SOCIAL DETERMINANTS OF PHYSICAL ACTIVITY AND HEALTHY DIET CONSUMPTION AMONG ADOLESCENTS LIVING WITH HIV IN IFAKARA TOWN, TANZANIA

Justina J. Maganga

A Dissertation Submitted in Partial Fulfilment of the Requirements for the Degree of Master of Science in Public Health Research of the Nelson Mandela African Institution of Science and Technology.

Arusha, Tanzania

August, 2025

ABSTRACT

Insufficient physical activity and poor dietary habits are among the important risk factors for non-communicable diseases (NCDs) worldwide. While NCDs typically impact adults, these risk factors frequently emerge in adolescents, enhancing future NCD risk. In Tanzania, adolescents living with HIV (ALHIV) are at risk for NCDs due to HIV-related chronic inflammation and side effects of long-term antiretroviral therapy, as well as low physical activity and unhealthy eating. This qualitative study looked into the factors that influence physical activity and healthy diet consumption among ALHIV in Ifakara Town. A cross-sectional phenomenological qualitative study was conducted with ALHIV aged 15 to 19 and their parents and caregivers from the Kilombero and Ulanga Antiretroviral Cohort (KIULARCO). Between May and July 2024, 22 in-depth interviews with ALHIV were done, as were ten interviews with parents and caregivers. Thematic content analysis was carried out with NVivo 14 software. The coding approach employed both inductive and deductive coding techniques, with inductive codes obtained from the participants' tales and deductive codes developed using IDI guides and theoretical conceptions. The findings were theoretically categorized using the socio-ecological theory's intrapersonal, interpersonal, and community levels. Adolescents living with HIV and their parents/caregivers showed some awareness of physical activity and healthy eating and acknowledged the role of these behaviors in managing HIV and preventing NCDs. However, there were still gaps in their understanding. Physical activity among ALHIV was influenced by **intrapersonal factors** (limited time and inadequate knowledge); **interpersonal** (support from family and peers); and **community-level** (gender norms, negative perceptions, and lack of proper facilities). Similarly, healthy eating was shaped by **intrapersonal factors** (limited autonomy, weight concerns, and individual food preferences); **interpersonal factors** (low household income and having a large family); and **community-level influences** (the widespread availability of fast food). The findings highlight a range of factors influencing both physical activity and dietary habits of ALHIV. This study underscores the need to involve the community, parents, and caregivers in the efforts to create a supportive environment that promotes a better lifestyle for ALHIV and tackles the barriers to physical activity and healthy eating. To further emphasize and reinforce these two health behaviors in this population, physical activity and nutrition education need to be incorporated into HIV care guidelines and programs as part of day-to-day HIV care.

DECLARATION

I, **Justina Joseph Maganga,** hereby declare that the submitted dissertation is my original work under the guidance of the supervisors listed below. It is being submitted to partially fulfil the requirements of the degree of Masters of Science in Public Health Research at the Nelson Mandela African Institution of Science and Technology, and it has neither been submitted nor is currently being submitted in any other institution.

Justina J. Maganga		11/08/2025
Candidate name	**Signature**	**Date**

The declaration is confirmed by:

Dr. Sally Mtenga	Smtenga	11/08/2025
Supervisor 1	**Signature**	**Date**

Prof. Maja Weisser		11/08/2025
Supervisor 2	**Signature**	**Date**

Dr. Clara Mollay		11/08/2025
Supervisor 3	**Signature**	**Date**

COPYRIGHT

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the Senate of the Nelson Mandela African Institution of Science and Technology, a dissertation entitled *"Social Determinants of Physical Activity and Healthy Diet Consumption among Adolescents Living with HIV in Ifakara Town, Tanzania"* in partial fulfilment of the requirements for the award of the Degree of Master of Science in Public Health Research of the Nelson Mandela African Institution of Science and Technology.

Dr. Sally Mtenga	Smtenga	11/08/2025
Supervisor 1	**Signature**	**Date**
Prof. Maja Weisser		11/08/2025
Supervisor 2	**Signature**	**Date**
Dr. Clara Mollay		11/08/2025
Supervisor 3	**Signature**	**Date**

ACKNOWLEDGEMENT

First and foremost, I am very thankful to the Almighty God for giving me the strength, health and perseverance to complete this work. I would like to express my deepest and sincere gratitude to my supervisors, Dr Sally Mtenga, Prof. Dr Maja Weisser, and Dr Clara Mollay for their invaluable guidance, support, and encouragement throughout the entire process of this dissertation. Their expertise, patience, and insightful feedback have been instrumental in shaping this research and are highly appreciated.

I am grateful to the Nelson Mandela African Institute of Science and Technology (NM-AIST) and the Ifakara Health Institute (IHI) for providing the resources and facilities necessary for conducting this study. My sincere thanks to the entire CDCI team, particularly Dr. Ezekiel Luoga, Dr. Andrew Katende, Dr. George Sigalla, and Mr. Jamal Bashiru, for their support throughout my research journey. I extend my appreciation to the participants in this study from KIULARCO for their willingness to contribute their time and insights, without which this research would not have been possible.

I am indebted to my friends and colleagues, Fenrick Msigwa, Nancy Nshatsi, Neema Masanja, Anitha Mutashobya, Simon Mnzava, and Fahad Mwakalebela, for their encouragement, discussions, and assistance during various stages of this research. Last but not least, exceptional thanks go to my family for their unwavering love, understanding, and encouragement during this academic journey. Their constant support has been a source of great strength and motivation, pushing me towards achieving my goals.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS AND ACRONYMS

ALHIV	Adolescents living with HIV
ART	Antiretroviral therapy
CDCI	Chronic Diseases Clinic in Ifakara
FGDs	Focus Group Discussions
IDIs	In-depth Interviews
IHI	Ifakara Health Institute
IRB	Institutional Review Board
KIULARCO	Kilombero and Ulanga Antiretroviral Cohort
LMICs	Low- and Middle-Income Countries
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly, and Children
NCDs	Non-communicable Diseases
NIMR	National Institute for Medical Research
NMNAP II	National Multisectoral Nutrition Action Plan II
PLHIV	People living with HIV
SFRH	Saint Francis Referral Hospital
SRH	Sexual and Reproductive Health
SSA	Sub-Saharan Africa
UNAIDS	The Joint United Nations Program on HIV/AIDS
NICEFU	United Nations Children's Fund
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the Problem

Adolescents account for 16% of the global population, 23% in Sub-Saharan Africa (SSA), and 23.6% of Tanzania's total demographic (UNICEF, 2019). Adolescents living with HIV (ALHIV) represent a significant population in the global HIV epidemic, with approximately 1.65 million adolescents aged 10–19 affected worldwide (UNICEF, 2020). About 89% live in SSA, and 5.8% are in Tanzania (UNICEF, 2020). Research has reported a notable increase in the risk factors for non-communicable diseases (NCDs) among adolescents. This is shown to be largely driven by urbanization and a change in dietary patterns (Changoh *et al.,* 2024; Shayo, 2019). A narrative review focusing on African cities reported that urbanization leads to an increase in fast-food outlets and increased consumption of carbohydrate-dense foods, especially among adolescents and young adults (Juma *et al.,* 2020). These factors, combined with reduced physical activity, heighten the NCD risk in this population.

The World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2024). A healthy diet is defined as eating a variety of foods such as staples, legumes, animal sources and fruits and vegetables, and less salt, sugar, saturated and trans-fats (World Health Organization, 2019). Regular physical activity and healthy eating help to strengthen the body's immunity, improve mental health, lower the chances of NCDs and enhance the quality of life (WHO, 2024). The WHO reports that 81% of the global adolescent population is insufficiently physically active (WHO, 2018). Research from Mozambique and South Africa has similarly found that ALHIV tend to be physically inactive, consume more junk meals, and possess inadequate nutrition understanding. (Chirindza *et al.,* 2022; Kamkuemah *et al.,* 2022).

Unhealthy eating and physical inactivity are linked to an increased risk of overweight and obesity, which may lead to the occurrence of NCDs (Cerf, 2021; Shayo, 2019). Adolescents living with HIV (ALHIV) are vulnerable because they not only face NCD risk factors, but also experience HIV-related chronic inflammation and potential side effects of prolonged antiretroviral therapy (ART) such as weight gain (Kamkuemah *et al.,* 2020). Low physical activity, poor diets and long-term ART intake combined may heighten the risk of ALHIV becoming overweight or obese and developing diabetes, dyslipidemia and arterial hypertension

(Kato *et al.,* 2020; Kagaruki *et al.,* 2014). A study conducted in urban Tanzania found that 16.4% of perinatally HIV-infected adolescents were overweight/obese, 13.2% had hypertension, and 29% had impaired fasting glucose, indicating a risk of pre-diabetes (Nkinda *et al.,* 2022).

Non-communicable disease management in PLHIV is complicated by the risk of drug-drug interactions between ART and NCD treatment (Heydari *et al.,* 2024). These interactions can alter drug efficacy and increase the risk of adverse effects (Foy *et al.,* 2014). It also increases the pill burden on patients and makes adherence to treatment regimens challenging, leading to poorer health outcomes, including disease progression and increased rates of deaths (Yang *et al.,* 2021; Gausi *et al.,* 2021). Several studies have found an increasing risk and prevalence of NCDs in ALHIV (Ndirangu-Mugo *et al.,* 2022; Kamkuemah, 2021; Innes & Patel, 2018). Evidence shows that adolescents in Tanzania are exposed to poor diets and physical inactivity, increasing their susceptibility to NCDs (Shayo, 2019; Tengia-kessy & Killenga, 2020). Physical inactivity and unhealthy diet are likely to expose adolescents to overweight and obesity, eventually leading to NCDs (Salvatory Kalabamu *et al.,* 2020).

Although Tanzania's National Guidelines for the Management of HIV and AIDS focus on critical aspects such as clinical HIV care, ART adherence, and opportunistic infections, there is limited attention on health behaviors such as physical activity and diet and their role in preventing a HIV/NCD multimorbidity (MOHCDGEC, 2019). This reveals a notable gap in current HIV care and management practices. Furthermore, few studies in Tanzania have qualitatively examined the lived experiences and perceptions of ALHIV regarding these behaviors, particularly in rural areas. This lack of exploration represents a missed opportunity in addressing NCD prevention in this high-risk group. To address this gap, the present study explored the social determinants influencing physical activity and healthy eating among ALHIV in a semi-rural Tanzanian setting (Ifakara).

1.2 Statement of the Problem

Human Immunodeficiency Virus (HIV) remains a major public health concern globally. Untreated HIV is associated with rapid weight loss, undernutrition, and higher mortality due to AIDS-related illnesses and opportunistic infections (Nalugga *et al.,* 2022). Advancements in HIV treatment and greater access to ART have led to longer life expectancy for people living with HIV (PLHIV) (Joint United Nations Programme on HIV/AIDS (UNAIDS), 2016).

Consequently, their chances of developing NCDs such as cardiovascular conditions have also heightened (WHO, 2023a; Musyani *et al.,* 2024; Patel *et al.,* 2018).

Studies show that diabetes and hypertension are more common among individuals on long-term ART, partly due to chronic inflammation and dyslipidemia (Kato *et al.,* 2020; Ndirangu-Mugo *et al.,* 2022). Medications like tenofovir alafenamide and integrase inhibitors have been linked to weight gain, which increases the risk of metabolic syndrome and type 2 diabetes (Wood & Huhn, 2021; Bares *et al.,* 2024). Dolutegravir-based ART has been associated with weight gain, obesity, and hypertension in a recent Tanzanian study (Weisser *et al.,* 2024). ART, physical inactivity, and unhealthy eating combined may predispose ALHIV to overweight, obesity, and future NCDs.

To address the dual burden of diseases such as HIV/AIDS and NCDs (WHO, 2023b), Tanzania introduced the National NCD Prevention and Control Program in 2019, focusing on early detection and community-level prevention of NCDs (Ngowi *et al.,* 2023). Despite these efforts, managing both conditions remains financially challenging for patients and the health system (Murphy *et al.,* 2020). Apart from that, there is limited research on adolescent health in Tanzania, mostly focused on sexual and reproductive health (SRH) while overlooking NCDs. Also, interventions to prevent NCDs are mostly directed towards the adult population, with little focus on adolescents, including those living with HIV (Tluway *et al.,* 2018).

Several studies in Tanzania have reported a high prevalence of physical inactivity and unhealthy diets in adolescents (Tengia-kessy & Killenga, 2020; Shayo, 2019). Studies have also shown that the prevalence of NCDs is increasing among ALHIV (Nkinda *et al.,* 2022; Kamkuemah *et al.,* 2022). However, there is currently a limited in-depth understanding of the factors driving these two NCD risk behaviors among adolescents, especially those living with HIV. Gaining insight into these underlying determinants is essential for preventing overweight and obesity in ALHIV and reducing their risk of developing NCDs later in life. Therefore, this study investigated the social determinants influencing physical activity and dietary practices among ALHIV in Ifakara.

1.3 Rationale of the Study

While several quantitative studies have assessed physical activity and dietary behaviors of adolescents in Tanzania, there are limited studies that have qualitatively explored these two health behaviors in the context of HIV. This study aimed to explore the perceptions,

experiences and determinants of physical activity and healthy eating in ALHIV, which could be adequately captured using a qualitative approach. Furthermore, ALHIV represent a vulnerable group with unique health challenges, therefore by targeting them, this study addresses a critical gap in understanding health behaviors in this population.

Exploring both physical activity and diet acknowledges their joint influence on health outcomes, particularly in the context of HIV and NCD prevention. The findings from this study will help inform the government and development partners of the social determinants underlying these behaviors in ALHIV. The findings will also help strengthen the efforts to prevent the growing NCD burden in adolescents, those living with HIV.

1.4 Research Objectives

1.4.1 General Objective

To explore the social determinants influencing the experiences and practices of physical activity and healthy diet consumption among ALHIV in Ifakara Town.

1.4.2 Specific Objectives

(i) To understand how ALHIV interpret physical activity and healthy diet consumption in the context of their HIV status

(ii) To examine adolescents' perceptions of the relationship between physical activity, diet consumption and NCDs

(iii) To identify the sociocultural factors that influence the physical activity and dietary behaviors of ALHIV

(iv) To understand parents' and caregivers' perceptions and attitudes towards physical activity and healthy diet consumption in ALHIV

1.5 Research Questions

(i) How do ALHIV perceive and interpret physical activity and healthy diet consumption, especially in the context of their health status?

(ii) How do ALHIV perceive the relationship between physical activity, dietary consumption, and the development of NCDs?

(iii) What sociocultural factors do ALHIV perceive to influence their physical activity and dietary behaviors?

(iv) What are the parents' and caregivers' perceptions and attitudes towards physical activity and diet consumption in ALHIV?

1.6 Significance of the Study

This study contributes important insights about the underlying factors that influence physical activity and dietary behaviors of ALHIV. By identifying key determinants of these behaviors, the research addresses a critical gap in the strategies aimed at preventing the potential HIV/NCD multimorbidity. The findings also underscore the role of parents and caregivers in promoting health behaviors in ALHIV and offers evidence to support the development of interventions that take into account parents and caregivers. By doing so, this study provides a foundation for policymakers to review and reinforce current policies and initiatives to enhance the health and quality of life of ALHIV.

1.7 Delineation of the Study

Previous studies have mainly focused on quantifying the levels of physical activity and dietary behaviors of the general adolescent population, with little focus being given to the underlying social determinants of these health behaviors. Furthermore, most studies on adolescent physical activity and diet have been conducted in urban areas. This presents a gap because there may be different factors influencing these behaviors in adolescents in rural settings. Given the unique health challenges that ALHIV face, this study addresses the gap by qualitatively exploring the factors influencing physical activity and diet in ALHIV in a rural context. Furthermore, this study also incorporates parental views and perspective, recognizing the critical influence parents have on the health choices and lifestyle behaviors of ALHIV. By focusing specifically on this population, the study aims to generate insights to inform targeted interventions to improve the well-being of adolescents in rural areas, including those living with HIV.

