectrum of age and it is difficult to establish pharmacokinetic properties for different drugs in each spectrum. Due to this, child doses are based on age and weight of the child (39).

In the initial stages of growth and development, weight changes drastically hence the need to optimize child doses. However, a study conducted in western Kenya indicated high initiation rate and less follow-ups done among children as the caregivers were not accompanied by children for refills thus leading to ARV optimization challenges as the weight of the children is not established during drug refills (40).

A study done in the United States using data collected as part of the Paediatric AIDS Clinical Trial Group, established that level of adherence decreased with age. Older children had lower levels of adherence compared to younger children (6). These findings agree with a systematic review done in Ethiopia that highlights the plight of older children who might be given several roles and responsibilities making it difficult for them to focus on treatment (41). This may also be due to the fact that older children are more aware of the condition and may be faced with stigma and shame. This might affect their medicine adherence especially among adolescents who have to attend school and administer medicine while in school which may arise curiosity among their peers (42). Wadunde *et al*, established that older children are more adherent to medicine than younger children in their study on factors associated with adherence to ARVS among children in Uganda (27), contrast to the findings in the United States study (6).

A study in South Nigeria established that children may refuse to take medicine, vomit or sleep before the drug is administered, affecting adherence to medicine (36). These findings

highlight the importance of scheduling drug administration time bearing in mind the sleeping patterns of a child.

Proper dispensing guidelines on steps to follow in the event of a vomited dose ought to be implemented to ensure that the minimum effective dose is achieved. School friendly guidelines ought to be put in place to aid creating awareness and supporting HIV Positive children while in school.

2.3.2. Regimen characteristics

In 2015, W.H.O set new recommendations that all people living with HIV should start treatment, making everyone eligible for treatment including children (43). This new development created the need for child friendly formulations to ensure that adherence is maintained (30).

Some of the regimen characteristics associated with adherence include, palatability, difficulty in swallowing, regimen complexity, transport and storage (30). A study in South Africa indicated that poor palatability was the most common problem encountered by caregivers when administering medicine to children, with 68% of the complains being associated with Ritonavir (44).

Protease Inhibitors (PIs) are the first line drugs for children below 3 years (45). Efforts have been made to avail them as liquid formulations as well as dispersible pellets (12). Despite these efforts the bitter taste remains a challenge (30). This creates the need to develop better formulation to enhance palatability which goes a long way in ensuring adherence to the medicine.

The government has ensured that the formulations of children regimen are palatable and the right dosage forms such as suspensions and dispersible tablets. There might be challenges as Lopinavir/Ritonavir syrup is supposed to be refrigerated and most homes have no fridges hence the potency of the drug may be affected (12). Transporting the drugs may also be a challenge as one has to carry many bottles of the liquid preparations (12). Despite the efforts to introduce FDCs, there is the pill burden where children take the two to three pills, two times in a day in combination with a suspension. This may lead to poor adherence. Pill burden is reported to be barrier to adherence in the systematic review and meta-analysis by Shubber *et al.* (46).

Waudo *et al* also allude that regimen complexity and pill burden could be some of the factors affecting adherence among Paediatric HIV patients (19).

2.3.3. Caregiver characteristics

Children are highly dependent in nature. It has been established that caregivers do influence the levels of adherence in children (47)(29). The relationship between a child and the caregiver is found to determine the level of adherence. A study conducted in Tanzania established that level of adherence was higher among children living with biological parents compared to those living with non-biological caregiver (29).

Forgetting to administer a drug is also another aspect that can lead to poor adherence. A study conducted in Uganda established that caregiver forgetfulness was the main reason for missed doses (27).There is need to educate the caregivers on the importance of dose scheduling.

These drugs are dosed based on weight and sometimes parents do visit the hospitals for refills without their children especially school going children and adolescents as found in Kenya, forcing health care providers to use the last weight recorded as the dosing weight. This may lead to under dosing hence optimum therapy is not achieved (41).

2.3.4. Patient and healthcare provider relationship

A good relationship between patients and healthcare providers is known to enhance adherence leading to improved treatment outcomes. Healthcare provider factors that enhance adherence are competency, good communication skills and empathy and involvement of the patients in decision making during the course of therapy (48).

2.4. The association between adherence to antiretroviral therapy and viral load suppression

Adherence levels have to be above 95% for one to be virally supressed (1). Failure to maintain high levels of adherence may lead to drug resistance. When resistance is detected a change of regimen is recommended (49). This change in regimen may result in the use of more potent drugs that could be more toxic predisposing the patients to adverse drug effects. A cross sectional study conducted by Ng'eno et al. investigating the burden of HIV infection among children aged between 18 months to 14 years in Kenya, among the 3,681 children, 11 had been previously diagnosed with HIV infection. The findings further revealed that all the

eleven patients were in HIV care and receiving cotrimoxazole, eight were on ART while among those on ART, four were immunologically suppressed (50).

According to an observational study conducted by Arnsten et al. investigating ART adherence and viral suppression among HIV patients revealed that, there was significant relationship between ART adherence and HIV viral load. The findings further showed that the chances of achieving virologic suppression if ART adherence based on electronic monitoring was higher compared to self-reported ART adherence (51). The findings thus revealed that self-reported adherence is higher than MEMS adherence, but a strong relationship exists between both measures and virus load. However, electronic monitoring is more sensitive than self-report for the detection of nonadherence and should be used in adherence intervention studies.

Similarly, a cohort study conducted by Sethi et al investigating the association between adherence to ART and HIV virus drug resistance found that, missing of a scheduled clinic visit in the past month , a cumulative adherence of between 70 and 80 percent and a CD4 cell nadir of <200 cells/µL were independently associated with an increase in hazard of viral rebound with clinically significant resistance (52). The findings from the study reveal that clinicians and patients must set high adherence goals to help avoid any development of resistance.

Dziva, Chikwari and Ferrand in a cross-sectional study conducted investigating the association between self-reported adherence and HIV viral load suppression among older children and adolescents revealed that, among participants who had a viral load measurement at 48 weeks post ART initiation, 37% were not virally suppressed. Among 28 of 166 of patients who scored <95% on the visual analogue scale (VAS) 16 of the 28 were unsuppressed compared to 45 of 139 who scored ≥95% (53). These findings showed that VAS score was significantly associated with viral suppression.

Non-adherence may also lead to elevated viral load levels and a decrease in CD4 count (47), which may cause increased incidence of opportunistic infections and deterioration in the quality of life. Opportunistic infections may occur as a result of non-adherence. A study conducted by Waudo *et al* indicated that there was higher prevalence of opportunistic infections among patients who were non-adherent compared to the adherent patients (19). Non-adherence may also necessitate treatment changes as indicated by Low *et al* in which they found that treatment failure was the most common reason for changing regimen (54).

3. CHAPTER THREE: METHODOLOGY

3.1.Introduction

This chapter described the methodology that was used by the researcher to conduct the study. It highlighted the study design, location of the study, study population, eligibility criteria, sampling, research instruments, validity, reliability and data collection techniques.

3.2.Study design

The study was hospital-based cross-sectional study. A questionnaire (Appendix 3) was used to collect data from caregivers of HIV positive children attending clinic at KNH CCC. A data abstraction tool (Appendix 4) was used to obtain secondary data from patient files. A cross-sectional study allowed us to collect data on all variables and describe the prevalence of non-adherence among HIV positive children attending CCC at KNH.

3.3.Location of the Study

The study was conducted in the CCC at Kenyatta National Hospital, Nairobi County, Kibra sub-county, Woodley/Kenyatta Golf course ward. Kenyatta National Hospital is a level six hospital and the largest hospital in Kenya with a bed capacity of 1800 beds. The facility serves as a teaching and referral hospital for the University of Nairobi making it a suitable site. The facility has about 60 theatres (16specialized), 50 wards, 22 out-patient clinics as well as an Accident and Emergency department. It offers a wide range of services including Comprehensive Care Centre (CCC) where People Living with HIV AIDS access healthcare. The services offered at the CCC include testing and counselling, pharmaceutical care, nutritional support, laboratory services as well as Prevention of Mother to Child Transmission (PMTCT). Approximately 500 children who are HIV positive seek ART treatment at CCC (55). CD4 level measurement is done at baseline while viral load is assessed after every six months.

