ANTIRETROVIRAL THERAPY ADHERENCE, DIETARY PRACTICES AND NUTRITION STATUS OF ADOLESCENTS ATTENDING KIAMBU LEVEL 5 HOSPITAL, KIAMBU COUNTY KENYA

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A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE (FOOD, NUTRITION, AND DIETETICS) IN THE SCHOOL OF HEALTH SCIENCES OF KENYATTA UNIVERSITY

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DECLARATION

This thesis is my own original work and has not been submitted for a degree at any other university

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DEDICATION

This thesis is dedicated to my wife, Purity Karendi, in recognition of her steadfast support, patience, and encouragement throughout the course of this academic pursuit. It is also dedicated to our children, Susan Nyawira and Levi Mwenda, whose presence has been a constant source of inspiration and motivation.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	:	Acquired immune deficiency virus
ALHIV	:	Adolescents living with HIV/AIDS
ART	:	Antiretroviral therapy
ARV	:	Antiretroviral (drug)
BMI	:	Body Mass Index
CCC	:	Comprehensive Care Centre
CDC	:	Centre for disease control
FFQ	:	Food frequency questionnaire
HIV	:	Human immune deficiency virus
MUAC	:	Mid-Upper Arm Circumference
WHO	:	World Health Organization
IGAs	:	Income Generating Activities.
RDA	:	Required daily allowances
DI	:	Dietary Intake
BMI	:	Body Mass Index
KCAL	:	Kilocalories
SPSS	:	Statistical Package for Social Science
DDS	:	Dietary Diversity Score
KASF	:	Kenya AIDS Strategic Framework
NASCOP	:	National AIDS and STI Control Programme
UNAIDS	:	Joint United Nations Programme on HIV/AIDS

OPERATIONAL DEFINITIONS OF TERMS

Adolescent: Persons aged 10–19 years, in accordance with the World Health Organization's definition. In this study, the term refers to HIV-positive individuals within this age group receiving care at Kiambu Level Five Hospital.

Adherence to ART: The extent to which an adolescent consistently takes antiretroviral therapy as prescribed, assessed using self-report and pill count methods. Categorized as high (≥95%), moderate (80–94%), or low (<80%) adherence.

Antiretroviral Therapy (ART): A medical regimen using antiretroviral drugs to suppress HIV viral load and improve immune function in people living with HIV. All participants in this study were on ART at the time of data collection.

Dietary practices: Refers to the frequency, type, and variety of foods consumed by adolescents within a specified recall period. It includes meal frequency, food choices, and timing of meals.

BMI for age: An indicator used to determine nutritional status of the adolescent living with HIV/AIDS.

Adolescent related factors: Refers to knowledge and attitude towards ART adherence, Dietary practices and Nutrition status

Nutrition status: The health condition of an individual as determined by anthropometric indicators. In this study, it was measured using Body Mass Index-for-Age Z-scores (BAZ), classified as normal, underweight (thinness), or overweight.

Comprehensive Care Centre (CCC): A health facility unit offering integrated services to people living with HIV, including treatment, counselling, and nutritional support.

Dietary Diversity: The variety of food groups consumed over the previous 24 hours, based on FAO guidelines. Low diversity indicates intake from fewer than four food groups.

ABSTRACT

Adolescents living with HIV face challenges in maintaining adherence to antiretroviral therapy (ART), adopting appropriate dietary practices, and achieving optimal nutritional status. In Kenya, adolescent HIV prevalence is 4.44%, with Kiambu County reporting 5.6%, placing it among the six most affected counties. This study assessed ART adherence, dietary practices, and nutritional status among adolescents living with HIV attending Kiambu Level Five Hospital. A cross-sectional design was used, with data collected from 271 adolescents aged 10–19 years through structured questionnaires, 24-hour dietary recall, anthropometric measurements, and focus group discussions (FGDs). Systematic random sampling was used for quantitative data, and purposive sampling for the FGD. Quantitative data were analysed using SPSS version 23 and NutriSurvey, with chi-square tests and logistic regression used to determine associations and predictors. Participants were 51.3% male and 48.7% female, mean age 15.6 years. Most (74.9%) were in secondary school, and 50.2% lived in households with ≤6 members. Socio-economically, 74.5% lived in rented houses and 52.4% of caregivers worked in the informal sector. ART adherence was moderate to high in 56.2%, while 43.8% had poor adherence. Dietary diversity was low in 38.1%, medium in 41.9%, and high in 20.0%, with many showing micronutrient inadequacies. Nutritional assessment revealed 15.2% underweight, 74.3% normal weight, and 10.5% overweight/obese. Chi-square analysis showed significant associations between nutritional status and both ART adherence ($p = 0.013$) and dietary diversity ($p = 0.003$). Logistic regression identified ART adherence (AOR = 2.31; 95% CI: 1.14–4.65; $p = 0.020$) and dietary diversity (AOR = 2.89; 95% CI: 1.41–5.93; $p = 0.004$) as independent predictors of normal nutritional status. Caregiver education and household income were also significantly associated with dietary practices and nutritional outcomes. Qualitative findings highlighted stigma, school schedules, and limited adolescent-friendly services as barriers to adherence, while food insecurity and inadequate nutrition knowledge constrained dietary diversity. The study concludes that ART adherence and dietary diversity are significant, modifiable determinants of nutritional status among adolescents living with HIV in Kiambu County. It recommends integrating targeted nutrition education into adolescent HIV care, enhancing adherence counselling through peer support and flexible clinic schedules, and strengthening caregiver engagement. Policy measures should institutionalize routine nutrition assessment, foster multi-disciplinary care, and promote caregiver economic empowerment to address food insecurity. Further research should explore long-term effects of integrated interventions and evaluate the role of school-based programs in improving adolescent health outcomes.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Adolescence, defined by the World Health Organization (WHO) as the period between 10 to 19 years and is marked by rapid physical, psychological, and cognitive development (WHO, 2022). These changes influence adolescents' health behaviours, including treatment adherence, dietary practices, nutrition status and overall health (Singh et al., 2019).

Globally, the HIV prevalence among adolescents is estimated at 4%, with approximately 85% of affected adolescents residing in Sub-Saharan Africa. Among those aged 15–19 years in Africa, prevalence is higher in girls (3.3%) than in boys (1.4%) (UNICEF, 2022). In Kenya, the national adolescent HIV prevalence is estimated at 4.44%, while Kiambu County reports a higher rate of 5.6%, placing it among the top six high-burden counties (NASCOP, 2020).

Despite improved ART coverage and national guidelines on HIV care, adolescents living with HIV continue to experience poor health outcomes (KNBS and ICF, 2023). These include suboptimal ART adherence, low dietary diversity, inadequate micronutrient intake, and compromised nutritional status. Factors contributing to poor adherence include stigma, forgetfulness, pill burden, side effects, and lack of support from caregivers or peers. Similarly, food insecurity, limited nutrition knowledge, and lack of access to adolescent-friendly services also compromise dietary practices and health outcomes (Bhattarai & Bhusal, 2019).

Adherence to ART and good nutritional status is a key health outcome in adolescents living with HIV (Sparrow et al., 2021). Malnutrition increases the risk of opportunistic infections, slows recovery, and reduces ART effectiveness. Adolescents are particularly vulnerable because of increased nutrient requirements, metabolic changes, and the physical demands of growth during puberty (Gebrie et al., 2023a).

In addition to adherence, good dietary practices are essential for adolescents living with HIV. Malnutrition weakens immune function and may reduce the effectiveness of ART, while poor dietary intake limits recovery and development (Bhattarai & Bhusal, 2019).. Adequate nutrition supports treatment efficacy, enhances tolerance to medications, and promotes physical growth and mental well-being (Nanewortor et al., 2021).

Stunting and weight loss are common signs of under nutrition among people living with HIV (Senbanjo et al., 2015). Adolescents with infection are especially prone to malnutrition due to increased nutritional demands associated with puberty and HIV infection (Christian & Smith, 2018). Pellowski et al. (2019) conducted a comprehensive meta-analysis on 17 studies related to nutrition among adolescents living with HIV on antiretroviral and found an extremely high burden of under nutrition.

1.2 Problem Statement

In Kenya, adolescents living with HIV (ALHIV) face significant health challenges despite the availability of free antiretroviral therapy (ART). This age group demonstrates the lowest levels of ART adherence and viral suppression compared to other populations,

resulting in high rates of opportunistic infections, treatment failure, and HIV-related mortality. Nationally, HIV prevalence among adolescents is 4.44%, with Kiambu County reporting a higher rate of 5.6%, indicating a high disease burden in this region (MOH, 2021).

The Government of Kenya has implemented several strategies to improve health outcomes among adolescents living with HIV. These include the Adolescent Package of Care (APOC), which provides a framework for delivering adolescent-friendly services in HIV clinics, and the Kenya AIDS Strategic Framework (KASF) 2020/21–2024/25, which prioritizes improved treatment outcomes and integrated care for adolescents. Additionally, initiatives such as the Adolescent Health Policy (2015) and National Guidelines for Nutrition of People Living with HIV aim to promote holistic care by addressing both medical and nutritional needs. However, despite these efforts, evidence shows that many adolescents still experience poor adherence to ART and inadequate dietary practices (MOH, 2023).

In public health facilities such as Kiambu Level 5 Hospital, routine nutrition assessment is not consistently implemented, and most adolescents do not receive individualized dietary counseling. When adolescents are undernourished, their immune systems weaken, leading to faster progression of HIV, reduced ART effectiveness, and higher risk of opportunistic infections even when treatment is ongoing (WHO, 2023). Although Kenya’s national nutrition guidelines for people living with HIV recommend integrating nutrition into HIV

care, these services are rarely adapted to meet the specific needs of adolescents, and facility-level data to inform such efforts remain limited.

Despite growing recognition of the importance of integrated HIV and nutrition care, there is limited scientific data in Kenya that focuses specifically on adolescents living with HIV/AIDS. Most existing studies target adults or young children, leaving a gap in understanding how adolescents manage ART, nutrition, and dietary challenges. This gap is even more evident in public healthcare settings like Kiambu Level 5 Hospital, where adolescents access care under the same programs as adults but have different needs. This study obtained data to fill this gap by assessing ART adherence, dietary practices, and nutritional status among adolescents at Kiambu Level 5 Hospital, Kiambu County.

1.3 Purpose of the Study

To determine adherence to antiretroviral therapy (ART), dietary practices, and nutrition status among adolescents living with HIV/AIDS who receive care at Kiambu Level 5 Hospital, Kiambu County, Kenya.

1.4 Objectives of the Study

The objectives of the study were:

1. Determine the social economic and demographic characteristics of the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital.
2. Determine adherence to ART among the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital.

3. Assess the dietary practices of the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital.
4. Determine the adolescent-related factors influencing adherence to ART, dietary practices, and nutrition status of the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital.
5. Establish the nutritional status of the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital.
6. Establish the relationship between the adherence, dietary practices, and nutrition status of the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital.

1.5 Hypotheses

1. $HO_{1:}$ There is no significant relationship between the socio-economic and demographic and nutrition status of the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital.
2. HO_2: There is no significant relationship between ART adherence and the nutrition status of the adolescents living with HIV/AIDS at Kiambu Level 5 Hospital.
3. $HO_{3:}$ There is no significant relationship between the dietary practices and the nutrition status of the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital.

1.6 Significance of the Study

This study contributes to the growing body of evidence on the health challenges faced by adolescents living with HIV, particularly in relation to treatment adherence, dietary

practices, and nutritional outcomes. The findings will provide critical insights to healthcare providers, program implementers, and policymakers on the factors influencing these outcomes in public health settings.

Specifically, the study will help identify service delivery gaps at Kiambu Level Five Hospital and inform improvements in adolescent-friendly HIV care. It will guide the integration of nutrition support, ART adherence counselling, and caregiver involvement into routine adolescent HIV services.

At the policy level, the results may support the operationalization of national frameworks such as the Adolescent Package of Care (APOC) and the Kenya AIDS Strategic Framework (KASF) by highlighting key implementation challenges at the facility level. In addition, the evidence generated can inform training, resource allocation, and monitoring strategies to improve adolescent HIV treatment and nutrition programs in similar high-burden counties.

1.7 Justification of the study

Adolescents living with HIV (ALHIV) face serious challenges in maintaining adherence to antiretroviral therapy (ART), meeting their dietary needs, and achieving optimal nutritional status. These challenges are often overlooked in standard HIV care, which tends to focus on adults or young children. Yet, adolescence is a critical stage of growth and development that requires targeted attention.

The Comprehensive Care Centre at Kiambu Level Five Hospital provides essential services to ALHIV, but the extent and quality of support related to ART adherence, nutrition assessment, and dietary counselling remain unclear. Adolescents in this setting may not be receiving adequate, individualized care that matches their unique developmental and psychosocial needs. This study supports the clinic's goal of delivering comprehensive, adolescent-focused care by identifying service gaps and opportunities to improve patient outcomes.

National strategies such as the Adolescent Package of Care (APOC) and the Kenya AIDS Strategic Framework (KASF 2020/21–2024/25) call for integrated, adolescent-friendly services. However, implementation has been inconsistent, and there is limited facility-level data to assess whether these guidelines are being met—especially in high-burden counties like Kiambu. Most existing research in Kenya has focused on adult populations, leaving a significant evidence gap on adolescents.

This study addresses that gap by generating context-specific data on ART adherence, dietary practices, and nutritional status among adolescents living with HIV. The results will help health providers and decision makers strengthen interventions that are tailored to adolescents, improve counselling and follow-up practices, and inform policies aimed at improving treatment outcomes and nutritional care for this vulnerable group.

1.8 Study Limitation

This study had several limitations that may have influenced the results and interpretation. First, data on ART adherence and dietary practices were based on self-reports from adolescents, which may have introduced social desirability bias participants may have reported what they believed was expected rather than their actual behaviours. Secondly, the use of recall-based data, particularly in the 24-hour dietary recall and ART adherence reporting, may have introduced recall bias, especially among younger participants who may have had difficulty remembering past behaviours accurately.

Third, the cross-sectional design of the study limited the ability to infer cause-and-effect relationships between ART adherence, dietary practices, and nutritional status. The findings only reflect a snapshot in time rather than long-term trends or outcomes. Additionally, the study was conducted in a single facility which may limit the generalizability of the results to other counties or healthcare settings with different service structures or resources.

1.9 Assumption of the Study

The study assumed the HIV diagnostic tests done in the hospital were accurate. It also assumed that the health records of the respondent from the hospital are error-free. Assumed ALHIV were on medications and those who took part in the study provided honest responses about their adherence to ART, dietary practices, and nutrition status.

1.10 Conceptual framework

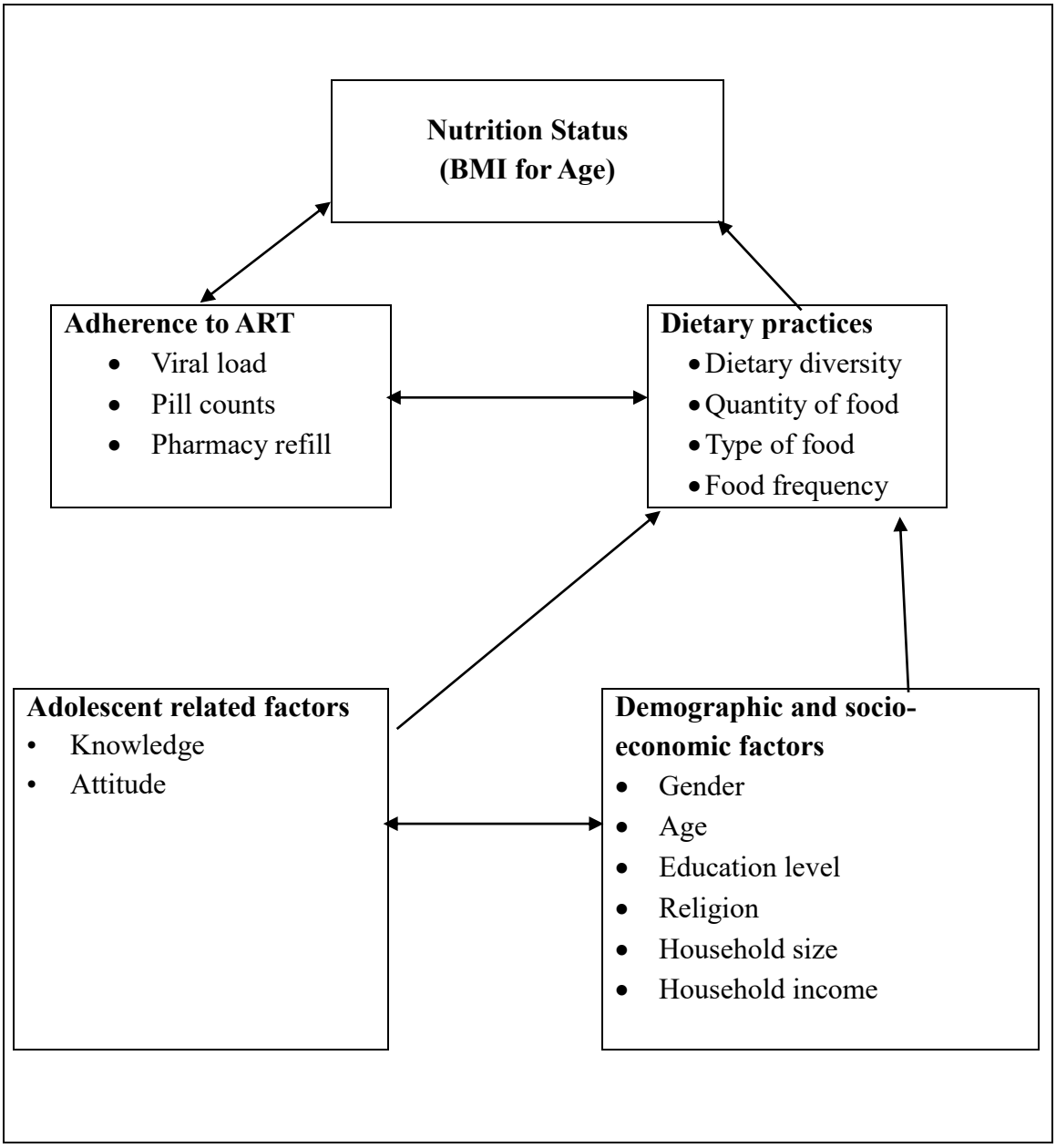

Figure 1.1 Factors influencing the nutritional status of adolescents living with HIV/AIDS

Source: adopted and modified from the UNICEF conceptual framework (1993)

Figure 1.1 illustrates the conceptual framework adapted from the UNICEF (1993) model on the causes of malnutrition and modified to suit the objectives of this study. The framework outlines the interrelated factors that influence the nutritional status of adolescents living with HIV. The two main direct determinants are adherence to antiretroviral therapy (ART) and dietary practices.

Dietary practices, including food variety, frequency, quantity, and type, play a critical role in determining nutritional status. Inadequate dietary intake contributes to undernutrition, weakens the immune system, and reduces treatment effectiveness among adolescents living with HIV (Tekelehaimanot et al., 2021). Similarly, poor adherence to ART is associated with increased viral load, compromised immune function, and treatment failure, all of which negatively affect nutritional outcomes (Jimmy & Jose, 2011).

Socio-demographic and economic variables such as household income, education level, household size, and living conditions indirectly affect dietary intake and ART adherence. These factors shape food access, affordability, and health-seeking behaviours, which in turn influence nutritional status (Mussa et al., 2022). Adolescent-specific factors, including knowledge and attitudes toward HIV, nutrition, and medication, also contribute to variations in adherence and dietary behaviours. Misconceptions about ART or food beliefs may interfere with recommended practices, thereby worsening nutritional outcomes (Mussa et al., 2022). The framework provides a basis for understanding how these variables interact and helps guide the design and interpretation of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Prevalence of the HIV among the adolescents and the challenges faced at global, regional, and local

HIV continues to be a major global public health concern, particularly among adolescents aged 10–19 years. According to the World Health Organization (WHO, 2023), approximately 1.7 million adolescents are living with HIV globally, with nearly 85% residing in sub-Saharan Africa. New infections among adolescents remain high, especially among adolescent girls, who face greater vulnerability due to social, cultural, and economic factors (Anema et al., 2009).

Globally, adolescents living with HIV (ALHIV) face numerous challenges including stigma, discrimination, lack of adolescent-friendly services, and limited access to comprehensive sexual and reproductive health education. Adolescent girls are disproportionately affected, with infection rates nearly six times higher than boys in certain regions, driven by early sexual debut, gender-based violence, and transactional sex (UNICEF, 2020).

Sub-Saharan Africa is home to 70% of the global HIV burden, accounting for more than half of its annual impact. Adolescents in this region are especially at risk, with countries such as South Africa, Kenya, Uganda, and Tanzania reporting high infection rates among youth. (UNICEF, 2019). Factors contributing to its high prevalence include early sexual initiation among adolescents; intergenerational sexual relationships between generations; low condom use; and gender-based violence (Singh et al., 2019). Research shows that

adolescent girls experience disproportionately high rates, nearly twice as high as their male counterparts (UNICEF, 2020).