1.8 Conceptual Framework

The study's conceptual framework (Fig.1) draws on the Socio-ecological theoretical model by Urie Bronfenbrenner to investigate the determinants of physical activity and diet consumption in ALHIV. The theory recognizes that individual behavior is a result of a complex interaction

of factors across multiple levels (Scarneo *et al.,* 2019). It identifies five levels of influence namely: the intrapersonal, interpersonal, community, organizational and policy levels. Given the scope and objectives of this study, we did not examine the organizational and public policy levels. The theoretical constructs such as social and cultural norms were used to construct the study tools and frame the analytical categories. The constructs from the socio-ecological model provided a basis for the identification of themes during thematic analysis and helped in the interpretation of the data. Figure 1 illustrates the conceptual framework for the social determinants of physical activity and diet consumption among ALHIV in Ifakara, Tanzania.

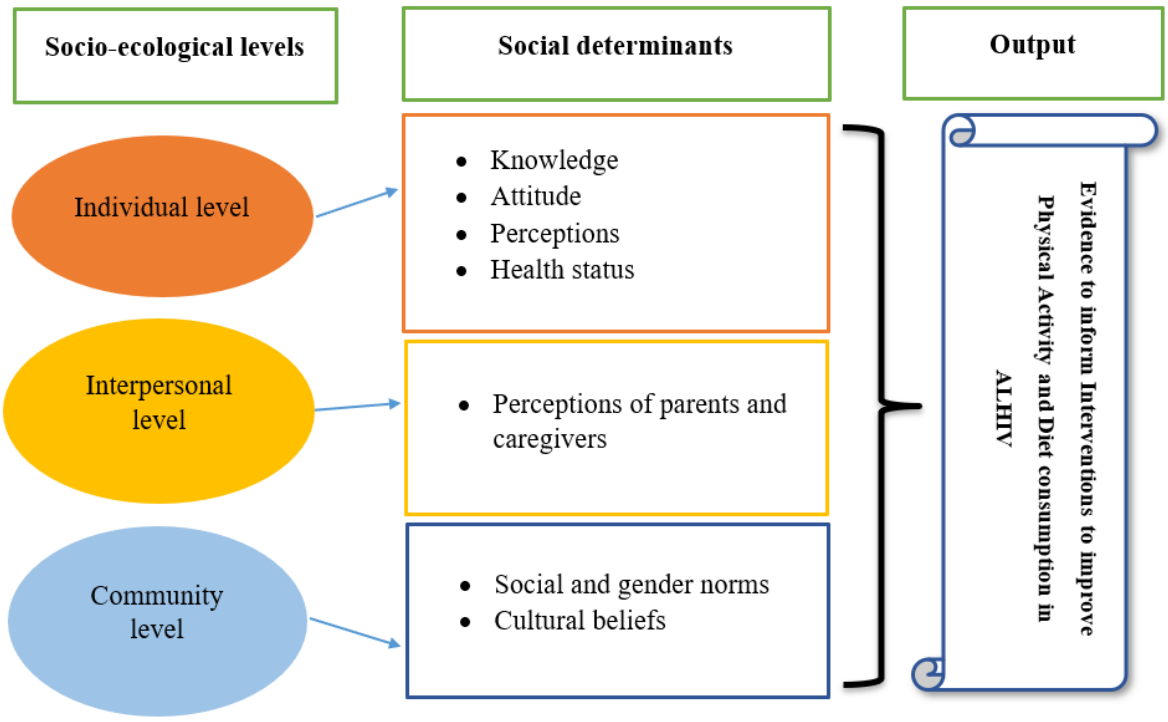

Figure 1: A conceptual framework

CHAPTER TWO

LITERATURE REVIEW

2.1 Definition of terms

2.1.1 Social determinants of health

Social determinants of health are the non-medical factors that influence an individual's health and well-being and contribute to the occurrence of diseases or other health outcomes. They refer to the conditions in which people are born, grow, work, live and age that shape their lives and impact their overall health outcomes (Malamou, 2015). They include income, education level, occupation, housing and neighborhood conditions, social support networks, access to healthcare, environmental factors, culture and social norms, social cohesion, food security, early childhood experiences, knowledge, attitude, and social exclusion and discrimination. Understanding the social determinants influencing adolescent health is crucial to identifying new insights that can guide future interventions and policies tailored for adolescents, including those living with HIV.

2.1.2 Physical activity and healthy diet consumption

According to the WHO, physical activity refers to any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2024). Examples of physical activities include sports, occupational physical activity such as housework and farming, walking, jogging and cycling. For adolescents, WHO guidelines recommend at least 60 minutes of moderate to vigorous intensity physical activity per day (World Health Organization, 2020). A healthy diet is defined as eating a variety of foods that are less in salt, sugar, saturated and trans-fats. Examples of these foods include staples, legumes, animal sources and fruits and vegetables (World Health Organization, 2019). Several studies have shown that regular physical activity and a healthy diet strengthen body immunity, improve mental health, ensure better response to treatment, and improve the quality of life in PLHIV (NIH, 2021; Jaggers & Hand, 2016). Maintaining an active lifestyle and healthy diet can help manage and prevent NCDs such as cardiovascular diseases, diabetes, chronic respiratory diseases, cancer and mental health diseases (WHO, 2020).

2.1.3 Adolescents living with HIV (ALHIV)

Adolescence is the transition period from childhood to adulthood, ages 10 to 19. It is marked by physical changes such as a growth spurt and the beginning of menstruation in females, as well as cognitive, emotional, and social changes (American Academy of Pediatrics, 2015). During this phase, adolescents also establish different patterns of behavior related to diet, physical activity, sexual activity and substance use, which may impact their health during adolescence and in the future.

Adolescents living with HIV represent a vulnerable group facing complex health and social challenges. As they transition, they face not only the physical and emotional changes of this developmental stage but also the lifelong management of HIV, including adherence to ART (UNICEF, 2021). Additionally, ALHIV are at a risk of developing NCDs partly due to chronic inflammation, possible ART-related side effects such as insulin resistance and dyslipidemia, and lifestyle factors such as physical inactivity and poor diets (Kamkuemah *et al.,* 2022). Identifying and addressing their challenges through targeted interventions is essential to improving their well-being and long-term health outcomes.

2.2 Strategies implemented to improve adolescent health in Tanzania

Tanzania implemented the National Adolescent Reproductive Health Strategy (2011 – 2015), which aimed to improve adolescent sexual and reproductive health (MoH, 2015). Later on, the National Adolescent Health and Development Strategy (2018 – 2022) was developed which highlighted the need to understand the socio-cultural and economic conditions and how they influence adolescents' health behavior and disease burden (MOHCDGEC, 2018). However, research on adolescent health in Tanzania is still limited and mostly focused on sexual and reproductive health (SRH) and HIV/AIDS, with little being said about rising issues such as NCDs. Also, most of the interventions to address NCDs are focused on the adult population, with adolescents being largely overlooked (Akseer *et al.,* 2020). While some Tanzanian policies acknowledge the importance of nutrition and physical activity, specific interventions targeting adolescents are often lacking. Therefore, there is a need to develop evidence-based policies to address NCDs and NCD risk factors in adolescents, including those with HIV.

2.3 ART uptake and the risk of NCDs in adolescents living with HIV

With the introduction and increased availability of ART, PLHIV are now living longer with a remarkable decline in mortality and undernutrition. According to UNAIDS, 76% of all people with HIV were accessing ART globally as of the end of 2022 (UNAIDS, 2022). As PLHIV live longer, their risk of developing NCDs increases. This is mainly associated with the normal ageing process but also partly with chronic inflammation. Furthermore, there is an association with long-term use of ART; for example, protease inhibitors have been associated with metabolic changes such as insulin resistance, abnormal lipid levels (HIV dyslipidemia), and altered body fat distribution (lipodystrophy) (McComsey *et al.,* 2022). This is of concern for ALHIV as they live in an era of nutrition transition marked by unhealthy diets and physical inactivity due to rapid urbanization (Kamkuemah *et al.,* 2020). The combination of physical inactivity, unhealthy diets and ART may predispose ALHIV to overweight/obesity and to developing NCDs in the future.

2.4 HIV/NCD multimorbidity in low- and middle-income countries (LMICs)

Multimorbidity is defined as the co-occurrence of two or more long-term health conditions in an individual (Oni *et al.,* 2015). LMICs, including Tanzania, are experiencing a dual burden of diseases; that is, NCDs and chronic infectious diseases such as HIV/AIDS and TB (WHO, 2023b). Research indicates that diabetes and hypertension are more prevalent among individuals on prolonged ART, partly due to the ageing process, chronic inflammation and dyslipidemia (WHO, 2023a; Kato *et al.,* 2020). A study conducted in Tanzania found that approximately one in three adolescents with perinatal HIV infection had impaired fasting glucose which could develop into diabetes (Nkinda *et al.,* 2022).

A study also reported that the risk behaviors for NCDs, such as unhealthy eating, physical inactivity and obesity, are mostly initiated during adolescence and emphasized the importance of addressing the social, environmental and economic determinants of these behaviors in ALHIV (Kamkuemah *et al.,* 2022; Shayo, 2019). A study conducted in Uganda reported an increased burden of overweight and obesity among PLHIV and proposed that further research be done to explore the factors underlying to prevent the occurrence of HIV/NCD multimorbidity (Nalugga *et al.,* 2022).

2.5 Impact of the HIV/NCD multimorbidity on the health system in Tanzania

Tanzania has been working with global organizations such as PEPFAR and USAID to facilitate HIV treatment and improve the coverage of health services for HIV patients (Van Hout *et al.,* 2020). However, NCDs are rising in parallel and are equally chronic conditions for which continuous care is needed. This may put major stress on the health system in Tanzania if the government is required to fund both NCD and HIV treatment. This is because managing both HIV and NCDs requires continuous medication and specialist care, leading to higher healthcare costs. Healthcare coverage in Tanzania is still low, and with PLHIV also being at risk, there is an increased threat of a HIV/NCD double burden.

The combination of HIV and NCDs may cause patients to have more complex health needs requiring specialized care. Healthcare workers are already burdened with HIV-related services; therefore, managing NCDs and HIV may increase their workload and require additional training (Rugakingira *et al.,* 2024). NCDs lower the quality of life of PLHIV by increasing the financial burden, risk of complications, disability, and death (Woldesemayat, 2020). This may affect the progress made so far in the fight against HIV by decreasing the survival of PLHIV. Since most of the risk behaviors for NCDs are initiated during adolescence, exploring the non-medical factors underlying these risk behaviors in ALHIV provides an opportunity for early intervention to prevent future HIV/NCD multimorbidity.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study setting

This study was conducted at the Chronic Diseases Clinic in Ifakara (CDCI) – the care and treatment center of the St. Francis Regional Referral Hospital (SFRRH) in Ifakara Town Council. The CDCI has a single-site, open prospective cohort of PLHIV called The Kilombero and Ulanga Antiretroviral Cohort (KIULARCO). The cohort enrolls various patients diagnosed with HIV, including infants, children, adolescents, non-pregnant adults, and pregnant women. So far, the cohort has enrolled close to 13,000 PLHIV, with around 3,800 being under active care (unpublished data). Services offered include ART, one-to-one counselling, screening for opportunistic infections, and group therapy (Letang *et al.,* 2017). The study was conducted from May to July 2024 at the CDCI.

3.2 Study design

A cross-sectional qualitative study was conducted using a phenomenological qualitative approach to capture the lived-in experience, understanding and perceptions of ALHIV and their parents and caregivers regarding physical activity and healthy diet consumption. This approach was selected because it ensures in-depth understanding of human experiences rather than quantifying them (Pathak, 2017). Primary data collection was conducted at the CDCI using in-depth interviews (IDIs) to enable the response to the four specific objectives identified in this study. This study utilized the Socio-ecological Model to explore how factors interact across different levels, specifically the intrapersonal, interpersonal, and community levels. However, due to the study's scope, the organizational and public policy levels of the model were not examined. The methodological approach explained in this dissertation was also described in the Masters student's research publication (Maganga *et al.,* 2025).

3.3 Sampling design and sample size

Purposive sampling was used to select and recruit participants from KIULARCO at the CDCI who could provide rich information on the study phenomena (Moser & Korstjens, 2018). The eligibility criteria were ALHIV aged 15-19, under active care, and who had a clinic visit during the study period. Individuals who did not consent to participate, and those with other conditions

apart from HIV were excluded from the study. Convenience sampling was also used to ensure that only those willing to participate in the study were recruited. The sample size for the IDIs was informed by the saturation of views, which was assessed through ongoing data collection and analysis (Francis *et al.,* 2010). The study initially aimed to recruit 15 adolescents and 5 parents/caregivers; however, data saturation was reached with 22 adolescents living with HIV and 10 parents/caregivers.

3.4 Study procedure

The study included twenty-two consenting ALHIV and ten parents or caregivers from the KIULARCO. Before data collection, the researcher presented the study to the CDCI team and received feedback that helped refine the study protocol. The researcher also reviewed the IDI guides and pre-tested them on a small group from the target population to ensure the questions were clear and culturally appropriate. Insights from the pre-test were used to revise the tools. Eligible adolescents were recruited after their clinic visits, whereby the healthcare workers introduced the study and invited them to participate. Adolescents aged 18 to 19 who provided consent were interviewed on the same day. If a parent/caregiver accompanied them and agreed to participate, they were also interviewed separately, either on the same day or at a later agreed time. For adolescents under 18, the researcher requested contact details for their parents or caregivers who were then informed about the study and invited to accompany their children to the clinic for the interviews.

3.5 Data collection

In this study, data was collected through IDIs by the Masters student with the guidance and support of the CDCI team. Two semi-structured IDI guides were created. The guide for ALHIV explored their overall understanding of physical activity and diet, personal experiences and factors influencing these behaviors. The guide for the parents and caregivers focused on their perceptions of these health behaviors and their involvement in shaping these behaviors in ALHIV. In-depth interviews were relevant for this study because they helped capture detailed information on the study phenomena from an individual point of view. All interviews were carried out in Swahili and were audio-recorded by the interviewer after obtaining consent from the participants. Handwritten notes were also taken and helped supplement the interviews.

3.6 Data analysis

All audio-recorded interviews were transcribed verbatim to ensure familiarity with the data. A mind-mapping technique was used to reflect on and organize the information in relation to the study objectives, serving as a foundation for analysis (Fearnley, 2022). Transcripts were imported into NVivo version 14, and insights from the mind map guided interpretation.

Both inductive and deductive coding approaches were applied. Inductive codes emerged from participants' responses, while deductive codes were based on the interview guides and theoretical framework. To ensure validity, two individuals independently coded the data and resolved discrepancies through discussion (Halpin, 2024). The masters' student and another individual independently coded the transcripts and compared their coding, and any discrepancies were discussed and resolved by reaching an agreement. The codes were then grouped into themes, and adolescent responses were triangulated with those of parents/caregivers to improve credibility and understanding.

3.7 Ethical considerations

Ethical approval for the study was granted by the Institutional Review Board (IRB) of the Ifakara Health Institute (IHI/IRB/No: 18-2024). All the study participants were fully informed about the study and its potential risks and benefits before obtaining their written informed consent. For participants below 18 years of age, the proxy consent of their parents/caregivers was obtained in addition to their assent to participate in the study. All participants were notified that their quotes could be utilized in publications and agreed to it. All interviews were conducted at the CDCI in one of the counselling rooms available to ensure privacy. To maintain confidentiality, the names of participants were not recorded; instead, each participant was assigned an identification number to be able to identify them throughout the study. All audio recordings and transcripts were securely saved on a password-protected computer, and access was limited to authorized research team members.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Results

The results are organized into the following key areas: (a) demographic profiles of the study participants; (b) understanding of physical activity and healthy diet consumption; (c) perceptions of NCDs in relation to physical activity and diet consumption; (d) factors perceived to influence physical activity and dietary practices in ALHIV; and (e) perceptions and attitudes of parents and caregivers toward physical activity and diet in ALHIV. To highlight significant insights and perspectives, selected quotations from participant interviews have been included in this section. Some of these findings were also reported in a peer-reviewed article published by the Masters student (Maganga *et al.,* 2025).