3.4.Study Population

The target population was HIV positive children and adolescents (less than 18 years) in Kenya. Adolescents were included as they are still legally minors and dependent on caregivers for their healthcare. In Kenya, there are approximately 52,262 HIV Positive children as of December 2020 (47). The study population was all HIV positive children attending the KNH CCC. According to the facility's MOH-729A (a reporting tool capturing

data on Facility Monthly ARV Patient Summary on DHIS) there are about 500 HIV positive children receiving treatment at the facility as at November 2020 (47).

3.5.Eligibility Criteria

3.5.1. Inclusion criteria

This study included patients who meet the following criteria;

1. HIV Positive children under the age of 18 years

2. Children who had been on ART for at least 6 months

3. Patients whose caregivers voluntarily consented to participate in the study

3.5.2. Exclusion Criteria

1. Patients with incomplete, medical records in their files.

2. Patients who did not consent to the study

3.6.Sampling

3.6.1. Sample size calculation

The study was descriptive cross-sectional/prevalence study. The main outcome variable was prevalence of adherence which is a categorical variable (adherent vs. non-adherent). Therefore, the formula described by Cochran was used (48).

$$\mathbf{n = Z^2 . p (1-p) / d^2}$$

Where,

n - Sample size

Z - Z value at an alpha level of 0.05(t=1.96)

P - expected prevalence (p=91%) based on findings by Waudo *et al* (19).

d accepted level of deviation (d=0.05 since outcome variable is categorical)

The calculated target sample size based on the above formula is 126.

3.6.2. Sampling technique

Consecutive sampling was used where every subject meeting the eligibility criteria was selected as they were identified until the required sample size is achieved. This sampling technique was relevant to this study because the study population was small, and patients were likely to have extended To Come Again (TCAs) due to COVID-19 and school schedules.

3.7.Research Instruments

A pre-tested questionnaire (Appendix 3) was used to collect data from caregivers after well informed consent. The questionnaire was administered by interview method by the lead researcher, where the researcher asked the questions and filled the answers given in the questionnaire.

Data abstraction tools (Appendix 4) was used to extract data from patient records, including patient files and electronic data sources.

3.8.Data collection procedure

The data collection process began after approval from KNH-UoN Ethics Committee and permission from the KNH administration. Similarly, data collection began in early October to ensure that there was large sampling frame which included children who were in boarding school to ensure that there was equal chance to recruit patients across different age groups based on inclusion criteria where children under the age of 18 were targeted. Participants were recruited from the KNH CCC clinic during their clinic visits. Recruitment was done by the lead Investigator.

Once a potential participant has been identified, the lead investigator with the help of research assistants engaged their parents to seek consent as well as the minors assent to participate in the study. Informed consent was shared with caregivers and only those who agreed to participate in the study were recruited. Unaccompanied minors seeking ART treatment were treated as emancipated minors hence able to make decisions pertaining their health hence they were required to sign the consent form. Once the consent and assent forms had been signed, the research assistant led the participant into a separate room to allow for privacy during the data collection process.

A Pretested questionnaire was administered by the research assistant in an interview and the responses were filled in (Appendix 3). This method enabled participants to seek clarification on any of the questions. Data on patient socio-demographic characteristics as well as the relationship with their caregivers were collected. Regimen type data was also collected as well as the problems encountered when administering ARVs to children. Data on adherence and the factors influencing adherence among the patients was also collected. Data from patient records were abstracted using pretested data collection form (Appendix 4). This was used as an objective method of data collection. Regimen data, viral load as well as data on recorded adverse drug reactions (ADRs) were collected.

3.9.Data Management and Quality Assurance

3.9.1. Quality assurance

The questionnaire and the data abstraction tool were piloted on 10% of the sample size which was 13 participants. The pilot study was used to test the objectivity of the questionnaire and data abstraction tool hence helped in restructuring the questionnaire based on the responses obtained from the pilot.

The data collection tool was filled by a trained research assistant under the guidance and supervision of the principal investigator to obtain the demographic and clinical data. The research assistant recruited had a minimum qualification of diploma in clinical nursing. The research assistants were trained for two days to ensure that they are well conversant with the research tool and how to interact with respondents without causing any form of psychological harm to the responses. The first day of training was used to familiarize with the research tool. The second day of training focused on interacting with the respondents and testing of the tool.

The principal investigator (PI) led the data collection procedure and continuously supervising research assistants in ensuring that they collect quality data. The Principal Investigator recruited a qualified statistician who assessed, cleaned and analyzed the collected data.

The caregivers to be included in the pilot gave informed consent. Data collected from the participants was analysed. The importance of this process is to ascertain suitability of the data collection tools and assess whether the language used was understood by the respondents. Any challenges arising were addressed and the questionnaire and data abstraction tool reformatted. The data collection tools were designed appropriately, using simple, clear and

concise language to ensure internal validity is achieved. Internal validity entails the steps take in conducting the study to ensure credibility of the findings (49).

External validity is the extent to which the findings of the study can be generalized to the entire population (49). The inclusion and exclusion criteria and sampling procedures are adequate and broad enough to achieve a representative sample.

3.9.2. Data management

The data collected was coded and transferred to Microsoft Excel (2010) Worksheet. Data entry and cleaning was done on a daily basis. Verification of data on consistency and completeness was also done daily.

The filled data collection tools were stored under lock and key with limited access to the lead researcher only. All databases were secured using passwords.

Data was backed-up on Google drive and a flash disk with access to the lead researcher only.

3.10. Data Analysis

On completion of data collection, data was transferred to STATA (Statistics/Data Analysis) version 13 (StataCorp, USA) for analysis. Descriptive as well as inferential statistics was done.

In descriptive analysis, variables were summarized using measures of central tendency as well as measures of dispersion and presented using acceptable formats containing frequencies and percentages. Socio-demographic data were summarized in form of pie charts and bar graphs

Adherence was also determined using a customized table as indicated on the questionnaire (Appendix 3) question 19. Each 'No' response was assigned a score of 10, while a 'Yes' response was assigned a score of zero. The maximum score was 90 while the minimum score is 0. The total score for each patient was calculated and expressed as a percentage patient who scored 90 was classified as fully adherent. A patient who scored between 60 and 80 was classified as partially adherent. A patient who scored 50 or less was classified as non-adherent. In this study, adherence was grouped into non-adherence (<70%), partial adherence (70 – 94%) and fully adherence (≥95%). In the bivariable and multivariable analysis, the level of adherence was grouped into two groups, non-adherence and adherence (both partial and fully adherence).

Logistic regression was carried out to determine the relationship between the various independent variables and outcome variable since the outcome variable was adherence which is a binary categorical variable. Crude measures of association were determined by bi-variable analysis while adjusted measures of association were determined by multivariate analysis. An information criterion was used in forward stepwise model building to determine a parsimonious model. Multilevel variables such as marital status was analysed by using an indicator variable. The P-value was set at 0.05, where a P-value of less than 0.05 was considered to indicate statistical significance.

3.11. Ethical Considerations

The researcher was granted approval from the Kenyatta National Hospital /University of Nairobi-Ethics and Research Committee (KNH/UON-ERC) approval number: P338/05/2021. The research was registered in the Department of Research and Programs at Kenyatta National Hospital.

The recruited patients/ caregivers into the study were required to sign consent and assent for minors who are accompanied by their caregivers while unaccompanied children was treated as adults and be required to fill the assent form. This showed their agreement with the study protocols and processes. Those who did not consent were excluded from the study. Strict confidentiality and anonymity were observed when collecting, storing, processing of data, and in handling of the results. For respondents who are able to make judgment (≥7 years), they were required to understand their HIV status which is essential in determining adherence levels. Consent was sought using the consent form (Appendix 2) from caregivers of the children before recruiting them into the study. Children aged seven and older was given an opportunity to provide assent using the assent tool (Appendix 2C). Summary of study findings shall be presented to KHN administration. Those who were found to be non-adherent were identified and counseled and educated to understand the implications of non-adherence and the need to improve quality of life and outcomes.