At a regional level, certain cultural beliefs and norms associated with desirable HIV-related practices and attitudes have led to greater acceptance and support available for affected individuals in certain regions (Darshit et al., 2021). Socioeconomic factors, including poverty and limited education access, can exacerbate difficulties faced by adolescents living with HIV, further restricting resources available and health services that they need. Locally, ignorance about HIV or cultural beliefs that promote stigma within families lead to a lack of family support, making HIV a major challenge (MOH, 2023). Limited awareness and education about its management present additional obstacles; inadequate information could cause individuals to engage in risky behaviours that increase transmission rates, while an absence of peer support networks compounds those feelings further (Wabiri & Taffa, 2013).

In response, Kenya has developed several national strategies to improve adolescent HIV care, including the Adolescent Package of Care (APOC), the Kenya AIDS Strategic Framework (KASF), and the National Guidelines for Nutrition of People Living with HIV (NASCOP, 2024). These frameworks aim to integrate nutritional counselling, adherence support, and psychosocial interventions into routine HIV care for adolescents. However, the implementation of these guidelines has not been uniformed across facilities, especially in high-burden counties such as Kiambu. Adolescents often face challenges accessing

adolescent-friendly nutrition services, and their unique dietary and psychosocial needs may be overlooked in standard HIV care models (MOH, 2022).

Kiambu County in Kenya presents unique challenges when it comes to adhering to antiretroviral medication regimens, dietary practices, and nutritional requirements. Long distances to healthcare facilities, limited nutritional support options, and stigmatization within communities all present obstacles that hinder efforts to adhere to antiretroviral therapy (ART) regimens and improve nutritional status (Iacob et al., 2017). Malnutrition remains a widespread public health problem among adolescents, as many are undernourished or consume poor quality diets that negatively impact immune response and ART efficacy. Nutrition assessments and targeted interventions are key elements in improving health outcomes for adolescents living in these settings. Tackle these complex challenges head on requires tailor made approaches that combine ART adherence support, nutritional education, and interventions (Srivastava et al., 2021).

2.2 Social-economic and demographic characteristics

Socio-demographic and economic factors play a critical role in influencing antiretroviral therapy (ART) adherence and the nutritional status of adolescents living with HIV (ALHIV). According to research by MacCarthy et al. (2018), variables such as age, gender, education level, household income, and living conditions affect adolescents' ability to access healthcare, maintain adequate diets, and follow treatment regimens effectively.

Age and gender are especially influential. Adolescents aged 15 to 19 years are more likely to engage in risky behaviours such as unprotected sex or substance use, which may increase the risk of HIV transmission. According to UNICEF (2021), adolescent girls are disproportionately affected due to factors such as early sexual debut, gender-based violence, and unequal power relations in sexual partnerships.

Education is another important determinant. As found in a systematic review by Crowley and Rohwer (2021), adolescents with higher levels of education are more likely to understand the importance of ART adherence, engage in positive health-seeking behaviours, and adopt appropriate dietary practices. School attendance also creates opportunities for peer support and exposure to health education, which can further improve treatment outcomes.

Household income and caregiver employment influence access to both food and medical care. A study conducted by Mussa et al. (2022) revealed that adolescents from low-income households are more likely to experience food insecurity, resulting in poor dietary diversity and meal frequency. These challenges may also prevent regular clinic attendance, particularly when transport or caregiver accompaniment is needed (Simelane et al., 2022).

Household size and structure further affect adolescent health. Larger households often face greater competition for limited resources, reducing the availability of nutritious food. According to Ankrah et al. (2016), adolescents living in single-parent or extended family

households may also lack consistent emotional and treatment support, leading to poorer ART adherence (Simelane et al., 2022).

Cultural norms, stigma, and religious beliefs can further complicate treatment behaviours. For instance, research by Mburu et al. (2014) found that fear of stigma or accidental disclosure may cause adolescents to hide their HIV status, avoid medication in public, or skip clinic visits. In some cases, religious beliefs may discourage ART use or restrict food choices during fasting periods (Arage et al., 2017).

2.3 ART adherence among the adolescents living with HIV/AIDS

Adherence to antiretroviral therapy (ART) is essential for achieving viral suppression, restoring immune function, and improving the overall health of adolescents living with HIV/AIDS. According to research by Iacob et al. (2017), adolescents are the least adherent population compared to adults and younger children, primarily due to developmental, psychosocial, and structural challenges.

Multiple studies have identified individual-level factors affecting adherence. These include forgetfulness, lack of understanding of ART benefits, pill fatigue, fear of side effects, and depression. A study conducted by Bygrave et al. (2012) in Zimbabwe found that adolescents frequently miss doses due to forgetfulness and feelings of being overwhelmed by long-term medication routines.

Psychosocial factors also play a significant role. According to Mburu et al. (2014), stigma and fear of disclosure can cause adolescents to avoid taking ART in the presence of peers or family members, especially when their HIV status is not known to others. Many adolescents skip doses during school hours or while attending social events to avoid being questioned about their medication.

Structural and health system barriers further complicate adherence. These include long clinic waiting times, lack of adolescent-friendly services, and poor follow-up. In Kenya, most HIV clinics are not tailored to the specific needs of adolescents. As found in a study by MacCarthy et al. (2018), adolescents prefer receiving services in youth-only clinics or through peer-led models, but these are limited in public healthcare settings.

School commitments, particularly during examinations, can also interfere with clinic visits and medication routines. Adolescents may find it difficult to manage ART schedules alongside academic responsibilities (Simelane et al., 2022). Inconsistent caregiver support further contributes to treatment lapses, especially for adolescents living with extended family or under guardianship (Villiera et al., 2022).

ART adherence is commonly measured using self-reported recall, pill counts, and pharmacy refill data. According to Simoni et al. (2006), self-reporting is widely used in resource limited settings but may be affected by social desirability and recall bias. This study used self-reported measures, and pill counts to assess ART adherence levels among adolescents at Kiambu Level 5 Hospital. Improving ART adherence in adolescents requires

a multifaceted approach that combines counselling, family involvement, peer support, school engagement, and adolescent-friendly service models (Saha et al., 2024).

2.4 Dietary practices of adolescents living with HIV/AIDS

Dietary practices are a key determinant of health and treatment outcomes among adolescents living with HIV/AIDS. Proper nutrition supports immune function, promotes physical growth and mental development, and improves the effectiveness of antiretroviral therapy. According to research by Coles (2014), adequate dietary intake can reduce the risk of opportunistic infections, enhance ART absorption, and delay HIV progression.

Adolescents living with HIV face unique challenges in maintaining healthy dietary patterns. A study conducted by Alderman and Breuner (2019) found that food insecurity, poverty, and stigma are among the major barriers affecting adolescent nutrition. Many adolescents report poor appetite, nausea due to ART, or lack of access to diverse foods, especially in low-income households (Weiser et al., 2011).

Dietary diversity is particularly important in achieving adequate nutrient intake. As found in a study by Christian and Smith (2018), adolescents who consumed food from at least five food groups had significantly better nutritional status than those with limited dietary variety. Low dietary diversity is associated with micronutrient deficiencies, stunting, and weakened immunity conditions that compromise ART effectiveness (Tekelehaimanot et al., 2021).

Meal frequency also influences nutritional wellbeing. A study by Weiser et al. (2011) reported that adolescents consuming three or more meals per day had better body mass index (BMI) and immune response than those who skipped meals. However, adolescents on ART often miss meals due to medication side effects, food unavailability, or school schedules.

Food insecurity is a persistent issue among ALHIV. Ivers et al. (2009) observed that adolescents in food-insecure households were more likely to be undernourished and showed lower adherence to ART. Limited caregiver support, poor household food budgeting, and inadequate nutrition knowledge contribute to erratic eating patterns and poor health outcomes.

Nutrition counselling is a recommended component of HIV care. However, in many settings including Kenya, adolescents receive minimal nutrition education at health facilities. According to research by Mwangome et al. (2020), most HIV clinics lack trained personnel or tools for adolescent-focused dietary counselling. At Kiambu Level 5 Hospital, adolescents attending the Comprehensive Care Centre (CCC) often receive generalised nutrition advice that does not consider their age-specific needs, food access challenges, or medication side effects.

2.5 Nutritional status of the adolescents living with HIV

Nutritional status plays a critical role in the management of HIV, especially among adolescents who are undergoing rapid physical, hormonal, and cognitive changes. Proper nutrition supports immune function, promotes growth, and enhances the effectiveness of antiretroviral therapy (ART) (Gebrie et al., 2023b). A study conducted by Christian and Smith (2018) emphasized that adolescents living with HIV have higher nutrient requirements and are more vulnerable to malnutrition compared to their HIV-negative peers.

Malnutrition weakens immune response, delays puberty, and increases susceptibility to opportunistic infections. According to research by Gebrie et al. (2023), undernourished adolescents on ART have higher rates of treatment failure and disease progression. Poor nutritional status also contributes to poor school attendance, impaired concentration, and low academic performance among ALHIV.

Several factors contribute to undernutrition in adolescents with HIV. These include food insecurity, poor dietary practices, limited nutrition knowledge, high disease burden, and medication side effects. A study by Tekelehaimanot et al. (2021) found that many adolescents with HIV consume inadequate food quantities and lack dietary diversity, resulting in poor nutritional outcomes such as stunting and wasting.

ART side effects, such as nausea and reduced appetite, can further limit dietary intake. Additionally, food insecurity defined as lack of reliable access to sufficient and nutritious

food is common in households affected by HIV. According to Ivers et al. (2009), food-insecure adolescents have significantly higher odds of being underweight and are more likely to interrupt ART due to hunger-related stress or lack of food to take with medication. Nutrition assessment is an important component of adolescent HIV care. Body Mass Index for Age Z-scores (BAZ) are commonly used to assess nutritional status in this age group. A BAZ score below -2 indicates undernutrition, while a score above +2 indicates overweight or obesity (WHO, 2007).

Despite the importance of nutritional monitoring, many HIV care centres in Kenya do not routinely assess or manage adolescent nutrition. A study conducted by Mwangome et al. (2020) found that nutrition services at HIV clinics were limited by staff shortages, lack of adolescent-specific tools, and poor integration of nutrition into ART programs.

2.6 Adolescent related factors influencing dietary practices and adherence to ART.

Adolescents who possess an accurate understanding of nutrition's relationship to HIV tend to engage in healthier eating practices and exhibit better adherence to antiretroviral therapy (ART). A study by Kawuki et al. (2023)revealed that adolescents educated on the significance of eating healthy for improving immune function and ART effectiveness were more likely to consume varied and nutritious diets. Maintaining a healthy weight and mitigating the side effects associated with ART treatment are paramount to its effectiveness and adherence. A Research in South Africa demonstrated how nutritional education programs improved adolescents' knowledge about immune system support through proper

nutrition as a part of effective ART use, leading to improved diet diversity and greater ART adherence rates among participants (Hyle et al., 2021).

Adolescents who understand the significance of regular ART use to achieve viral suppression are more likely to follow their medication regimen. According to the study by Weiser et al. (2011) adolescents who had more knowledge about how ART worked to manage viral load were more likely to take their medicine regularly and engage in healthy dietary practices that support its absorption and reduce side effects. Those with limited knowledge were more prone to missing doses, leading to poor treatment outcomes and higher viral loads (Chhim et al., 2018). Gender and age both play key roles in shaping knowledge and attitudes about HIV, nutrition, and ART. Studies have revealed that female adolescents tend to experience more HIV-related stigma, which in turn negatively influences their attitudes about ART and nutrition (Ankrah et al., 2016). According to a study by Bezabhe et al. (2014) revealed female adolescents in sub-Saharan Africa were especially likely to encounter stigma caused by this virus, which in turn made them less likely to adhere to treatment and maintain proper nutrition, while male adolescents typically had better adherence rates despite socio-economic barriers preventing accessing nutritious food sources.

Attitudes toward HIV, nutrition, and ART play an immense role in dietary practices and treatment adherence. Positive attitudes foster proactive health behaviours such as adhering to ART and maintaining a nutritious diet for instance adolescents who view HIV as manageable with proper treatment and nutrition are more likely to engage in healthy eating

behaviours and adhere to ART (Richard et al., 2020). Adolescents with positive attitudes about managing HIV were more likely to consume nutrient-rich foods regularly as well as taking their ART, improving their overall health outcomes overall (Darmon & Drewnowski, 2008).

2.7 Literature review summary

The literature reviewed in this chapter highlights the complex and interconnected nature of adherence to antiretroviral therapy (ART), dietary practices, and nutritional status among adolescents living with HIV/AIDS (ALHIV). Globally and regionally, adolescents remain a high-risk group for HIV acquisition and face significant challenges in achieving and maintaining optimal treatment outcomes. Kenya, and specifically Kiambu County, continues to report high adolescent HIV prevalence, despite the presence of supportive national frameworks such as the Adolescent Package of Care (APOC) and the Kenya AIDS Strategic Framework (KASF).

According to studies reviewed, ART adherence is affected by a combination of individual, psychosocial, and structural factors. Adolescents often struggle with pill fatigue, stigma, poor disclosure environments, and lack of youth-friendly services. Dietary practices are influenced by food availability, caregiver support, medication side effects, and nutrition knowledge. Undernutrition remains a common outcome, especially in food-insecure households, and is compounded by poor dietary diversity, meal skipping, and low frequency of nutrition counselling.

The reviewed evidence also confirms that poor nutritional status compromises ART effectiveness and weakens immunity, leading to poorer clinical outcomes. However, nutrition assessment and counselling are often overlooked in adolescent HIV programs, particularly in public healthcare settings. Furthermore, gaps persist in how socio-demographic factors such as age, gender, education level, household income, and family structure influence both dietary and adherence behaviours.

Most of the reviewed studies used cross-sectional designs and self-reported measures to assess adherence, dietary practices, and nutrition, which while practical may introduce bias. Nonetheless, the studies provide valuable insights into the lived experiences of ALHIV and offer frameworks for improving service delivery. The reviewed literature supports the need for more targeted, context-specific research focused on adolescents in local care settings. This study contributes to filling that gap by examining how ART adherence and dietary practices affect the nutritional status of adolescents living with HIV at Kiambu Level Five Hospital. The findings aim to guide policy and programmatic interventions tailored to adolescent needs within facility-based HIV care in Kenya.

Studies have demonstrated that malnutrition is a persistent issue for adolescents living with HIV. Poor dietary practices and noncompliance to antiretroviral therapy (ART), coupled with sociodemographic, socioeconomic, and adolescent-specific influences often contribute to poor nutritional status. There has been limited literature reviewed on antiretroviral adherence, diet practices and nutrition status of adolescents in Kiambu County

CHAPTER THREE: METHODS AND MATERIALS

3.1 Research design

This study adopted a cross-sectional analytical design to assess the relationship between ART adherence, dietary practices, and nutritional status among adolescents living with HIV attending Kiambu Level Five Hospital. The design was chosen because it allows the collection of data on multiple variables at a single point in time, making it suitable for examining associations among factors within a defined population.

3.2 Research Variables

The study involved two main categories of variables: dependent and independent variables.

3.2.1 Dependent variables

Nutritional status of adolescents living with HIV, assessed using Body Mass Index-for-Age Z-scores (BAZ). This variable was measured through anthropometric data and categorized according to WHO standards.

3.2.2 Independent Variables

ART adherence, assessed through self-reported adherence, pill counts, and viral load data. Dietary practices, including dietary diversity, meal frequency, food quantity, and type of food consumed, as reported using a structured questionnaire.

Table 3.1: Dependent and independent variables

Dependent variables	Independent variables
Primary outcome	
Nutrition status (BMI for age)	• Adherence to ART (Viral load, Pill counts and Pharmacy refill) • Dietary practices (Dietary diversity, quantity of food and type of food)
Secondary outcome	
Adherence	• Socio-demographic and socio-economic factors • Adolescent related factors
Dietary practices	• Socio-demographic and socio-economic factors • Adolescent related factors

3.3 Study area

The study was conducted at Kiambu Level Five Hospital, located in Kiambu County, Kenya. This is a major referral facility and serves as the primary comprehensive care centre (CCC) for HIV management within the county. Kiambu County is situated in the central region of Kenya and shares borders with Nairobi, Murang'a, Machakos, and Nakuru counties. The county is both urban and peri-urban, with a high population density and a significant number of adolescents enrolled in HIV care.

According to NASCOP (2020), Kiambu is among the top six counties with the highest burden of HIV among adolescents, reporting a prevalence of 5.6% above the national average of 4.44%. Kiambu Level Five Hospital was selected as the study site due to its high adolescent HIV patient load, availability of ART services, and accessibility to nutrition and counselling departments. The facility also has an established data recording system, which facilitated sampling and follow-up. The choice of this location allowed for collection of relevant clinical, dietary, and socio-demographic information from a representative group of adolescents living with HIV in a real-world healthcare setting.

3.4 Target population

The target population comprised adolescents aged 10 to 19 years living with HIV/AIDS who were enrolled in care at the Comprehensive Care Centre (CCC) of Kiambu Level Five Hospital at the time of data collection. This population was selected because adolescents in this age group represent a transitional developmental stage with increased nutritional requirements and psychosocial challenges that influence ART adherence and dietary behaviours. According to research by Simelane et al. (2022), adolescents are at higher risk of treatment non-adherence and malnutrition compared to other age groups.

The hospital's CCC serves many adolescents and offers HIV-related services including ART administration, clinical monitoring, nutritional counselling, and psychosocial support. This made it an appropriate setting for accessing the target population. The study focused specifically on adolescents who had been enrolled in care for at least six months, to ensure they had sufficient treatment experience.

3.4.1 Inclusion criteria

The study targeted adolescents living with HIV who had been receiving care at the Comprehensive Care Centre (CCC) of Kiambu Level 5 Hospital for at least six months. Hospital records showed that over 650 adolescents were actively enrolled in care at the time of the study. This population was selected because they were already linked to HIV services and could provide reliable information on treatment adherence, dietary practices, and nutritional status.

3.4.2 Exclusion criteria

Adolescents were excluded from the study if they had any chronic medical conditions that could affect dietary intake, were on HIV pre-exposure or post-exposure prophylaxis, or had physical or cognitive disabilities that could interfere with nutrition assessment or adherence evaluation. Those who relied entirely on school meals, such as full-time boarding school students, were also excluded.

3.5 Sampling Technique

A sampling frame of 650 adolescents living with HIV was developed using appointment records and daily attendance register from the Comprehensive Care Centre (CCC) at Kiambu Level 5 Hospital. These records were reviewed over a one-month period before data collection. Only adolescents who had been in care for at least six months and met the inclusion criteria were listed in the sampling frame. The study used a combination of simple random sampling and systematic sampling, following the approach recommended by Mugenda and Mugenda (2003). First, the sampling interval (K) was calculated by dividing the total number in the sampling frame (650) by the required sample size (271), resulting in a value of 2.6, which was rounded up to 3.

To identify the starting point, simple random sampling was applied through balloting among the first three adolescents on the list. Participant number 2 was randomly selected. From that point, every third adolescent on the list (e.g., 2, 5, 8, 11, and so on) was selected until the target sample size of 271 was reached. Adolescents who did not meet the inclusion criteria was skipped, and the next eligible adolescent in the list was selected to maintain

the sampling pattern. This process ensured randomization at the start and consistent coverage across the sampling frame. It also helped minimize selection bias and ensured equal opportunity for participation among the eligible adolescents.

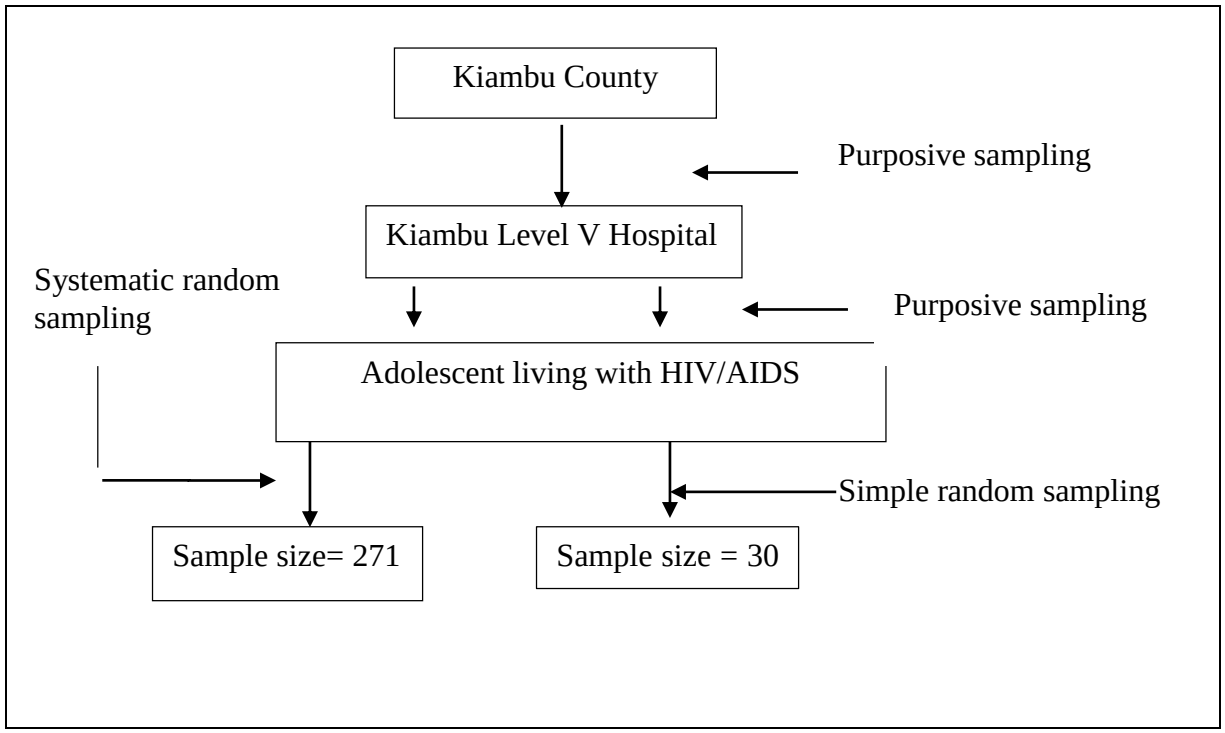

Figure 3.1: Flow chart of sampling procedure

3.5.1 Sample size

Fisher et al (1998) propose that an ideal sample size be calculated using their formula; since there are limited data regarding prevalence rates among adolescents living with HIV in Kiambu County, 50% was adopted per Fisher's recommendations; thus, defining the sample size accordingly.