4.1.1 Demographic profile of the study participants

A total of 22 adolescents and 10 parents and caregivers participated in semi-structured, in-depth interviews at CDCI. Table 1 shows that the adolescents were from 15 to 19 years old, with 72.7% attending secondary school and 27.3% attending primary school. Bicycles, motorbikes, and tricycles were the common transportations to the clinic. The parents and caregivers interviewed were between 25 and 64 years, and 80% had a primary school education (Table 2).

Table 1: Demographic characteristics of adolescents living with HIV

Variables		Frequency (n)	Percentage (%)
Gender	Male	12	54.5%
	Female	10	45.5%
Age group (years)	15 – 17	9	40.9%
	18 – 19	13	59.1%
Education level	Primary	6	27.3%
	Secondary	16	72.7%
Transport to the clinic	Tricycle	4	18.2%
	Bicycle	5	22.7%
	Car	4	18.2%
	Motorcycle	6	27.3%
	On foot	3	13.6%

Table 2: Demographic characteristics of parents and caregivers

Variables		Frequency (n)	Percentage (%)
Gender	Male	2	20.0%
	Female	8	80.0%
Age	25 – 35	4	40.0%
	36 – 45	2	20.0%
	46 – 64	4	40.0%
Education level	No formal education	1	10.0%
	Primary education	8	80.0%
	Secondary education	1	10.0%
Occupation	Farmer	4	40.0%
	Entrepreneur	5	50.0%
	Teacher	1	10.0%

4.1.2 Understanding of physical activity and healthy diet consumption

(i) Physical activity

In this study, participants offered varying interpretations of physical activity, often using the term "exercise" to describe different types of physical activities. Most ALHIV described physical activity as any activity undertaken to refresh the body and maintain fitness:

> *"For me, when you talk about physical activity, I understand it as anything done to refresh and energize the body so that it becomes strong."* – **(Male adolescent, 18 years)**

Some adolescents described physical activity as any form of household work, such as washing utensils, cleaning the house, washing clothes, and doing farm work. This view was also shared by some of the parents and caregivers, as reported by one of them:

> *"If you say physical exercise, I understand it as doing the small chores at home like washing clothes, washing dishes, going to the farm, eeh."* – **(Parent, 52 years)**

The commonly mentioned types of physical activities were active transport such as walking and running; ball games such as football and netball; domestic chores; and occupational activities such as farm and mechanics work. Two of the ALHIV perceived sexual intercourse as part of physical activity as explained by a participant:

> *"But also, young people in the community say that even engaging in sexual activity is sufficient exercise."* **- (Male adolescent, 19 years)**

Two forms of sedentary behaviors were discussed by some of the adolescents, namely, watching TV and sitting around making stories, especially for female adolescents:

> *"You know for us girls, most of the time you'll find us either studying, watching TV or just sitting somewhere making stories. We honestly don't exercise much."* – **(Female adolescent, 17 years)**

(ii) Healthy diet consumption

Healthy diet consumption was described as eating a variety of foods consisting of proteins, carbohydrates, fats and oils, and vitamins. This was similarly expressed by some of the parents and caregivers. One of the adolescents said:

> *"When I say a healthy meal, I mean for example eating fruits, proteins, and carbohydrates at lunch – basically mixing a variety of foods. It's not just eating ugali with beans only; in that case, you can't say that you've eaten a healthy meal."* – **(Female adolescent, 15 years)**

Other participants interpreted healthy diet consumption as the practice of eating three meals a day; that is, in the morning, afternoon, and evening. One of them said,

> *"A healthy meal means eating three times a day: in the morning, in the afternoon, and in the evening."* - **(Male adolescent, 16 years)**

Some poor eating behaviors were commonly discussed by the ALHIV, namely, eating fast foods such as chips, fried bananas, and soft drinks, and low intake of fruits and vegetables:

> *"We young people nowadays prefer to eat chips, potatoes, and other small things like juice, biscuits, sweets, etc."* – **(Female adolescent, 16 years)**

(iii) Attitude towards physical activity and healthy diet consumption

Attitude refers to an individual's positive or negative opinion about something or their behavioral practice. Most of the adolescents interviewed demonstrated a positive attitude towards physical activity and healthy diet consumption and regarded these behaviors as being beneficial to their health:

> *"Healthy foods are very important for a person with HIV or even for a person without HIV, food is very important."*- **(Female adolescent, 19 years)**

However, some adolescents presented a negative attitude towards physical activity and healthy diet consumption. They did not perceive these behaviors to be particularly important, and some of them admitted that they prefer not to engage in these behaviors:

> *"I don't really like exercise."* - **(Female adolescent, 16 years)**

The perceived benefits of physical activity and healthy diet consumption were similar and included building the body, strengthening the body immunity and preventing diseases, reducing stress and stimulating the mind. Participants also expressed the belief that these two health behaviors could help prevent other people from noticing that an individual is HIV-positive.

> *"A healthy diet helps to strengthen the body to be fit, meaning that the body will not be weak and a person won't be so thin that they appear to have HIV."* – **(Female adolescent, 17 years)**

4.1.3 NCDs in relation to physical activity and healthy diet consumption

(i) Awareness about NCDs

Most of the participants described NCDs as diseases that cannot be transmitted from one person to another; while some described them as diseases originating from the reproductive organs; and a few of them perceived NCDs as diseases caused by dirtiness.

Interestingly, most adolescents and their caregivers mentioned communicable diseases like malaria, STDs, worms, and HIV/AIDS as examples of NCDs, showing a lack of awareness about which diseases truly fall into this category. However, some also correctly identified diabetes, hypertension, kidney disease, and heart disease as examples of NCDs.

(ii) Perceived risk of NCDs to people living with HIV

Some adolescents perceived a possible risk of PLHIV (including themselves) developing NCDs. Poor eating behaviour and not properly adhering to ART were mentioned as the possible factors contributing to this risk in PLHIV:

> *"What I know and understand is that for someone with HIV, ARVs protect them from other opportunistic diseases. So, if you don't use the medication correctly it means that other opportunistic diseases such as these NCDs must develop in your body."* – **(Male adolescent, 19 years)**

Some of the parents and caregivers also shared these views, as one of them said:

> *"Yes, adolescents with HIV can also get these non-communicable diseases because they are human like everyone else. If others can get them by not following health*

guidelines or proper nutrition, then if they don't follow these, they too will likely be affected." – **(Caregiver, 43 years)**

(iii) Perceived relationship between NCDs, physical activity, and diet consumption

Some ALHIV perceived a direct link between physical activity and the development of NCDs. They explained that exercising regularly and keeping the body active is likely to protect an individual from diseases including NCDs; and they associated sedentary behaviour with conditions such as swelling of legs, high blood pressure, diabetes, and lowered body immunity:

"Yes, physical exercise and these diseases are somewhat related because if you don't exercise regularly or if you just act like a boss, you can get diseases like high blood pressure." **- (Male adolescent, 17 years)**

Also, some adolescents perceived a relationship between diet consumption and NCDs. They explained that some food choices such as too much sugar intake are likely to contribute to NCDs such as diabetes and heart diseases:

"For example diabetes, diabetes is caused by your sugar intake. A person may be drinking half
a cup of tea and putting sugar that is three-quarters of the cup. While drinking he may be saying
aah this tea is very sweet. However, as he drinks more and more, his sugar level increases." – **(Female adolescent, 15 years)**

However, a few adolescents had a different perspective, stating that there was no relationship between NCDs and physical activity or between NCDs and diet. Two of the parents and caregivers expressed similar views, as one of them said:

"I can say that exercise and those diseases are not related because, are those diseases caused by exercise? No." – **(Parent, 46 years)**

4.1.4 Factors influencing physical activity and dietary practices in ALHIV

Participants' perspectives on the factors influencing physical activity and dietary practices in ALHIV were organized into two main themes: perceived facilitators and perceived barriers. In this study, facilitators refer to factors that positively encourage adolescents to engage in

physical activity and adopt healthy eating habits, while barriers are factors that hinder or discourage these practices in ALHIV. These themes were further categorized into individual, interpersonal, and community domains of the Socio-ecological Model by Urie Bronfenbrenner.

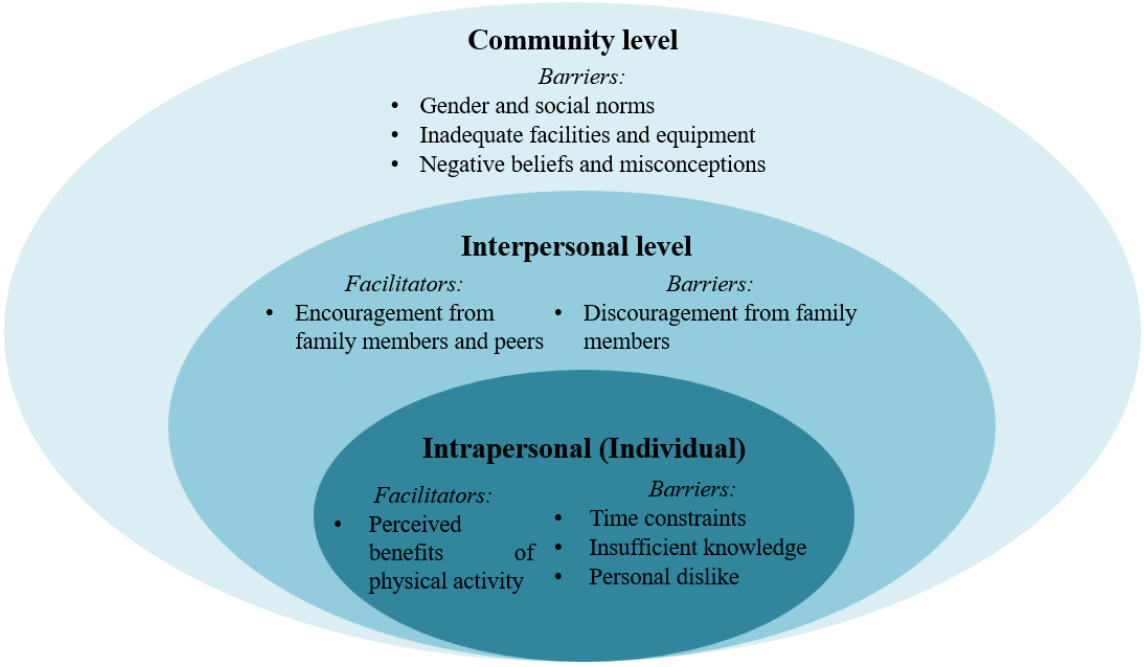

Figure 2: Summary of the facilitators and barriers to physical activity in ALHIV

(a) Facilitators for physical activity in ALHIV

Intrapersonal level (Individual)

Perceived benefits of physical activity: Some ALHIV reported being genuinely interested in certain types of physical activity such as football, due to the belief that these activities could help them remain fit and healthy. Some explained that they engage in physical activity because it allows them to travel to different places. Others mentioned that sports such as football could lead to future employment, which served as a motivating factor for them to stay physically active:

> *"I exercise because when we participate in UMISETA, we travel to various places like Morogoro, Tabora, etc.; that's what motivates me to go to netball exercises every day."*- **(Female adolescent, 16 years)**

Some of the parents and caregivers had a similar view, as one of them said:

"As I said, this may be part of the job search; many think that they should run to the sports market to get jobs. So, they don't go there just to exercise, they go there to develop their talent."- **(Caregiver, 43 years)**

Interpersonal level

Encouragement from family members and peers: Some adolescents reported that having family members, friends, and peers who like to exercise is a key motivating factor for them to engage in physical activity:

"One of the things that motivates me to exercise is my peers. The young people I grew up with in the neighborhood are into exercising, so if I don't exercise that means I'll be alone. Most of them are usually there, for example, when it comes to football, they are all in football. So I have to join them and exercise." - **(Male adolescent, 18 years)**

(b) Barriers to physical activity in ALHIV

Intrapersonal (Individual) level

Time constraints: The majority of the ALHIV reported that they have little time to engage in physical activity. They feel that domestic chores and tight school schedules consume most of their time and contribute to some level of physical inactivity, especially for female adolescents:

"I don't have time to exercise. For example, at school, there's so much studying that we don't get time to exercise. And even when I get home, there's a lot of work to do. When I get back from school, I still have to study, wash the dishes, cook, be sent on errands; so, I don't have time to exercise." - **(Female adolescent, 18 years)**

Insufficient knowledge: Some of the parents and caregivers believe that the lack of knowledge about physical activity is an aspect contributing to physical inactivity in ALHIV. They explained that most ALHIV have not been adequately educated about the types and importance of physical activity:

"But there are also others who don't know about exercise. That's why you find on the streets, children may be exercising but all they do is just play football. You won't see a child running by just for exercise, and that is because no one has educated them about the types and importance of exercise. Therefore, if that education is provided by trainers or facilitators, I think it will be a good thing." - **(Caregiver, 43 years)**

Personal dislike: Some adolescents reported that they simply do not find physical activities enjoyable or stimulating and therefore prefer not to participate. Others explained that they don't like to exercise because whenever they do so, they get problems, such as nose bleeding:

"If I run too much, I get nosebleeds and I suddenly run out of energy. That's why I don't like to exercise."- **(Female adolescent, 17 years)**

Interpersonal level

Discouragement from family members: Some ALHIV reported that their families do not make any effort to motivate them to engage in physical activity, which in turn discourages them from doing so:

> *"In my family, no one likes exercise, so there is no one who can encourage me to exercise."* - **(Male adolescent, 18 years)**

Some of the parents and caregivers admitted to discouraging their children from exercising, partly because they believe it to be a waste of time. Some also believe that the health problems that some adolescents have, such as asthma and joint problems, could prevent them from exercising.