3.12. Covid-19 Infection Prevention Measures

As the world is currently faced with the COVID-19 Pandemic, infection prevention measures (IPC) were applied during this study. The investigator as well as the participants had their face masks on. There was at least one metre social distance and there was no handshaking

during data collection. The Namaste method was used instead of handshake. Pocket size sanitizers were used during the interview process.

4. CHAPTER FOUR: RESULTS

4.1.Introduction

The study sought to determine the prevalence, determinants and selected outcomes of adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital. A total of 126 questionnaires were administered where all questionnaires were accurately and completely filled resulting into a 100% response rate.

4.1.1. Demographic characteristics of among HIV positive children receiving treatment at Kenyatta National Hospital

Seventy-one (56.3%) of the respondents were female, and 44(34.9%) were aged between 15 to 18 years. The findings established that 57(45.2%) had duration of 5 to 10 years while 39(31%) had less than five years of HIV disease. The findings also revealed that 23(18.3%) of the respondents had a sibling who was HIV positive as shown in Table 4.1.

Table 4.1: Demographic characteristics of among HIV positive children receiving treatment at Kenyatta National Hospital

	Frequency	**Percent**
Gender		
Male	55	43.7
Female	71	56.3
Age group		
<10 years	43	34.1
10 - 14 years	39	31.0
15 - 18 years	44	34.9
Duration of disease		
<5years	39	31.0
5 - 10 years	57	45.2
>10 years	30	23.8
Presence of HIV positive sibling		
Yes	23	18.3
No	103	81.7

4.1.2. Characteristics of caregiver of HIV positive children and adolescents receiving treatment at KNH

The characteristics of caregivers of HIV positive children and adolescent were investigated as shown in Table 4.2. Majority, 99(78.6%) of the caregivers were aged between 31 to 50 years, 56(44.4%) had tertiary level of education and 78(61.9%) were unemployed. Ninety-nine (78.6%) of the caregivers were biological parents of the children, 91(72.2%) of the caregivers were HIV positive while 2(1.6%) were cigarette smokers.

Table 4.2: Characteristics of caregiver of HIV positive children and adolescents receiving treatment at KNH

Caregiver factors	Frequency	Percent
Age of caregiver		
<30 years	8	6.3
31 - 50 years	99	78.6
>50 years	19	15.1
Highest level of education		
Primary	43	34.1
Secondary	27	21.4
Tertiary	56	44.4
Employment status		
Employed	48	38.1
Unemployed	78	61.9
Relationship with child		
Biological father or mother	99	78.6
Sibling brother or sister	4	3.2
Aunt, uncle, grandparent, cousin	20	15.9

Step parent	3	2.4
Caregiver HIV status		
Positive	91	72.2
Negative	35	27.8
Cigarette smoking		
Yes	2	1.6
No	124	98.4

4.1.3. Treatment characteristics of HIV positive children and adolescents receiving treatment at KNH

Treatment characteristics were also investigated as presented in Table 4.3. The findings showed that 122(96.8%) were on first line treatment with 91(72.2%) on CF4E TDF + 3TC + DTG treatment regimen. Four (3.2%) of the respondents were on second line treatment.

Table 4.3: Treatment characteristics of HIV positive children and adolescents receiving treatment at KNH

	Frequency	Percent
Regimen child is taking		
First line (n =122)		
CF2G ABC+3TC+DTG	27	21.4
CF4E TDF + 3TC + DTG	91	72.2
ABC+3TC+ATV/r	1	0.8
AZT+3TC+ATV/r	1	0.8
AZT+3TC+DTG	1	0.8
TDF+3TC+ATV/r	1	0.8

Second regimen (n =4)		
13 CS2B ABC+3TC+DTG	3	2.4
CS2A ABC+3TC+LPV/r	1	0.8
Challenges when administering medicines		
Yes	16	12.7
No	110	87.3
Challenges (n =16)		
Child refused to take medicine due to bitter taste	9	56.3
Inability of child to swallow large tablets	7	43.7
Child refuse to take medicines sometimes		
Yes	30	23.8
No	96	76.2
Frequency in refusing medicines (n =30)		
Less than 3 times	17	56.7
More than 3 times	13	43.3
Success in measures taken (n =30)		
Yes	23	76.7
No	7	23.3
Problem after taking medicines		
Yes	15	11.9
No	111	88.1
Problem experienced (n =15)		
Vomiting	7	46.7
Diarrhoea	5	33.3
Rash	3	20

The results also established that 16(12.7%) of the respondents had challenges when administering medicines, 30(23.8%) of the patients sometimes refuse to take medicines. The results also showed that 15(11.9%) of the respondents had problems after taking medicines. Among those who had problems, they included vomiting 7(46.7%), diarrhoea 5(33.3%) while 3(20%) had rashes.

4.2.Adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital

Adherence to ART among HIV positive children receiving treatment in the last week was assessed as showed in Table 4.4. In investigating the adherence to antiretroviral therapy, 31(24.6%) of the caregivers asserted that their child had missed a dose of their medicine, 29(23%) affirmed that they sometimes forget to give their children their medicines with 19 of these affirming to forgetting once a week. Twenty-nine (23%) stated that their children sometimes refused to take their medicines with explainable reason including that the tablets were too big/difficult to swallow 13(48.3%) or had a bad smell/taste 12(41.4%). In investigating whether their children had missed any of their appointments scheduled, 46(36.5%) of the respondents agreed to missing at least one of their last three scheduled appointments. The reasons for missing appointment included lack of transport 23(50%), having medicines from previous appointment 14(30.4%) and 9(19.6%) cited forgetfulness.

Table 4.4: Adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital

	Frequency	Percent
In the last 1 week, did your child miss a dose of their medicine?		
No	95	75.4
Yes	31	24.6
Drugs missed (n =31)		
ABC + 3TC, DTG	8	6.3
TDF/3TC, DTG	27	21.4
Do you sometimes forget to give your child their medicines		
No	97	77.0
Yes	29	23.0
Frequency of forgetfulness (n =29)		
2 - 3 times a week	6	20.7
More than three times a week	4	13.8
Once a week	19	65.5
Does your child sometimes refuse to take their medicines?		
No	97	77.0
Yes	29	23.0
Frequency of refusing to take medicines (n =29)		
2 - 3 times a week	9	31.0
More than three times a week	9	31.0
Once a week	11	38.0
Reasons child gives for refusing to take the medicines (n =29)		
Bad smell/taste	12	41.4
Made them feel bad	3	10.3
Too big/difficult to swallow	13	48.3
Does the dosing of your child's medicines confuse you?		
No	125	99.2
Yes	1	0.8
Do you sometimes change the dosing of your child's medicines?		
No	125	99.2

Yes	1	0.8
How did you change the dosing of your child's medicines? (n =1)		
Increased the amount given	1	100.0
Reasons given to change the dosing of your child's medicines		
When they refuse to swallow	1	0.8
When your child looks and feels completely well, do you stop giving medicine to the child?		
No	121	96.0
Yes	5	4.0

	Frequency	Percent
Did you miss any of your last three scheduled appointments?		
No	80	63.5
Yes	46	36.5
What is the reason for missing appointments? (n =46)		
Did not have transport	23	50.0
Forgot	9	19.6
Still had medicines from previous appointment	14	30.4
Do you ever forget to refill your medicines before they run out?		
No	123	97.6
Yes	3	2.4
What did you do when you ran out of your child's medicine? (n =3)		
Visited the hospital as soon as possible for a refill	3	2.4

4.2.1. Prevalence of adherence to antiretroviral therapy among HIV positive children receiving treatment at KNH

The prevalence of ART adherence was also investigated among HIV positive children and adolescents at Kenyatta National Hospital. The total adherence score for each patient was calculated as a percentage. Adherence was grouped into non-adherence (<70%), partial adherence (70 – 94%) and fully adherence (≥95%). In the bivariable and multivariable analysis, the level of adherence was grouped into two groups, non-adherence and adherence (both partial and fully adherence).

The findings showed that 112(88.9%) of the patients adhered to antiretroviral therapy, 95%CI: 82.1 – 93.8%. The findings also revealed that 43(34.1%) of the patients were fully adherent, 69(54.8%) were partially adherent while 14(11.1%) were non-adherent as shown in Figure 4.1.