The formula used for calculation is n = Z^2pq/e^2, where:

- n - represents the desired sample size
- Z - is the standard normal deviation set at a 95% confidence level (1.96)
- e - denotes the desired level of precision set at 0.05

- p - represents the prevalence of the characteristic set at 50%
- q - Equals 1 - p, which signifies the proportion of the population without the disease.
- Thus, at a 95% confidence level, the sample size (n) is calculated as follows:

  $n = (1.96)^2 \times 0.5 (1-0.5) / 0.0025 = 384.$

As the population is less than 10,000, the sample size is calculated using the formula Nf = n / (1 + ((n-1) / N)), where:

Nf- represents the sample size.

- N - signifies the total population (approximately 650)
- n - Represents the estimated sample size.

Therefore, Nf = 384 / (1 + ((384-1) / 650)) = 246.

To account for potential non-response, 10% was added, resulting in a total sample size of 271

3.6 Research Instruments

3.6.1 Structured Questionnaire

A structured, interviewer-administered questionnaire was used to collect data on socio-demographic characteristics (Objective 1), ART adherence (Objective 2), and dietary practices (Objective 3). The questionnaire included both closed and semi-structured items and was adapted from validated tools. ART adherence was assessed using a 7-day recall scale and pharmacy refill records. Dietary practices were evaluated using a 24-hour dietary recall and food frequency questionnaire. Nutrient intake was analysed using NutriSurvey software. Anthropometric data were collected to assess nutritional status (Objective 5),

with weight measured using a digital scale and height using a stadiometer. Body Mass Index-for-Age Z-scores were calculated using WHO AnthroPlus.

A focus group discussion (FGD) guide was used to collect qualitative data (Objective 4). The guide explored adolescents' experiences with ART adherence, dietary behaviours, challenges in maintaining good nutrition, and barriers to accessing care. One FGD was conducted with 10 adolescents, stratified by age and sex. Discussions were held in a private room at the facility, audio-recorded, and later transcribed and analysed thematically.

3.6.2 Focus group discussion guide

At the conclusion of the study, a Focused Group Discussion (FGD) was held with HIV adolescents' respondents and caregivers (treatment supporters). The FGD consists of 9 people and gathered information regarding an adolescent's knowledge about adherence to antiretrovirals and diet practices.

3.7 Recruitment and Training of Research Assistants

Two research assistants were selected with minimum qualifications of a Certificate in Nutrition and fluency in English and Kiswahili. Candidates with prior experience participating in data collection participation were preferred. A comprehensive two-day training session took place, detailing purposes, objectives, and data collection procedures including interview techniques, research ethics considerations, and questionnaire tracking along with interview techniques demonstrations and role-playing exercises provided by a researcher facilitator.

3.7.1 Pretesting of the research instruments

The data collection tools were pretested on 27 adolescents (10% of the sample size) at Thika Level Five Hospital, which is a facility with similar characteristics to the study site but not included in the main study. The purpose of the pretest was to evaluate the clarity, reliability, and appropriateness of the questions.

Feedback from the pretest revealed areas where language needed simplification and instructions required clarification. Mino revisions were made to improve flow, eliminate ambiguity, and ensure that questions were culturally and age-appropriate. Pretesting also confirmed the feasibility of the data collection process, including the time needed per interview and anthropometric measurements.

3.7.2 Instruments validity

To ensure the validity of the data collection instruments, a multi-step process was employed. Content validity was established through critical review by an expert panel from the Department of Food, Nutrition, and Dietetics at Kenyatta University. The panel evaluated the questionnaire items for relevance, clarity, and alignment with the study objectives. Following expert review, the questionnaire was pretested on 27 adolescents (10% of the calculated sample) at Thika Level Five Hospital, which has similar characteristics to the study site. Feedback from this pilot group informed the revision of several questionnaire items to improve language clarity, cultural sensitivity, and appropriateness for adolescent respondents. Ambiguous items were reworded, redundant questions removed, and the sequencing of questions refined to enhance flow.

Construct validity was further strengthened by adapting sections of the questionnaire from standardized tools previously validated in adolescent HIV and nutrition research. For example, ART adherence was measured using a 7-day recall model and pharmacy refill verification, both recommended in clinical ART monitoring protocols. This combination of expert review, pilot testing, and adaptation from established tools ensured that the data collection instruments accurately captured the intended constructs and were suitable for use among adolescents living with HIV.

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3.7.3 Instrument Reliability

To ensure the consistency of the data collection tool in producing consistent results, a test and re-test method was used. Each participant took two tests with a three-day gap between administration by the same research assistant; their correlation between results was then assessed using Cronbach's alpha; an acceptable coefficient of 0.76 was established by as per Gliem & Gliem (2003) which served as evidence that the questionnaire can be relied upon.

3.8 Data collection procedure

Before data collection commenced, ethical approval was obtained from the Kenyatta University Ethics Review Committee and research authorization was granted by NACOSTI and Kiambu County authorities. The researcher then held an official meeting with the Medical Superintendent and Hospital Administrator at Kiambu Level Five Hospital to present the study objectives and seek institutional support.

Data collection took place between January and March 2024 and was carried out by the principal researcher with the help of two trained research assistants. The assistants had at least a Certificate in Nutrition and prior experience in data collection. They underwent a two-day intensive training workshop covering the study objectives, questionnaire content, anthropometric measurement techniques (including the use of digital weighing scales and stadiometers), ethical considerations, confidentiality procedures, and standardized interview protocols. The training included mock interviews and role-plays to ensure familiarity with the tools and uniformity in data collection procedures.

Recruitment of participants followed systematic sampling from a verified list of adolescents living with HIV at the Comprehensive Care Centre (CCC). Health records were reviewed to confirm eligibility, including age (10–19 years) and ART enrolment of at least six months. Caregivers or legal guardians provided informed consent for adolescents below 18 years, while assent was sought from the adolescents themselves. Participants aged 18 or 19 years provided their own informed consent.

Face-to-face interviews were conducted in private consultation rooms at the CCC to maintain confidentiality. The structured questionnaire was administered by the research assistants in English or Kiswahili, depending on the respondent's preference. Each interview lasted approximately 45 minutes. The questionnaire collected data on socio-demographic characteristics, ART adherence (via self-reports, 7-day recall, and pharmacy refill records), and dietary practices (using 24-hour dietary recall and a food frequency questionnaire). Nutrient intake data were analysed using NutriSurvey software.

Anthropometric measurements (weight and height) were taken twice and the average recorded. Weight was measured using a calibrated digital scale (to the nearest 0.1 kg), and height using a stadiometer (to the nearest 0.1 cm).

In addition to quantitative data, a focus group discussion (FGD) was conducted with 10 adolescents (not included in the main study) to gain qualitative insights into ART adherence, dietary challenges, and psychosocial experiences. The FGD was audio-recorded, transcribed, and analysed thematically. All data collection procedures adhered to ethical standards for research involving minors, with efforts made to ensure privacy, voluntary participation, and data protection.

3.9 Data analysis

Quantitative data were coded, entered, and analysed using Statistical Package for Social Sciences (SPSS) version 23. Nutrient intake data were analysed using NutriSurvey software. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarise socio-demographic characteristics (Objective 1), ART adherence levels (Objective 2), and dietary practices (Objective 3).

For Objective 4, associations between adolescent-related factors and ART adherence, dietary practices, and nutritional status were assessed using chi-square tests. For Objective 5, nutritional status was evaluated using BMI-for-age Z-scores and categorised according to WHO growth reference standards. Binary logistic regression was used to determine

predictors of nutritional status and adherence (Objective 6), with independent variables including socio-demographic characteristics, dietary practices, and ART adherence levels.

Qualitative data from the focus group discussion were transcribed verbatim and analysed thematically. Emerging themes were grouped and interpreted in relation to the study objectives. NVivo software was used to assist in organising and coding qualitative data. Triangulation of qualitative and quantitative findings was done during interpretation to provide deeper insights.

Table 3.2: Data analysis matrix

Objectives	Research instruments	Variable indicator	Statistical tests and data presentation
Determine the social-economic and demographic characteristics of the adolescents	Structured questionnaire	• Gender • Age • Marital status • Education level • Religion • Household size	• Frequencies, • Means, • Standard deviation
Establish adherence to antiretrovirals	Structured questionnaire FGD	• Viral load • Pill counts • Pharmacy refill	• Frequencies • Mean score • Standard deviation
Assess the dietary practices	• FFQ	• Dietary diversity • Meal frequency • Quantity nutrient adequacy of food • Food frequency	• Frequencies • Means • Standard deviation • Median intake (ff)
Determine the nutrition status	• Structured questionnaire	• Weight • Height • BMI for AGE	• Frequencies • Means • Standard deviation
Identify the factors related to dietary practices and ART	• Structured questionnaire	• Knowledge • Attitude	• Frequencies • Means
To establish the relationship between the adherence, dietary practices, and nutrition status of the adolescents living with HIV/AIDS attending Kiambu Level 5 Hospital	• Structured questionnaire • Anthropometric measurements	• Adherence, dietary practices, and nutrition status	• Person product moment correlation, • odds ratio • Logistic regression • T-test

3.10 Logistical and ethical consideration

Kenyatta University Graduate School gave permission to the research study, and Kenyatta University Ethics Review Committee issued the research approval (reference number KU.ERC/APPROVAL/VOL.1). Also, the authorization to conduct the study was granted by the National Commission for Science, Technology, and Innovation (NACOSTI) under the reference number NACOSTI/P/24/34504. The Kiambu County Government also issued permission for conducting research at Kiambu Level five Hospital (refer appendix H).

Informed consent was obtained from all participants aged 18–19 years. For participants below 18 years, informed assent was obtained alongside written consent from their caregivers or guardians. Participation was voluntary, and adolescents were informed of their right to withdraw from the study at any time without any consequence to their care.

To maintain confidentiality, no identifying information was recorded on questionnaires or transcripts. Data were collected in private consultation rooms and stored securely with access limited to the research team. The study adhered to ethical principles of respect for persons, beneficence, and justice throughout all phases of data collection and reporting.

CHAPTER 4: RESULTS

4.1 Introduction to the study results

This chapter presents the research findings, organized according to the study objectives. This study included 271 adolescents living with HIV at Kiambu Level five Hospital. The results show the socio demographic and socioeconomic characteristics, adherence to antiretroviral, dietary practices, nutrition status, and adolescent-related factors influencing dietary practices, adherence to antiretroviral, and nutrition status. This study used the Chi-square test to get the relationship among the variables, as well as regression to check the predictors of nutrition status.

4.1.1 Demographic characteristics

Out of the 271 adolescents who took part in the study, 51.3% were male and 48.7% were female, showing a fairly equal gender distribution. Most of the participants (69.4%) were between 15 and 19 years old, while 30.6% were aged 10 to 14 years. This shows that most of the adolescents receiving HIV care at the facility were in the older adolescent age group, which is often linked to more health-related responsibilities and lifestyle changes that may affect treatment adherence and dietary practices.

In terms of household size, half of the respondents (50.2%) came from households with 4 to 6 members, while 38.4% lived in smaller households with 1 to 3 members. A smaller number (11.4%) were from larger households with 7 to 9 members. Living in large households may increase pressure on food and other basic needs, which can affect both nutrition and treatment support at home.

Nearly all respondents (98.9%) reported being Christian, while only 1.1% were Muslim. Regarding relationship status, most adolescents (85.2%) said they were single, while 14.8% were in a dating relationship. Being in a relationship during adolescence may influence behaviours related to medication use, nutrition, and support systems (Table 4.1).

Table 4.1: Demographic characteristics of adolescents living with HIV and their caregivers

Characteristic	Description	Frequency(n=271)	Percentage (%)
Sex	Male	139	51.3
	Female	132	48.7
			30.6
Age category	10–14 years	83	
	15–19 years	188	69.4
			38.4
Household size	1-3	104	
	4-6	136	50.2
	7-9	31	11.4
			98.9
Religion	Christian	268	
	Muslim	3	1.1
			85.2
Relationship status	Single	231	
	Dating	40	14.8

4.2 Social-economic characteristics

Most adolescents (44.6%) were in secondary school, while 31.7% were in primary school and 23.6% had reached tertiary education. This indicates that a good number of adolescents were still in formal education during the study period, which may affect their access to regular meals and adherence to medication schedules.

Caregiver education levels were balanced, with 34.7% having secondary education and 34.3% having completed primary education. About 25.8% had tertiary education, while only 5.2% had no formal education. Caregiver education can influence an adolescent's nutrition and treatment support, especially in areas such as understanding ART instructions and preparing balanced meals.

More than half of the caregivers (52.4%) were involved in informal employment, 38.7% had formal jobs, and 8.9% were engaged in farming. In terms of income, 56.8% of caregivers earned between 20,000–30,000 KES per month, while 38% earned 10,000–20,000 KES. Only 5.2% had the lowest income bracket of 5,000–10,000 KES. These income levels suggest that while most households are above the poverty line, financial pressure may still affect consistent access to nutritious food and healthcare.

Regarding housing, 74.5% of respondents lived in rented houses, 22.5% in owned homes, and 3% in informal settlements. A majority (65.7%) lived in homes with one or two rooms, which could reflect crowded living conditions and limited resources. Most families (81.9%) relied on purchasing food, while 18.1% used farm produce, indicating a low level of food self-sufficiency. In terms of cooking energy, 61.3% of households used gas (LPG), 17.7% used charcoal, 11.8% used electricity, and 9.2% relied on firewood. These differences may affect food preparation quality and frequency, especially in low-income settings.

55.4% of adolescents reported having some form of income-generating activity (IGA), mainly through part-time jobs (41.3). This highlights that many adolescents are taking on

adult roles, which may contribute to stress, irregular meals, and poor adherence to medication due to time constraints or lack of support (Table 4.2).

Table 4.2: Socioeconomic characteristics of adolescents living with HIV and their caregivers

Characteristics	Description	Frequency (n=271)	Percentage (%)
Adolescent Education level	Primary School	86	31.7
	Secondary School	121	44.6
	Tertiary	64	23.6
Caregiver education level	No formal education	14	5.2
	Primary	93	34.3
	Secondary	94	34.7
	College/University	70	25.8
Caregiver occupation	Formal employment	105	38.7
	Informal employment	142	52.4
	Agriculture/farming	24	8.9
Caregiver level of income	5,000-10,000 KES	14	5.2
	10,000-20,000 KES	103	38.0
	20,000-30,000 KES	154	56.8
Care giver Housing	Owned	61	22.5
	Rented	202	74.5
	Informal settlement	8	3
Caregiver House size	1	98	36.2
	2	80	29.5
	3	57	21
	4 or more	36	13.3
Source for family food	Purchase	222	81.9
	Farm Produce	49	18.1
Cooking energy	Electricity	32	11.8
	Firewood	25	9.2
	Natural gas/LPG	166	61.3
	Charcoal	48	17.7
Adolescent IGA*	Yes	150	55.4
	No	121	44.6
Adolescent type of IGA*	Part-time Job	112	41.3
	Full-time job	32	11.8
	Self-employed	8	3
	None	119	43.9

*IGA refers to income generating activities such as hawking, shop keeping, fruit vending among others

4.3 ART adherence of the adolescents living with HIV

4.3.1 Male and female respondents drug adherence level

The bar chart below (Figure 4.1) shows the distribution of drug adherence levels among adolescents living with HIV. Only 3% of the respondents had good adherence, while the majority (54.6%) had inadequate adherence. A further 42.4% reported poor adherence.

These findings highlight a concerning trend, where fewer than one in ten adolescents consistently follow their antiretroviral treatment as prescribed. The high percentage of inadequate and poor adherence suggests the need for targeted interventions, especially among adolescents who may face barriers such as stigma, forgetfulness, or lack of support.

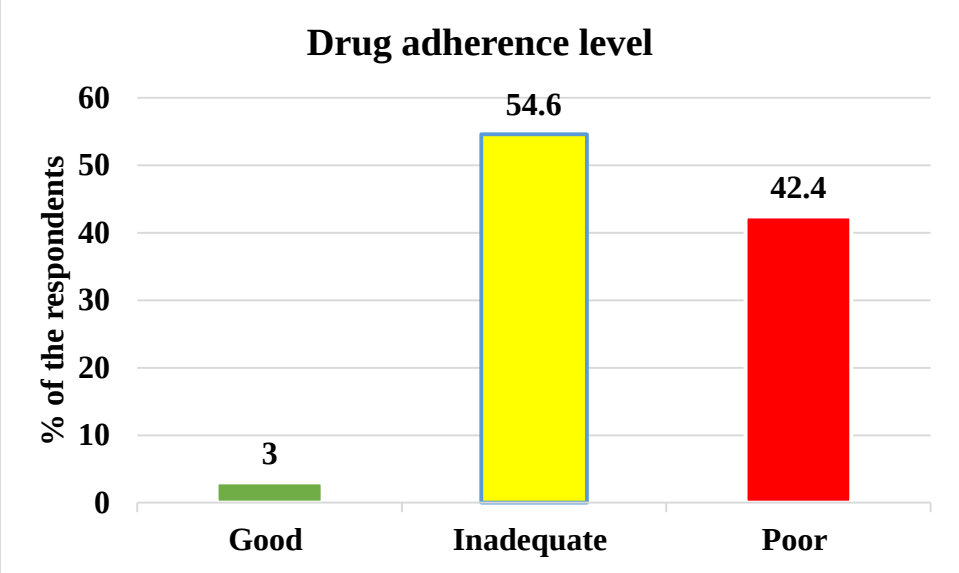

Figure 4.1: Antiretroviral levels of the adolescents living with HIV attending Kiambu Level 5 Hospital

Good (0 issues on ART adherence), **inadequate** (1-2 issues on ART adherence) and **poor** (3-8 issues on ART adherences). Source: Ministry of Health, National AIDS & STI Control Program. Kenya HIV Prevention and Treatment Guidelines, 2022 Edition. Nairobi, Kenya.

4.3.2 ART adherence by age and sex of adolescents living with HIV attending Kiambu Level 5 hospital

The results show distinct patterns in ART adherence across both age groups and sex. Good adherence (a score of 8) was reported only among adolescents aged 15–19 years (3%), with none in the younger age group (10–14 years). All participants who achieved good adherence were male, although they made up just 3% of the total sample, highlighting how rare optimal adherence was in this population.

Inadequate adherence (scores of 6–7) was highest among older adolescents, with 46.5% of those aged 15–19 years reporting this level, compared to only 8.1% in the 10–14 age group. In terms of sex, 30.6% of females and 24% of males reported inadequate adherence, suggesting that females may have slightly better adherence in this category.

Poor adherence (scores below 6) was more common among younger adolescents (22.5%) than among older ones (19.9%). Similarly, males had a slightly higher rate of poor adherence (24.4%) compared to females (18.1%) (Table 4.3).

Table 4.3: ART adherence by age and sex of adolescents attending Kiambu Level 5 Hospital

Adherence Level (scores)	**Age range (years)**			**Sex**	
		10–14	**15–19**	**Male**	**Female**
Good Adherence (8 scores)	Count	0	8	8	0
	Percent	0	3	3	0
Inadequate adherence (6-7 scores)	Count	22	126	65	83
	Percent	8.1	46.5	24	30.6
Poor adherence (< 6 scores)	Count	61	54	66	49
	Percent	22.5	19.9	24.4	18.1

4.3.3 Type of ART regimen and duration of intake among HIV positive adolescents attending Kiambu Level 5 Hospital

Majority of adolescents (80.1%) had been on antiretroviral therapy (ART) for more than 10 years, while only 19.9% had been on treatment for 5–10 years. This suggests that most of the respondents likely acquired HIV in early childhood and have remained in long-term care.