> *"In my son's case, I can say that exercise bothers him because he has a certain chest problem called asthma, so when you give him difficult tasks, it bothers him. That's why he doesn't exercise, and when he does, he only does the lighter ones. He doesn't even do any hard work."* - **(Parent, 42 years)**

Community level

Gender roles and social norms: Most adolescents reported that communities mostly expect female adolescents to perform all domestic chores and grant them less freedom compared to boys. Furthermore, certain sports like football are often viewed as 'masculine', which discourages girls from participating. These views emerged as a significant barrier to physical activity in ALHIV:

> *"In many societies, it is known that the female child does all the housework, but the male child only has small tasks: maybe when he gets older and starts to earn money, but when he is younger, housework is not for him most of the time. So, you find that the girl spends a lot of time doing housework, but when the boy comes back and*

decides to exercise or do something else, he just goes without being stopped by any parent or anything." - **(Male adolescent, 19 years)**

Inadequate facilities and equipment: Several ALHIV mentioned that there is limited access to open areas and stadiums for exercising in the area, due to flooding and the long distance to the available facilities. Others mentioned the lack of proper exercise tools, such as jerseys, training shoes, etc., as a factor contributing to their physical inactivity:

"Areas for exercise are few and far from home. Maybe if I lived near a stadium like the national stadium, I would exercise even if it meant squeezing my schedule." - **(Male adolescent, 16 years)**

Some parents and caregivers had an opinion regarding the lack of equipment for physical activity:

"I have mentioned the infrastructure, meaning the stadiums, but there is also no equipment for the children to use during exercise. When you exercise, you must have a jersey, maybe training shoes, if it is football then have a ball, etc. So many young people don't have them." - **(Caregiver, 43 years)**

Negative beliefs and misconceptions: Some respondents reported a strong community belief that physical activity could lead to adolescents becoming spoiled and joining negative peer groups. Others viewed physical activity as a waste of time:

"For example, my daughter will be going to Machipi later today for sports camp. Many people are saying to me, "You are just letting the child go to Machipi there, do you know what kind of environment she is going to live in?" Many parents believe that when a girl child has too much freedom to exercise, she will be spoiled. That is probably why, even in the street, you find many girls are not allowed to exercise." – **(Parent, 33 years)**

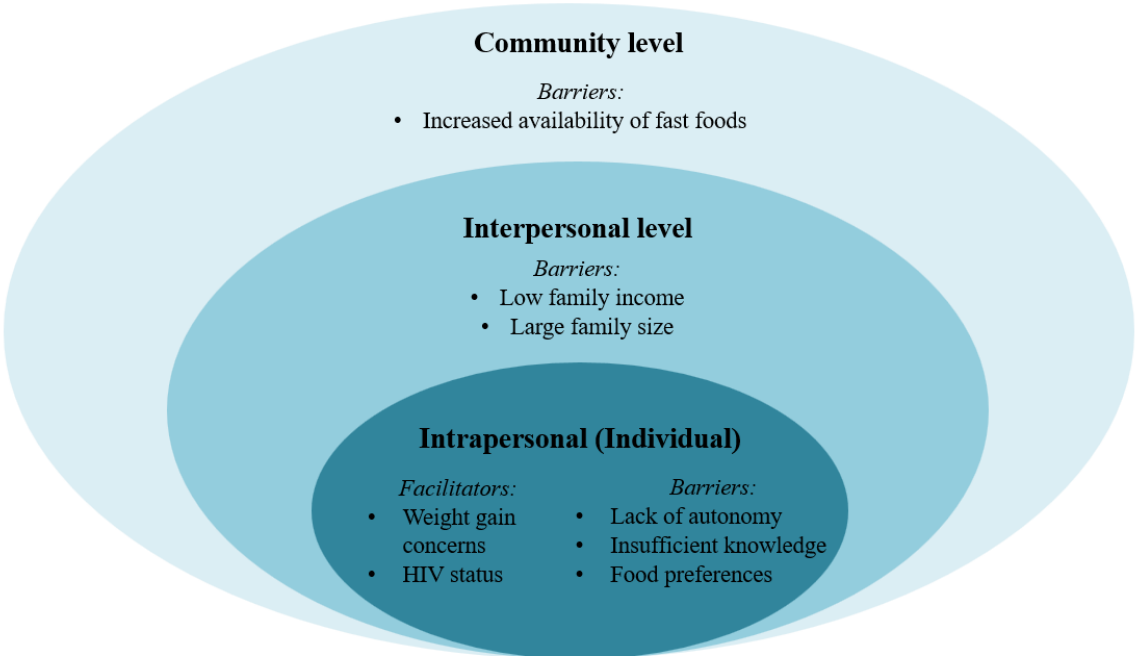

Figure 3: Summary of facilitators and barriers to healthy diet consumption in ALHIV

(c) Facilitators of healthy diet consumption in ALHIV

Intrapersonal level (Individual)

Weight gain concerns: A few adolescents cited their fears about being overweight and their fear of being called offensive names as reasons for changing to a healthier diet. They avoid certain foods, particularly fatty ones, since they wish to be slender:

> *"I don't like fatty foods because they can make you fat. Getting fat is not very good because sometimes they will call you 'tukunya tukunya' or 'bonge' or 'bigi'(overweight). For example, if you fail in class, the teacher will cane you and then say, oh bigi, why did you fail?"* - **(Female adolescent, 15 years)**

HIV status: According to some adolescents, their HIV status motivates them to eat healthily. They said that in addition to eating well to stay healthy and prevent illnesses, they also do this to keep others from learning about their health issues:

> *"Personally, because I am infected with HIV, I know that eating these healthy foods will boost my immunity. I eat these foods because I have been advised about the things to use so that my health improves, and because I love myself that's why I use these foods."* – **(Male adolescent, 19 years)**

(d) Barriers to healthy diet consumption in ALHIV

Intrapersonal level (Individual)

Lack of autonomy: The majority of adolescents cited a lack of control over their home meal choices as a major reason for their consumption of meals high in carbohydrates and low in fruits and vegetables. They clarified that parents often decide what should be cooked at home and that they are powerless to overrule those choices:

> *"You know I can't change a whole group of people to do this or that, no. Whatever is decided and whatever I find at home, I have to eat that. So, you find that most of the time green vegetables are not cooked at home."*- **(Female adolescent, 19 years)**

Food preferences: The majority of the adolescents cited their love of fast food as a reason for their poor eating habits. Common unhealthy foods mentioned include chips, sodas, fried bananas, biscuits, sweets, etc. They stated that they like these foods because they are affordable, enticing, and easy to eat, and because they are easily accessible in their homes and at school. In this study, ALHIV seemed to link their love of fast food to a contemporary trend that is apparently widespread among their peers:

> *"We young people nowadays prefer to eat chips, potatoes, and other small things like juice, biscuits, sweets, etc."* – **(Female adolescent, 16 years)**

Some parents/caregivers shared a similar view regarding adolescents' preference for fast food:

> *"I usually see this son of mine sometimes when he gets a little money, his favorite things to eat are usually chips and juices. You know how these young people are, they like to have fun (Laughs). So, I often see him rushing to eat chips and juices whenever he gets any money."* – **(Parent, 64 years)**

Insufficient knowledge: One of the reasons given by several of the adolescents for their poor eating habits was a lack of nutritional information. The reason for this is that during clinic visits, there is typically less advice provided regarding healthy eating and more emphasis on ART adherence. This turned out to be one among the biggest obstacles to ALHIV eating a nutritious diet. A few caregivers had a similar opinion regarding the inadequate dietary education among ALHIV:

"The first issue is a lack of education. You know these foods that cause harm to the body are often appealing; pork is appealing, meat is appealing, and chips are appealing. It's not easy for someone to prefer vegetables when they have the means to buy something else. Therefore, the lack of nutritional education is also a problem."- **(Caregiver, 43 years)**

Interpersonal level

Low family income: Parents and caregivers mentioned that their poor income occasionally prevents them from buying certain nutrient-dense foods. They clarified that proteins like meat and eggs, as well as fruits and vegetables are usually pricey and out of reach for most people. This causes meal repetition and a greater reliance on carbohydrate-dense meals, which further adds to ALHIV's poor eating habits:

"For example, there are days when we eat fried cassava and drink water only, and the morning goes by like that. In the afternoon, we cook ugali, maybe with sardines and the day goes by like that. Sardines are good, but green vegetables and fruits are also required. The problem is we don't have the income to be able to buy all these other foods, so what we get is what he eats." – **(Parent, 42 years)**

Large family size: Some adolescents reported that being part of a large family made it difficult to get a good diet because they had to rely on less nutrient-dense, less expensive food that was sufficient for everyone. They stated that because fruits, vegetables, and protein-rich foods are costly and typically come in little quantities that are insufficient for the whole family, they frequently miss out on them:

"We often eat beans because they are plentiful and there are many of us at home. When you buy vegetables, they come in small amounts, so they aren't enough for everyone. Vegetables are often served to grandfather, grandmother and our eldest brother. The rest of us are just given beans." - **(Male adolescent, 15 years)**

Community level

***Increased availability of fast foods*:** The majority of the adolescents in this study claimed that fast meals such chips as well as sugary drinks like soda are readily available in their neighborhoods. They mentioned that these items are not only available in the neighborhood, but also in schools, and are less expensive than healthier choices such as fruits. This emerged as an important hindrance to healthy eating among the ALHIV:

"For me, at school I usually eat fried cassava and other things, because most of what they sell is cassava, samosas, fried bananas, and ice cream, that's it. They don't really sell fruits."- **(Female adolescent, 18 years)**

4.1.5 Parents' perceptions toward physical activity and diet in ALHIV

Parents and caregivers often play a crucial part in influencing the health behaviors of adolescents, including their physical activity and dietary habits. Their attitudes and perceptions can directly influence adolescents' access to healthy foods and opportunities to engage in physical activity. In this study, the parents and caregivers interviewed expressed several views concerning these two health behaviors, some of which were similar to those of the adolescents and some of which were a bit different.

(i) Perceived importance of physical activity and diet

Parents and caregivers displayed a degree of awareness about physical activity and diet consumption. Most of them perceived physical activity and a healthy diet as being important for the health and well-being of ALHIV. Some of the benefits they mentioned include strengthening the body's immunity, reducing body weight, a possible source of employment, stimulating the mind, and strengthening the body; these were similar to those expressed by the adolescents.

"For my child, exercise is important because of his condition. If he exercises, perhaps the virus might become dormant. If he remains idle, you may find that the virus becomes active, so that's why he exercises." – **(Caregiver, 60 years)**

(ii) Attitude towards physical activity in ALHIV

Same as adolescents, most parents and caregivers indicated a positive attitude towards physical activity in ALHIV. They believed that physical activity could help improve adolescents' health and overall well-being:

"From my point of view, I think physical exercise is a good thing, that's why I try so hard to advise my son to exercise."- **(Caregiver, 29 years)**

However, several participants highlighted the negative attitudes and beliefs held by some parents regarding physical activity among ALHIV. They explained that some parents fear that

giving adolescents the freedom to participate in physical activities could expose them to negative peer influences or risky behaviors. This concern was particularly high for female adolescents, as expressed by a parent:

> *"With girls, I see this a lot, even my own child faces challenges. You'll hear people say, 'Every day, your child is exercising, every day doing sports. She will end up spoiled.' So that's what they believe; many parents think that if a child especially a girl engages too much in physical activities, she will become spoiled."* **- (Parent, 33 years)**

Some parents also appeared hesitant to support their children to engage in physical activity. One explained that HIV by itself wasn't an issue, but she feared that her child was experiencing pain while engaging in physical activity due to other health problems.

> *"But now, one of her legs is bothering her, so I usually tell her, 'When you're doing exercises, don't you see you're hurting yourself and increasing the pain?"*- **(Parent, 52 years)**

(iii) Attitude towards diet consumption

Parents and caregivers also expressed a positive attitude towards a healthy diet, citing its importance for overall health and well-being of ALHIV. However, some parents and caregivers expressed a negative attitude towards diet consumption, which stemmed from their financial limitations that hindered them from providing a healthy diet to their adolescents.

> *"Honestly, we just eat to fill our stomachs, not necessarily that the food must be healthy. When we have food, we eat, but on days when things are tough, we can't manage to have a balanced meal."*- **(Caregiver, 29 years)**

4.2 Discussion

This study explored the social determinants influencing physical activity and healthy diet consumption among ALHIV in Ifakara Town, Tanzania. The findings highlight multiple factors that influence these two practices as reported by adolescents and their parents/caregivers. Some parts of this discussion were also presented in the Masters student's research publication (Maganga *et al.,* 2025).

4.2.1 Understanding of physical activity and healthy diet consumption

This study highlights understandings of physical activity and healthy diet consumption among ALHIV. Adolescents living with HIV mostly describe physical activity as domestic chores and sports. Additionally, the majority of the participants often used the terms 'exercise' and 'physical activity' interchangeably. This indicates limited understanding of the different domains of physical activity and their contributions to health. Similar findings have been reported in other studies and were observed to contribute to physical inactivity in adolescents (Bhattacharya *et al.,* 2024; Sundar *et al.,* 2018). In terms of diet consumption, ALHIV and their parents and caregivers identified common unhealthy eating habits such as consumption of fast foods like chips and soft drinks, as well as low intake of fruits and vegetables. These findings are consistent with other studies done in Tanzania and Nigeria, which found that PLHIV had a high intake of fried snacks and sugary beverages coupled with a low intake of fruits and vegetables (Boncyk *et al.,* 2022; Ezenwosu & Ezenwosu, 2023). These findings emphasize the importance of integrating physical activity and dietary education into day-to-day HIV care programs.

4.2.2 Attitude towards physical activity and healthy diet consumption

Many ALHIV and their parents/caregivers recognized the benefits of physical activity for overall health and well-being. These findings align with a study conducted in Morocco, where adolescents and their parents emphasized the importance of physical activity in maintaining both physical and mental health (Abdelghaffar *et al.,* 2019). However, some participants in this study reported that some parents and caregivers feared that allowing adolescents to engage in physical activity might expose them to negative peer influence. Similar concerns have been reported in previous studies and were linked to lower levels of physical activity, particularly among older adolescents (Su *et al.,* 2022; Hosokawa *et al.,* 2023).

The majority of the participants in this study also had positive views about healthy diet consumption in ALHIV. They discussed several benefits of healthy eating, which is consistent with findings from a study conducted in South Africa, where some of the adolescents and youth living with HIV identified healthy eating as one of the keys to maintaining healthy body weight and avoiding the stigma associated with HIV-related weight loss (Nyamaruze & Govender, 2020). Another study conducted in Tanzania indicated that PLHIV recognized the importance of healthy and nutritious diets in enhancing body immunity and preventing diseases (Boncyk *et al.,* 2022).

4.2.3 Perceptions of NCDs in relation to physical activity and diet

Most of the participants in this study mistakenly perceived communicable diseases such as malaria, STDs and HIV/AIDS as examples of NCDs, while some classified diseases such as diabetes as communicable diseases. This indicates limited understanding and misconceptions about NCDs. Similar findings were reported in a study conducted in Kenya, where a significant number of adolescents mistakenly classified certain diseases; for example, 37% of participants incorrectly believed that diabetes was communicable (Kiplagat *et al.,* 2023). The findings suggest the need for targeted health education programs that enhance ALHIV's knowledge of NCDs and their risk factors.

Some ALHIV and in this study recognized the risk of PLHIV (including themselves) developing NCDs. A previous study in Tanzania similarly highlighted that poor dietary behaviors significantly contribute to the likelihood of developing NCDs among PLHIV (Mutagonda *et al.,* 2022). However, some participants believed that PLHIV including adolescents had a low risk of developing NCDs. This aligns with findings from other studies, which reported that despite the increased risk of conditions like Type 2 diabetes and hypertension in PLHIV, awareness of this heightened risk was limited (Kagaruki *et al.,* 2018). This underscores the need for educational interventions as part of HIV care to improve awareness about the risk of developing NCDs among ALHIV.

4.2.4 Factors influencing physical activity and diet consumption in ALHIV

(i) Facilitators to engage in physical activity among ALHIV

According to the findings of this study, ALHIV are strongly motivated to engage in physical activities when they are encouraged by their families and peers. Other research found a similar

result and stressed the importance of family and peer support in increasing physical activity among ALHIV (Kitilya *et al.,* 2023; Alexandra *et al.,* 2014). However, this study found some contradicting perspectives, with some individuals citing parental constraints as obstacles to ALHIV taking part in physical activity. Similar concerns were raised in a prior study, which found that restrictive parenting was linked to poorer physical activity, particularly among older adolescents (Su *et al.,* 2022; Hosokawa *et al.,* 2023). This emphasizes the importance of educating family and peers, as well as reinforcing support structures, in order to actively promote physical activity among ALHIV.

(ii) Barriers to engaging in physical activity among ALHIV

Societal norms and gender roles were cited as obstacles to ALHIV's engagement in physical activity. This is consistent with research conducted in Kenya, Ethiopia and the United Kingdom (Cowley *et al.,* 2021; Hardy-Johnson *et al.,* 2021); and demonstrates that community and public awareness is necessary to overcome the gender obstacles to physical activity that persist in ALHIV.

This study also discovered that there are still misconceptions and unfavorable attitudes around physical activity in the community. Parents were worried that adolescents would be exposed to dangerous peer groups through physical activities. Similar to earlier studies from Slovakia and Nigeria (Adebusoye *et al.,* 2023; Karchynskaya *et al.,* 2024) this was found to be a substantial barrier to physical activity among ALHIV, underscoring the necessity of public and community awareness initiatives.