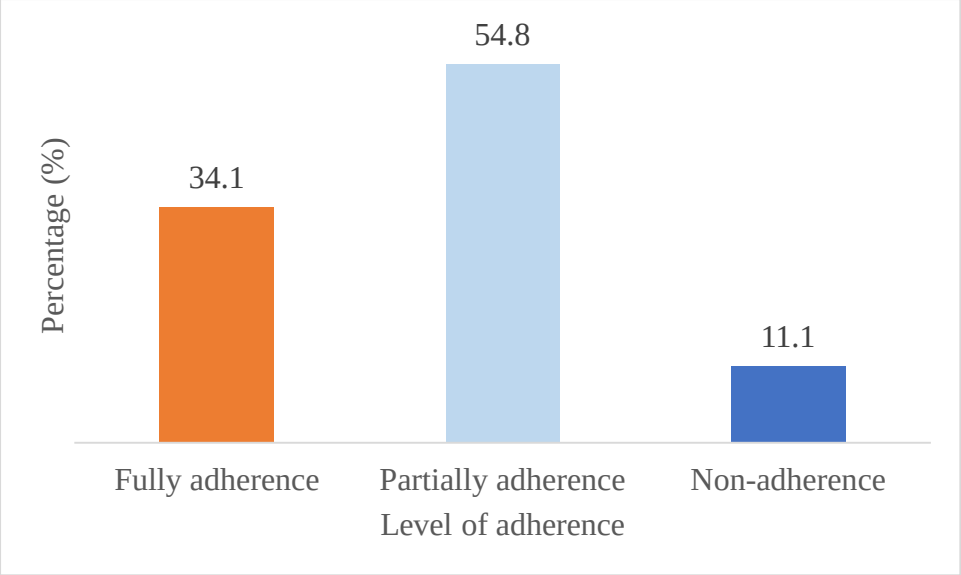

Figure 4.1: Prevalence to adherence of antiretroviral therapy

4.3.Selected outcomes among HIV positive children receiving treatment

The findings from the last three viral load measured showed a decreasing viral load among patients receiving treatment at Kenyatta National Hospital with the 1st viral load reading showing an average of 5554 (SD±2287.7) cells/mm3 and the average viral load in the 3rd viral load reading of 877(SD±505.8) cells/mm3 as shown in Figure 4.2.

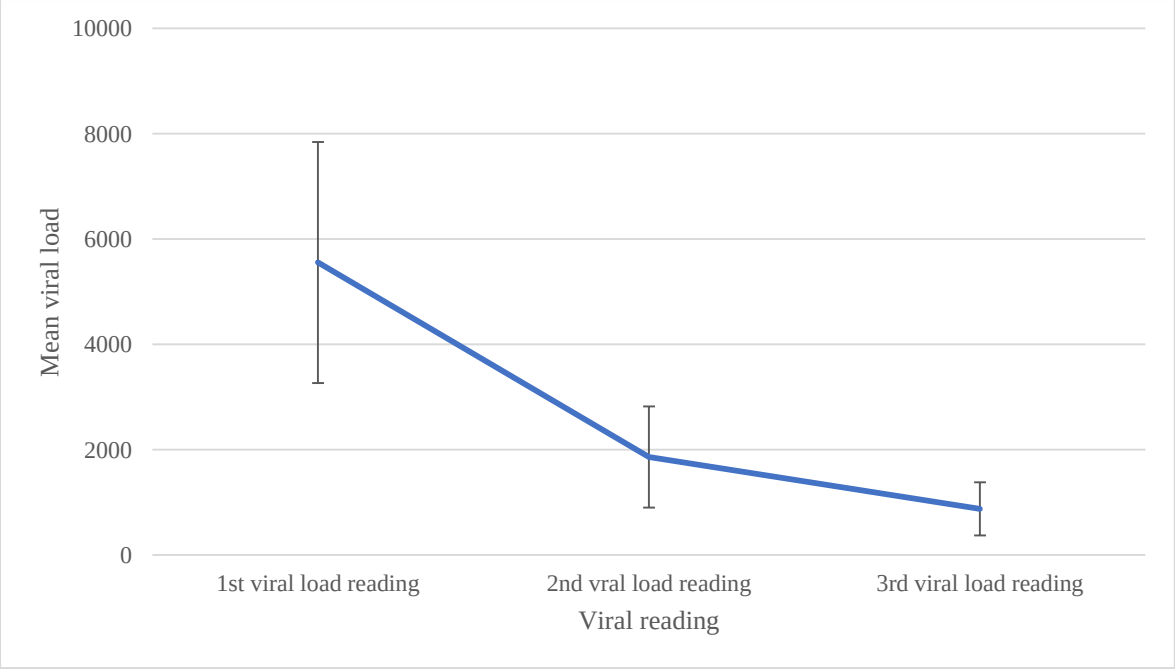

Figure 4.2: Last three viral load graphical presentation

The findings also revealed that 97(77%) of the patients had LDL viral load, 62(49.2%) had normal CD4 levels. Only one of the children fell sick, 1(0.8%) as shown in Table 4.5.

Table 4.5:Selected outcomes among HIV positive children receiving treatment

	Frequency	Percent
Current viral load		
LDL Levels	97	77.0
High levels	29	23.0
Current CD4 levels		
Low CD4 levels	32	25.4
Normal CD4 levels	62	49.2
High CD4 levels	32	25.4
Child fallen sick		
Yes	1	0.8
No	125	99.2

4.4.The determinants of adherence to antiretroviral therapy among HIV positive children receiving treatment at Kenyatta National Hospital.

4.4.1. Demographic characteristics associated with adherence to antiretroviral therapy

The findings from bivariable logistic regression revealed that gender of the patient and duration of disease were significantly associated with adherence to antiretroviral therapy. Those who were female were approximately four times as likely to adhere to antiretroviral therapy compared to male (COR=3.72, 95%CI: 1.1 – 12.6, p =0.035). Those who had lived with HIV disease for between 5-10 years were 77% less likely to adhere to antiretroviral therapy compared to those who had lived with the disease for less than 5 years (COR =0.23, 95%CI: 0.006 – 0.96, p=0.043). Further, those who had HIV disease for more than 10 years were 85% less likely to adhere to antiretroviral therapy compared to those who have lived with HIV for less than 10 years (COR =0.15, 95%CI: 0.04 – 0.63, p = 0.009) as shown in Table 4.6.

Table 4.6:Demographic characteristics associated with adherence to antiretroviral therapy

	Adherence			
	Adherence	**Non-adherence**	**COR(95%CI)**	**P-value**
Gender				
Male	45(40.2)	10(71.4)	Ref	
Female	67(59.8)	4(28.6)	3.72(1.1 - 12.6)	0.035
Age				
<10 years	41(36.6)	2(14.3)	Ref	
10 - 14 years	35(31.3)	4(28.6)	0.22(0.04 - 1.1)	0.065
15 - 18 years	36(32.1)	8(57.1)	0.51(0.14 - 1.86)	0.311
Duration of disease				
<5years	36(32.1)	3(21.4)	Ref	
5 - 10 years	54(48.2)	3(21.4)	0.23(0.06 - 0.96)	0.043
>10 years	22(19.6)	8(57.1)	0.15(0.04 - 0.63)	0.009
HIV positive sibling				
Yes	21(18.8)	2(14.3)	1.39(0.29 - 6.66)	0.685
No	91(81.3)	12(85.7)	Ref	
HIV status of caregiver				
Positive	79(70.5)	12(85.7)	0.4(0.09 - 1.88)	0.246
Negative	33(29.5)	2(14.3)	Ref	

4.4.2. Treatment related characteristics associated with adherence to antiretroviral therapy

The findings from bivariable logistic regression revealed that line of treatment, refusing to take medicines were significantly associated with adherence to antiretroviral therapy. Those who were on first line of treatment were 30 times as likely to adhere compared to those who were on second line treatment (COR =30.27, 95%CI: 2.90 – 88.41, p =0.004). Patients who did not refuse to take medicines were three times as likely to adhere to antiretroviral therapy compared to those who did not refuse (COR =3.26, 95%CI: 1.08 –3.92, p =0.020) as shown in Table 4.7.