In terms of regimen, 72% of adolescents were on first-line ART, while 28% were on second-line therapy. Being on second-line treatment often indicates previous treatment failure or drug resistance, which may be linked to poor adherence. The relatively high proportion on second-line ART highlights the need for ongoing support to prevent further regimen failure and improve long-term treatment outcomes. These findings show the importance of strengthening adherence support, especially for adolescents with long ART histories or those already transitioned to second-line regimens (Table 4.4).

Table 4.4: Type of ART regimen and duration of intake of HIV positive adolescents attending Kiambu Level 5 Hospital

Characteristics	Description	Frequency(n=271)	Percentage (%)
Duration of ARV intake	5-10 years	54	19.9
	above 10 years	217	80.1
ARV regimen	First line	195	72
	Second line	76	28

4.3.4 Respondents viral load

Viral load testing showed that only 31.0% of the adolescents had a suppressed viral load (<50 copies/ml), indicating successful control of the virus. The majority (56.8%) had viral loads between 200 and 199 copies/ml, while 12.2% had high viral loads (≥1000 copies/ml),

both categories considered unsuppressed. This means that more than two-thirds (69%) of the adolescents had not achieved viral suppression. Such a high rate of unsuppressed viral load is a major concern, as it increases the risk of HIV progression, opportunistic infections, and drug resistance. It also suggests suboptimal adherence to ART among a significant proportion of respondents. These results emphasise the urgent need for targeted adherence support and close viral load monitoring in adolescent HIV care, particularly for those showing signs of treatment failure (Table 4.5).

Table 4.5: Viral load of the HIV positive adolescents attending Kiambu Level 5 Hospital

Characteristic	Description	Frequency (n=271)	Percentage
viral load	<50 Copies/ml (Suppressed)	84	31.0%
	200-199 Copies/ml (Unsuppressed)	154	56.8%
	≥1000 Copies/ml (Unsuppressed)	33	12.2%

4.3.5 Percentage of the medications taken by adolescents living with HIV

The data show that 58% of the adolescents took at least 95% of their prescribed antiretroviral medications, which is considered good adherence. About 21% had taken between 85% and 94% of their medication, classified as inadequate adherence. The remaining 14.9% had taken less than 85% of their ART doses, falling into the poor adherence category.

Although over half of the respondent's demonstrated good adherence based on pill count or self-report, the combined 36% with inadequate or poor adherence represents a

significant portion of the study population. This level of non-adherence can contribute to suboptimal viral suppression and increase the risk of drug resistance and treatment failure. The findings support the need for continued monitoring of ART adherence and more focused support, especially for adolescents falling below the 95% adherence threshold required for optimal treatment outcomes (Table 4.6).

Table 4.6: Percentage of ARVs taken by pill count, of adolescents living with HIV attending Kiambu Level 5 Hospital

Percentage of Medications taken	Frequency (n=271	Percentage
≥ 95% - Good	167	58%
85-94% - Inadequate	61	21%
< 85% - Poor	43	14.9%

4.3.6 Pharmacy drug refill

The results show that 47.2% of the adolescents reported picking up their ART medication on time, while 46.9% experienced delays. This near-even distribution suggests that nearly half of the respondents struggle with timely drug refills. Delayed medication pick-up may be caused by various factors such as school commitments, forgetfulness, lack of transport, or limited caregiver support. Late refills can disrupt treatment continuity, contributing to poor adherence, missed doses, and eventual treatment failure. These findings point to the need for strengthened appointment reminders, flexible clinic schedules (especially for school-going adolescents), and increased involvement of caregivers to support timely ART refills (Table 4.7).

Table 4.7: Monthly pharmacy drug refill among adolescents living with HIV attending Kiambu Level 5 Hospital

Characteristic	Frequency (n=271)	Percentage (%)
Picked the ARV on time	136	47.2%
Delayed in picking up medication	135	46.9%

4.4 Dietary practices of the adolescents living with HIV/AIDS

Dietary practices for 271 participants were collected through a 24-hour recall method and an individual dietary diversity questionnaire.

4.4.1 Energy and Nutrient intake

4.4.1.1 Macronutrient intake of adolescents living with HIV attending Kiambu Level 5 Hospital

The dietary intake of adolescents living with HIV was compared to both the HIV-specific Recommended Dietary Allowance (RDA) from Kenya's 2022 guidelines and the general RDA provided by WHO/Tufts (2002). The analysis showed that energy intake for both male and female adolescents was slightly below the HIV-specific RDA. Males consumed 1,997 kcal compared to the recommended 2,100 kcal, and females consumed 1,870 kcal against the required 2,000 kcal. Although these values exceeded the general RDA for healthy adolescents, they were insufficient to meet the elevated energy needs associated with HIV.

Carbohydrate intake was generally high in both groups, with males consuming 418 g/day and females 383 g/day. This was above the general RDA and met or exceeded HIV-specific recommendations for males, though slightly lower for females. Protein intake was inadequate, especially among males who consumed 50 g/day, which falls far below both the HIV-specific (75 g) and general RDA (63 g). Female adolescents consumed 71 g/day, slightly below the HIV-specific recommendation of 82 g. Fat intake met the requirements for males (70 g/day), but was notably low among females at only 50 g/day compared to the

HIV-specific RDA of 78 g. Fibre intake was also insufficient across both sexes, with males consuming 24 g/day and females 21 g/day, both below the recommended 30 g/day.

These findings suggest that while carbohydrate intake was relatively sufficient, there were consistent gaps in energy, protein, fat, and fibre intake, which could negatively affect immune function, growth, and overall treatment outcomes. This highlights the need for tailored nutrition education and support to help adolescents meet their increased dietary requirements (Table 4.8).

Table 4.8: Macronutrient intake of adolescents living with HIV attending Kiambu Level 5 Hospital

	Participants intake		***RDA for HIV**		****Normal RDA**	
Nutrient	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Energy (kcal)	1997	1870	2100	2000	1950	1900
Carbohydrates g/day	418	383	391	412	341	298
Protein g/day	50	71	75	82	63	54
Fat (g/day)	70	50	78	78	76	76
Fibre (g/day)	24	21	30	30	30	30

*RDA values are based on guidelines for management of HIV/AIDS in Kenya, 2022

** WHO/Tufts University, 2002

4.4.1.2 Micronutrient intake among adolescents living with HIV attending Kiambu Level 5 Hospital

The analysis of micronutrient intake among adolescents living with HIV revealed widespread deficiencies relative to the Recommended Dietary Allowances (RDA). Although the average intake of vitamin A exceeded the RDA for both males and females, only 30% of participants met the requirement, suggesting significant variability in intake. Folic acid intake was also inadequate, with just 65% of the recommended level achieved by both sexes. Calcium intake was notably low, with adolescents consuming only about 479 mg/day approximately 43% of the RDA posing a risk to bone health during a critical growth period. Phosphorus intake reached 56% of the RDA, while zinc and iron intake were 45% and 67% of the RDA respectively, indicating potential risks to immune function and red blood cell formation. Magnesium intake was similarly low, at just over half the recommended amount (56% for both sexes).

Vitamin E intake reached only 38% of the RDA, while intake of vitamin B1 (thiamine) and vitamin B2 (riboflavin) met only 39% and 45% of their respective requirements. These deficiencies could negatively impact energy metabolism and neurological function. Although vitamin B6 intake approached adequacy at 74%, intake of vitamin C remained suboptimal, meeting only 48% of the requirement despite its critical role in immunity and iron absorption.

Overall, the data show that most adolescents in the study were not meeting their micronutrient needs, with only a few nutrients (like vitamin A and B6) approaching or

exceeding minimum recommendations. These widespread deficiencies point to a need for strengthened dietary counselling and potentially micronutrient supplementation to support the health and treatment outcomes of adolescents living with HIV (Table 4.9).

Table 4.9: Micronutrient intake among adolescents living with HIV attending Kiambu Level 5 Hospital

	*RDA/AI		Participants Mean intake		% met RDA
Nutrient	**Males**	**Females**	**Males**	**Females**	
Vit. A (µg)	900	700	1055.9	1037.2	30
tot. folic.acid (µg)	400	400	150.4	150.8	65
calcium (mg)	1300	1300	479.5	479.9	43
phosphorus (mg)	1250	1250	731.2	728.7	56
zinc (mg)	11	11	6.3	6.3	45
iron (mg)	11	15	8.4	8.5	67
magnesium (mg)	410	360	203.5	206.0	56
Vit. E (eq.) (mg)	15	15	10.8	11.0	38
Vit. B1 (mg)	1.2	1	0.7	0.8	39
Vit. B2 (mg)	1.3	1	0.9	0.9	45
Vit. B6 (mg)	1.3	1.2	1.1	1.1	74
Vit. C (mg)	75	65	89.3	88.7	48

4.4.2 Individual dietary diversity score of adolescents living with HIV attending Kiambu Level 5 hospital

The dietary diversity scores among adolescents living with HIV revealed that only 30.6% achieved high dietary diversity, consuming six or more food groups in the previous 24 hours. A larger proportion (36.8%) fell within the moderate range, consuming 4–5 food groups, while 26.7% had low dietary diversity, reporting intake from only 0–3 food groups.

These findings indicate that more than half of the adolescents were not meeting the minimum threshold for diverse diets. Low dietary diversity is often associated with poor intake of essential nutrients, particularly micronutrients such as iron, vitamin A, and zinc,

which are critical for immune function and recovery in HIV-infected individuals. The limited dietary variety may be linked to household income constraints, food insecurity, or lack of nutrition knowledge. These results highlight the need for nutrition education and food-based interventions aimed at improving diet quality among adolescents on antiretroviral therapy (Table 4.10).

Table 4.10: Individual dietary diversity score among adolescents living with HIV attending Kiambu Level 5 hospital

Characteristic	Frequency (n=271)	Percentage (%)
Low dietary diversity (0 – 3)	77	26.7
Moderate dietary diversity (4 – 5)	106	36.8
High dietary diversity (6 -12)	88	30.6

4.4.3 Food groups consumed by adolescents living with HIV attending Kiambu Level 5 Hospital

Eggs were one of the least-consumed food groups among adolescents; only 17% took eggs daily. 20.7% consumed organ meat while 39.9% ate meat and fish products; dark green leafy vegetables made up 57.6% of adolescents' diets while 67.2% enjoyed spices, condiments, beverages, legumes seeds milk products 68.3% also took sweets 69% enjoyed sweets as part of their meals while 88% included oils and fats into daily meals; all adolescents consumed starchy staples food group daily as part of daily meals Figure 4.2.

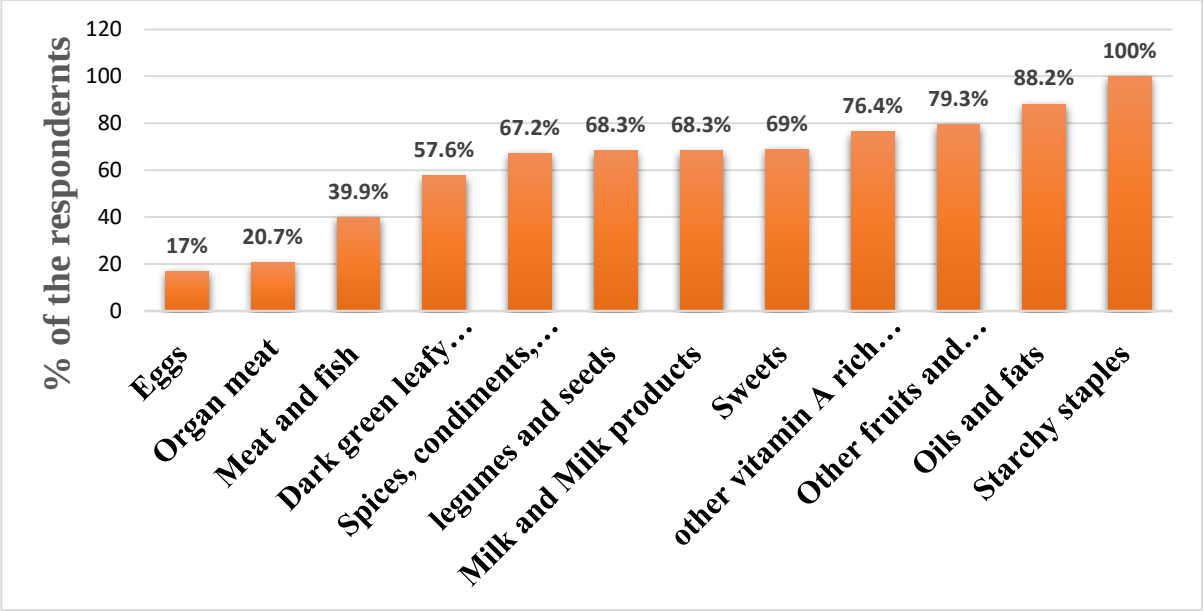

Figure 4.2: Food groups consumed by adolescents living with HIV attending Kiambu Level 5 Hospital

4.4.4 Respondents Appetite

Study participants included 271 individuals with varied levels of appetite. Of those involved, 17% reported having very good appetite while 62% of participants said theirs was good and 21% described it as poor Table 4.8.

4.4.5 Meal frequency of adolescents living with HIV attending Kiambu Level 5 Hospital

62% of respondents reported eating regular meals. Only 46.5% of respondents regularly consume breakfast, with only 62.44% eating lunch regularly and 62.7 % dining on supper as their most consumed meal and 39.1% reported snack consumption.

4.4.6 Nutritional supplements consumed by adolescents living with HIV attending Kiambu Level 5 Hospital

The study revealed that adolescents living with HIV were taking nutrition supplements; 26.6% took multivitamins and 34.3% Vitamin C supplements. Dietary restrictions were not widely reported among respondents with 22.1% reporting some form of restriction (Table 4.11).

Table 4.11: Dietary practices of adolescents living with HIV attending Kiambu Level 5 hospital

Characteristics	Description	Frequency(n=271)	Percentage (%)
Appetite	Very good	46	17
	Good	168	62
	Poor	57	21
Regular Meals	Yes	168	62
	No	103	38
Took breakfast	Yes	126	46.5
	No	145	53.5
Took Lunch	Yes	169	62.4
	No	102	37.6
Took Supper	Yes	170	62.7
	No	101	37.3
Took Snack	Yes	106	39.1
	No	165	60.9
Nutrition Supplements	None	106	39.1
	Multivitamin*	72	26.6
	Vitamin C	93	34.3
Dietary Restrictions	Yes	60	22.1
	No	211	77.9

*Multivitamin is a combination of vitamins and minerals in form of syrup or tablets form

4.5 Adolescent-related factors influencing dietary practices, adherence to antiretroviral therapy, and nutritional status

4.5.1 HIV-related Knowledge

The findings show that most adolescents had a good level of basic HIV knowledge. A large majority correctly understood that HIV can be transmitted through blood (81.9%) and sharing needles (78.1%). Almost all respondents (99.3%) knew that HIV cannot be spread through sharing toilets or utensils, and 88.9% knew that mosquito bites do not transmit HIV. However, only 13.2% believed there is a vaccine to prevent HIV, which reflects a misconception, as no vaccine currently exists.

Most participants understood the role of antiretroviral therapy (ART), with 75.7% agreeing that ARVs help HIV-positive individuals live healthier lives. Additionally, 88.9% knew that people with HIV must take ARVs daily, and 94.8% were aware that there is no cure for HIV. While 88.9% acknowledged the importance of supporting people living with HIV, only 33.6% (91 out of 271) knew that HIV cannot be transmitted through hugging or shaking hands highlighting a gap in knowledge regarding casual contact transmission Table 4.10.

Table 4.12: Knowledge on HIV transmission, treatment, and prevention among adolescents living with HIV attending Kiambu Level 5 Hospital

Characteristic	Frequency N=271(%)
Can get HIV from blood	236 (81.90)
Can get HIV from sharing needles	225(78.10)
Cannot get HIV from sharing a toilet or utensils	269 (99.26)
ARV can help HIV+ people live a healthier life	218 (75.70)
There is a vaccine to prevent HIV	38 (13.20)
Cannot get HIV from a mosquito bite	256 (88.90)
Knew one cannot get HIV from hugging or shaking hands	91 (247)
Knew that people with HIV need to take ARV every day	256 (88.90)
Knew that there is no cure for HIV/AIDS	257 (94.80)
Knew its important to support friends or family members who have HIV	256 (88.90)

4.5.2 Attitude towards HIV, treatment, and disclosure among adolescents living with HIV attending Kiambu Level 5 Hospital

Attitudes among adolescents living with HIV were determined using a five-point Likert scale, from one (1) (indicating strong disagreement) to five (5) (indicating strong agreement).

As shown in Table 4.13, most adolescents reported positive attitudes toward HIV, though stigma and disclosure challenges remain. About 61% felt comfortable discussing their HIV status, while 22% disagreed. Over 85% agreed that HIV is manageable, but fewer (38%) strongly supported openness, with many only somewhat supportive. More than half (51%) acknowledged ongoing discrimination, and 25% somewhat agreed, showing persistent

stigma. Nearly 75% agreed that disclosure is a personal choice, reflecting good awareness of individual rights.

The need for adolescent-friendly services was widely supported (77%), and 70% agreed that HIV can affect anyone. About 52% felt supported in taking ART, with another 33% somewhat supported indicating room for improvement in caregiver. While 61% knew of available support groups, 33% only somewhat agreed, showing gaps in awareness. Encouragingly, over 94% agreed that people with HIV can lead fulfilling lives, and 74% believed that a healthy diet improves wellbeing, reflecting strong knowledge of HIV self-care.

Table 4.13: Attitude towards HIV, treatment, and disclosure among adolescents living with HIV attending Kiambu Level 5 Hospital

N=271					
	Strongly Agree	**Agree**	**Somewhat agree**	**Disagree**	**Strongly disagree**
Indicator	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Comfortable discussing status	58 (20.1)	119 (41.3)	32 (11)	54 (18.8)	8 (2.8)
HIV is manageable	66 (33.9)	148 (51.4)	41 (14.2)	41(14.2)	16 (5.6)
Support openness on HIV	30 (10.4)	78(27.1)	133 (46.2)	24(8.3)	6(2.1)
Recognized ongoing discrimination	24(8.3)	148(51.4)	71(24.7)	22(7.6)	6(2.1)
HIV disclosure is personal choice	44(15.3)	171(59.4)	56(19.4)		
Need for accessible services.	72(25)	150(52.1)	49(17)		
HIV/AIDS can affect anyone	46(16)	157(54.4)	62(21.5)	6.0(2.1)	
supported to take ART	20(6.9)	149(51.7)	94(32.6)	8(2.8)	
Know available support groups	46(16)	131(45.5)	94(32.6)		
Individuals with HIV can lead fulfilling lives	40(13.9)	105(36.5)	126(43.8)		
Healthy diet impacts well-being	54(18.8)	160(55.6)	57(19.8)		

4.6 Nutrition status of the adolescents living with HIV attending Kiambu Level 5 Hospital

The assessment of nutritional status using BMI-for-age showed that nearly half of the adolescents (48%) fell within the normal range (18.50–24.99). However, under nutrition was still prevalent. About 29% had mild thinness, 12.2% moderate thinness, and 5.9% severe thinness together accounting for nearly 46.9% of the sample. Only 5.2% were classified as overweight. These findings suggest that under nutrition is a major concern

among adolescents living with HIV, with a much higher prevalence than overweight. Poor nutritional status can negatively affect immune function, ART response, and growth, particularly in this age group. The results highlight the need for integrated nutrition interventions alongside HIV care to address both macro- and micronutrient deficiencies (Table 4.14).

Table 4.14: The nutrition status by BMI for Age among adolescents living with HIV attending Kiambu Level 5 hospital

Nutrition status using BMI for age	
Description	**n=271 (%)**
Severe thinness <16.00	16(5.9)
Moderate thinness 16.00 - 16.99	33 (12.2)
Mild thinness 17.00 - 18.49	78(28.8)
Normal range 18.50 - 24.99	130(48)
Overweight ≥25.00	14(5.20

4.7 The relationship between factors affecting Nutrition status

The study considered nutrition status as the outcome variable in relation to other variables. Chi square test and regression analysis was done to determine the associations between variables.

4.7.1 The relationship between demographic characteristics and ART adherence of adolescents living with HIV attending Kiambu Level 5 Hospital

The chi-square analysis showed a significant association between ART adherence and both sex ($\chi^2 = 12.53$, $p = 0.002$) and age ($\chi^2 = 48.036$, $p < 0.001$). Male adolescents were more likely to have poor adherence compared to females, and younger adolescents (10–14 years) showed significantly lower adherence than those aged 15–19 years. Household size was

also significantly associated with adherence (χ^2 = 282.503, p < 0.001), with larger households more likely to report poor adherence—possibly due to reduced caregiver supervision or resource constraints. In contrast, religion (χ^2 = 0.229, p = 0.892) and relationship status (χ^2 = 0.229, p = 0.892) were not significantly associated with ART adherence. These findings suggest that demographic factors such as age, sex, and household structure play a key role in influencing treatment adherence among adolescents living with HIV (Table 4.15).