Time constraints were identified in this study as an obstacle to physical activity, and they were linked to tight home and school schedules. A similar finding was reported to contribute to a decrease in physical activity among adolescents in other studies (Abdelghaffar et al., 2019; Martins *et al.,* 2021). This illustrates the necessity of school schedules incorporating mandatory physical activity lessons. To accommodate the many interests and skills of adolescents, including those living with HIV, a range of sports and leisure activities need to be provided.

Furthermore, ALHIV in this study reported inadequate access to community resources as a barrier to participating in physical activity, owing mostly to flooding in the area and vast distances to existing facilities. Other studies in Sub-Saharan Africa have found that adolescents face major hurdles to physical activity due to a lack of accessible exercise places and inadequate infrastructure (Zelenovic *et al.,* 2021; Sluijs *et al.,* 2022).

(iii) Facilitators to consume a healthy diet among ALHIV

In this research, adolescents acknowledged fears of gaining weight and being mocked as reasons to avoid meals that they believe could contribute to weight gain. Other studies found that adolescents who wished to lose weight generally adopted healthier eating behaviors (Bodega *et al.,* 2024; Song *et al.,* 2022). Furthermore, ALHIV stated that their goal not to appear weakened fueled their dedication towards healthy eating. A study in Tanzania found that people living with HIV might favor healthy diets in order to boost their immune systems as they cope with the stigma caused by their illness (Boncyk *et al.,* 2022).

(iv) Barriers to consuming a healthy diet among ALHIV

Adolescents living with HIV reported having little say in what was cooked at home due to parental control and limitations. This result is consistent with other research showing that parental influence continues to have a significant impact on adolescent eating habits, especially in the home setting (Neufeld *et al.,* 2022; Daly *et al.,* 2022).

Parents and caregivers in this study clarified that although ALHIV eat the majority of their meals at home, they frequently spend their pocket money on unhealthy snacks that they buy outside the house. Studies have shown similar results, highlighting the necessity of educating ALHIV and expanding access to healthy snacks in schools and neighborhoods (Trübswasser *et al.,* 2022).

Low household income tends to limit access to diverse foods including fruits and vegetables, resulting in higher consumption of carbohydrate-rich meals. Similar results have been documented in other low-resource contexts, where inadequate financial capability frequently impairs food quality (Kamkuemah *et al.,* 2022).

Adolescents living with HIV further stated that being part of a large household generally resulted in lower food quality. This effect was also found in studies from affluent countries such as the United States (McCullough *et al.,* 2022). Interventions such as tailored nutrition support initiatives may help address these concerns, underscoring the importance of multifaceted methods to tackling these health factors in ALHIV.

4.2.5 Strengths of the study

The primary strength of this study is its thorough comprehension of the factors that influence ALHIV's dietary behaviors and physical activity in Ifakara, Tanzania. This qualitative study offers broad perspectives into the lived experiences and perceptions of ALHIV concerning these behaviors, which are frequently underrepresented in quantitative research. Given that parents and other caregivers frequently have a significant influence on adolescents' lives, triangulating their answers with those of the ALHIV helped uncover additional information and insights.

4.2.6 Limitations of the study

Firstly, since this study was limited to a single semi-rural Tanzanian location, some of the opinions expressed might only apply to adolescents in that context, making it harder to extrapolate them to other contexts. Second, there may have been a potential selection bias because participants were mostly selected from the CDCI using purposive sampling, which ensures that only willing people are included in the study. Adolescents not involved in care may have been under-represented since those who are more involved in health care may hold different opinions from those who are not.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study reveals multiple social determinants at the intrapersonal, interpersonal, and community levels that influence physical activity and dietary behaviors of ALHIV in Ifakara. While ALHIV demonstrated some understanding about physical activity and healthy diet consumption and recognized the importance of these two behaviors in preventing NCDs, some had limited understanding and different perspectives on this relationship. This study indicated that while a lack of awareness, gender and social norms, and negative opinions were thought to prevent ALHIV from being physically active, support from peers and family encourages them to do so. Concerns about weight gain and HIV status affected the intake of healthy diets among ALHIV, whereas big family sizes, lack of autonomy, and financial limitations all had a role in unhealthy eating. In addition to that, the study demonstrates the influence that parents and caregivers may have on ALHIV's health behaviors through the various views that they reported in the study.

5.2 Recommendations

These research insights point to the necessity of reviewing and reinforcing current policies and initiatives in order to better meet the requirements of ALHIV. The study specifically urges that strategic objectives that promote physical activity and healthy eating for PLHIV, including adolescents, be included in the National Guidelines for the Management of HIV and AIDS in Tanzania. Physical activity and nutritional education also need to be incorporated into HIV care programs' routine activities for PLHIV, including adolescents. Health care providers need to be instructed and trained to incorporate education about physical activity and nutrition into regular HIV care. Public awareness programs are essential at the community level to dispel myths and unfavorable perceptions about these health behaviors. To guarantee supportive home environments that facilitate a healthy lifestyle for ALHIV, it is imperative to educate and include parents and caregivers. In addition to addressing these determinants, these tailored policies and program initiatives could also enhance the future well-being of ALHIV.

REFERENCES

Abdelghaffar, E. A., Hicham, E. K., Siham, B., Samira, E. F., & Youness, E. A. (2019). Perspectives of adolescents, parents, and teachers on barriers and facilitators of physical activity among school-age adolescents: A qualitative analysis. *Environmental Health and Preventive Medicine*, *24*(1). https://doi.org/10.1186/s12199-019-0775-y

Adebusoye, B., Leonardi-Bee, J., Phalkey, R., & Chattopadhyay, K. (2023). Barriers and facilitators of physical activity among school attending adolescents in Lagos State, Nigeria: A qualitative study exploring views and experiences of decision-makers in secondary schools. *Health Science Reports*, *6*(1), 1–10. https://doi.org/10.1002/hsr2.997

Akseer, N., Mehta, S., Wigle, J., Chera, R., Brickman, Z. J., Al-Gashm, S., Sorichetti, B., Vandermorris, A., Hipgrave, D. B., Schwalbe, N., & Bhutta, Z. A. (2020). Non-communicable diseases among adolescents: Current status, determinants, interventions and policies. *BMC Public Health*, *20*(1), 1–20. https://doi.org/10.1186/s12889-020-09988-5

Bares, S. H., Wu, X., Tassiopoulos, K., Lake, J. E., Koletar, S. L., Kalayjian, R., & Erlandson, K. M. (2024). Weight Gain After Antiretroviral Therapy Initiation and Subsequent Risk of Metabolic and Cardiovascular Disease. *Clinical Infectious Diseases*, *78*(2), 395–401. https://doi.org/10.1093/cid/ciad545

Barnett, B. I., Gonzalez, W., Bipul, M., Chowdhury, D., Wouabe, E. D., & Deo, A. K. (2021). Improving adolescents ' food choices : Learnings from the Bhalo Khabo Bhalo Thakbo (" Eat Well , Live Well ") campaign in Bangladesh. *BMC Public Health, 66*, 23–25.

Bhattacharya, M., Picchioni, F., Zanello, G., & Srinivasan, C. S. (2024). Quantity and quality of physical activity during adolescence: Evidence from a mixed-method study in rural Telangana, India. *The Journal of Biosocial Science*, *56*(2), 314–337. https://doi.org/10.1017/S0021932023000147

Bodega, P., de Cos-Gandoy, A., Fernández-Alvira, J. M., Fernández-Jiménez, R., Moreno, L. A., & Santos-Beneit, G. (2024). Body image and dietary habits in adolescents: A systematic review and meta-analysis. *Nutrition Reviews*, *82*(1), 104–127. https://doi.org/10.1093/nutrit/nuad044

Boncyk, M., Shemdoe, A., Ambikapathi, R., Mosha, D., Froese, S. L., Verissimo, C. K., Mwanyika-Sando, M., Killewo, J., Leyna, G. H., Gunaratna, N. S., & Patil, C. L. (2022). Exploring drivers of food choice among PLHIV and their families in a peri-urban Dar es Salaam, Tanzania. *BMC Public Health*, *22*(1), 1–12. https://doi.org/10.1186/s12889-022-13430-3

Carolyn Boyce, MA, E. A., & Palena Neale, PhD, S. E. A. (2006). A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input. *Pathfinder International*, *4*(2). https://doi.org/10.1080/14616730210154225

Cerf, M. E. (2021). Healthy lifestyles and noncommunicable diseases: Nutrition, the life-course, and health promotion. *Lifestyle Medicine*, *2*(2), 1–12. https://doi.org/10.1002/lim2.31

Changoh, C. M., Tatah, L., Aroke, D., Nsagha, D., & Choukem, S. P. (2024). Noncommunicable diseases behavioural risk factors among secondary school adolescents in Urban Cameroon. *BMC Public Health*, *24*(1), 1–7. https://doi.org/10.1186/s12889-024-17753-1

Chirindza, N., Leach, L., Mangona, L., Nhaca, G., Daca, T., & Prista, A. (2022). Body composition, physical fitness and physical activity in Mozambican children and adolescents living with HIV. *PLoS ONE*, *17*(10 October), 1–16. https://doi.org/10.1371/journal.pone.0]275963

Daly, A. N., O'Sullivan, E. J., & Kearney, J. M. (2022). Considerations for health and food choice in adolescents. *Proceedings of the Nutrition Society*, *81*(1), 75–86. https://doi.org/10.1017/S0029665121003827

Ezenwosu, I. L., & Ezenwosu, O. U. (2023). Effect of nutrition education on dietary diversity among HIV Patients in Southeast , Nigeria. *Proceedings of the Nutrition Society*, *23*(1), 170–177.

Fearnley, C. J. (2022). Mind mapping in qualitative data analysis: Managing interview data in interdisciplinary and multi-sited research projects. *Geography and Environment*, *9*(1), 1–19. https://doi.org/10.1002/geo2.109

Foy, M., Sperati, C. J., Lucas, G. M., & Estrella, M. M. (2014). Drug interactions and

antiretroviral drug monitoring. *Current HIV/AIDS Reports*, *11*(3), 212–222. https://doi.org/10.1007/s11904-014-0212-1

Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, V., Eccles, M. P., & Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology & Health*, *25*(10), 1229–1245. https://doi.org/10.1080/08870440903194015

Gausi, B., Berkowitz, N., Jacob, N., & Oni, T. (2021). Treatment outcomes among adults with HIV/non-communicable disease multimorbidity attending integrated care clubs in South Africa. *AIDS Research and Therapy*, *18*(1), 72. https://doi.org/10.1186/s12981-021-00387-3

Gebrie, M., Perry, L., Xu, X., Kassa, A., & Cruickshank, M. (2023). Nutritional status and its determinants among adolescents with HIV on anti-retroviral treatment in low- and middle-income countries: A systematic review and meta-analysis. *BMC Nutrition*, *9*(1), 1–15. https://doi.org/10.1186/s40795-023-00714-z

Halpin, S. N. (2024). Inter-Coder Agreement in Qualitative Coding: Considerations for its Use. *The American Journal of Science and Qualitative Research*, *8*(3), 23–43. https://doi.org/10.29333/ajqr/14887

Hardy-Johnson, P., Dhuria, P., Strommer, S., Weller, S., Barker, M., & Fall, C. (2021). Exploring the Diet and Physical Activity Behaviours of Adolescents Living in India and sub-Saharan Africa: A Qualitative Evidence Synthesis. *Public Health Nutrition*, *24*(16), 5288–5298. https://doi.org/10.1017/S1368980021002408

Heydari, M., Foroozanfar, Z., Bazmi, S., Mohammadi, Z., Joulaei, H., & Ansari, G. (2024). The prevalence of antiretroviral drug interactions with other drugs used in women living with HIV and its association with HIV drug change and patient compliance. *BMC Infectious Diseases*, *24*(1). https://doi.org/10.1186/s12879-024-09958-x

Hosokawa, R., Fujimoto, M., & Katsura, T. (2023). Parental support for physical activity and children's physical activities: A cross-sectional study. *BMC Sports Science, Medicine and Rehabilitation*, *15*(1), 1–9. https://doi.org/10.1186/s13102-023-00700-9

Innes, S., & Patel, K. (2018). Noncommunicable diseases in adolescents with perinatally

acquired HIV-1 infection in high-income and low-income settings. *Current Opinion in HIV/AIDS*,*13*(3).https://journals.lww.com/co/hivandaids/fulltext/2018/05000/noncommunicable_diseases_in_adolescents_with.5.aspx

Jaggers, J. R., & Hand, G. A. (2016). Health Benefits of Exercise for People Living With HIV: A Review of the Literature. *American Journal of Lifestyle Medicine*, *10*(3), 184–192. https://doi.org/10.1177/1559827614538750

Juma, K., A. Juma, P., Shumba, C., Otieno, P., & Asiki, G. (2020). Non-Communicable Diseases and Urbanization in African Cities: A Narrative Review. *Public Health in Developing Countries in Africa - Challenges and Opportunities*, *November*. https://doi.org/10.5772/intechopen.89507

Kagaruki, G. B., Mayige, M. T., Ngadaya, E. S., Kilale, A. M., Kahwa, A., Shao, A. F., Kimaro, G. D., Manga, C. M., Mbata, D., Materu, G. S., Masumo, R. M., & Mfinanga, S. G. (2018). Knowledge and perception on diabetes and hypertension among HIV clients utilizing care and treatment services: A cross sectional study. *BMC Public Health*, *18*(1), 1–9. https://doi.org/10.1186/s12889-018-5639-7

Kagaruki, G. B., Mayige, M. T., Ngadaya, E. S., Kimaro, G. D., Kalinga, A. K., Kilale, A. M., Kahwa, A. M.,& Mfinanga, G., (2014). Magnitude and risk factors of non-communicable diseases among people living with HIV in Tanzania: A cross sectional study. *BMC Public Health*, *14*(1), 904. https://doi.org/10.1186/1471-2458-14-904

Kamkuemah, M., Gausi, B., & Oni, T. (2020). Missed opportunities for NCD multimorbidity prevention in adolescents and youth living with HIV in urban South Africa. *BMC Public Health*, *20*(1), 1–11. https://doi.org/10.1186/s12889-020-08921-0

Kamkuemah, M., Gausi, B., & Oni, T. (2022). High prevalence of multimorbidity and non-communicable disease risk factors in South African adolescents and youth living with HIV: Implications for integrated prevention. *South African Medical Journal*, *112*(4), 259–267. https://doi.org/10.7196/SAMJ.2022.v112i4.15967

Karchynskaya, V., Kopcakova, J., Geckova, A. M., Katrusin, B., Reijneveld, S. A., & de Winter, A. F. (2024). Barriers and enablers for sufficient moderate-to-vigorous physical activity: The perspective of adolescents. *PLoS ONE*, *19*(2 February), 1–16.

https://doi.org/10.1371/journal.pone.0296736

Kato, I., Basil, P., & Department. (2020). Prevalence of non-communicable diseases among individuals with HIV infection by antiretroviral therapy status in Tanzania. *PloS One*, *15*(7). https://doi.org/10.1371/Journal.Pone.0235542

Kiplagat, S. J., Steyl, T., Wachira, L. J., & Phillips, J. (2023). Knowledge of non-communicable diseases among adolescents in Uasin Gishu County, Kenya. *African Health Sciences*, *23*(2), 589–596. https://doi.org/10.4314/ahs.v23i2.68

Kitilya, B., Sanga, E., Praygod, G., Kavishe, B. B., Ditlevsen, K., & Peck, R. (2023). Perceptions, facilitators and barriers of physical activity among people living with HIV : A qualitative study. *BMC Public Health*, 1–12. https://doi.org/10.1186/s12889-023-15052-9

Letang, E., Kalinjuma, A. V., Glass, T. R., Gamell, A., Mapesi, H., Sikalengo, G., Luwanda, L. B., Mnzava, D., Ntamatungiro, A. J., Ndaki, R., Francis, G., Vanobberghen, F., Furrer, H., Klimkait, T., Felger, I., Tanner, M., Hatz, C., Weisser, M., & Battegay, M. (2017). Cohort profile: The Kilombero and Ulanga Antiretroviral Cohort (KIULARCO) - A prospective HIV cohort in rural Tanzania. *Swiss Medical Weekly*, *147*(July), 1–9. https://doi.org/10.4414/smw.2017.14485

Maganga, J. J., Katende, A., Luoga, E., Nshatsi, N., Siru, J., Sigalla, G., Mollay, C., Weisser, M., & Mtenga, S. (2025). "I Don't Have Time to Exercise": Determinants of Physical Activity and Diet Consumption Among Adolescents Living with HIV in Southern Tanzania – A Phenomenological Qualitative Study. *HIV/AIDS - Research and Palliative Care* , *17*(May), 63–76. https://doi.org/10.2147/HIV.S519922

Martins, J., Costa, J., Sarmento, H., Marques, A., Farias, C., Onofre, M., & Valeiro, M. G. (2021). Adolescents' perspectives on the barriers and facilitators of physical activity: An updated systematic review of qualitative studies. *International Journal of Environmental Science Research and Public Health Research*, *18*(9). https://doi.org/10.3390/ijerph18094954

McComsey, G. A., Emond, B., Shah, A., Bookhart, B. K., Rossi, C., Milbers, K., Lafeuille, M. H., & Donga, P. (2022). Association Between Weight Gain and the Incidence of

Cardiometabolic Conditions Among People Living with HIV-1 at High Risk of Weight Gain Initiated on Antiretroviral Therapy. *Infectious Diseases and Therapy*, *11*(5), 1883–1899. https://doi.org/10.1007/s40121-022-00673-1

McCullough, M. L., Chantaprasopsuk, S., Islami, F., Rees-Punia, E., Um, C. Y., Wang, Y., Leach, C. R., Sullivan, K. R., & Patel, A. V. (2022). Association of Socioeconomic and Geographic Factors with Diet Quality in US Adults. *JAMA Network Open*, *5*(6), E2216406. https://doi.org/10.1001/jamanetworkopen.2022.16406

MOHCDGEC. (2018). National Adolescent Health and Development Strategy 2018 - 2022. *The Ministry of Health, Community Development, Gender, Elderly and Children*, 1–41.