Table 4.7:Treatment related characteristics associated with adherence to antiretroviral therapy

	Adherence			
	Adherence	**Non-adherence**	**COR(95%CI)**	**P-value**
Line of treatment				
First line	111(99.1)	11(78.6)	30.27(2.90 - 88.41)	0.004
Second line	1(0.9)	3(21.4)	Ref	
Challenges when administering the medicine				
Yes	14(12.5)	2(14.3)	0.86(0.17 - 4.24)	0.850
No	98(87.5)	12(85.7)	Ref	
Child refuse to take medicine sometimes				
Yes	23(20.5)	7(50)	Ref	
No	89(79.5)	7(50)	3.26(1.08 - 8.81)	0.020
Experiencing any problem after taking medicine				
Yes	13(11.6)	2(14.3)	0.79(0.16 - 3.92)	0.771
No	99(88.4)	12(85.7)	Ref	

4.4.3. Independent determinants of adherence to antiretroviral therapy

The variables that were statistically significant ($p \leq 0.2$) under bivariate analysis were subjected to a multivariable model to control for possible confounders as shown in Table 4.8. The findings established that gender of the child, line of treatment and refusing to take medicine sometimes were significant determinants of adherence to antiretroviral therapy. Patients who were female were 7.7 times as likely to adhere to antiretroviral therapy compared to those who were male (AOR = 7.7, 95%CI: 1.07 – 55.93, p=0.043). those who were on first line treatment were 2.3 times as likely to adhere to antiretroviral therapy compared to those who were on second line (AOR =2.31, 95%CI: 1.03 – 5.71, p =0.007). Further, the findings established that not refusing to take medicines was associated with 8 times increased likelihood of adherence to antiretroviral therapy (AOR = 8.11, 95%CI: 3.87 – 20.11, p =0.007).

Table 4.8:Independent determinants of adherence to antiretroviral therapy

Factors	**AOR(95%CI)**	**P-value**
Gender		
Male	Ref	
Female	7.73(1.07 -55.93)	**0.043**
Duration of disease		
<5years		
5 - 10 years	0.15(0.02 - 1.51)	0.107
>10 years	0.62(0.022 - 2.46)	0.121
Line of treatment		
First line	2.31(1.03 - 5.71)	**0.007**
Second line	Ref	
Child refuse to take medicine sometimes		

Yes	Ref	
No	8.11(3.87 - 20.11)	**0.005**

4.5.The association between adherence to antiretroviral therapy and viral load suppression

The findings from bivariable logistic regression as shown in Table 4.9 found that those who were adherent to antiretroviral therapy were 12 times as likely to have LDL compared to those who were non-adherent, COR =12.33, 95%CI: 3.11 – 45.11, p =0.019.

Table 4.9: The association between adherence to antiretroviral therapy and viral load suppression

Adherence level	**Viral load**			
	LDL	**High viral load**	**COR(95%CI)**	**P-value**
Adherence	92(94.8)	20(69)	12.33(3.11 - 45.11)	0.019
Non-adherence	5(5.2)	9(31)	Ref	

4.6.Association between adherence to antiretroviral therapy and current CD4

The findings from bivariable logistic regression as shown in Table 4.10 also revealed that those who were non-adherent to antiretroviral therapy were seven times more likely to have low CD4 count, COR=6.81, 95%CI: 1.87 – 21.12, p =0.021.

Table 4.10:Association between adherence to antiretroviral therapy and current CD4

CD4 count levels

	Low CD4	Normal	COR (95%CI)	P-value
Adherence	23(74.2)	89(73.2)	6.81(1.87 - 21.12)	0.021
Non-adherence	9(25.8)	5(35.7)	Ref	

5. CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1.Discussion

The present study sought to investigate the prevalence, determinants and selected outcomes of adherence to antiretroviral therapy among HIV positive children receiving treatment at a tertiary hospital in Kenya.

Majority of the patients were female, 56.3 percent. These findings are consistent with a study conducted in Malawi which revealed that more than half of the patients were female (27). These findings however, contrast those from a study conducted in Tanzania which identified that majority of patients were male, 57.8% (12). Another study conducted in Ethiopia also revealed that 51.2% of the patients were male. The present findings also revealed that the average age of the patients was 12 years with 34.9% aged between 15 and 18 years. These findings compare to those from a study in Tanzania which revealed that 34.5% of the patients were aged more than 15 years (12). However, the findings differed with a study in Ethiopia which established that half of the patients were aged between 5 – 9 years (56). This difference could be due to difference in the study population where in our study which included all children aged less than 18 years while their study included children less than 15 years taking ART for a minimum of one month. Our findings also revealed that majority of the patients had the disease for more than five years. This could be because most of the children in the study were born with HIV.

The current study found that 88.9% of the patients adhered to antiretroviral treatment. These findings are consistent with other studies ((22), (25), (12). Nichols et al. in a study conducted in Ghana revealed that the current ART adherence ranged between 70 and 90 percent (22). A prospective study in East Africa including Kenya, Uganda and Tanzania found that the average ART adherence was 90 percent throughout the years of follow up (25). Further several studies have also identified contrasting findings relating to adherence to ART among children. A systematic review study conducted in Sub-Saharan Africa revealed that the average adherence score was 72.9% (16). Similarly another study in Ethiopia revealed that adherence to ART treatment among children was 78% (57). A study conducted in Tanzania revealed slightly lower adherence to ART among children was 84% (12). A cross sectional study in Thika, Kenya found significantly low rate of paediatric adherence to ART (58). This was mainly due to the study setting and commitment of caregivers to understand about HIV.

Most of the studies however concur with our present findings which have showed that the average level of adherence is below the recommended 95% threshold.

Adherence to antiretroviral therapy is absolutely necessary for its efficacy. Above 95 percent is the degree of optimal adherence that is recommended for ART in order for it to be effective. A patient is judged to have achieved unsatisfactory adherence if they miss more than three doses during the course of a treatment course that lasts one month (59). This percentage is less than 95%. A degree of adherence that is greater than 95% (known as optimal adherence) helps to reduce viral replication and stops the development of drug resistance while also preventing therapy from failing (60). Accordingly, there is evidence suggesting that a lack of adherence to the treatment regimen that was prescribed is associated with unfavourable clinical outcomes. It is expected that better health outcomes are achieved as a result of efforts to improve adherence rates.

The current study has shown that self-reported adherence to ART remained high although there was variation in relation to patient level and site level factors. Our present study established that female patients were more likely to adhere to antiretroviral therapy. These findings compare with those from a study conducted in Tanzania which found that gender was a significant determinant of adherence to antiretroviral therapy (12). Similar findings were observed in a study conducted in Ethiopia which revealed that gender was significant determinant of adherence. Female patients were more likely to adhere to ART therapy with odds of 1.4 (61). Similarly, a study in Cameroon revealed that majority of male patients were more likely to adhere to ART therapy (62).

Our findings also revealed that line of treatment were a determinant for adherence to ART among children. Our findings further established that those who were on first line were more likely to adhere to ART. These findings compare to those from a study conducted in Lusaka Zambia which revealed that adhere to first line of ART is always crucial and positive has an influence on non-virologic outcomes among patients assessed in more than 12 months of treatment (63). Similarly, a study done in Malawi established that ART regimen was independently associated with adherence (OR 2.11)(64). This could be mainly because of the need to maintain low viral load and improved quality of life.

Findings from other studies have revealed that age of the child is a significant determinant of adherence to ART among children (27)(64). Older children (11 years and above) were more likely to adhere to ART than younger ones (0–10 years) (27). However, in our present study,

age of the patients was not found to be a significant determinant of adherence to ART. This could be due to smaller sample size in our present study as well as smaller sample of patients who were non-adherent to ART. In our present study, fourteen of the patients receiving treatment were non-adherent.

Current results also revealed that refusing to take medicines was a significant determinant of adherence to ART. Those who did not have issues in taking medicines were eight times more likely to adhere. These findings are in line with a study conducted in Nigeria which revealed that refusing to take medicines, sleeping before taking drugs were significant determinants of non-adherence (43). Another study conducted in India investigating determinants of adherence among children on ART revealed that child refusing to take medicines, running out of medications and caregivers finding it physically tiring to reach the ART centres were significantly associated with non-adherence (65). To achieve adherence in children, both the youngster and the primary caregiver need to be willing to cooperate. However, a young child may refuse to take the prescription for a number of different reasons, including an inability to swallow tablets, a distaste to the flavour, or feeling unwell and hence refusing to cooperate. These are just some of the potential explanations. There is also the possibility of hostility toward the individual who is providing the therapy. The regimens also include medications, some of which may have complicated dose schedules and may result in poor tolerability due to the fact that they cause food disruptions and unpleasant effects.