Table 4.15: Association between demographic characteristics and ART adherence among adolescents living with HIV attending Kiambu Level 5 hospital

Demographic Characteristic	Description	n=271 (%)	ART adherence		
			X^2	Df	P-Value
Sex	Male	139 (51.3)	12.53	2	0.002
	Female	132 (48.7)			
Age (years)	10–14	83 (30.6)	48.036	2	0.001
	15–19	188 (69.4)			
Household size	1-3	104 (38.4)	282.503	6	0.001
	4-6	136 (50.2)			
	4-9	31 (11.4)			
Religion	Christian	268 (98.9)	0.229	2	0.892
	Muslim	3 (1.1)			
Relationship	Single	231 (85.2)	0.229	2	0.892
	Dating	40(14.8)			

4.7.2 The relationship between demographic characteristics and dietary practices of adolescents living with HIV attending Kiambu Level 5 Hospital

There was a significant association between dietary practices and sex (χ^2 = 7.862, p = 0.02), with female adolescents generally reporting more diverse diets than males. Age also had a strong influence (χ^2 = 43.898, p < 0.001), with older adolescents (15–19 years) showing better dietary diversity than those aged 10–14 years. Household size was significantly

associated with dietary practices (χ^2 = 69.21, p < 0.001); adolescents from larger households tended to have poorer diets, likely due to increased competition for food and limited resources.

Religion was also statistically significant (χ^2 = 9.774, p = 0.008), although the small number of Muslim participants limits broader conclusions. Relationship status, however, was not significantly associated with dietary practices (χ^2 = 9.774, p = 0.154), suggesting that whether an adolescent was single or dating had little effect on what they ate.

Overall, the results suggest that sex, age, household size, and religion influence dietary diversity among adolescents living with HIV. These factors should be considered in designing nutrition education and support programmes within adolescent HIV care (Table 4.16).

Table 4.16: Association between socio demographic characteristics and dietary practices among adolescents living with HIV attending Kiambu Level 5 hospital

Demographic Characteristic	**Description**	**n=271 (%)**	**Dietary Practices**		
			x	df	P - Value
Sex	Male	139 (51.3)	7.862	2	0.02
	Female	132 (48.7)			
Age (years)	10–14	83 (30.6)			
	15–19	188 (69.4)	43.898	2	0.001
Household size	1-3	104 (38.4)			
	4-6	136 (50.2)	69.21	6	0.001
	4-9	31 (11.4)			
Religion	Christian	268 (98.9)			
	Muslim	3 (1.1)	9.774	2	0.008
Relationship	Single	231 (85.2)			
	Dating	40(14.8)	9.774	2	0.154

4.7.3 The relationship between demographic characteristics and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

The relationship between nutrition status and demographic characteristics was evaluated using a chi-square test. Sex (χ^2=35.406, df=4, p=0.001), age (χ^2=36.834, df=4, p=0.001), household size (χ^2=139.228, Df=12, p=0.001), and relationship status (χ^2=10.708, df=4, p=0.03) were a significantly associated with the nutrition status. However, no significant relationship was found between nutrition status and religion (χ^2=2.353, Df=4, p=0.671) (Table 4.17).

Table 4.17: Association between socio demographic characteristics and nutrition status of adolescents living with HIV attending Kiambu Level 5 hospital

Demographic Characteristic	Description	n=271 (%)	Nutrition status		
			x	Df	P - Value
Sex	Male	139 (51.3)	35.406	4	0.001
	Female	132 (48.7)			
Age (years)	10–14	83 (30.6)			
	15–19	188 (69.4)	36.834	4	0.001
Household size	1-3	104 (38.4)			
	4-6	136 (50.2)	139.228	12	0.001
	4-9	31 (11.4)			
Religion	Christian	268 (98.9)			
	Muslim	3 (1.1)	2.353	4	0.671
Relationship	Single	231 (85.2)			
	Dating	40(14.8)	10.708	4	0.03

4.7.4 The relationship between socio-economic characteristics and ART adherence of adolescents living with HIV attending Kiambu Level 5 Hospital

The relationship between socio-economic characteristics and ART adherence among adolescents was evaluated using chi-square tests, showing several significant associations. Adolescent education level (χ^2=53.515, df=4, p=0.001), caregiver education level

(χ^2=63.835, df=6, p=0.001), the caregiver occupation (χ^2=79.654, df=4, p=0.001), and caregiver income (χ^2=32.121, df=4, p=0.001) were all significantly associated with ART adherence. Housing type also showed a significant relationship (χ^2=21.269, df=4, p=0.002), while the house size was not significantly associated (χ^2=43.619, df=6, p=0.31). Food source (χ^2=15.795, df=2, p=0.01) and cooking energy type (χ^2=98.214, df=6, p=0.01) were significantly associated with ART adherence (Table 4.18).

Table 4.18: Association between socio-economic characteristic and ART adherence of adolescents living with HIV attending Kiambu Level 5 hospital

Characteristics	Description	n=271 (%)	ART adherence		
			χ^2	Df	P-value
Adolescent Education level	Primary School	86 (31.7)	53.515	4	0.001
	Secondary School	121(44.6)			
	College/university	64 (23.6)			
Caregiver education level	No formal education	14 (5.2)	63.835	6	0.001
	Primary	93 (34.3)			
	Secondary	94 (34.7)			
	College/University	70 (25.8)			
Caregiver occupation	Formal employment	105 (38.7)	79.654	4	0.001
	Informal employment	142 (52.4)			
	Agriculture/farming	24 (8.9)			
Caregiver income	5,000-10,000 KES	14 (5.2)	32.121	4	0.001
	10,000-20,000 KES	103 (38)			
	20,000-30,000 KES	154 (56.8)			
Housing	Owned	61 (22.5)	21.269	4	0.002
	Rented	202 (74.5)			
	Informal settlement	8 (3)			
House size	1	98 (36.2)	43.619	6	0.31
	2	80 (29.5)			
	3	57 (21)			
	4 or more	36 (13.3)			
Source of food	Purchase	222 (81.9)	15.795	2	0.01
	Farm Produce	49 (18.1)			
Cooking energy	Electricity	32 (11.9)	98.214	6	0.01
	Firewood	25 (9.2)			
	Natural gas/LPG	166 (61.3)			

4.7.5 The relationship between socio-economic characteristics and dietary practices of adolescents living with HIV attending Kiambu Level 5 Hospital

The chi-square test for the relationship between socio-economic characteristics and dietary practices among the respondents showed several significant associations. School

attendance (χ^2=9.843, df=2, p=0.007) and adolescent education level (χ^2=62.634, df=4, p=0.001) were significantly related to dietary practices, indicating that adolescents who attend school and have higher education levels tend to have better dietary practices. Caregiver occupation (χ^2=19.834, df=4, p=0.001) and income level (χ^2=21.559, df=4, p=0.001) were also significantly related. Housing type (χ^2=13.984, df=4, p=0.007) and house size (χ^2=32.726, df=6, p=0.04) showed significant associations. However, the source of family food (χ^2=1.915, df=2, p=0.384) was not significantly related to dietary practices. Cooking energy type (χ^2=13.972, df=6, p=0.03) was significantly associated with dietary practices, indicating that households using natural gas/LPG have better dietary practices compared to those using other cooking energy types (Table 4.19).

Table 4.19: The relationship between socio-economic characteristic and dietary practices of adolescents living with HIV attending Kiambu Level 5 hospital

Characteristics	Description	n=271 (%)	Dietary practices		
			χ^2	df	p-value
Attending school	Yes	203 (74.9)			
	No	68 (25.1)	9.843	2	0.007
Adolescent Education level	Primary School	86 (31.7)	62.634	4	0.001
	Secondary School	121(44.6)			
	College/university	64 (23.6)			
Caregiver education level	No formal education	14 (5.2)	74.975	6	0.001
	Primary	93 (34.3)			
	Secondary	94 (34.7)			
	College/University	70 (25.8)			
Caregiver occupation	Formal employment	105 (38.7)	19.834	4	0.001
	Informal employment	142 (52.4)			
	Agriculture/farming	24 (8.9)			
Caregiver level of income	5,000-10,000 KES	14 (5.2)	21.559	4	0.001
	10,000-20,000 KES	103 (38)			
	20,000-30,000 KES	154 (56.8)			
Housing	Owned	61 (22.5)	13.984	4	0.007
	Rented	202 (74.5)			
	Informal settlement	8 (3)			
House size (rooms)	1	98 (36.2)	32.726	6	0.04
	2	80 (29.5)			
	3	57 (21)			
	4 or more	36 (13.3)			
Source for family food	Purchase	222 (81.9)	1.915	2	0.384
	Farm Produce	49 (18.1)			
Cooking energy	Electricity	32 (11.9)	13.972	6	0.03
	Firewood	25 (9.2)			
	Natural gas/LPG	166 (61.3)			
	Charcoal	48 (17.7)			

4.7.6 The relationship between socio-economic characteristic and nutrition status of adolescents living with HIV attending Kiambu Level 5 hospital

The chi-square test report for the selected socio-economic characteristics were significantly associated with nutrition status of the respondents. School attendance (χ^2=41.928, df=4, p=0.001) and adolescent education level (χ^2=43.245, df=8, p=0.001) were linked to better nutrition. Caregiver education (χ^2=84.153, df=12, p=0.001), occupation (χ^2=58.049, df=8, p=0.001), and income (χ^2=57.463, df=8, p=0.001) were significantly associated, with higher education, formal employment, and higher income associated with good nutrition. Housing type (χ^2=101.144, df=8, p=0.001) and house size (χ^2=173.203, df=12, p=0.001) showed that having a house and having many rooms link with better nutrition. Food source (χ^2=98.374, df=4, p=0.001) and cooking energy type (χ^2=211.373, df=12, p=0.001) were significant, with purchasing food and using natural gas/LPG linked to better nutrition (Table 4.20).

Table 4.20: The relationship between socio-economic characteristic and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

Characteristics	Description	n=271 (%)	Nutrition status		
			χ^2	df	p-value
Attending school	Yes	203 (74.9)			
	No	68 (25.1)	41.928	4	0.001
Adolescent Education level	Primary School	86 (31.7)	43.245	8	0.001
	Secondary School	121(44.6)			
	College/university	64 (23.6)			
Caregiver education	No formal education	14 (5.2)	84.153	12	0.001
	Primary	93 (34.3)			
	Secondary	94 (34.7)			
	College/University	70 (25.8)			
Caregiver occupation	Formal employment	105 (38.7)	58.049	8	0.001
	Informal employment	142 (52.4)			
	Agriculture/farming	24 (8.9)			
Caregiver income	5,000-10,000 KES	14 (5.2)	57.463	8	0.001
	10,000-20,000 KES	103 (38)			
	20,000-30,000 KES	154 (56.8)			
Housing	Owned	61 (22.5)	101.144	8	0.001
	Rented	202 (74.5)			
	Informal settlement	8 (3)			
House size (rooms)	1	98 (36.2)	173.203	12	0.001
	2	80 (29.5)			
	3	57 (21)			
	4 or more	36 (13.3)			
Source of food	Purchase	222 (81.9)	98.374	4	0.001
	Farm Produce	49 (18.1)			
Cooking energy	Electricity	32 (11.9)	211.373	12	0.001
	Firewood	25 (9.2)			
	Natural gas/LPG	166 (61.3)			
	Charcoal	48 (17.7)			

4.7.7 The relationship between adherence to antiretroviral therapy and the nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

The findings show that only 2.8% of adolescents had a high adherence to ART, while 51.4% had moderate adherence and 39.9% had poor adherence. This distribution reflects a major adherence challenge in the study population. The association between adherence level and overall treatment outcomes was statistically significant ($p = 0.001$), indicating that poor adherence is a widespread issue likely affecting health outcomes. Regarding treatment regimen, 67.7% of adolescents were on first-line ART while 26.4% were on second-line regimens. The relationship between ART regimen and adherence was also statistically significant ($p=0.003$), suggesting that those on second-line treatment may have experienced past treatment failure due to non-adherence or drug resistance.

Viral load results further highlight the impact of adherence: only 29.2% of adolescents had suppressed viral loads (<50 copies/ml), while the majority (53.5%) had unsuppressed viral loads between 200–199 copies/ml, and 11.5% had viral loads ≥1000 copies/ml. This association was highly significant ($p = 0.001$), confirming that poor adherence is strongly linked to unsuppressed viral loads and suboptimal treatment outcomes.

These findings emphasise the urgent need for targeted adherence support, particularly for adolescents on second-line regimens and those with unsuppressed viral loads. Improving adherence could enhance viral suppression and reduce the risk of disease progression (Table 4.21).

Table 4.21: The relationship between adherence to antiretroviral therapy and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

Characteristic	Description	n=271 (%)	P - vale
Adherence Level	High Adherence (8 scores)	8(2.8)	0.001
	Moderate adherence (6-7 scores)	148 (51.4)	
	Low adherence (< 6 scores)	115 (39.9)	
ARV Regimen	First line	195 (67.7	0.003
	Second line	76 (26.4)	
Viral load	<50 Copies/ml (Suppressed)	84 (29.2)	0.001
	200-199 Copies/ml (Unsuppressed)	154 (53.5)	
	≥1000 Copies/ml (Unsuppressed)	33 (11.5)	

4.7.8 Relationship between dietary practices and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

The findings show that dietary diversity among adolescents was generally fair, with 46.5% achieving high diversity and 44.8% falling in the moderate range. Only 2.8% had low dietary diversity. The association between dietary diversity and nutrition-related outcomes was statistically significant (p = 0.001), indicating that most adolescents consumed a relatively varied diet, though gaps remain in quality and consistency.

Supplement use was reported by 57.3% of adolescents, while 36.8% did not use any nutritional supplements. This difference was significant (p = 0.001), suggesting that access to or awareness of supplementation is relatively high, though not universal. More than half of the respondents (58.3%) reported eating regular meals, while 35.8% did not, a difference that was also statistically significant (p = 0.001). Irregular meals may be linked to food insecurity, school schedules, or poor appetite.

When asked about appetite, 58.3% rated theirs as “good” and 16% as “very good,” while 19.8% reported a poor appetite. This association was again significant ($p = 0.001$), and may reflect side effects of ART, emotional stress, or illness all of which can impact dietary intake and nutritional status. These findings highlight that while most adolescents have moderately diverse diets and receive some level of dietary support, nutritional challenges remain, particularly for those with poor appetite or inconsistent meal patterns. Targeted interventions should address not only food variety but also appetite management, meal planning, and supplement access (Table 4.22).

Table 4.22: Relationship between dietary practices and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

Characteristic	Description	n=271 (%)	P-value
Dietary diversity score	Low dietary diversity (0 – 3)	8(2.8)	0.001
	Moderate dietary diversity (4 – 5)	129(44.8)	
	High dietary diversity (6 -12)	134 (46.5)	
Supplements	No	106(36.8)	0.001
	Yes	165(57.3)	
Regular Meals	Yes	168(58.3)	0.001
	No	103(35.8)	
Appetite	Very good	46(16)	0.001
	Good	168(58.3)	
	Poor	57(19.8)	

4.7.9 Adolescent related factors and the nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

The results from chi-square tests showed significant associations between adolescent-related factors and the nutrition status of the study participants. Good HIV knowledge (p=0.008) was associated with good nutrition status. However, attitude did not show a

significant association with nutrition status (p=0.236), indicating that the difference in nutrition status is not significantly linked to whether the attitude is good or poor, (Table 4.23).

Table 4.23: Relationship of adolescent related factors and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

Characteristic	Description	n=271 (%)	P-value
HIV knowledge	Good	232(85.60)	0.008
	Poor	39(14.40)	
Attitude	Good	186(68.60)	0.236
	Poor	85(31.40)	

4.8 Regression analysis

The study regressed the variables that were found to have a significant relationship to ascertain the specific variables that predicted the ART adherence, dietary practices and nutrition status. A binary logistic regression analysis was done where the nutrition status was grouped into two categories of good nutrition status and poor nutrition status, ART adherence divided into good adherence and poor adherence and dietary practices categorized into good practices and poor practices.

4.8.1 Regression analysis between social demographic characteristics, adherence to ART, dietary practices and nutrition status

A binary logistic regression analysis was conducted to evaluate the impact of various socio-demographic variables on the nutrition status (BMI for Age) of 271 study participants. The logistic regression analysis revealed that household size was a statistically significant predictor of ART adherence. Compared to adolescents from households with 1–3 members (reference group), those from households with 4–6 members had significantly lower odds

of good adherence (AOR = 0.322; 95% CI: 0.172–0.604; p = 0.001), and those from households with 7–9 members had even lower odds (AOR = 0.132; 95% CI: 0.047–0.373; p = 0.001). This suggests that living in larger households may negatively impact adherence, possibly due to reduced supervision, resource constraints, or competing demands at home. Sex and age were not significantly associated with adherence. Female adolescents had slightly lower odds of adherence compared to males (AOR = 0.642; 95% CI: 0.642–1.153; *p* = 0.138), while older adolescents (15–19 years) also showed no significant difference in adherence compared to those aged 10–14 (AOR = 0.878; 95% CI: 0.490–1.572; *p* = 0.878). Religion was not a significant predictor either (AOR = 1.794; 95% CI: 0.138–23.270; *p* = 0.655), likely due to the very small number of Muslim respondents.

Overall, household size was the strongest and only significant predictor in the model, suggesting that adolescents from larger households may need more tailored adherence support within the home setting (Table 4.24)

Table 4.24: Regression analysis between social demographic characteristics, adherence to ART, dietary practices and nutrition status

Characteristic	description	N=271 COR (CI)*	P**	N=271 AOR (CI)***	P**
Sex	Male (ref.)				
	Female	0.648(0.360-1.168)	0.149	0.642(0.642-1.153)	0.138
Age (yrs)					
	10–14 (ref)				
	15–19	0.898 (0.491 - 1.643)	0.728	0.878 (0.490-1.572	0.878
Household size	1-3 (ref)		0.001		0.001***
	4-6	0.322 (0.172-0.603)	0.001	0.322 (0 .172-0.604)	0.001***
	7-9	0.133(0.047-0.377	0.001	0.132 (0.047-0.373)	0.001***
Religion	Christian (ref)				
	Muslim	1.769 (0.136-22.934)	0.663	1.794 (0.138-23.270	0.655

COR [CI]* is an acronym for the crude odds ratio and their confidence intervals
**** p** stands for p-value: significance level at $p < 0.05$
*****AOR [CI]** is an acronym for adjusted odds ratio with their confidence intervals. It was adjusted for gender, marital status and education
******significant relationship

4.8.2 Regression analysis between ART adherences and nutrition status adolescents living with HIV attending Kiambu Level 5 Hospital

A binary logistic regression was used to assess whether adherence level, ARV regimen, and viral load significantly predicted the nutrition status (BMI for age) among the study participants. The nutrition status was classified as either good or poor nutrition and then regressed with these variables. In relation to BMI for age and adherence level, the results suggested that participants with moderate adherence (6-7 scores) were approximately 2 times more likely to be well-nourished compared to those with low adherence (<6 scores) (AOR: 1.83; 95% CI: 1.038-3.215; p=0.037). Those with low adherence were less likely to be well-nourished (AOR: 0.62; 95% CI: 0.038-1.215; p=0.003).

The analysis on ARV regimen indicated no significant difference in nutrition status between participants on the second-line regimen and those on the first-line regimen (AOR: 0.73; 95% CI: 0.420-1.272; p=0.268). For viral load, participants with a viral load of 200-199 copies/ml (unsuppressed) were approximately 51% less likely to be well-nourished compared to those with a viral load of <50 copies/ml (suppressed) (AOR: 0.51; 95% CI: 0.279-0.914; p=0.024). Participants with a viral load of ≥1000 copies/ml (unsuppressed) did not show a significant difference in nutrition status compared to those with suppressed viral load (AOR: 0.70; 95% CI: 0.273-1.804; p=0.46). These findings show that moderate adherence is positively associated with better nutrition status, while low adherence and unsuppressed viral loads are significant predictors of poor nutrition status. The type of ARV regimen does not significantly affect nutrition status (Table 4.25).