MOHCDGEC. (2019). National Guidelines for the Management of HIV and AIDS in Tanzania. *The Tanzania National HIV/AIDS Control Programme*, *April*, 309–309. https://doi.org/10.5005/jp/books/13071_20

Moser, A., & Korstjens, I. (2018). Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European Journal of General Practice*, *24*(1), 9–18. https://doi.org/10.1080/13814788.2017.1375091

Musyani, A., Mosi, G., & Kinyenje, E. (2024). The Burden and Opportunities for Screening NCDs among People Living With HIV / AIDS Attending Care and Treatment Clinic at Temeke Regional Referral Hospital in Dar es Salaam. *Bulletin of the National Research Centre*, 1–15. https://doi.org/10.1186/s42269-024-01288-x

Mutagonda, R. F., Siril, H., Kaaya, S., Amborose, T., Haruna, T., Mhalu, A., Urassa, D., Mtisi, E., Moshiro, C., Tarimo, E., Reuben, G., Somba, M., August, F., & Mugusi, F. (2022). Prevalence and determinants of non-communicable diseases including depression among HIV patients on antiretroviral therapy in Dar es Salaam, Tanzania. *BMJ,* 742–751. https://doi.org/10.1111/tmi.13790

Nalugga, E. A., Laker, E., Nabaggala, M. S., Ddungu, A., Batte, C., Piloya, T., & Bongomin, F. (2022). Prevalence of overweight and obesity and associated factors among people living with HIV attending a tertiary care clinic in Uganda. *BMC Nutrition*, *8*(1), 1–7. https://doi.org/10.1186/s40795-022-00604-w

Ndirangu-Mugo, E., Shumba, C. S., Gatiti, P., Mutwiri, B. D., Abubakar, A., & Teitelman, A.

(2022). Interventions for Prevention of Non-Communicable Diseases among Adolescents Living with HIV: A Systematic Review. *SN Comprehensive Clinical Medicine*, *4*(1), 1–12. https://doi.org/10.1007/s42399-022-01186-1

Neufeld, L. M., Andrade, E. B., Ballonoff Suleiman, A., Barker, M., Beal, T., Blum, L. S., Demmler, K. M., Dogra, S., Hardy-Johnson, P., Lahiri, A., Larson, N., Roberto, C. A., Rodríguez-Ramírez, S., Sethi, V., Shamah-Levy, T., Strömmer, S., Tumilowicz, A., Weller, S., & Zou, Z. (2022). Food choice in transition: adolescent autonomy, agency, and the food environment. *The Lancet Public Health*, *399*(10320), 185–197. https://doi.org/10.1016/S0140-6736(21)01687-1

Ngowi, J. E., Mloka, D., Kitambala, E., & Kiologwe, J. (2023). Mitigating the Rising Burden of Non-Communicable Diseases through Locally Generated Evidence: Lessons from Tanzania. *Tanzania Journal of Health, 89*(1), 1–12. https://doi.org/10.5334/aogh.4111

Nkinda, L., Buberwa, E., Memiah, P., Ntagalinda, A., George, M., Msafiri, F., Joachim, A., Majigo, M., Ramaiya, K., & Sunguya, B. (2022). Impaired fasting glucose levels among perinatally HIV-infected adolescents and youths in Dar es Salaam, Tanzania. *Frontiers in Endocrinology*, *13*(December), 1–10. https://doi.org/10.3389/fendo.2022.1045628

Nyamaruze, P., & Govender, K. (2020). "I like the way I am, but I feel like I could get a little bit bigger": Perceptions of body image among adolescents and youth living with HIV in South Africa. *PLoS ONE*, *15*(1), 1–10. https://doi.org/10.1371/journal.pone.0227583

Oni, T., Youngblood, E., Boulle, A., McGrath, N., Wilkinson, R. J., & Levitt, N. S. (2015). Patterns of HIV, TB, and non-communicable disease multi-morbidity in peri-urban South Africa: A cross sectional study. *BMC Infectious Diseases*, *15*, 20. https://doi.org/10.1186/s12879-015-0750-1

Patel, P., Rose, C. E., Collins, P. Y., Nuche-Berenguer, B., Sahasrabuddhe, V. V, Peprah, E., Vorkoper, S., Pastakia, S. D., Rausch, D., & Levitt, N. S. (2018). Noncommunicable diseases among HIV-infected persons in low-income and middle-income countries: A systematic review and meta-analysis. *AIDS (London, England)*, *32 Suppl 1*(Suppl 1), S5–S20. https://doi.org/10.1097/QAD.0000000000001888

Pathak, V. C. (2017). Phenomenological research : A study of lived experiences. *International*

Journal of Advance Research and Innovative Ideas in Education, *3*(1), 1719–1722.

Rugakingira, A. A., Yondu, E., Thobias, J. M., Dionis, I., Kamata, C. C., Kilonzi, M., Metta, E., & Sirili, N. (2024). Opportunities and challenges for the integration of managing non-communicable diseases within HIV care and treatment services in Tanzania. *HIV Research and Clinical Practice*, *25*(1). https://doi.org/10.2024/hrcp.v4i2.1080

Salvatory Kalabamu, F., Msengi, G., & Mkopi, N. (2020). Magnitude of Overweight, Obesity and Insufficient Physical Sports Activities Among Secondary School Students in Kinondoni Municipal, Dar es Salaam. *East African Health Research Journal*, *4*(2), 164–171. https://doi.org/10.24248/eahrj.v4i2.640

Scarneo, S. E., Kerr, Z. Y., Kroshus, E., Register-Mihalik, J. K., Hosokawa, Y., Stearns, R. L., DiStefano, L. J., & Casa, D. J. (2019). The socioecological framework: A multifaceted approach to preventing sport-related deaths in high school sports. *Journal of Athletic Training*, *54*(4), 356–360. https://doi.org/10.4085/1062-6050-173-18

Shayo, F. K. (2019). Co-occurrence of risk factors for non-communicable diseases among in-school adolescents in Tanzania: An example of a low-income setting of sub-Saharan Africa for adolescence health policy actions. *BMC Public Health*, *19*(1), 1–8. https://doi.org/10.1186/s12889-019-7320-1

Sluijs, E. M. F. Van, Ekelund, P. U., & Crochemore-silva, I. (2022). Group Physical activity behaviours in adolescence : Current evidence and opportunities for intervention. *BMC Public Health, 398*(10298), 429–442. https://doi.org/10.1016/S0140-6736(21)01259-9

Song, L., Zhang, Y., Chen, T., Maitusong, P., & Lian, X. (2022). Association of body perception and dietary weight management behaviours among children and adolescents aged 6–17 years in China: A cross-sectional study using CHNS (2015). *BMC Public Health*, *22*(1), 1–10. https://doi.org/10.1186/s12889-022-12574-6

Su, D. L. Y., Tang, T. C. W., Chung, J. S. K., Lee, A. S. Y., Capio, C. M., & Chan, D. K. C. (2022). Parental Influence on Child and Adolescent Physical Activity Level: A Meta-Analysis. *International Journal of Environmental Research and Public Health*, *19*(24). https://doi.org/10.3390/ijerph192416861

Sundar, T. K. B., Løndal, K., Lagerløv, P., Glavin, K., & Helseth, S. (2018). Adolescents'

views on physical activity: Experiences of participants in an internet-based intervention - A qualitative study. *The BMC Public Health Research Journal*, *18*(1), 622. https://doi.org/10.1186/s12889-018-5546-y

Tluway, F. D., Leyna, G. H., & Mmbaga, E. J. (2018). Magnitude and factors associated with overweight and obesity among adolescents in in semi-rural area of Babati District, Tanzania. *The National Tanzania Journal of Health Research*, *20*(2 SE-Articles). https://doi.org/10.4314/thrb.v20i2.2

Trübswasser, U., Talsma, E. F., Ekubay, S., Poelman, M. P., Holdsworth, M., Feskens, E. J. M., & Baye, K. (2022). Factors Influencing Adolescents' Dietary Behaviors in the School and Home Environment in Addis Ababa, Ethiopia. *Frontiers in Public Health*, *10*(April), 1–10. https://doi.org/10.3389/fpubh.2022.861463

UNICEF. (2020). AIDS HIV and AIDS. *New HIV Infections among Young People Aged 15 - 24,* 1–6. https://www.unicef.org/tanzania/media/2436/file/HIV Fact Sheet.pdf

UNICEF. (2021). *Support for Adolescents Living With Hiv in Eastern and Southern Africa*. 38. https://www.unicef.org/esa/media/8791/file/Adolescents-HIV-Eastern-Southern-Africa-2021.pdf

Van Hout, M. C., Bachmann, M., Lazarus, J. V., Shayo, E. H., Bukenya, D., Picchio, C. A., Nyirenda, M., Mfinanga, S. G., Birungi, J., Okebe, J., & Jaffar, S. (2020). Strengthening integration of chronic care in Africa: Protocol for the qualitative process evaluation of integrated HIV, diabetes and hypertension care in a cluster randomised controlled trial in Tanzania and Uganda. *BMJ Open*, *10*(10), 1–11. https://doi.org/10.1136/bmjopen-2020-039237

Weisser, M., Mapesi, H., Vanobberghen, F., Okuma, J., Eichenberger, A., Wilson, H. I., Paris, D. H., Kalinjuma, A. V., Luoga, E., Wilson, L., Glass, T. R., Franzeck, F. C., Asantiel, A., Bani, F., Battegay, M., Byakuzana, T., Claud, J., Chale, A., Dotto, E., Wilson, H. (2024). Body weight changes in people living with HIV starting dolutegravir versus efavirenz-based regimens in a large cohort in rural Tanzania. *HIV/AIDS Research and Palliative Care*. https://doi.org/10.1097/0000000000004085

WHO. (2018). Global Action Plan on Physical Activity 2018-2030. In *Journal of Policy Modeling* (Vol. 28, Issue 6).

WHO. (2020). Non-Communicable Diseases. In *The Wiley Blackwell Encyclopedia of Health, Illness, Behavior, and Society* (pp. 1686–1690).

Woldesemayat, E. M. (2020). Chronic Diseases Multimorbidity among Adult People Living with HIV at Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia. *The International Journal of Chronic Diseases*, *2020*, 1–9. https://doi.org/10.1155/2020/2190395

Wood, B. R., & Huhn, G. D. (2021). Excess Weight Gain with Integrase Inhibitors and Tenofovir Alafenamide: What Is the Mechanism and Does It Matter? *Open Forum Infectious Diseases*, *8*(12), ofab542. https://doi.org/10.1093/ofid/ofab542

Yang, Z., Zhu, Z., Lizarondo, L., Xing, W., Han, S., Hu, H., Hu, Y., & Wu, B. (2021). Experience of chronic noncommunicable disease in people living with HIV: A systematic review and meta-aggregation of qualitative studies. *BMC Public Health*, *21*(1), 1–19. https://doi.org/10.1186/s12889-021-11698-5

Zelenovic, M., Manic, M., Stamenkovic, A., Capric, I., & Bozic, D., (2021). Barriers to physical activity in adolescents: A systematic review. *Turkish Journal of Kinesiology*, *7*(1), 22–30. https://doi.org/10.31459/turkjkin.840536

APPENDICES

Appendix 1: An In-depth Interview Guide for Adolescents living with HIV

SOCIAL DETERMINANTS OF PHYSICAL ACTIVITY AND HEALTHY DIET CONSUMPTION AMONG ADOLESCENTS LIVING WITH HIV IN IFAKARA TOWN

IN-DEPTH INTERVIEW GUIDE FOR ADOLESCENTS LIVING WITH HIV

I am _____. Thank you for agreeing to participate in this interview. I am a Nelson Mandela African Institution of Science and Technology scholar. I am conducting a study on the social determinants of physical activity and healthy diet consumption in adolescents living with HIV in Ifakara**.** This study aims to understand your attitudes, knowledge, and perceptions of the practices of physical activity and diet consumption and the underlying factors that influence them. The interview will take about 30 to 45 minutes. There is no wrong view or response. Your views are valuable; please, feel free to speak to me. If it is okay with you, I will be tape recording our conversation; so that I can get all the information and carry on an attentive conversation with you. I guarantee that all your views will remain confidential. Before starting, I would like us to read this participant information sheet and then if acceptable, you can provide your consent to participate in the study.

SECTION A: DEMOGRAPHIC INFORMATION

1. How old are you?
2. What is your education level?
3. Where do you live?
4. Who do you live with?
5. Your religion, please?
6. How do you come to the clinic? E.g. by foot, bicycle, motorcycle, etc.

SECTION B: GENERAL QUESTIONS

1. How do you feel about your health today?
2. How are you coping with your illness?
    a) **Probe:** What is the most difficult part of coping with your illness?
3. Do you get any information on how you can improve your health?
    a) **Probe:** If yes, what information do you get? Where do you get this information from?

b) **Probe:** Do you trust the source of the information? Why?

4. Did that information help you? If yes, how? If not, why not?

SECTION C: KNOWLEDGE AND ATTITUDE TOWARDS PHYSICAL ACTIVITY AND HEALTHY DIET CONSUMPTION

Physical activity:

1. Have you ever heard of the term 'physical activity?' What does it mean? **(Hints:** sports, walking, cycling, running, swimming, household chores)
2. Where did you learn about physical activity?
   a) **Probe:** Have you received any information about physical activity? If yes, please explain
3. What more would you be interested to learn about physical activities?
4. What kind of physical activities do you engage in?
   a) **Probe:** How many times do you engage in these activities in a week?
5. How do these activities make you feel?
   a) Probe: Are you happy about doing or engaging in these activities?
6. Has your physical activity level changed in any way over the last year? If so, how?
7. Why do you engage in these physical activities?
8. How important do you think physical activity is to a person living with HIV?