Our current results found that there was significant association between adherence to antiretroviral therapy and viral load where those who were adherent to antiretroviral therapy were 12 times more likely to have LDL of viral load. These findings echo those from an observational study conducted by Arnsten et al. which revealed that there was a substantial association between the use of ART and the amount of HIV in the patient's system. The data also demonstrated that there was a significant difference in the chances of achieving virologic suppression based on self-reported ART adherence and the chances of achieving ART adherence based on electronic monitoring (51). In addition, Dziva et al. established that self-reported adherence and HIV viral load suppression were significantly related and it was found that out of 28 of 166 of patients who scored <95% on the visual analogue scale (VAS) 16 of the 28 were unsuppressed compared to 45 of 139 who scored ≥95% (53).

The present study also established that those who were non-adherent to antiretroviral therapy were seven times more likely to have low CD4 count. Adherence has been significantly

found to positively influence patient health status through viral load suppression and increase in CD4 count which help boost immunity. Comparably, Dachew et al maintained that non-adherence may significantly increase viral load and a decrease in CD4 count (47). Non-adherence among HIV patients creates a gap in care which lead to increased opportunistic infections (19). Antiretroviral adherence must be persistent to achieve the optimal health outcome of viral suppression.(30)

5.2.Conclusion

The findings have shown that the average adherence was 88.9% which was lower than recommended 95% antiretroviral therapy adherence for optimal outcomes. Determinants of adherence to antiretroviral therapy included female patients, first line treatment and not refusing to take medicines. The results have also indicated that majority of patients (77%) had LDL viral load while almost half, (49.2%) of the patients reported normal high CD4 count. Adherence was also found to be significantly associated with viral load suppression.

5.3.Recommendations

5.3.1. Recommendations for policy and practice

- To provide social support system that will encourage sharing of responsibility for remembering medication within households if optimum adherence level is to be attained.
- Educate caregivers on diverse approaches to help in convincing their children to easily take medication and improve their immune status.
- Allow sufficient drugs for children in school could enhance drug adherence among children.
- ART centres to provide HIV care to children and adolescents targeting integration of psychosocial and other youth-friendly services into day-to-day clinic operations.
- School administrators could also be sensitized on HIV/AIDS and the importance of adherence to enable a conducive environment for learners who are boarders.

5.3.2. Recommendations for future studies

- There is need to conduct a prospective study that follows patients to effectively determine adherence among patients on first and second line of treatment.

5.4.Limitations of the study

The main limitation of this study was recall bias. In this study, adherence prevalence was measured using self-reports from the caregivers, which tends to overestimate the prevalence of adherence. Caregivers might be prone to social desirability bias responding inappropriately to the research assistants. Thus, in mitigating this limitation, recall was based on past one week which is easy for caregivers to remember and provide accurate feedback.

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APPENDICES

Appendix 1: Eligibility screening form

Study Title: **DETERMINANTS OF ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG HIV POSITIVE CHILDREN AT KENYATTA NATIONAL HOSPITAL**

Patient unique identifier_____.

CRITERIA	**REMARK**	
HIV Positive child under the age of 18 years	**YES**	**NO**
Child has been on ART for at least 6 months	**YES**	**NO**
Caregiver has given voluntarily consent to participate in the study	**YES**	**NO**
Child (7years) and above has assented to participate in the study	**YES**	**NO**
Patients has complete medical record in their file	**YES**	**NO**

Appendix 2A: Participant Consent form

Study Title: **DETERMINANTS OF ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG HIV POSITIVE CHILDREN AT KENYATTA NATIONAL HOSPITAL**

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Introduction

My name is Dr. Ngei Bettinah Mbithe and I would like to tell you about the study I am conducting. This form will provide you with information that you require to decide if you would like to participate in this study. You may ask any questions you have about purpose of the study, risks and benefits, your rights as a volunteer and any other questions you have. Once I have addressed all your concerns to your satisfaction, you may decide to participate in the study or not to participate; this is referred to as the 'informed consent'. Once you accept to be in this study, you will be required to sign your name on this form. Your decision to be included in the study is completely voluntary and you may withdraw at any time you wish without giving reasons. Refusal to participate in the study will not in any way affect provision of services offered to you in any health facility. I will give you a copy of this form for your records.

What is this study about?

The study will aim at interviewing patients who have been on ARV drugs for the past six months. The purpose of the interview will be to determine the regimen your child is using and the challenges you face while giving/taking the drugs. It will also look into the clinic appointment dates and whether the dates scheduled are consistent with the actual dates of clinic visits and some of the factors influencing clinic attendance. The study will include 126 participants .I am requesting your consent to participate in this study.

What will happen if you decide to participate in this study?

If you agree to be included in this study, you will be interviewed in a private area to ensure you are comfortable answering the questions. The interview will take approximately 30 minutes. Information will also be obtained from your patient file at the CCC.

Risks and/or discomfort

There will be no risks to you during the study. There will be no financial obligations of any kind on your side as a participant in this study. During the study, precautions will be taken to ensure your privacy and comfort.

Benefits

The information obtained will help us understand how well you manage your ARVs as well as the challenges you face when administering the drugs to your child. The information obtained will also help your primary clinician to evaluate how well the current ARV regimen works for you and this may inform changes in treatment if required. The information may also assist the Ministry of Health to develop child friendly guidelines for children.

Confidentiality

All information obtained will be kept private under lock and key and all electronic information will be protected by a password. All information obtained will only be used for research and academic purposes.

Justice

During the study, you shall receive the same treatment as the other participants regardless of the outcome. Your gender, social status, culture, level of education or any other characteristics will not negatively affect the treatment you receive. There will be no discrimination of any kind.

Veracity

The importance of all questions will be explained to your satisfaction. I will be truthful with all the information given.

Problems or Questions

Should you have any further questions or concerns about participating in this study, please call or text Dr. Ngei Bettinah Mbithe on mobile number 0713566945 For more information about your rights as a research participant, you may contact the Secretary, KNH-UoN Ethics and Research Committee on P.O. Box 20723-00200, telephone number 2726300 Ext. 44102, email: uonknh_erc@uon.ac.ke.

CONSENT CERTIFICATE

Participant's Statement

I have read this consent form or had the information read to me. I have had the chance to discuss this research study with a study counsellor. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study. I understand that all efforts will be made to keep information regarding my identity confidential. By signing this consent form, I have not given up any of the legal rights that I have as a participant in a research study.

Participant name: _____

Participant signature/Thumb print: _____

Date: _____

Researcher's statement

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has willingly and freely given his/her consent.

Researcher's Name: …….…….

Researcher's signature: …….

Date: ……

Appendix 2B: Fomu ya Idhini ya Mshiriki

Kichwa cha Utafiti: WADAU WA KUZINGATIA KATIKA TIBA YA VIRUSI VYA UKIMWI KATI YA WATOTOT KATIKA HOSPITALI KUU YA KENYATTA

CHUO	Department of Pharmacology, School of Pharmacy, University of Nairobi. P.O Box 30197-00400, Nairobi.
MTAFITI MKUU	Dr.Bettinah Mbithe Ngei Phone number: 0713566945 Email: bettinahngei@gmail.com
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KAMATI YA MAADILI	Kenyatta National Hospital/University of Nairobi Ethical and Research Committee P.O Box 20723-00100, Nairobi. Tel. 2726300/2716450 Ext 44102 Email: uonknh_erc@uonbi.ac.ke.