Table 4.25: Regression analysis between ART adherence and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

	Description	**AOR (CI)*** **	**P****
Adherence Level	Good Adherence (8 scores)	2.123 (2.022-4.012)	0.112
	Inadequate adherence (6-7 scores)	1.827(1.038-3.215)	0.037***
	Poor adherence (< 6 scores)	0.617(.038-1.215)	0.003***
ARV Regimen	First line (ref)		
	Second line	0.731 (0.420-1.272)	0.268
Viral load	<50 Copies/ml (Suppressed)		0.07
	200-199 Copies/ml (Unsuppressed)	0.505 (0.279-0.914)	0.024***
	≥1000 Copies/ml (Unsuppressed)	0.702 (0.273-1.804)	0.46

** p stands for p-value: significance level at p < 0.05
***AOR [CI] is an acronym for adjusted odds ratio with their confidence intervals. It was adjusted for gender, marital status and education
****significant relationship

4.8.3 Regression analysis between dietary practices and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

A binary logistic regression analysis results indicated that dietary diversity score, supplement intake, regular meal consumption, and appetite level were significant predictors of nutrition status. Participants with moderate High diversity (8) (AOR: 0.813; CI: 0.070-0.406; p=0.001) and moderate dietary diversity (6-12) (AOR: 0.213; CI: 0.090-0.506; p=0.001) were likely to have good nutrition status compared to those with low dietary diversity (0-3). Those who consumed supplements were more likely to have good nutrition status (AOR: 0.70; CI: 0.28-0.172; p=0.001). Participants who did not consume regular meals were more likely to have poor nutrition status compared to those who consumed regular meals (AOR: 3.262; CI: 1.616-6.586; p=0.001). Respondents with a very good appetite were more likely to have good nutrition status compared to those with a poor appetite (AOR: 6.316; CI: 2.926-13.635; p=0.00). These findings suggest that higher dietary diversity, supplement intake, and very good appetite are associated with good nutrition status, while lack of regular meals is associated with poor nutrition status (Table 4.26)

Table 4.26: Regression analysis between dietary practices and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

Characteristic	Description	AOR (CI)***	P**
Dietary diversity score	Low dietary diversity (0 – 3) (ref)		0.002***
	Moderate dietary diversity (4 – 5)	0.813(0.070-.406)	0.001***
	High dietary diversity (6 -12)	0.213(0.090-0.506)	0.001***
Supplements	No (ref)		
	Yes	0.70(0.28-0.172)	0.001***
Regular Meals	Yes (ref)		
	No	3.262(1.616-6.586)	0.001***
Appetite	Poor (ref)		
	Good	2.565 (.0.912-7.213)	0.74
	Very good	6.316(2.926-13.635)	0.001***

** p stands for p-value: significance level at $p < 0.05$
***AOR [CI] is an acronym for adjusted odds ratio with their confidence intervals. It was adjusted for gender, marital status and education
****significant relationship

4.8.4 Regression analysis between adolescent related factors influencing dietary practices, ART adherence and nutrition status

A binary logistic regression was used to assess whether the adolescent related factors **(**knowledge and attitude variables) significantly predicted the nutrition status (BMI for age) of the study participant. The nutrition status was categorized into two categorises – poor and good nutrition status and regressed with knowledge and attitude on HIV. The results for the regression on the BMI for age shown that the respondents with good knowledge were three times likely to have good nutrition status compared to those with poor knowledge (AOR:3.413; CI:1.550-7.514; p=0.002), those with good attitude had 16 % likelihood of having good nutrition status however it was not significant (AOR:1.161; CI:0.685-1.967; p=0.579).

4.9 Qualitative results

4.9.1 Qualitative Results from Focus Group Discussion

This study's results are drawn from a focus group discussion held on May 2024 with ten adolescents living with HIV/AIDS not part of the main study, who shared their experiences around adherence to antiretroviral therapy (ART), diet practices, nutrition status, and coping mechanisms. Below is an outline of each of thematic areas discussed within this discussion group.

Section 1: Adherence

Most participants reported taking their antiretroviral therapy (ART) daily, often with help from alarms or reminders from family. For example, one participant shared that taking her medications daily was due to being reminded by their mom who acts as an "alarm clock." However, some participants noted that taking medication could sometimes be difficult. "*When traveling or away from home it's hard to remember*" (KL5H discussant, May 2023) admitted one participant while another expressed feeling sick often enough to want to skip her medications altogether.

As they discussed their medications, many participants reported experiencing side effects like dizziness and nausea after taking their pills; one girl stated, *"after taking my pills I sometimes feel like throwing up."* Yet most understood its importance for maintaining good health: one boy stated, *"If I miss a dose, I know it should be taken as soon as possible if remembered,"* but others where uncertain what action should be taken if one is missed for longer than expected.

Section 2: Dietary Practices

When asked to name their favorite foods, many participants mentioned traditional staples like chapati, ugali and rice. Chapati was often their top pick; however, they couldn't always afford it due to budget restrictions; another stated they mostly opt for cheaper meals like ugali and Sukuma instead. Asked which foods they prefer when feeling unwell, some adolescents said lighter options like porridge were their preference. *"Porridge helps when I feel weak,*" stated one participant.

As participants discussed their daily diets, most reported simple and predictable meals "*Breakfast typically consists of tea or porridge; lunch often features ugali with vegetables; dinner usually features more of the same,"* one participant shared. A few also made note that certain types of foods they avoided: one boy noted: *"I don't enjoy fatty foods; they make me uncomfortable."* Group participants generally agreed that nutritious food is key to good health; one participant noted, *"Without proper food, medicine doesn't work as effectively",* with many also agreeing that proper nutrition is a cornerstone of managing their condition.

Section 3: Nutrition Status.

When asked how they felt about their body and health, several participants expressed discontent. *"Since beginning my medication, I've gained weight that I don't like the look of,"* one said. Another participant lamented, "*Even though I take my pills regularly, I still feel tired most days; and don't know if I'm eating the right food."* (KL5H discussant, May 2023).

Some participants saw noticeable improvement in their energy levels since beginning ART, such as when one participant shared, "*Before I was always tired, but now I have more strength*," as compared to "*before, I was always tired, but now I have more strength*". Yet others reported concerning fluctuations in their weight; one boy shared, "*People have noticed I have thinned out...this makes me uncomfortable*".

The group generally agreed that feeling energetic and having a healthy appetite were indicators of good health, with several girls noting, "*When I have energy and can eat well, it tells me I'm doing okay*." Conversely, many participants associated fatigue as being indicative of poor health; another participant pointed out.

Section 4: Coping and Support Systems

Many participants cited their caregivers, particularly parents and older siblings, as the primary support in taking their medications and accessing nutritious food. One boy mentioned how his mom reminds him to take his meds; another participant mentioned how her sister helped keep him on track with eating well and his medication regimen.

Emotionally, many participants of this study reported feeling sad or anxious about their HIV status, often at times of reflection about its future. One girl admitted feeling this way "when thinking about my future", while many reported feelings particularly overwhelmed during health check-ups or when discussing progress with healthcare workers; *"check-ups*

always make me nervous because of worrying about results", one participant expressed their anxiety.

As part of their coping mechanisms, several participants relied on their mothers for emotional support*: "My mom is who I turn to when I feel down."* Others relied on friends or peer support groups. One boy commented that they understood what he was experiencing - together they talked and encouraged one another.

When asked what helped keep them going through difficult times, many participants highlighted having a routine as being the source of strength. One participant shared how keeping to his or her medication schedule kept them grounded while family and friends provided additional strength - *"my family reminds me I am not alone"*.

Table 4.27: Challenges, coping strategies, and support systems among adolescents living with HIV attending Kiambu Level 5 Hospital
(Drawn from Focus Group Discussion – May 2024)

Challenges Experienced	Coping Strategies Used	Support Systems Involved
Forgetting medication when traveling or away from home	Use of alarms or reminders from caregivers	Parents (especially mothers), older siblings
Side effects from ART (nausea, dizziness, fatigue)	Taking lighter meals (e.g., porridge); resting after medication	Peer encouragement, healthcare workers
Stigma and fear of disclosure at school	Hiding medication, avoiding talking about HIV	Friends, trusted classmates
Lack of dietary variety due to financial constraints	Repeating meals (e.g., ugali and sukuma); avoiding expensive foods	Household caregivers
Emotional distress and anxiety about health/future	Talking to supportive peers or caregivers; maintaining medication routine	Mothers, peer support groups
Poor appetite or discomfort during illness	Consuming soft foods (e.g., porridge, tea)	Family members providing food
Low motivation or isolation	Staying connected with support networks	Friends, family routines

Section 5: Recommendations

As participants discussed potential improvements to their medication regimen, most suggested decreasing pill count or size; one participant suggested *"fewer or smaller pills would make things simpler"*, with others concurring in his suggestion.

Few participants recommended additional focus group discussions as beneficial. *"We need more of these meetings where we can share what's bothering us; it helps,"* stated one participant. Regarding healthcare provider support, many participants felt more personalized attention would be beneficial. *"Nurses should spend more time listening to us*

about side effects," suggested one girl; while another wanted more guidance regarding their diet; one boy mentioned.

Finally, when asked for their advice to other adolescents living with HIV, most participants emphasized the significance of seeking support and remaining positive. One participant advised others: *"Don't be afraid to talk to someone. It makes a significant difference,"* while another commented that living with HIV doesn't limit anyone from living their best lives - remain strong, don't isolate yourself and you won't become less than awesome.

Focus group discussion at Kiambu Level 5 Hospital revealed several key areas influencing ART adherence, diet practices, and emotional well-being for adolescents living with HIV/AIDS. Participants reported similar challenges related to adhering to their treatment and proper nutrition; insights gained show the significance of offering ongoing support services so these adolescents can manage their health more efficiently.

CHAPTER 5: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter discusses the key findings of the study in relation to the research objectives and compares them with findings from previous literature. The discussion focuses on ART adherence, dietary practices, nutritional status, and factors influencing these outcomes among adolescents living with HIV. Where relevant, both quantitative and qualitative findings are integrated to provide a more complete understanding of the results.

5.1.1 Demographic and Socio-economic Characteristics

Socio-demographic and economic factors of the adolescents play a key role in shaping dietary practices, adherence to antiretroviral therapy (ART) and nutrition status. Such factors include gender, age, education level, religion, household size conditions, income, caregiver support among others (Weber et al., 2020)

Kiambu level five hospital findings indicated that most respondents (69.4%) were between 15-19 years (similar to Mozambique study results) with most ALHIV between this age range; most likely due to increased sexual activity and experimentation during this age bracket, as well as other risky behaviors like smoking or alcohol consumption - increasing transmission risks (Teasdale et al., 2021)

This study's findings are in line with other studies investigating gender's effect on nutritional status, adherence to antiretrovirals, and diet practices among adolescents living with HIV. This study's almost equal gender distribution between participants, 51.3% males

and 48.7% females, mirrors Thompson & Abel (2016)research, which also found no gender disparity in HIV prevalence rates. This study also underscored gender-based nutritional disparities; females may be more vulnerable to malnutrition due to social and cultural influences; this finding aligns with that of Kawuki et al., 2023). According to evidence from studies females face greater difficulties gaining access to nutritious food sources. This study's observation that gender influences ART adherence is consistent with findings by Verma et al. (2020),whereby females may face higher stigma while males engage in risky behaviors that influence ART uptake. Finally, gender-based differences in diet practice aligned with findings byRousham et al. (2020). This evidence highlights the need for gender-sensitive interventions that address specific health challenges faced by both male and female adolescents living with HIV.

Household size plays a pivotal role in shaping the nutrition status of adolescents living with HIV (Weiser et al., 2015). Numerous research studies have demonstrated this fact; larger households tend to be more at risk from issues relating to food insecurity, leading to poor nutritional status in these adolescents. Study by Bukusuba et al. (2007) revealed that food insecurity was more likely to occur among larger households and diet diversity was generally low - this trend improved with reduction of household size. Large households often prioritize quantity over quality when it comes to diet, leading to unhealthy dietary practices. In this study, most participants came from households of 4-6 members - this finding corresponded with Weldegebreal et al. (2018b)findings in Nigeria where medium-sized households made up the bulk of ALHIV patients.

This study found that an overwhelming majority of respondents identified as Christian (98.9%), with only a small minority identifying as Muslim (1.1%). This religious distribution is consistent with regional demographics and has been found in other research studies. Stanic et al. (2021)noted an abundance of Christian respondents when studying relationship dynamics and HIV risk among urban adolescents; Chikere and Okonkwo (2021) discovered how religious beliefs, particularly within Christian communities, can significantly impact health behaviors such as antiretroviral therapy (ART) adherence and diet practices.

Education levels play a crucial role in shaping health outcomes, particularly within chronic illness management. In this study, 44.6% of adolescents were attending secondary school, and 23.6% had reached tertiary education; these findings align with Mahat & Scoloveno (2018)finding that higher educational attainment among adolescents correlates with better ART adherence due to increased health literacy and self-management abilities; additionally, Crowley & Rohwer (2021)work shows how education enhances understanding of HIV medication regimens while encouraging their adherence.

Thus study assessed the caregiver education levels, whereby 34.7% had completed secondary school and 25.8% holding college or university degrees. According to Liu et al. (2020) higher education levels among caregivers correlates with better health outcomes in their charges' children, as educated caregivers are more likely to understand medical instructions and offer necessary support. Conversely, 5.2% of caregivers without formal education could struggle with managing HIV in ways that would compromise adolescents'

health, according to study by Kalichman et al. (2016)where lower education levels were linked with poorer health literacy and poor adherence.

Economic stability within households, often determined by caregivers' occupation and income, has an immense effect on healthcare access and dietary practices. According to this study, most caregivers engaged in informal employment (52.4%) while 38.7% worked formal jobs. Informal employment typically features low pay with job insecurity that makes accessing healthcare and nutritious food costly and inaccessible. Verma et al. (2020)highlighted when they found that informal employed caregivers faced major barriers accessing services for their children in healthcare due to job insecurity and informally employed caregivers being excluded from formal.

Income levels indicated that 56.8% of caregivers earned between 20,000-30,000 KES per month, which may not cover all household needs including healthcare and nutrition. This finding aligns with those by Kimani-Murage et al. (2015)who found that low-income households struggled to meet nutritional needs of children living with HIV, leading to compromised health outcomes. On the contrary, Abuya et al. (2018)discovered that households with strong social support networks could maintain improved health outcomes despite low-income levels; suggesting income isn't the sole factor determining health.

Housing stability and quality are crucial to the health and well-being of adolescents living with HIV/AIDS. In this study, 74.5 % of families lived in rented houses while a significant percentage resided in small houses with one or two rooms. These findings support Chacha

et al. (2023)who reported that overcrowded and unstable housing conditions in urban areas contribute to stress, poor health outcomes in vulnerable populations such as adolescents living with HIV.

Poor housing conditions found in informal settlements such as rentals can worsen health issues such as adhering to antiretroviral therapy (ART) regimens and maintaining a nutritious diet, according to research conducted by Almeida et al. (2019)which revealed that adolescents living in inadequate housing are more likely to experience food insecurity and have lower adherence rates to ART. In contrary Mesic et al. (2019)presented an opposing view suggesting that community cohesion in informal settlements may mitigate some negative health outcomes by providing support networks which facilitate adherence and dietary practices.

From the study findings a total of 81.9% respondents relied on purchased food as their main source of nutrition, this highlighted economic vulnerabilities that may impact food security. This was especially key in urban settings with high cost of living where income changes may alter access to nutritious food sources. These findings support research conducted by Weiser et al. (2015)that demonstrated food insecurity is a significant barrier to maintaining adequate nutritional status among those living with HIV.

Natural gas/LPG was used by considerable number of families as their main cooking energy source is an encouraging sign, as this has been linked to improved respiratory health and lower levels of indoor air pollution. This result agrees with WHO (2023)guidelines

promoting cleaner cooking fuels to reduce infections associated with compromised immune systems such as adolescents living with HIV. Conversely, 26.9% of families using firewood or charcoal may expose themselves to greater risks for respiratory problems, as demonstrated by studies by Pereira et al. (2016)which link traditional cooking methods with increased respiratory infections as well as other health issues related to this age group.

In this study, adolescents were engaged in income-generating activities (IGAs), including part-time jobs. While such activities may provide essential financial support, they may also interfere with academic pursuits and health management - specifically ART adherence. further supported this observation, noting that adolescents engaging in economic activities face difficulties balancing work with school and health obligations, potentially leading to worse health outcomes. However, Mesic et al. (2019)found that adolescents participating in supportive work environments were better able to maintain their antiretroviral treatment (ART) regimens.

5.1.2 ART adherence among adolescents living with HIV attending Kiambu Level 5 Hospital

Adherence to ART is a fundamental determinant of health outcomes among adolescents living with HIV/AIDS (ALHIV). In this study, more than half of the respondents (54.6%) demonstrated moderate adherence levels, while only 3% showed optimal adherence. These findings align with global trends where adolescents consistently exhibit lower adherence compared to other age groups, often due to psychosocial and developmental challenges (Iacob et al., 2017). Similar observations were made by MacCarthy et al. (2018), who noted

that stigma, forgetfulness, and lack of adolescent-friendly services hinder optimal adherence.

The current findings corroborate with a study by Simelane et al. (2022), which highlighted that school commitments and fear of unintended disclosure at school remain key barriers to consistent medication use. Additionally, our study found that poor adherence was more prevalent in the younger age group (10–14 years), possibly due to lower health literacy and greater dependency on caregivers for treatment management. This is supported by Bygrave et al. (2012), who noted that adolescents often struggle with pill fatigue and inconsistent caregiver support.

In Kenya, adherence remains a persistent issue. According to NASCOP (2022), only a fraction of adolescents meet the recommended >95% adherence threshold necessary for viral suppression. Our findings indicate that interventions must be strengthened to improve adherence outcomes in this population. Strategies such as caregiver involvement, peer-led support groups, and integration of ART adherence counselling into school programs have shown promise and should be prioritized (Saha et al., 2024).

Furthermore, the type of ART regimen significantly influenced adherence and nutrition outcomes, with those on first-line treatment showing better adherence. This suggests that regimen tolerability may play a crucial role, as supported by Smith & Jackson (2018), who reported that side effects and complexity of second-line treatments often reduce adherence rates.

Viral load suppression is a key indicator of successful antiretroviral therapy (ART) adherence and management, however most adolescents had unsuppressed viral loads with only a minority reaching viral suppression below 50 copies/ml. Studies have identified adolescents with viral loads exceeding 200 copies/ml as being at an increased risk for disease progression and transmission, suggesting significant challenges in reaching optimal treatment outcomes. Unsuppressed viral loads are often linked to poor ART adherence, drug resistance or insufficient treatment support as noted by Mesic et al. (2019) Adolescents with over 1000 copies/ml should be of particular concern as this indicates a greater risk of virologic failure and drug-resistant strains of their virus. Previous research, such as that conducted by (Kamau et al., 2024)has confirmed this finding by noting how these adolescents often face significant barriers to adherence such as psychosocial factors, stigma and transitioning between pediatric care services and adult care services.

5.1.3 Dietary practices of adolescents living with HIV/AIDS

The study revealed that dietary practices among adolescents living with HIV were generally suboptimal. A significant proportion of respondents reported consuming fewer than three meals per day, while dietary diversity was low, with limited intake of animal-source foods, fruits, and vegetables. These findings are consistent with Tekelehaimanot et al. (2021), who found that ALHIV in resource-limited settings frequently consume diets dominated by starchy staples, with inadequate micronutrient-rich foods.

Adolescents in this study reported meal skipping, often due to lack of food at home or poor appetite—sometimes linked to ART side effects. This is supported by Ivers et al. (2009),

who documented strong associations between food insecurity and poor dietary practices in HIV-positive populations. Meal skipping not only compromises nutrition but also undermines ART adherence and effectiveness, given that certain ART regimens require food for proper absorption and reduced side effects (Coles, 2014).

School attendance, particularly among those in boarding schools, emerged as another factor influencing dietary patterns. Adolescents in boarding schools often lacked access to diverse and adequate meals, and some reported challenges in meeting specific dietary needs while managing treatment. These findings echo those of Mwangome et al. (2020), who noted that school-based meal programs rarely cater for adolescents with chronic health conditions such as HIV.

Caregiver involvement in adolescent feeding was inconsistent. While some adolescents reported receiving caregiver support with meal planning or food preparation, others were responsible for their own meals, especially those from single-parent or extended family households. According to Ankrah et al. (2016), adolescents who receive emotional and practical support from caregivers tend to achieve better dietary outcomes and show greater adherence to nutrition advice.

Notably, less than half of the respondents in this study reported receiving consistent nutrition counselling during clinic visits. This reflects a broader gap in adolescent-focused services, as most HIV clinics in Kenya lack dedicated adolescent nutrition programs or trained staff (Mwangome et al., 2020). Strengthening nutrition counselling, integrating it

into ART follow-up sessions, and including caregivers in the counselling process would likely enhance both dietary and treatment outcomes.

5.1.4 Adolescent-related factors that influenced dietary practices, ART adherence, and nutrition status.

This study identified several adolescent-related factors that influenced dietary practices, ART adherence, and nutritional status. Key among them were age, HIV-related knowledge, attitudes toward treatment, stigma, and the level of personal responsibility in managing care.

Older adolescents (15–19 years) were more likely to manage their treatment independently compared to younger adolescents (10–14 years), who often relied on caregivers for reminders and medication administration. While independence is developmentally appropriate, it also exposes adolescents to challenges such as pill fatigue, missed doses due to forgetfulness, and lack of adherence to dietary guidelines (Iacob et al., 2017).

A major concern was stigma, both perceived and experienced. Several adolescents reported hiding their medication or skipping doses at school to avoid disclosing their status to peers or teachers. Fear of stigma also affected food intake, particularly for those living in extended families where food was shared and privacy limited. This finding aligns with Mburu et al. (2014), who observed that stigma reduces ART adherence and influences dietary behaviours among ALHIV.