Diet:

9. Have you ever heard of the term 'healthy diet consumption?' What does it mean?
10. Where did you learn about healthy diet consumption?
11. Please describe your dietary habits.
    a) **Probe:** What types of foods do you consume regularly?
    b) **Probe:** How many times do you consume these foods in a week?
12. How do these foods make you feel?
    a) **Probe:** Does consuming these foods make you happy?
13. Why do you consume these foods?
14. Have your dietary habits changed in any way over the last year? If yes, how?
15. Do you know any foods that can be bad for your health? If yes, please mention them
16. Do you know any foods that can be good for your health? If yes, please mention them
17. Do you think a healthy diet is important for a person living with HIV? Why?

SECTION D: PERCEPTION ON THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY, DIET CONSUMPTION AND NCDs

1. How do you understand the term 'Non-communicable diseases (NCDs)?'
   a) **Probe:** What do you think are examples of NCDs?
2. What is your view regarding the risk of NCDs in people living with HIV (PLHIV)?
   a) **Probe:** How easy/difficult do you think it is for PLHIV to develop NCDs?
3. Do you know of any adolescent who has NCDs? What about adults?
   a) **Probe:** Why do you think people develop these diseases?
4. Do you think these diseases can be prevented? If yes, how? If not, why not?
5. In your opinion, do you think there is a relationship between physical activity and NCDs? If yes, please elaborate further
6. In your opinion, do you think there is a relationship between diet consumption and NCDs? If yes, please elaborate further

SECTION E: SOCIO-CULTURAL FACTORS THAT INFLUENCE THE PRACTICES OF PHYSICAL ACTIVITY AND HEALTHY DIET CONSUMPTION

Physical activity

1. Are HIV-infected people allowed to practice physical activities? If yes why? If not, why?
2. What cultural aspects do you feel may deter your engagement in physical activities?
3. What other factors do you feel could hinder your engagement in physical activities?
   a) **Prompt:** Economic factors, religion, environmental?
4. In your experience, between male and female adolescents, who are more likely to engage in physical activities? Why?
5. What physical activities are male adolescents more likely to engage in? What about female adolescents?
   a) **Probe:** What do you think are the reasons for these differences?
6. Are you aware of any conceptions or beliefs related to physical activity practices in PLHIV? If yes, please mention them
   a) **Probe:** Do you think these beliefs affect you? If yes, how?
7. Does your family support you to engage in physical activities? If yes, how?
   a) **Probe:** How is this important to you?

Diet:

I will tell you a story about food: Neema is in favor of much salt in her food, she also likes to put a lot of sugar in her tea and cooks with a lot of fat. She eats less vegetables and fruits for her reasons.

1. What part of Neema's eating habits best describes you?
   a) **Probe:** Do you prefer salty food? Sugary? Fatty?
   b) **Probe:** Why?
2. What cultural factors do you feel influence your eating preferences?
3. What other factors do you feel influence your dietary habits?

a) **Prompt:** Economic factors? Religious? Environmental? Please explain more

4. Neema eats fewer fruits and vegetables, what do you think about this? What about you?
5. In your experience, are there any differences in dietary consumption between male and female adolescents? If yes, please explain
6. What kinds of food are male adolescents more likely to consume? What about female adolescents?
   a) **Probe:** What may be the reasons for these differences?
7. Does your family support you to consume a healthy diet? If yes, how?
   a) Probe: How is this important to you?

Appendix 2: An In-depth Interview Guide for Parents and Caregivers of ALHIV

SOCIAL DETERMINANTS OF PHYSICAL ACTIVITY AND HEALTHY DIET CONSUMPTION AMONG ADOLESCENTS LIVING WITH HIV IN IFAKARA TOWN

IN-DEPTH INTERVIEW GUIDE FOR PARENTS AND CAREGIVERS OF ADOLESCENTS LIVING WITH HIV

I am _____. Thank you for agreeing to participate in this interview. I am a Nelson Mandela African Institution of Science and Technology scholar. I am conducting a study on the social determinants of physical activity and healthy diet consumption in adolescents living with HIV in Ifakara**.** This study aims to understand your views and perceptions on physical activity and diet consumption and how you are likely to influence these practices in ALHIV. The interview will take about 30 to 45 minutes. There is no wrong view or response. Your views and opinions are valuable; therefore, feel free to speak to me.

If it is acceptable to you, I will be tape recording our conversation; so that I can get all the information and carry on an attentive conversation with you. I guarantee that all your views will remain confidential. Before starting, I would like us to read this participant information sheet and then if acceptable, you can provide your consent to participate in the study (provide the consent form).

SECTION A: DEMOGRAPHIC INFORMATION

1. How old are you?
2. What is your education level?
3. Your religion, please?
4. How many children do you have?
5. What is your occupation?

SECTION B: PERCEPTIONS AND ATTITUDES TOWARDS PHYSICAL ACTIVITY AND DIET CONSUMPTION IN ADOLESCENTS LIVING WITH HIV

Physical activity:

1. What is your view regarding physical activity?
    a) **Probe:** What are its benefits?
    b) **Probe:** Do you exercise? If not, why? If yes, why?

2. Do you motivate your children to engage in physical activity? How? Why?
3. How easy or difficult is it for you to motivate your children to engage in physical activity? Please explain
4. Do you think physical activity is important for adolescents? If yes, why? And if not, why?
5. What do you think may happen if adolescents do not practice physical activity?
6. What is your understanding of NCDs?
   a) **Probe:** What are the examples of NCDs?
7. What is your view regarding the risk of NCDs in adolescents living with HIV?
   a) **Probe:** Do you think HIV-infected adolescents can develop NCDs?
8. Do you know of any adolescent who has NCDs?
   a) **Probe:** If yes, what may have caused this?
9. Do you think there is any link between NCDs and physical activity? If yes, please explain
10. Do you think your views on physical activity can have any effect on an adolescent? If yes, how?

Diet:

1. What do you understand by the term 'healthy diet consumption'?
2. How do you perceive the practice of healthy diet consumption?
   a) **Probe:** What are its benefits?
3. Do you motivate your children to eat healthy? How? Why?
4. In your opinion, what could happen if adolescents do not consume a healthy diet?

Some adolescents tend to eat most of their meals outside their homes, while others eat most of their meals at home.

5. Which of these best describes the adolescent in your home?
   a) **Probe:** What do you think influences adolescents' choices of food?
6. Do you think there is any link between NCDs and diet consumption? If yes, please explain
7. Do you think your views on diet consumption can have any effect on an adolescent? If yes, how?

Appendix 3: Mwongozo wa Mahojiano ya Kina kwa Vijana wanaoishi na VVU

VIASHIRIA VYA KIJAMII VYA KUFANYA MAZOEZI YA MWILI NA ULAJI WENYE AFYA WA VYAKULA KWA VIJANA WANAOISHI NA VVU KATIKA MJI WA IFAKARA

MWONGOZO WA MAHOJIANO YA KINA KWA VIJANA WANAOISHI NA VVU

(Salaam) Naitwa _____. Asante kwa kukubali kushiriki katika mahojiano haya. Mimi ni mwanafunzi katika Taasisi ya Kiafrika ya Sayansi na Teknolojia ya Nelson Mandela. Ninafanya utafiti kuhusu viashiria vya kijamii vya kufanya mazoezi ya mwili na ulaji wenye afya wa vyakula kwa vijana wanaoishi na VVU hapa Ifakara. Utafiti huu unalenga kuelewa mtazamo, maarifa, na ufahamu wako juu ya mazoezi ya mwili na ulaji wa vyakula na mambo ya kimsingi yanayoathiri tabia hizi. Mahojiano yatachukua kama dakika 30 hadi 45. Hakuna maoni au jibu lisilo sahihi. Maoni yako ni ya thamani sana, hivyo jisikie huru kuzungumza nami. Kama ni sawa kwako, nitakuwa nikirekodi mazungumzo yetu; ili nipate taarifa zote lakini pia niweze kuendelea na mahojiano kwa umakini na wewe. Ninakuhakikishia kwamba maoni yako yote yatabaki kuwa siri. Kabla ya kuanza, ningependa tusome karatasi hii ya maelezo ya mshiriki kisha ikikubalika, unaweza kutoa ridhaa yako ya kushiriki katika utafiti (toa fomu ya idhini).

SEHEMU A: TAARIFA ZA KIDEMOGRAFIA

1. Una miaka mingapi?
2. Unasoma?
3. Unaishi wapi?
4. Unaishi na nani?
5. Wewe ni dini gani?
6. Je, unafikaje kliniki? Mfano: kwa miguu, baiskeli, pikipiki n.k.

SEHEMU B: MASWALI YA JUMLA

1. Kiafya unajisikiaje leo?
2. Kuna ugumu wowote unaupata katika kukabiliana na hali yako kiafya? Tafadhali, fafanua
3. Je, huwa unapata taarifa yoyote kuhusu jinsi unavyoweza kuimarisha afya yako?

   a) Kama ndiyo, unapata taarifa gani? Kutoka wapi?

SEHEMU C: MAARIFA NA MTAZAMO JUU YA MAZOEZI YA MWILI NA ULAJI WA VYAKULA

Mazoezi ya mwili:

1. Unaelewa nini kuhusu mazoezi ya mwili? (**Vidokezo:** michezo, kutembea, baiskeli, kukimbia, kuogelea, kazi za nyumbani)
2. Ulisikia au kujifunza wapi kuhusu mazoezi ya mwili?
3. Wewe binafsi huwa unafanya mazoezi yoyote ya mwili? Ikiwa ndiyo, ni mazoezi gani huwa unafanya?

   a) Je, unafanya mazoezi haya mara ngapi kwa wiki?

   Kwa nini unafanya mazoezi ya mwili?
4. Unajisikiaje unapofanya mazoezi?
5. Je, kiwango chako cha mazoezi ya mwili kimebadilika kwa namna yoyote katika mwaka uliopita? Kama ndio, kivipi?
6. Unafikiri mazoezi ya mwili yana umuhimu gani kwa mtu anayeishi na VVU?

Ulaji:

7. Je, umewahi kusikia kuhusu ‘ulaji wa vyakula wenye afya?’Nini maana yake? (**Au:** mlo kamili/mlo bora/lishe bora)
8. Ulisikia au kujifunza wapi kuhusu lishe bora?
9. Kwa siku huwa unakula mara ngapi? Ni aina gani za vyakula huwa unapendelea kula zaidi?
10. Unajisikiaje unapokula vyakula hivi?
11. Unafahamu vyakula vyovyote ambavyo vinaweza kukuletea madhara kwenye afya yako? (mf: magonjwa)? Kama ndiyo, tafadhali vitaje
12. Unafahamu vyakula vyovyote ambavyo vinaweza kuwa na faida au manufaa kwa afya yako? Kama ndiyo, tafadhali vitaje
13. Unafikiri lishe bora ina umuhimu gani kwa mtu anayeishi na VVU?
14. Je, unafikiri matumizi ya dawa za VVU yameathiri ulaji wako? Ikiwa ndio, kivipi?

SEHEMU D: MTAZAMO JUU YA UHUSIANO KATI YA MAZOEZI YA MWILI, ULAJI WA VYAKULA NA MAGONJWA YASIYOAMBUKIZWA (NCDs)

1. Umewahi kusikia kuhusu ‘magonjwa yasiyoambukizwa?’ Nini maana yake?

   a) Tafadhali, taja mifano ya magonjwa yasiyoambukizwa unayoifahamu.

2. Je, unafikiri kuna uwezekano wa watu wanaoishi na VVU kupata magonjwa yasiyoambukizwa? Kwa nini unafikiri hivyo?

3. Je, unamfahamu kijana yeyote ambaye ana magonjwa yasiyoambukizwa? Vipi kuhusu watu wazima?

4. Unafikiri ni kwa nini watu wanaugua magonjwa yasiyoambukizwa?
5. Unafikiri magonjwa yasiyoambukizwa yanaweza kuzuilika? Kama ndiyo, kivipi? Kama hapana, kwanini?

6. Kwa mtazamo wako, unafikiri kuna uhusiano kati ya mazoezi ya mwili na magonjwa yasiyoambukizwa? Kama ndiyo, tafadhali fafanua zaidi.

7. Kwa mtazamo wako, unafikiri kuna uhusiano kati ya ulaji wa vyakula na magonjwa yasiyoambukizwa? Kama ndiyo, tafadhali fafanua zaidi.

SEHEMU E: MAMBO YA KIJAMII NA UTAMADUNI YANAYOCHANGIA KUTOFANYA MAZOEZI YA MWILI NA ULAJI USIO NA AFYA WA VYAKULA

Mazoezi ya mwili:

1. Je, watu wanaoishi na VVU wanaruhusiwa kufanya mazoezi ya mwili? Kama ndiyo kwa nini? Kama sivyo, kwa nini?

2. Ni mambo gani kwenye jamii yanakuhamasisha kufanya mazoezi ya mwili?

3. Unafikiri ni mambo gani kwenye jamii yanaweza kukuzuia usifanye mazoezi ya mwili?

   a) Mambo ya kiuchumi, familia, dini, mazingira, hali ya kiafya?

4. Kwa mtazamo wako, kati ya vijana wa kiume na wa kike, ni kina nani huwa wanafanya mazoezi ya mwili zaidi? Unadhani ni kwa nini?

5. Ni mazoezi gani ya mwili vijana wa kiume huwa wanafanya zaidi? Vipi kuhusu vijana wa kike?

6. Je, kuna mtazamo au imani yoyote iliyozoeleka katika jamii kuhusu mazoezi ya mwili kwa vijana wanaoishi na VVU? Kama ndiyo, tafadhali fafanua.

a) Je, mtazamo au imani hizi zinakuathiri? Ikiwa ndio, kivipi?

7. Je, familia yako inakuhamasisha kufanya mazoezi ya mwili? Kama ndiyo, kivipi?

Ulaji wa vyakula:

Nitakuambia hadithi fupi kuhusu chakula kisha nitakuuliza maswali kadhaa:

Neema anapenda chumvi nyingi kwenye chakula chake, pia anapenda kuweka sukari nyingi kwenye chai yake. Huwa anatumia mafuta mengi katika kupika chakula na anakula mboga mboga na matunda kwa kiasi kidogo sana.

8. Je, katika tabia hizi za ulaji za Neema, ni ipi wewe huwa unaifanya pia?
   a) Kwa nini?
9. Nini maoni yako kuhusu ulaji wa Neema?
10. Tafadhali, elezea tabia yako ya ulaji kwa siku.
11. Unafikiri ni mambo gani kwenye jamii (ama familia) yanaathiri ulaji wako wa vyakula?
    a) Mambo ya kiuchumi? Kidini? Mazingira? Afya? Tafadhali eleza zaidi
12. Je, ni aina gani ya vyakula vijana wa kiume hupendelea kula zaidi? Vipi kuhusu vijana wa kike?
    a) Nini kinaweza kuwa sababu ya tofauti hizi?
13. Je, familia yako inakuhamasisha kula vyakula vyenye afya? Kama ndiyo, kivipi?