Utangulizi

Jina langu ni Dk Ngei Bettinah Mbithe na ningependa kukujulisha kuhusu utafiti ninaoufanya. Fomu hii itakupa habari ambayo unahitaji kuamua ikiwa ungependa kushiriki katika utafiti huu. Unaweza kuuliza maswali yoyote unayo juu ya kusudi la utafiti, hatari na faida, haki zako kwa kujitolea na maswali mengine yoyote unayo. Mara tu tutakaposhughulikia wasiwasi wako wote hadi kukuridhisha, unaweza kuamua kushiriki katika utafiti au kukataa; hii inajulikana kama 'idhini ya habari'. Mara tu utakapokubali kuwa

katika utafiti huu, utahitajika kusaini jina lako kwenye fomu hii. Uamuzi wako wa kujumuishwa katika utafiti ni wa hiari kabisa na unaweza kujiondoa wakati wowote unapotaka bila kutoa sababu. Kukataa kushiriki katika utafiti hakutaathiri kwa njia yoyote utoaji wa huduma unazopewa katika kituo chochote cha afya. Nakala ya fomu hii itapatikana kwako kwa kumbukumbu zako.

Je! Utafiti huu unahusu nini?

Utafiti ulioorodheshwa hapo juu utahoji watu ambao wamekuwa wakitumia dawa za Virusi Vya Ukimwi kwa meiezi sita na zaidi. Madhumuni ya mahojiano yatakuwa kujua ni aina gani ya dawa za ARV anazozitumia mtoto wako na changamoto unzopitia ukompa mtoto dawa yake.

Utafiti huu utazingatia tarehe unazopewa kuja kiliniki na tarehe ambazo huwa mnaitembelea kiliniki na changamoto zozote mnazopitia ili kuweza kuja kiliniki.

Utafiti utajumlisha watoto 126.Ninaomba idhini yako kuweza kuwa mshiriki katika utafii huu.

Je! Ni nini kitatokea ikiwa utaamua kushiriki katika utafiti huu?

Ukikubali kujumuishwa Kartika utafiti huu, utahojiwa kwenye sehemu itakayohakikisha usiri na itakayoukuwa na maandhari mema kukuwezesha wewe kuyajibu maswali.Mahojianio yatachukuwa jumlama dakika 30.Ujumbe utaweza kunakiliwa kutoka kwenye faili yako.

Hatari na / au usumbufu

Hakutakuwa na hatari kwako wakati wa utafiti. Hakutakuwa na majukumu ya kifedha ya aina yoyote upande wako kama mshiriki wa utafiti huu. Wakati wa utafiti, tahadhari zitachukuliwa kuhakikisha faragha yako na faraja.

Faida

Habari itakayopatikana itatusaidia kuelewa jinsi unavyosimamia ARVs yako pamoja na changamoto unazokabiliana nazo unapompa mtoto wako dawa hizo. Habari itakayopatikana pia itasaidia daktari wako wa msingi kutathmini ni vipi regimen yako ya sasa ya ARV inakufanyia kazi na hii inaweza kutoa mabadiliko kwa matibabu ikiwa inahitajika. Habari hiyo inaweza pia kusaidia Wizara ya Afya kukuza miongozo rafiki kwa watoto.

Usiri

Habari zote zilizopatikana zitawekwa faragha chini ya kufuli na ufunguo na habari zote za elektroniki zitalindwa na nywila. Habari yote inayopatikana itatumika tu kwa utafiti na madhumuni ya kitaaluma.

Ukweli

Umuhimu wa maswali yote utaelezewa kuridhika kwako. Nitakuwa mkweli na habari yote itakayotolewa.

Shida au Maswali

Ikiwa una maswali yoyote zaidi au wasiwasi juu ya kushiriki katika utafiti huu, tafadhali piga simu au utumie barua pepe kwa Dk Ngei Bettinah Mbithe kwa simu ya rununu 0713566945 Kwa habari zaidi juu ya haki zako kama mshiriki wa utafiti, unaweza kuwasiliana na Katibu, Maadili na Utafiti wa KNH-UoN Kamati ya PO Sanduku 20723-00200, namba ya simu 2726300 Ext. 44102, barua pepe: uonknh_erc@uon.ac.ke.

Taarifa ya Mshiriki

Nimesoma fomu hii ya idhini au habari hiyo imesomwa kwangu. Nimekuwa na nafasi ya kujadili utafiti huu wa utafiti na mshauri wa utafiti. Nimejibiwa maswali yangu kwa lugha ambayo ninaelewa. Hatari na faida zimeelezewa kwangu. Ninaelewa kuwa ushiriki wangu katika utafiti huu ni wa hiari na kwamba ninaweza kuchagua kujiondoa wakati wowote. Ninakubali kwa hiari kushiriki katika utafiti huu wa utafiti. Ninaelewa kuwa juhudi zote zitafanywa kutunza habari kuhusu kitambulisho changu kuwa siri. Kwa kusaini fomu hii ya idhini, nimepeana idhini ambayo ninayo kama mshiriki katika utafiti.

Jina la mshiriki: _____

Saini ya mshiriki / Chapa cha kidole gumba: _____

Tarehe: _____

Kauli ya mtafiti

Mimi, aliyesainiwa chini, nimeelezea kabisa maelezo yanayofaa ya utafiti huu kwa mshiriki aliyetajwa hapo juu na ninaamini kwamba mshiriki ameelewa na kwa hiari na kwa hiari ametoa idhini yake.

Jina la Mtafiti: ……. …….

Saini ya mtafiti: …….

Tarehe: ……

Appendix 2C: Participant Assent Form

Name of study: **DETERMINANTS OF ADHERENCE TO ANTIRETROVIRAL THERAPY AMONG HIV POSITIVE CHILDREN AT KENYATTA NATIONAL HOSPITAL**

I understand that I have been asked to participate in a study about: the ARV drugs that I take and I will be asked some questions about who I live with, how I take my drugs and if I take them as per the directions given.

I understand that I do not have to participate. If I do participate, I can quit at any time. I also understand that I do not have to answer any questions I don't want to answer or do anything I don't want to do. I know that this interview will take about 30 minutes

My parents, teachers, or anyone else will not know what I have said or done in the study. No one but the researcher will know.

This study is being done by Dr. Ngei Bettinah Mbithe, at Kenyatta National Hospital. Her phone number is 0713566945 and her e-mail address is Bettinahngei@gmail.com

If I have any questions or concerns about the study, I can call and ask her about them.

When I sign my name, this means that I agree to participate in the study and that all of my questions have been answered. I have also been given a copy of this form.

Name_____

Date_____

Signature_____

Appendix 2D: Fomu ya Idhini ya mshirikishi

Jina la utafiti: **WADAU WA KUZINGATIA KUDHIBITI KWA TIBA YA VVU**

Ninaelewa kuwa nimeulizwa kushiriki katika utafiti kuhusu: dawa za ARV ambazo ninachukua na nitaulizwa maswali juu ya nani ninaishi naye, jinsi ninavyotumia dawa zangu na ikiwa nitazitumia kulingana na maelekezo yaliyotolewa.

Ninaelewa kuwa sio lazima kushiriki. Ikiwa ninashiriki, ninaweza kuacha wakati wowote. Ninaelewa pia kwamba sio lazima nijibu maswali yoyote ambayo sitaki kujibu au kufanya chochote ambacho sitaki kufanya. Ninajua kuwa mahojiano haya yatachukua kama dakika 30

Wazazi wangu, walimu, au mtu mwingine yeyote hatajua kile nilichosema au kufanya katika utafiti. Hakuna mtu isipokuwa mtafiti atakayejua.

Utafiti huu unafanywa na Dk Ngei Bettinah Mbithe, katika Hospitali ya Kitaifa ya Kenyatta. Nambari yake ya simu ni 0713566945 na anwani yake ya barua pepe ni Bettinahngei@gmail.com

Ikiwa nina maswali yoyote au wasiwasi juu ya utafiti huo, ninaweza kumpigia simu na kumuuliza juu yao.

Wakati ninasaini jina langu, hii inamaanisha kwamba ninakubali kushiriki kwenye utafiti na kwamba maswali yangu yote yamejibiwa. Nimepewa pia nakala ya fomu hii.

Jina_____

Tarehe_____

Sahihi_____

Appendix 3: Study Questionnaire

STUDY TITLE: Determinants of adherence to antiretroviral therapy among HIV positive children at Kenyatta national hospital.

Serial number _____.

Date: _____/_____/ 2021

Patient unique Identifier_____.