Knowledge and attitudes also played a significant role. Adolescents with better understanding of HIV, ART importance, and nutrition were more likely to adhere to

medication and report higher dietary diversity. Those who held negative beliefs or lacked knowledge about the impact of nutrition on health outcomes demonstrated poorer adherence and nutritional status. Similar findings were reported by Crowley and Rohwer (2021), who emphasized the importance of adolescent-focused health education.

Mental health and emotional wellbeing were indirectly observed as influencing factors. Some adolescents reported feeling isolated, anxious, or hopeless, especially when lacking caregiver support or living with guardians unfamiliar with their treatment needs. These emotional stressors may reduce appetite, discourage treatment adherence, and contribute to undernutrition. The study findings support the need for integrated adolescent health services that include psychosocial counselling, tailored health education, peer support programs, and structured involvement of caregivers. Adolescents must be empowered with knowledge, coping strategies, and supportive environments to manage their treatment and nutrition effectively.

5.1.5 Nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

This study showed that a significant number of adolescents living with HIV were undernourished based on Body Mass Index-for-Age Z-scores (BAZ). Most of those affected had low dietary diversity and poor ART adherence, which likely contributed to their poor nutritional outcomes. These findings are consistent with research by Gebrie et al. (2023), who reported that undernutrition among HIV-positive adolescents in Ethiopia was linked to food insecurity and inconsistent medication use.

Adolescents who skipped meals or ate fewer than three times a day were more likely to have low weight-for-age scores. Inadequate intake of protein-rich and micronutrient-rich foods such as fruits, vegetables, eggs, and meat further increased the risk of undernutrition. These foods are essential for maintaining a strong immune system, especially in adolescents on ART. Similar results were reported by Tekelehaimanot et al. (2021), who found that low dietary diversity is a common cause of poor nutrition among adolescents living with HIV.

In this study, adolescents from low-income households were the most affected by undernutrition. Many lived in homes with limited food variety or experienced long periods without meals. This reflects findings from Ivers et al. (2009), who found that household food insecurity is a major barrier to good nutrition in people living with HIV. Furthermore, adolescents who had poor ART adherence were also more likely to be underweight, suggesting a link between medication consistency and nutritional outcomes.

Caregiver involvement also influenced nutrition. Adolescents who received help with meal planning or preparation from parents or guardians had better nutritional status than those who were left to manage on their own. Yet, nutrition counselling at the clinic was limited, with many adolescents reporting they had never received detailed advice on what to eat. This highlights a service gap at the facility level, similar to what Mwangome et al. (2020) observed in Kenyan HIV clinics.

In conclusion, this study shows that nutrition status among adolescents with HIV is closely linked to their eating habits, household food security, caregiver support, and ART adherence. Strengthening routine nutrition assessment, increasing counselling services, and providing support for food-insecure households are essential to improve adolescent health outcomes in HIV care.

5.1.6 Relationship between factors (social-demographic and dietary practices) and nutrition status of adolescents living with HIV attending Kiambu Level 5 Hospital

The study sought to establish the relationship between socio-demographic, socio-economic, dietary and the nutrition status of the adolescents living with HIV/AIDS.

5.1.6.1 Nutrition status in relation to demographic characteristics

This study found a significant relationship between ART adherence, dietary practices, and the nutritional status of adolescents living with HIV. Adolescents who were non-adherent to ART and had poor dietary diversity were more likely to be undernourished, as indicated by low BMI-for-age Z-scores. This supports findings by Christian and Smith (2018), who emphasized that consistent medication and adequate nutrition work together to improve health outcomes in adolescents with HIV.

The results showed that adolescents who consumed three or more meals daily and included a variety of food groups such as proteins, fruits, and vegetables were more likely to have normal nutritional status. On the other hand, adolescents who skipped meals, ate less diverse diets, or lacked appetite due to ART side effects were more likely to be

underweight. Similar associations were reported by Tekelehaimanot et al. (2021), who found that low dietary diversity and irregular meals significantly contributed to malnutrition among HIV-positive adolescents in Ethiopia.

Poor ART adherence was also strongly associated with undernutrition. Adolescents who missed doses regularly or skipped medication due to food unavailability had higher chances of being undernourished. This relationship highlights the two-way connection between nutrition and ART. As noted by Ivers et al. (2009), food insecurity reduces adherence, and poor adherence, in turn, weakens the immune system—worsening nutritional status and increasing the risk of disease progression.

The findings emphasize the importance of addressing both adherence and nutrition together in adolescent HIV care. Adolescents who received support from caregivers, nutrition counselling, and peer reminders showed better outcomes. However, many still lacked access to regular nutrition assessments or tailored counselling at the facility. This gap must be addressed through improved service integration and investment in adolescent-focused interventions.

5.1.6.2 Nutrition status in relation to socioeconomic characteristics

Analyses of socio-economic characteristics revealed significant associations with nutritional status of adolescents living with HIV/AIDS. School attendance and education level of adolescents was linked positively with improved nutrition, reflecting its key role in inculcating healthy eating practices and providing access to nutritional knowledge. This

finding is consistent with research that emphasizes the significance of education for enabling adolescents to make informed health decisions, particularly regarding chronic conditions like HIV/AIDS (Gupta & Suri, 2019). Higher caregiver education levels, formal employment status and household income all contributed to better nutrition outcomes in adolescents (Smith & Jackson 2018).

Housing conditions were an integral factor in nutritional status. Better house types and larger house sizes were associated with improved nutrition, suggesting secure living environments contribute to overall well-being. Also, reliable food sources and modern cooking facilities such as natural gas or LPG usage were linked with improved nutrition (Zhang & Li, 2016).

5.1.6.3 Nutrition status in relation to ART adherence

Chi-square test results confirmed significant correlations between antiretroviral therapy adherence and nutritional status of adolescents living with HIV/AIDS. High rates of antiretroviral therapy adherence were strongly linked with improved nutrition status, reflecting its critical importance in improving health outcomes for those living with HIV/AIDS. This finding aligns with existing research that highlights how adherence to antiretroviral therapy (ART) regimens is key for maintaining immune function, leading to better nutritional outcomes (Gupta & Suri, 2019).

Further, ARV regimen type was significantly related to nutritional status; those on first-line treatment regimens had better nutrition status. This may suggest that first-line ART,

typically more effective and better tolerated, may contribute to improved health and nutrition (Smith & Jackson, 2018). By suppressing viral load more effectively first-line ART is likely reducing risks such as opportunistic infections which could compromise nutrition negatively.

Viral load suppression was found to be positively associated with improved nutritional status in adolescents living with HIV/AIDS, with suppressed viral loads linked to improved nutrition (Zhang & Li, 2016). This finding supports this study showing how effective antiretroviral therapy (ART) leads to better health outcomes including enhanced nutritional status (Zhang & Li 2016).

5.2 Conclusion

The first objective of the study was to determine the socio-economic and demographic characteristics of adolescents living with HIV attending Kiambu Level 5 Hospital. This objective was descriptive and therefore not subjected to hypothesis testing. The results established that most respondents were in the older adolescent age group (15–19 years) with a fairly equal distribution by sex. Most resided in households of four to six members, and their caregivers primarily engaged in informal employment and possessed secondary-level education. These socio-demographic characteristics provide an important context for understanding treatment adherence, dietary practices, and nutritional outcomes among adolescents living with HIV.

The second objective was to determine adherence to antiretroviral therapy among adolescents. The null hypothesis (H_0) stated that there is no significant relationship between ART adherence and nutritional status. The chi-square and regression analyses revealed significant associations between ART adherence and nutritional status ($p = 0.013$; AOR = 2.31, $p = 0.020$). Since the p-value was less than 0.05, H_0 was rejected. The findings therefore confirm that ART adherence significantly influences nutritional status, with adolescents who adhered well to treatment demonstrating better nutritional outcomes. This shows the critical role of adherence support in improving adolescent health.

The third objective was to assess dietary practices among adolescents living with HIV. The null hypothesis (H_0) stated that there is no significant relationship between dietary practices and nutritional status. The results showed that dietary diversity had a statistically significant association with nutritional status ($p = 0.003$; AOR = 2.89, $p = 0.004$). Consequently, H_0 was rejected. The findings demonstrate that dietary practices, particularly dietary diversity, are central determinants of nutritional status. Adolescents with higher dietary diversity were more likely to achieve normal nutritional status, highlighting the need to integrate nutrition education and interventions into adolescent HIV care.

The fourth objective was to determine adolescent-related factors influencing ART adherence, dietary practices, and nutritional status. The null hypothesis (H_0) stated that there is no significant relationship between adolescent-related factors and nutritional status. Chi-square tests showed significant associations ($p < 0.05$) between adolescents' knowledge, attitudes, and nutritional outcomes. Thus, H_0 was rejected. The results indicate

that correct knowledge and positive attitudes toward HIV, ART, and nutrition were associated with improved adherence, healthier dietary practices, and better nutritional status. This illustrates the importance of adolescent-focused counselling and empowerment in HIV and nutrition programs.

The fifth objective was to establish the nutritional status of adolescents living with HIV attending Kiambu Level 5 Hospital. This was a descriptive objective and was not tested through hypotheses. The findings revealed that 74.3% of adolescents had normal nutritional status, 15.2% were underweight, and 10.5% were overweight or obese. These results demonstrate the existence of a double burden of malnutrition within this population, with both undernutrition and overnutrition posing significant health challenges.

In summary, the study concludes that ART adherence and dietary practices are significant, modifiable determinants of nutritional status among adolescents living with HIV. Furthermore, socio-economic characteristics and adolescent-related factors such as knowledge and attitudes exert additional influence on these outcomes. These findings highlight the need for integrated interventions that address adherence support, nutrition education, and socio-economic empowerment to optimize health outcomes for adolescents living with HIV.

5.3 Recommendations

5.3.1 Recommendations for Practice

1. Strengthen adolescent-focused ART adherence counselling at Kiambu Level 5 Hospital, integrating nutritional education into HIV care.
2. Implement regular dietary diversity screening for adolescents living with HIV as part of routine clinical follow-up.
3. Develop caregiver-targeted interventions to improve knowledge and practices related to adolescent nutrition and HIV management.
4. Enhance collaboration between nutritionists, clinicians, and counsellors to provide coordinated care addressing both medical and nutritional needs.

5.3.2 Recommendations for policy

1. I**ntegrate targeted nutrition education into adolescent HIV care**. National HIV guidelines should mandate the inclusion of structured, age-appropriate nutrition education sessions for adolescents during routine ART clinic visits. These should cover dietary diversity, meal planning, and managing ART-related side effects through diet.
2. **Institutionalize regular nutrition assessment and monitoring** – Facilities should be required to conduct quarterly dietary diversity assessments and BMI-for-age evaluations for all adolescents living with HIV, with results recorded in patient files for follow-up and trend analysis.

3. **Strengthen caregiver engagement in adolescent HIV programs** – Develop policy frameworks that make caregiver participation in nutrition and ART adherence counselling a standard component of care, with flexible clinic hours to accommodate working caregivers.
4. **Enhance multi-disciplinary collaboration in HIV care** – County and national policies should support the integration of services so that nutritionists, clinicians, pharmacists, and counsellors jointly manage adolescent HIV cases, ensuring a holistic approach to treatment and nutritional support.
5. **Incorporate adolescent-focused adherence strategies into national HIV guidelines** – This includes establishing peer-support groups, mobile reminders, and adolescent-friendly clinic scheduling to reduce missed doses and improve treatment outcomes.
6. **Promote socio-economic support programs within HIV care frameworks** – Policies should encourage partnerships with social protection and economic empowerment programs targeting households of adolescents with HIV, aiming to reduce food insecurity and improve diet quality.

5.3.2 Recommendations for research

1. **Longitudinal impact studies** – Conduct prospective cohort studies to assess how ART adherence and dietary diversity influence nutritional status and treatment outcomes in adolescents over time, allowing for causal inference rather than cross-sectional snapshots.
2. **Socio-economic determinants of dietary diversity** – Investigate how factors such as caregiver education, household income, and food access influence the ability of

adolescents living with HIV to maintain adequate dietary diversity across different counties in Kenya.

3. **Micronutrient interventions** – Evaluate the effectiveness of targeted micronutrient supplementation (e.g., iron, zinc, vitamin A) on immune function, ART tolerance, and nutritional recovery in adolescents living with HIV.
4. **School-based nutrition and adherence programs** – Study the feasibility and impact of embedding nutrition counselling, ART adherence support, and meal provision into school health programs for adolescents with HIV, particularly in high-burden areas.
5. **Adolescent psychosocial factors and health outcomes** – Explore how knowledge, attitudes, and stigma influence ART adherence, dietary practices, and nutritional status, using mixed-method approaches to capture both quantitative trends and lived experiences.
6. **Intervention trials for integrated HIV–nutrition care** – Test multi-component interventions combining adherence counselling, nutrition education, caregiver engagement, and economic empowerment to determine the most cost-effective strategies for improving adolescent health outcomes.

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APPENDICES

APPENDIX A: INFORMED CONSENT

My name is **Patrick Wanjohi Nyawira**. I am a Masters student from Kenyatta University. I am conducting a study on "**Antiretroviral Therapy Adherence, Diet Practices and Nutritional Status among Adolescents attending Kiambu Level 5 Hospital in Kiambu, County Kenya**. The information collected (findings) will be used by the Ministry of Health to enhance its management of individuals living with HIV/AIDS at Kiambu Hospital and similar healthcare facilities across Kenya.

Procedures to be followed

Participation in this study will include asking you questions about your diet, adherence to antiretroviral therapy and relevant health data as well as conducting nutritional assessments. Your participation is entirely voluntary - regardless of which option you select, no aspect of medical care and treatment at our HIV clinic will change as a result; plus, you have every right to raise any queries at any point regarding the study itself.

You have the right to refuse participation in this study. You will get the same care and medical treatment whether you agree to join the study or not and your decision will not change the care you will receive from the clinic today or that you will get from any other clinic at any other time.

Please remember the participation in this study is voluntarily. You may ask questions related to the study at any time. You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from this clinic or any other organization now or in the future.

Discomforts and Risks

Some of the questions you will be asked are on intimate subject and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time. The interview may add approximately half an hour to the time you wait before you receive your routine services.

Benefits

By taking part in this study, you will help create a more in-depth understanding of nutritional status and dietary practices, ultimately benefitting care for HIV-infected patients as well as future healthcare planning for the community. Furthermore, any identified nutritional issues will receive guidance for management within an HIV clinic in accordance with Ministry of Health guidelines.

Reward

Upon you voluntarily choose to take part in the study, you will not be eligible for any kind of compensation.

Confidentiality

The interviews and examinations will be conducted in a private setting within the clinic. Your name will not be recorded on the questionnaire. Your information will be kept in the strictest confidence, and they won't be utilized for anything other than the study's objectives.

Contact Information

If you have any questions, you may contact supervisor 1. Dr. Winfreda Nyamota - 07213471441 or Dr. Supervisor 2. Regina Kamuhu - 0717655404 or the Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke, secretary.kuerc@ku.ac.ke, secretariat.kuerc@ku.ac.ke

Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care that I will receive from the clinic today or that I will get from any other clinic at any other time.

Name of Participant……

_____ _____

Signature or Thumbprint Date

Investigator's statement

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved

Name of Interviewer……

_____ _____

Signature or Thumbprint Date

APPENDIX B: INFORMED ASSENT FOR CHILDREN

Project Title: Antiretroviral Therapy Adherence, Diet Practices and Nutritional Status among Adolescents attending Kiambu Level 5 Hospital in Kiambu, County Kenya.

Protocol Number: _____

Principal Investigator: PATRICK WANJOHI NYAWIRA

The investigators named above are doing a research study.

These are the things we want you to know about research studies:

We are asking you to be in a research study. Research is a way to test new ideas. Research helps us learn new things.

Whether or not to be in this research is your choice. You can say Yes or No. Whatever you decide is OK. We will still take good care of you.

What is the study about?

My name is Patrick Wanjohi Nyawira. I am a Masters student from Kenyatta University. I am conducting a study on "Antiretroviral Therapy Adherence, Diet Practices and Nutritional Status among Adolescents attending Kiambu Level 5 Hospital in Kiambu, County Kenya. The information collected (findings) will be used by the Ministry of Health to enhance its management of individuals living with HIV/AIDS at Kiambu Hospital and similar healthcare facilities across Kenya.

Why am I being asked to be in this research study?

You are being asked to be in the study because you have met the criteria for this study.

What will happen during this study?

By Participation in this study, you will ask questions about your diet, adherence to antiretroviral therapy and relevant health data as well as conducting nutritional assessments (taking weight height and MUAC)

Will the study hurt/risks?

Some of the questions you will be asked are on intimate subject and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time. The interview may add approximately half an hour to the time you wait before you receive your routine services.

What else should I know about the study?

If you feel sick or afraid that something is wrong with you, tell an adult at once. You do not have to answer any questions that are asked of you.

What are the good things /benefits that might happen?

By taking part in this study, you will help create a more in-depth understanding of nutritional status and dietary practices, ultimately benefitting care for HIV-infected patients as well as future healthcare planning for the community. Furthermore, any identified nutritional issues will receive guidance for management within an HIV clinic in accordance with Ministry of Health guidelines.

What if I don't want to be in this study?

You do not have to be in the study if you do not want to. You will not lose any care or service

Who should I ask if I have any questions?

If you have any questions, you may contact supervisor 1. Dr. Winfreda Nyamota - 07213471441 or Supervisor 2. Dr.Regina Kamuhu - 0717655404 or the Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke, secretary.kuerc@ku.ac.ke, secretariat.kuerc@ku.ac.ke

Do I have to be in the study?

No, you do not have to be in the study. Even if you say yes now, you can change your mind later. It is up to you. No one will be mad at you if you don't want to do this.

Signatures

Before deciding if you want to be in the study, ask any questions you have. You can also ask questions during the time you are in the study.

If you sign your name or put a mark below, it means that you agree to take part in this research study.

Your Name (Printed)	Age

APPENDIX C: STRUCTURED QUESTIONNAIRE

Research Topic - Antiretroviral Therapy Adherence, Dietary Practices, and Nutrition Status of Adolescents Living With HIV/AIDS Attending Kiambu Level 5 Hospital, Kiambu County, Kenya.

PART A: INTERVIEW RECORD

Questionnaire number:	
Participant residence:	
Interviewer's name:	
Interview date	(dd/mm/yyyy: _ _/_ _/_ _ _ _
Interview duration	Time started …… Time ended …….
Signed assent and consent	Yes (proceed with interview) 2 = No (terminate the interview)

PART B: DEMOGRAPHIC AND SOCIAL ECONOMIC CHARACTERISTICS

	DEMOGRAPHIC INFORMATION	
B1.	Age in years	
B2.	Sex of the respondent	1. Male 2. Female
B3.	Are you currently attending school or any educational institution?	1. Yes 2. No
	If yes, what type of school are you attending?	1. Public, 2. Private, 3. Homeschooling
B4.	If not attending school, what is the reason?	1. Lack of financial resources 2. Discrimination or stigma 3. Health related issues 4. Other (specify: ……..)
B5.	What is your current educational level?	1. Primary school (grade 1-8) 2. Secondary school (grade 9-12) 3. College/University 4. Not attending school 5. Other (Please specify: (_____)
B6.	Relationship status Tick/circle only one option	1. Single 2. In a relationship 3. Other (please specify)- …….....
B7.	Whom do you live with?	1. Parents/guardians 2. Relatives 3. Living independently 4. Living in a foster home 5. Other (please specify) _____

B8.	What is the highest level of education completed by your primary caregiver?	1. No formal education 2. Primary education (up to grade 8) 3. Secondary education (up to grade 12) 4. College/University degree or higher
B9.	How many people live in the household including you.	1. 1-3 2. 4-6 3. 7-9 4. 10 or more
	SOCIO ECONOMIC AND HOSUING INFORMATION	
B10.	Are you involved in any income-generating activities or employment?	1. Yes 2. No
B11.	If yes, what type of income generating activity or employment	1. Part-time job 2. Full-time job 3. Self-employed
B12.	What is the primary source of income for the household?	1. Formal employment 2. Informal employment (e.g., small business, casual labor) 3. Agriculture/farming 4. Social welfare/assistance 5. Other (please specify: _____)
B13.	What is the monthly household income?	1. Less than 5,000 KES 2. 5,000-10,000 KES 3. 10,000-20,000 KES 4. 20,000-30,000 KES 5. More than 30,000 KES
B14.	What is the main source of family food?	1. Purchase 2. Farm Production 3. Borrowing 4. Food Aid/Donations 5. Others (specify)……
B15.	What type of housing does the household reside in?	1. Owned house 2. Rented house/apartment 3. Government housing 4. Informal settlement (slum) 5. Other (please specify) _____
B16.	Does the household have access to clean drinking water?	1. No 2. Piped water (treated) 3. Piped water (untreated) 4. Borehole/well water 5. Rainwater 6. Other (please specify) _____

B17.	Which fuel source does your home utilize most frequently for cooking? (Tick/circle one option)	1. Kerosene 2. Electricity 3. Firewood 4. Natural gas and/or LPG 5. Charcoal 6. Agricultural crop 7. Other (specify) _____
B18.	What is your main source of light? Tick/circle one option	1. Kerosene 2. Electricity 3. Solar 4. Candle 5. Others (Specify)…….
B19.	Does the household have access to electricity?	1. Yes, 2. No
B20.	How many rooms are there in your household?	1. 1 2. 2 3. 3 4. 4 or more
B21.		5.