Appendix 4: Mwongozo wa Mahojiano ya Kina kwa Wazazi na Walezi wa Vijana wanaoishi na VVU

VIASHIRIA VYA KIJAMII VYA KUFANYA MAZOEZI YA MWILI NA ULAJI WENYE AFYA WA VYAKULA KWA VIJANA WANAOISHI NA VVU KATIKA MJI WA IFAKARA

MWONGOZO WA MAHOJIANO YA KINA KWA WAZAZI NA WALEZI WA VIJANA WANAOISHI NA VVU

Naitwa Justina Maganga. Asante kwa kukubali kushiriki katika mahojiano haya. Mimi ni mwanafunzi katika Taasisi ya Kiafrika ya Sayansi na Teknolojia ya Nelson Mandela. Ninafanya utafiti kuhusu viashiria vya kijamii vya kufanya mazoezi ya mwili na ulaji wenye afya wa vyakula kwa vijana wanaoishi na VVU hapa Ifakara. Utafiti huu unalenga kuelewa maoni na mtazamo wako kuhusu mazoezi ya mwili na ulaji wa vyakula na jinsi mzazi/mlezi unavyoweza kuchangia tabia hizi kwa vijana wanaoishi na VVU. Mahojiano yatachukua dakika 30 hadi 45. Maoni yako yote ni ya thamani sana, hivyo jisikie huru kuzungumza nami. Kama ni sawa kwako, nitakuwa nikirekodi mazungumzo yetu; ili nipate taarifa zote lakini pia niweze kuendelea na mahojiano kwa umakini na wewe. Ninakuhakikishia kwamba maoni yako yote yatabaki kuwa siri. Kabla ya kuanza, ningependa tusome karatasi hii ya maelezo ya mshiriki kisha unaweza kutoa ridhaa yako ya kushiriki katika utafiti (toa fomu ya idhini).

SEHEMU A: TAARIFA ZA KIDEMOGRAFIA

1. Una umri gani?
2. Kiwango chako cha elimu ni kipi?
3. Dini yako, tafadhali?
4. Una watoto wangapi?
5. Unajishughulisha na nini?

SEHEMU B: MTAZAMO KUHUSU MAZOEZI YA MWILI NA ULAJI WA VYAKULA KWA VIJANA WANAOISHI NA VVU

Mazoezi ya mwili:

1. Nini mtazamo wako kuhusu mazoezi ya mwili kwa vijana?
    a) Faida zake ni zipi?
    b) Je, unafanya mazoezi? Kama ndiyo, kwa nini? Ikiwa sivyo, kwa nini?
2. Je, unawahamasisha watoto wako kufanya mazoezi ya mwili? Kivipi? Kwa nini?

3. Je, ni rahisi au ni vigumu vipi kwako kuwahamasisha watoto wako wafanye mazoezi ya mwili? Tafadhali eleza
4. Je, unafikiri mazoezi ya mwili ni muhimu kwa vijana? Ikiwa ndiyo, kwanini? Kama sivyo, kwanini?
5. Unafikiri nini kinaweza kutokea ikiwa vijana hawatafanya mazoezi ya mwili?
6. Unaelewa nini kuhusu magonjwa yasiyoambukizwa?
    a) Taja mifano ya magonjwa yasiyoambukizwa unayoifahamu.
7. Nini mtazamo wako kuhusu hatari ya kupata magonjwa yasiyoambukizwa kwa vijana wanaoishi na VVU?
    a) Je, unafikiri vijana wanaoishi na VVU wanaweza kupata magonjwa yasiyoambukizwa?
8. Unamfahamu kijana yoyote ambaye ana magonjwa yasiyoambukizwa?
    a) Kama ndiyo, unafikiri nini kimesababisha hilo?
9. Unafikiri kuna uhusiano wowote kati ya magonjwa yasiyoambukizwa na mazoezi ya mwili? Kama ndiyo, tafadhali fafanua.
10. Unafikiri mtazamo wako kuhusu mazoezi ya mwili unaweza kuwa na athari yoyote kwa kijana? Kama ndiyo, kivipi?

Ulaji wa vyakula:

1. Unaelewa nini kuhusiana na ‘ulaji wenye afya wa vyakula?’
2. Nini maoni yako kuhusu ulaji wenye afya wa vyakula?
    a) Faida zake ni zipi?
3. Je, unawahamasisha watoto wako kula vyakula vyenye afya? Kivipi? Kwa nini?
4. Kwa mtazamo wako, nini kinaweza kutokea ikiwa vijana hawatakula vyakula vyenye afya?
5. Kwa mtazamo wako, unafikiri ni mambo gani yanaweza kuzuia vijana kula vyakula vyenye afya?
    a) (**Vidokezo:** Mambo ya kiuchumi, familia, mazingira, hali ya kiafya?)

Baadhi ya vijana huwa na tabia ya kula milo mingi zaidi nje ya majumbani kwao, na wengine hupenda zaidi kula nyumbani.

6. Je, ni ipi kati ya hizi inamuelezea vizuri zaidi kijana anayaeishi nyumbani kwako?
    a) Unafikiri ni nini kinaathiri uchaguzi wa vyakula kwa vijana?

7. Je, unafikiri kuna uhusiano wowote kati ya magonjwa yasiyoambukizwa na ulaji wa vyakula? Kama ndiyo, tafadhali fafanua.
8. Unafikiri mtazamo wako kuhusu ulaji wa vyakula unaweza kuwa na athari yoyote kwa kijana? Kama ndio, kivipi?

Appendix 5: Informed Consent Form

SOCIAL DETERMINANTS OF PHYSICAL ACTIVITY AND HEALTHY DIET CONSUMPTION AMONG ADOLESCENTS LIVING WITH HIV IN IFAKARA TOWN

INFORMED CONSENT FORM

Greetings,

My name is Justina Joseph Maganga, an MSc. Public Health Research scholar at the Nelson Mandela African Institution of Science and Technology. I am conducting a study on the social determinants of physical activity and healthy diet consumption among adolescents living with HIV in Ifakara**.** This study aims to understand adolescents', parents' and caregivers' attitudes, knowledge, and perceptions of physical activity and diet consumption; as well as the underlying factors that influence these practices. The interview will take about 30 to 50 minutes. There is no wrong view or response. I will be tape-recording our conversation; so that I can get all the information and carry on an attentive conversation with you.

Purpose of the study

The purpose of the study is to explore the social and cultural factors that influence the practices of physical activity and healthy diet consumption among ALHIV in Ifakara Town.

Subject Participation

We estimate that 15 ALHIV as well as 5 parents and caregivers will be enrolled in this study. Adolescent participants should be HIV-infected individuals aged 15-19; of both sexes, under active care and enrolled in KIULARCO at CDCI. Your participation will involve in-depth interviews, about 30 to 50 minutes in length.

Confidentiality

Your information will be treated with great confidentiality and will be used for study purposes only. Nonames or other identifying information will be used when discussing or reporting data. The audio recordings from the interview sessions will be kept confidential and after full analysis, will be destroyed.

Potential Benefits

Your participation in this study may help you have a better understanding of non-communicable diseases (NCDs) and the modifiable risk factors associated with them. Your views will also help inform the government and development partners of the social determinants underlying these risk factors. This is critical for developing effective

interventions to prevent and control the increasing burden of NCDs in ALHIV and later adult life.

Risks

There are no known risks anticipated in this study. However, you may feel free not to answer any questions that may make you feel uncomfortable.

Right to voluntary participation and withdrawal from the study

Your decision to participate in this study is voluntary, and you are free to quit at any time. If you decide not to participate in this study, it will not affect the care, services, or benefits to which you are entitled. No penalty or loss will be encountered upon refusal to participate or withdrawal from the study.

Who to consult:

If you ever have questions about this study, feel free to contact:

Justina Maganga (Principal Investigator)

P O Box 74, Bagamoyo.

Phone No: 0754 469 103

(Email: jmaganga@ihi.or.tz)

or the Supervisors:

Dr. Sally Mtenga Ifakara Health Institute **Phone No:** +255713304374 **(smtenga@ihi.or.tz)**	Prof. Maja Weisser Ifakara Health Institute **Phone No:** +417941708 83 **(mweisser@ihi.or.tz)**	Dr. Clara Mollay Nelson Mandela African Institution **Phone No:** +255 713 625 075 **(clara.mollay@nm-aist.ac.tz)**

For issues related to the ethics of this study, please contact the secretary of the IHI's ethics review board, Dr. Mwifadhi Mrisho; Tel: +255 655 766 675; Email: mmrisho@ihi.or.tz

Consent of the participant:

I…… have read and understood the foregoing information about the study. I hereby voluntarily agree and consent to participate in this study.

Name_____Signature/thumbprint_____Date_____

Witness_____Signature_____Date_____

Researcher_____Signature_____Date_____

Appendix 6: Fomu ya Ridhaa

VIASHIRIA VYA KIJAMII VYA KUFANYA MAZOEZI YA MWILI NA ULAJI WENYE AFYA WA VYAKULA KWA VIJANA WANAOISHI NA VVU KATIKA MJI WA IFAKARA

FOMU YA RIDHAA

Salaam,

Jina langu ni Justina Joseph Maganga, mwanafunzi wa Shahada ya Uzamili ya Sayansi ya Utafiti katika Afya ya Jamii, Taasisi ya Afrika ya Sayansi na Teknolojia ya Nelson Mandela. Ninafanya utafiti juu ya viashiria vya kijamii vya kufanya mazoezi ya mwili na ulaji wenye afya wa vyakula kwa vijana wanaoishi na VVU hapa Ifakara. Utafiti huu unalenga kuelewa maarifa, ufahamu, na mitazamo ya vijana, wazazi na walezi, kuhusu mazoezi ya mwili na ulaji wa vyakula; pamoja na mambo ya msingi yanayoathiri tabia hizi. Mahojiano yatachukua kama dakika 30 hadi 50. Hakuna maoni au jibu lisilo sahihi. Nitakuwa nikirekodi mazungumzo yetu; ili nipate taarifa zote lakini pia niweze kuendelea na mazungumzo kwa umakini na wewe.

Dhumuni la utafiti

Utafiti huu unalenga kuchunguza viashiria vya kijamii na kitamaduni vinavyoathiri tabia ya kufanya mazoezi ya mwili na ulaji wenye afya wa vyakula kwa vijana walioambukizwa VVU hapa Ifakara.

Ushiriki

Tunakadiria kuwa vijana 15 wanaoishi na VVU pamoja na wazazi au walezi 5 watajiandikisha katika utafiti huu. Washiriki vijana wanapaswa kuwa watu walioambukizwa VVU wenye umri wa miaka 15-19; wa jinsia zote, walio chini ya uangalizi hai na walioandikishwa katika KIULARCO hapa CDCI. Ushiriki wako utahusisha mahojiano ya kina kwa takribani dakika 30 hadi 50.

Usiri

Taarifa zako zitakazokusanywa zitakuwa siri na zitatumika kwa madhumuni ya utafiti pekee. Hakuna majina au utambulisho wowote utakaotumika wakati wa kujadili au kuripoti data. Rekodi za sauti wakati wa mahojiano zitahifadhiwa kwa usiri na baada ya uchambuzi kamili, zitaharibiwa.

Faida

Ushiriki wako katika utafiti huu unaweza kukuongezea ufahamu] zaidi kuhusu magonjwa yasiyoambukizwa pamoja na tabia hatarishi zinazohusiana nayo. Pia, maoni yako yatasaidia kuifahamisha serikali na washirika wa maendeleo juu ya viashiria vya kijamii vinavyoweza kuchangia tabia hizi hatarishi. Hii ni muhimu ili kudhibiti ongezeko la magonjwa yasiyoambukizwa kwa vijana na hata baadae watakapokuwa watu wazima.

Hatari

Hatutarajii hatari yoyote inayojulikana katika utafiti huu. Hata hivyo, jisikie huru kutojibu maswali yoyote ambayo yanaweza kukufanya usijisikie vizuri.

Haki ya kushiriki kwa hiari na kujitoa kwenye utafiti

Uamuzi wako wa kushiriki katika utafiti huu ni wa hiari, na uko huru kujiondoa wakati wowote ule ikibidi. Kutoshiriki katika utafiti huu hakutaathiri huduma au manufaa yoyote ambayo unastahiki. Hakuna adhabu au hasara utakayopewa kwa kukataa kushiriki au kujiondoa kwenye utafiti huu.

Nani wa kuwasiliana naye:

Kama utakuwa na maswali juu ya utafiti huu, unaweza kuwasiliana na:

Justina Maganga (Mtafiti Mkuu)

Kampasi ya Taasisi ya Afya ya Ifakara

P O Box 74, Bagamoyo.

Simu Na: 0754 469 103

(Barua pepe: jmaganga@ihi.or.tz)

Au Wasimamizi:

Dkt. Sally Mtenga Taasisi ya Afya ya Ifakara **Simu Na:** +255 713 304 374 **(smtenga@ihi.or.tz)**	Prof. Maja Weisser Taasisi ya Afya ya Ifakara **Simu Na:** +41 79 417 08 83 **(mweisser@ihi.or.tz)**	Dkt. Clara Mollay Taasisi ya Nelson Mandela **Simu Na:** +255 713 625 075 **(clara.mollay@nm-aist.ac.tz)**

Kwa masuala yanayohusiana na maadili ya utafiti huu, tafadhali wasiliana na katibu wa bodi ya mapitio ya maadili ya IHI, Dr. Mwifadhi Mrisho; Simu Na: +255 655 766 675; Barua pepe: mmrisho@ihi.or.tz

Ridhaa ya mshiriki:

Mimi…… nimesoma na kuelewa taarifa zilizotangulia kuhusu utafiti huu. Hivyo basi, ninakubali kwa hiari yangu kushiriki katika utafiti huu.

Jina_____Sahihi/Dole gumba_____Tarehe_____

Shahidi_____Sahihi_____Tarehe_____

Mtafiti_____Sahihi_____Tarehe_____

Appendix 7: Certificate of Approval

F120-ILH-v20.0

Plot 463, Kiko Avenue, Mikocheni | P.o. Box 78,373 Dar es Salaam, Tanzania | Phone: +255222774756 Email: irb@ihi.or.tz

ISO 9001:2015 certified

IFAKARA HEALTH INSTITUTE
research | training | services

INSTITUTIONAL REVIEW BOARD

April 5, 2024

National Institute for Medical Research
P O Box 9653
Dar Es Salaam
Email; headquarters@nimr.or.tz

Justina Maganga
Ifakara Health Institute
P.O.Box 74
Bagamoyo

IHI/IRB/No: 18-2024

INSTITUTIONAL CLEARANCE CERTIFICATE FOR CONDUCTING HEALTH RESEARCH

On 27th March 2024, the Ifakara Health Institute Review Board (IHI-IRB) reviewed from study titled: ***"Social Determinants of Physical Inactivity and Unhealthy Diet Consumption among Adolescents Living with HIV in Ifakara Town, Tanzania"***, submitted by the Principal Investigator, **Justina Maganga.** The study has been approved for implementation after IRB consensus. This certificate thus indicates that; the above- mentioned study has been granted an Institutional Ethics Clearance to conduct this study in Ifakara Town Council in Morogoro Region.

The Principal Investigator of the study must ensure that, the following conditions are fulfilled during or after the implementation of the study:

1. PI should submit a six-month progress report and the final report at the end of the project
2. Any amendment, which will be done after the approval of the protocol, must be communicated as soon as possible to the IRB for another approval
3. All research must stop after the project expiration date, unless there is prior information and justification to the IRB.
4. There should be plans to give feedback to the community on the findings
5. The PI should seek permission to publish findings from NIMR
6. The approval is valid until **5th April 2025**

The following documents were reviewed and approved:

1.IRB application form 2. Signed cover letter 3. Study protocol 4. Informed consent form 5. Data collection form 6.Up to date Curriculum Vitae of PI and Co-Investigator 7. Responses to the comments made

The IRB reserves the right to undertake field inspections to check on the protocol compliance

Chairperson
Prof. Elia Mmbaga

IRB Secretary
Dr Mwifadhi Mrisho

Appendix 8: Research Outputs

(i) Research Paper

Maganga, J. J., Katende, A., Luoga, E., Nshatsi, N., Siru, J., Sigalla, G., Mollay, C., Weisser, M., & Mtenga, S. (2025). "I Don't Have Time to Exercise": Determinants of Physical Activity and Diet Consumption Among Adolescents Living with HIV in Southern Tanzania – A Phenomenological Qualitative Study. *HIV/AIDS - Research and Palliative Care* , *17*(May), 63–76. https://doi.org/10.2147/HIV.S519922

(ii) Poster Presentation