A: Biodata

Information of the child

1. Gender (1) male ☐ (2) female ☐

2. Age_____(years)

3. Which year was the child diagnosed with HIV_____.

4 Does the child have siblings who are HIV positive? (1) Yes (2) No

Information of the caregiver

5. Age_____(Years)

6. Level of education (1) Primary (2) Secondary (3) Tertiary (4) none

7. Employment status: (1)Employed
(2) Unemployed

8. Relationship of caregiver with the child
(1)Biological mother or Father
(2) Sibling Brother/sister
(3)Other relative Aunt/uncle/ grandparent/cousin
(4) Step-parent/guardian
(5)School matron
(6) Other (specify)

9. HIV status of the caregiver (1)Positive (2) Negative (3) I don't know

B: Treatment information of the child

Consider children who have been on ARVs for at least six months

10. Is the child on first line, second line or third line regimen?

(1)First line (2) Second line (3) Third line

11. Which regimen does the child take? (Tick the appropriate regimen)

Number	**Code**	**Regimen**	
Paediatric ART 1st Line regimens			
1	CF2B	ABC + 3TC + EFV	
2	CF2D	ABC + 3TC + LPV/r	
3	CF2A	ABC + 3TC + NVP	

4	CF2F	ABC + 3TC + RAL	
5	CF2G	ABC+3TC+DTG	
6	CF1A	AZT + 3TC + NVP	
7	CF1B	AZT + 3TC + EFV	
8	CF1C	AZT + 3TC + LPV/r	
9	CF4E	TDF + 3TC + DTG	
10	CF5X	Any other 1st line Paediatric regimens	
Paediatric ART 2nd Line regimens			
11	CS1A	AZT + 3TC + LPV/r	
12	CS2A	ABC + 3TC + LPV/r	
13	CS2B	ABC+3TC+DTG	
14	CS1C	AZT + 3TC + DRV+RTV+RAL	
15	CS2D	ABC + 3TC + DRV+RTV+RAL	
16	CS4X	Any other 2nd line Paediatric regimens	
Paediatric ART 3rd Line regimens			
17	CT1H	AZT + 3TC + DRV+RTV+RAL	
18	CT2D	ABC + 3TC + DRV+RTV+RAL	
19	CT3X	Any other 3rd line Paediatric regimens	

12. Do you face any challenges when administering the medicine?(1)Yes (2)No

13. If yes in 11 above ,which challenge do you face

Code	**Problem**	**Tick box**

1	Child refused to take medicine due to bitter taste	
2	Difficulty in measuring medicine (syrups and suspensions)	
3	Difficulty in breaking tablets	
4	Inability of child to swallow large tablets	
5	Other()	

Other (Specify)

.

_____.

14. Does the child refuse to take the medicine sometimes? (1)Yes (2)No

14b. If yes above, how often does this happen?

(1) Less than 3 times (2) more than 3 times

15. When the child refuses to take medicine, how do you ensure that they take it?

Code	**Action Taken**	**Tick box**
1	Mix with food/juice	
2	Promise reward	
3	Beat/use force	
4	Other(specify)	

Are the measures taken in (15 above) successful? (1) Yes (2) No

16. Has the child experienced any problem after taking the medicine?

(1) Yes (2) No

17. If yes in 16 above, what problem did the child experience?

Code	Problem	Tick box
1	Vomiting	
2	Diarrhoea	
3	Rash	
4	Other	

Other (Specify)

.

_____.

18. How did you manage the problem in 16 above?

Code	Action taken	Tick box
1	Took child to hospital	
2	Used a herbal product	
3	Took no action	
4	Other	

C: Adherence information

19. Please answer the following questions

	No	Yes	SCORE
A. In the last one month, did your child miss a dose of their medicine?			
B. Do you sometimes forget to give your child their medicines?			
C. Does your child sometimes refuse to take their medicines?			
D. Does the dosing of your child's medicines confuse you?			
E. Do you sometimes change the dosing of your child's medicines?			
F. When your child looks and feels completely well, do you stop giving medicine to the child?			
G. Did you miss any of your last three scheduled appointments?			
H. Do you ever forget to refill your medicines before they run out?			
I. Have you ever found that your child's medicines were unavailable at the hospital when you went to refill them?			
Total score			

Note: Each 'No' response will be assigned a score of 10, while a 'Yes' response will be assigned a score of zero

20. (If answer to 19A was Yes): Which drug was missed?

Drug	Dose	Doses missed

21. (If answer to 19B was Yes): How often in a week do you forget to give your child their medicines? (Tick as appropriate)

Once a week:	2-3 times a week	More than 3 times a week

22. (If answer to 19C was Yes): How often in a week does your child refuse to take their medicines? (Tick as appropriate)

Once a week:	2-3 times a week	More than 3 times a week

What reason(s) does your child gives for refusing to take the medicines?

Bad smell/taste	
Too big/difficult to swallow	
Made them feel bad (explain)	
Other reason (explain)	

23. (If answer to 19E was Yes): How did you change the dosing of your child's medicines?

Reduced the amount given	
Increased the amount given	
Reduced the number of doses given in a day	
Increased the number of doses given in a day	

Other way (explain)	

What reason(s) made you change the dosing of your child's medicines?

_____.

_____.

_____.

_____.

_____.

24. (If answer to 19G was Yes): What is the reason for missing appointments?

Reason	**Tick**
Forgot	
Child was feeling better	
Did not have transport	
Still had medicines from previous appointment	
Other (explain)	

25. (If answer to 19H was Yes): What did you do when you ran out of your child's medicine?

Action	**Tick**
Share with my friends	
Visited the hospital as soon as possible for a refill	

Waited until the next appointment for a refill	
Nothing	
Other (explain)	

26. (If answer to 19I was Yes): What did you do when you found that your child's medicines were unavailable?

Action	**Tick**
Share with my friends	
Visited the hospital as soon as possible for a refill	
Visited other hospitals for a refill	
Waited until the next appointment for a refill	
Nothing	
Other (explain)	

Appendix 4: Data Abstraction Tool

Study Title: Determinants of adherence to antiretroviral therapy among HIV positive children at Kenyatta national hospital.

INFORMATION FROM PATIENT RECORD

A. Biodata

1. Serial number _____.
2. Patient Code_____.
3. Contact_____.
4. Date ……/……/2021

B. **REGIMEN DETAILS OF THE CHILD**

Which regimen is the child taking?

Number	**Code**	**Regimen**	
Paediatric ART 1st Line regimens			
1	CF2B	ABC + 3TC + EFV	
2	CF2D	ABC + 3TC + LPV/r	
3	CF2A	ABC + 3TC + NVP	
4	CF2F	ABC + 3TC + RAL	
5	CF2G	ABC+3TC+DTG	
6	CF1A	AZT + 3TC + NVP	
7	CF1B	AZT + 3TC + EFV	
8	CF1C	AZT + 3TC + LPV/r	
9	CF4E	TDF + 3TC + DTG	
10	CF5X	Any other 1st line Paediatric regimens	

Paediatric ART 2nd Line regimens			
11	CS1A	AZT + 3TC + LPV/r	
12	CS2A	ABC + 3TC + LPV/r	
13	CS2B	ABC+3TC+DTG	
14	CS1C	AZT + 3TC + DRV+RTV+RAL	
15	CS2D	ABC + 3TC + DRV+RTV+RAL	
16	CS4X	Any other 2nd line Paediatric regimens	
Paediatric ART 3rd Line regimens			
17	CT1H	AZT + 3TC + DRV+RTV+RAL	
18	CT2D	ABC + 3TC + DRV+RTV+RAL	
19	CT3X	Any other 3rd line Paediatric regimens	

c. VIRAL LOAD SUPPRESSION

8. Most recent viral load reading

Date	**Result(copies/ml)**

9. Last 3 recorded viral load readings

Date	**Result(copies/ml)**

10. Confirm whether the TCA (to come again) was adhered to for the last 5 visits

Date Expected	**Actual date of clinic visit**	**Missed Days**

11. Last 3 recorded CD4 count readings

Date	**Result(cells/mm^3)**

12. Has the child experienced any adverse event(s) while taking their medication in the past 1 month? (1) Yes (2) No

13. If yes in 12 above describe the event briefly

14. Has the child fallen sick in the last 1 month? (1) Yes (2) No

15. Describe the condition in detail if yes in 14 above._____.