PART C: HEALTH RELATED INFORMATION

1) Knowledge on HIV and its management

NO	Question	CHOICES - (circle the correct response)
	Can you get HIV from blood?	1. Yes 2. No
	Can you get HIV from sharing needles?	1.Yes 2.No
	Can you get HIV from sharing a toilet or utensils?	1.Yes 2.No
	Can ARV help people with HIV live longer and healthier lives?	Yes 2.No
	Is there a vaccine to prevent HIV?	1.Yes 2.No
C2.	Can you get HIV from a mosquito bite?	1. Yes 2.No
C3.	Can you get HIV from hugging or shaking hands?	1. Yes 2.No
	Is there a cure for HIV/AIDS?	1. Yes 2. No
	Do people with HIV need to take ARV every day?	1. Yes 2.No
	Is it important to support friends or family members who have HIV?	1. Yes 2.No

2) Attitude towards HIV/AIDS disease questions

	Attitude question	Strongly Agree (1)	Agree (2)	Somewhat agree (3)	Disagree (4)	Strongly Disagree (5)
	Do you feel comfortable discussing HIV/AIDS status with others.					
	HIV/AIDS is a manageable condition with proper treatment and care.					
	People living with HIV/AIDS deserve the same rights and respect as others.					
	Adolescents with HIV/AIDS should be open about their status with their friends.					
	Discrimination against people living with					

	HIV/AIDS is still a significant problem.					
	Disclosure of one's HIV/AIDS status should be a personal choice.					
	Society's perception of HIV/AIDS has improved over the years.					
	Educating others about HIV/AIDS is essential for reducing stigma and discrimination					
	There is a need for more accessible and youth-friendly HIV/AIDS services					
	HIV/AIDS can affect anyone, regardless of their background or lifestyle					
	HIV/AIDS is a manageable condition with proper medical care.					
	I feel supported by healthcare professionals in managing my condition.					
	I am aware of the available support groups and resources for adolescents living with HIV/AIDS.					
	I believe that individuals with HIV/AIDS can lead fulfilling lives					
	feel supported by healthcare professionals in managing my condition.					
	I have access to the necessary medical and psychosocial support for managing my HIV/AIDS.					
	I believe that my diet has an impact on my overall health and well-being.					

3) Morbidity-related data

	Question	**Choices**
	Besides HIV, have you had any other illnesses in the past two weeks?	1. Yes **2.** No
	For each disease(s) you suffered, state:	1. Type of illness …….. ……. ……. 2. Duration of Illness …….. ……. ……. 3. Signs and symptoms …….. ……. …….
	Where did you seek assistance/treatment? (Tick all the appropriate answers)	1. Herbal medicine 2. Private clinic 3. None 4. Over the counter medication 5. Traditional healer 6. Government health facility 7. Spiritual healers 8. Others (specify)…….
	In the previous 2 weeks, how many times have visited the hospital to seek medication?	Number ……
	Have you been admitted to the hospital in the last two weeks? (Tick/circle one response)	1. No 2. Yes
	Have you engaged in any of these habits? (Tick all the appropriate answers)	1. Smoking 2. Chewing miraa 3. Sniffing tobacco 4. Taking alcohol 5. Other (Specify) ……

Adherence practices to HIV treatment and management

Please mark your degree of agreement or disagreement with each statement by ticking one or more boxes, no matter your level of agreement or disagreement. No right or wrong answers exist here - as honest responses would ensure more valid results than otherwise would have been achieved.

Regarding your HIV treatment.

S/No.	Statement	Yes	No
C54.1	Do you sometimes forget to take your HIV medication?		
C54.2	People may mistakenly skip taking their medications for reasons other than forgetfulness. Over the last two weeks, was there any day where you failed to take it?		
C54.3	Have you stopped taking your medicine without telling your physician because you experienced discomfort when taking it?		
C54.4	Do you sometimes forget your medication when traveling or leaving home?		
C54.5	Did you take all your pills yesterday, as prescribed?		
C54.6	Do you sometimes stop taking medication when symptoms appear under control?		
C54.7	Taken daily, medication can be an inconvenient obligation. Do you ever find it challenging to stick to your treatment plan?		
C54.8	How often do you have trouble remembering to take all your medication? a) Never/Rarely……..... b) Once in a while……... c) Sometimes…….. d) Usually,……. e) All the time……..		

The MMAS comprises eight items with a scoring scheme in which "Yes" equals zero and "No" equals one, totalling eight scores from 0-8 with 8 representing high adherence, 6-7 being moderate adherence and any score below 6 being low (Cuevas & Pe, 2015).

The drug adherence level.

1. High adherence (8 scores)
2. Moderate adherence (6 -7 scores)
3. Low adherence (< 6 scores)

(Circle the appropriate choice (1 to 3) based on the total scores in C35)

Adherence based on the pills

Missed Doses per Month		% Of Medications Taken	Adherence Rating
For once-daily regimen	For BD regimen		
1 dose	1-3 doses	≥ 95%	Good
2-4 doses	4-8 doses	85-94%	Inadequate
≥ 5 doses	≥ 9 doses	< 85%	Poor

Adherence based on the pharmacy refill

Collected drugs on time	**Yes**
	No
Did not collect drugs on time	**Yes**
	No

DIETARY PRACTICES

	Question	Choices
	How would you describe your appetite?	1. Very good 2. Good 3. Poor 4. Very poor
	Do you eat at regular times each day? (Ask for each)	1. Breakfast Yes No 2. Lunch Yes No 3. Supper Yes No 4. Snack Yes No
	How many meals do you typically eat each day?	Indicate number on weekday. Indicate number on weekend
	Do you take any dietary supplements or multivitamins regularly? If yes, please specify which ones:	If yes, please specify: _____
	Do you have any specific dietary restrictions or food allergies?	If yes, please describe: _____

Section 2: A 24 Hour Recall

A 24-hour recall form will record the participant's food and drink intake for the previous day, both at home and outside, from waking up to going to bed. It will note the food/dish name, ingredients, amount consumed in household and metric measures (grams).

The form will also determine if the day was normal or unusual.1= usual day 2= unusual
If unusual, describe why.
1.=Celebration 2=Religious activity 3=Little food in household 4=Other (specify)

Meal/Time	Name of dish/food	Description of ingredients	Amt. consumed. (HH measures)	Quantity in grams	Method of preparation
Breakfast					
Mid-morning					
Lunch					
Afternoon snack					
Evening snack					
Supper					

NB. Method of preparations include a) Boiling b) stewed c) Roasting d) Deep frying e) Shallow frying f) Others (specify)

Section 3: Individual Dietary Diversity Baseline Questionnaire for adolescent respondents

Using the information provided about what you ate in the past day, please fill in the food groups. Give a score of '1' if you ate any food from that group, even if it was just a little bit. Give a score of '0' if you didn't eat anything from that group. Also, ask the person if they ate any food from groups that were not mentioned.

SNO.	Food group	Examples	**Score:** Yes = 1 No = 0
1.	**Starchy staples**	**Cereals:** Wheat, sorghum, millet, rice, corn/maize, or any other grains or products manufactured from these **White root & Tubers;** White yams, white cassava, white potatoes, or other root-based meals	
2.	**Dark green leafy vegetables**	Vegetables with dark green leaves, including wild variety + *Vitamin A-rich leaves that are locally available like amaranth, cassava leaves, kale, spinach*	
3.	**Other vitamin A rich fruits and vegetables**	**Vegetables rich in vitamin A and tubers:** sweet potato, squash, pumpkin, or carrot which have orange interiors & *other readily accessible veggies high in vitamin A that are local* **Vitamin a rich fruit**: ripe papaya, dried peach, fresh or dried apricots, ripe mango, cantaloupe, and other readily available vitamin A-rich fruits in these and other local juices.	
4.	**Other fruits and vegetables**	**Other Vegetables**: Other veggies (such as tomato, onion, and eggplant) and additional vegetables that are available nearby **Other fruits:** Other fruit varieties, such as wild fruit and 100% pure fruit juice made from them	
5.	Organ meat	meats from the liver, kidney, heart, or other organs, or blood-based foods	

6.	Meat and fish	Meats such as chicken, duck, hog, lamb, goat, rabbit, game, and insects. Shellfish and fish might be fresh or dried	
7.	Eggs	Any type of egg, including those from guinea hens, ducks, or chickens.	
8.	Legumes, nuts and seeds	legumes, peas, lentils, nuts, seeds, or products produced from them that are dried (e.g. hummus, peanut butter)	
9.	Milk and milk products	Yogurt, cheese, and other dairy items	
10.	Oils and fats	Butter, oil, or other fats used to cook with or add to meals	
11.	Sweets	Sugar, honey, sweetened beverages like soda or juice, as well as sweet meals like chocolate, sweets, pastries, and cakes	
12.	Spices, condiments, beverages	condiments (soy sauce, hot sauce), spices (black pepper, salt), coffee, tea, and alcoholic beverages	

TOTAL SCORE (ADD SCORES FOR GROUP 1 – 12) ----------
THE DIETARY DIVERSITY IS

1. Low dietary diversity (0 – 3)
2. Moderate dietary diversity (4 – 5)
3. High dietary diversity (6 -12)

(Circle the appropriate one based on the total scores and options 1 to 3)

PART E: NUTRITION ASSESSMENT

Anthropometric measurements information

Measurement	**1st**	**2nd**	**Average**	**BMI for age**	**Nutrition Status (Indicate codes as in the Key)**
Weight (to the nearest 0.1 Kg)					
Height (to the nearest 0.1 cm)					
MUAC (to the nearest 0.1 cm)					

Nutrition status key for BMI:

1. Severe thinness <16.00
2. Moderate thinness 16.00 - 16.99
3. Mild thinness 17.00 - 18.49
4. Normal range 18.50 - 24.99

5. Overweight ≥25.00

Nutrition status key for MUAC:

1. Normal ≥ 22.1 (Women), ≥ 23.1 (Men)
2. Moderate acute malnutrition ≥ 21.4 to ≤ 22.1 (Women); ≥ 22.4 and≤ 23.1 (Men)
3. Severe acute malnutrition < 21.4 (Women), < 22.4 (Men)

APPENDIX D: FOCUS GROUP DISCUSSION GUIDE

Section 1: ART Adherence

a. Do you take your medicine every day and if so, how do you remember?
b. What helps remind you to take it regularly?
c. Are there times when taking your medication can be challenging?
d. If there are any queries or concerns related to your medicine?
e. What should you do if you forget to take your medicine?

Section 2: Dietary Practices

a) What's your favorite food, and do you often eat it?
b) Are there certain foods that make you feel better when you're ill?
c) On an average day, what do you eat for breakfast, lunch and dinner?
d) Are there any particular dishes or ingredients you prefer not eating and why?
e) Do you believe eating nutritious food is necessary for good health? Why or why not?

Section 3: Nutrition Status

a. How are you feeling about your body and health, are you satisfied?
b. Have there been any noticeable differences in weight, energy levels or how you've been feeling since taking medicine?
c. Can there be any signs or feelings that indicate whether or not you are healthy?
d. How can you tell if you are getting enough of the appropriate foods?
e. Are there any concerns or health issues with which you need help?

Section 4: Coping and Support

a. Who helps with taking medicines or getting healthy foods?
b. Have you experienced sadness or worry due to HIV?
c. When do these feelings arise and what helps ease them?
d. Whom do you turn to when need help or someone to listen when feeling down?
e. What helps keep you feeling strong even when feeling poorly?
f. How are your friends and family helping when you don't feel your best?

Section 5: Recommendations

a) What would you change about your medicine to make it better?
b) How would making taking medicines more manageable help you and other kids like you take medicine each day?
c) Can you suggest any creative ways of keeping healthy while living with HIV?
d) What would help your healthcare team assist more effectively in meeting your needs?
e) Is there something special you'd like other children living with HIV to know or have to make their experience better?

APPENDIX E: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU

COUNTY GOVERNMENT OF KIAMBU
DEPARTMENT OF HEALTH SERVICES
P.O Box 2344 - 00900 Kiambu, Kenya
Tel: +254 709 877 000 **Email**: info@Kiambu.go.ke **Website**: www.Kiambu.go.ke **Twitter**: @KiambuCountyGov

REFERENCE KIAMBU/HRDU/AUTHO/NYAWIRA P. W.

Date: 22nd Apr 2024

TO WHOM IT MAY CONCERN,

RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY

Kindly note that we have received a request by **Patrick Wanjohi Nyawira** of **Kenyatta University** to carry out research in Kiambu County, the research topic being on ***"Antiretroviral Therapy Adherence, Dietary Practices, and Nutrition Status of Adolescents Living With HIV/AIDS Attending Kiambu Level 5 Hospital, Kiambu County, Kenya.""***.

We have duly inspected his documents and found that he has been cleared by **Kenyatta University Centre for Research Ethics and Safety** until **28th Mar 2025.** He thus does not need any further clearance with another regulatory body in order to conduct research within the county of Kiambu.

However, it is incumbent upon the facility in which the research is being carried out to ensure that they are conversant with the remit of the study and operate in line with their institutional norms on conducting research. This note also accords him the duty to provide feedback on his research to the county at the conclusion of his research.

DR. JUNE MUTHIORA
COUNTY HEALTH RESEARCH OFFICER
KIAMBU COUNTY

APPENDIX F: NACOSTI RESEARCH LICENCE

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **336285**

Date of Issue: **19/April/2024**

RESEARCH LICENSE

This is to Certify that Mr.. PATRICK WANJOHI NYAWIRA of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu on the topic: Antiretroviral Therapy Adherence, Dietary Practices, and Nutrition Status of Adolescents Living With HIV/AIDS Attending Kiambu Level 5 Hospital, Kiambu County, Kenya. for the period ending : 19/April/2025.

License No: **NACOSTI/P/24/34504**

336285

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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

See overleaf for conditions

APPENDIX G: KENYATTA UNIVERSITY ETHICAL APPROVAL

KENYATTA UNIVERSITY
CENTRE FOR RESEARCH ETHICS AND SAFETY

Fax: 8711242/8711575
Email: chairman.kuerc@ku.ac.ke
Nairobi, 00100

P. O. Box 43844,

Tel: 8710901/12

Website: www.ku.ac.ke
Our Ref: **KU/ERC/APPROVAL/VOL.1**

Date: 28th March, 2024

Patrick Wanjohi,
P.O Box 43844, 00100
Nairobi.

Dear Patrick,

APPLICATION NUMBER: PKU/2897/I12020: "ANTIRETROVIRAL THERAPY ADHERENCE DIETARY PRACTICE SAND NUTRITION STATUS OF ADOLESCENTS ATTENDING KIAMBU LEVEL 5 HOSPITAL, KIAMBU COUNTY, KENYA."

This is to inform you that ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE*** has reviewed and approved your above research proposal. Your application approval number is **PKU/2897/I12020.** The approval period is **28th /3/2024 *to* 28th / 3/2025.**

This approval is subject to compliance with the following requirements;

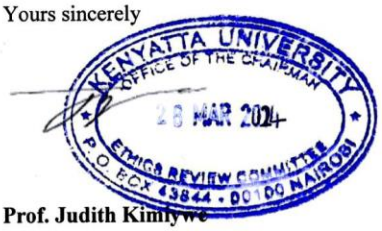
i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE***
iii. Death and life threatening problems and serious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

to ***KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE***

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

To serve you better, researchers are kindly requested to access and complete a customer feedback form and sent it back online as you continue with research and upon completion of data collection found on the following website link; ;(https://docs.google.com/forms/d/1ytWefDwvyz5h1oz_VIn0xbxg3uGdlDzMXFWNDsMrRPQ/edit?usp=sharing

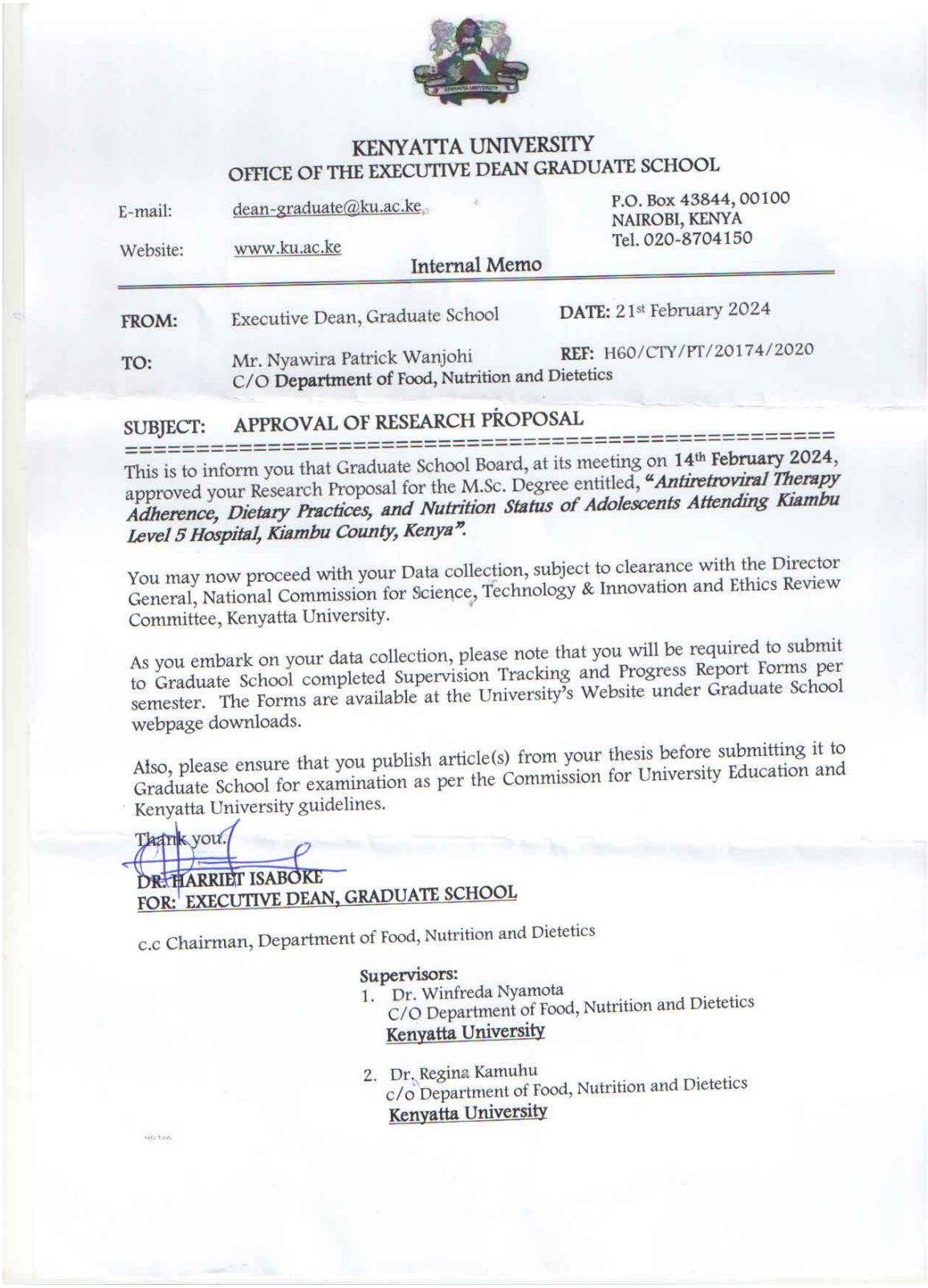
Yours sincerely



Prof. Judith Kimiywe

Director: Centre for Research Ethics and Safety

APPENDIX H: GRADUATE SCHOOL APPROVAL



KENYATTA UNIVERSITY
OFFICE OF THE EXECUTIVE DEAN GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Executive Dean, Graduate School
DATE: 21st February 2024

TO: Mr. Nyawira Patrick Wanjohi
C/O Department of Food, Nutrition and Dietetics
REF: H60/CTY/PT/20174/2020

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board, at its meeting on 14th February 2024, approved your Research Proposal for the M.Sc. Degree entitled, ***"Antiretroviral Therapy Adherence, Dietary Practices, and Nutrition Status of Adolescents Attending Kiambu Level 5 Hospital, Kiambu County, Kenya".***

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation and Ethics Review Committee, Kenyatta University.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The Forms are available at the University's Website under Graduate School webpage downloads.

Also, please ensure that you publish article(s) from your thesis before submitting it to Graduate School for examination as per the Commission for University Education and Kenyatta University guidelines.

Thank you.

DR. HARRIET ISABOKE
FOR: EXECUTIVE DEAN, GRADUATE SCHOOL

c.c Chairman, Department of Food, Nutrition and Dietetics

Supervisors:
1. Dr. Winfreda Nyamota
C/O Department of Food, Nutrition and Dietetics
Kenyatta University

2. Dr. Regina Kamuhu
c/o Department of Food, Nutrition and Dietetics
Kenyatta University

APPENDIX I: KIAMBU TOWN AND KIAMBU COUNTY MAP