

**MALNUTRITION AND ITS ASSOCIATED FACTORS AMONG ADULTS ATTENDING
ANTI-RETROVIRAL THERAPY AT THREE SELECTED HOSPITALS IN
BUSHENYI DISTRICT, UGANDA**

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Declaration

I, Odwee Ambrose affirm that this report is my own original work and has never been submitted for an award to any other institution.

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Dedication

To the Almighty God.

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Operational Definitions

Malnutrition: A condition where the body does not have the right nutrients resulting into under nutrition and over nutrition

Underweight is when the person body mass index is less than 18 kg/m^2

Overweight is a condition where the person's body mass index is greater than 25 kg/m^2

Obesity is a condition where the person's body mass index is greater than 30 kg/m^2

Opportunistic infections are illnesses that are caused by different organisms resulting from low immunity in an individual with advanced HIV infection

Adherence is the ability of an individual to accomplish drug routine as prescribed

Dietary diversity is the different types of food eaten by a household in a day

Food security is the capacity of the family to eat the type of food they want at any time to remain healthy

Meal frequency is the number of time a food is taken in a family per day

Normal nutrition is where a person has body mass index between $18\text{-}25 \text{ kg/m}^2$

Adult An adult is any person above the age of majority which according to the Uganda constitution is 18 years.

List of Abbreviations and Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ANOVA	Analysis of Variance
AOR	Adjusted Odd Ratio
ART	Antiretroviral Therapy
BMI	Body Mass Index
HIV	Human Immunodeficiency Virus
HAART	Highly Active Antiretroviral Therapy
KIU-TH	Kampala International University Teaching Hospital
NHS	National Health System
PEM	Protein Energy Malnutrition
PGSRD	Post Graduate Studies and Research Directorate
SES	Socioeconomic Status
UNAP	Uganda Nutrition Action Plan
WHO	World Health Organization

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ABSTRACT

Background: Malnutrition is a life-threatening condition among HIV positive adults and little is known about its patterns and associated factors in Southwestern Uganda. The aim of the study was to assess malnutrition and associated factors among HIV-positive adults in Bushenyi district, Uganda

Materials and Methods: This was a cross sectional study conducted at three selected hospitals handling HIV patients in Bushenyi district. A total of 253 participants were enrolled in the study and a semi-structured questionnaire was used to collect data while a review of patient records was conducted on CD4 count. Malnutrition was diagnosed by using the body mass index (BMI) and multiple logistic regression was conducted using SPSS Version 20 and significance was reported at 95% confidence interval in the presence of under and over nutrition to identify risk factors.

Results and Discussion: The mean age of the study participants was 33.4 years (range: 23.6-57.6 years; median: 30 years), 48.6% of the participants had their age in the range of 18 – 54 yrs. The study established an overall malnutrition prevalence of 34.8%, and this mainly due to over nutrition. Socio-economic factors associated with under nutrition were being illiterate, alcoholic and unemployed while over nutrition was associated with the educated, employed in females. In addition, under nutrition was associated with having opportunistic infections, due to ones inability to pay for medications, low adherence to HAART and in stage 1 of HIV/AIDS while over nutrition was associated with employed patients, and those who would afford to pay for the medications. Nutritional factors associated with under nutrition were eating fewer meals and carbohydrates while over nutrition were associated with eating three meals a day and mainly protein.

Conclusions Malnutrition is a threat in adult HIV patients in rural communities of Uganda. Under nutrition was associated with low socio-economic status which leads to poor nutritional and health options, while over nutrition was associated with a higher socio-economic status showing a need to improve on HIV community extension activities to improve on patient outcomes in this community

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

1.1.1. Historical Perspective

Malnutrition is a physical condition that develops when a person's dietary intake does not contain the right amount of nutrients for healthy functioning, or when a person cannot correctly absorb nutrients from food. The term malnutrition includes under-nutrition, over-nutrition or an incorrect balance of nutrients (Heli, *et al.* 2018). Malnutrition has economic consequences which include losses of 11% of Gross Domestic Product (GDP) annually in many African societies and several regions of Asia and preventing malnutrition delivers US\$16 in returns on investment for every US\$1 spent (International Food Policy Research Report, 2016). According to recent research, malnutrition is accountable for 11% of global disease burden and 35% of Adults deaths world over (Kerac *et al.*, 2009 & 2015). At least 30 – 50 % of patients in developed countries and nearly 90% in developing countries have reported symptoms relating to malnutrition (Smith, Quinn, Strober, Janoff, & Masur, 1992 & 2012. Süttmann *et al.*, 1995). Human Immunodeficiency Virus (HIV) infection is one of the greatest challenges to global health faced by the medical profession (WHO, UNAIDS, UNICEF. Global HIV/AIDS Response: progress report, 2011). In the year 2009, the average estimated HIV prevalence for African adults between the ages of 15 and 49 is about 4.7%, with a range from 0.1% to 26% depending on the individual country (Trehan *et al.*, 2011). To date, UNAIDS estimates 36.7 million (30.8 – 42.9 millions) people around the world were living with HIV/AIDS by the end of 2016. Of these, 34.5 million (28.8 million - 40. 2 million) were adults and children (< 15 years) were estimated at 2.1 million (1.7 million–2.6 million). The report also links HIV prevalence to low socio-economic status (UNAIDS, 2017b). In some regions, notably sub-Saharan Africa, HIV infection poses an added challenge to the care of in the malnourished adults. While the clinical context and interventions for many common causes of malnutrition-related mortality worldwide have been addressed over the last decade, the management of severe wasting disease and malnutrition particularly in those infected with HIV and/or tuberculosis (TB) plus other opportunistic infections—remains poorly addressed in many Sun-Saharan countries (Black, Morris & Brtce, 2003 & Hesselning, 2005). In Uganda, an estimated 1.2 million adults aged 15 – 64 are

living with HIV and this is about 6.2 % of the total population (Wanjala, 2013. CDC, ICAP, & MoH, 2017. UNAIDS, 2014)

The first cases of HIV infections were reported in 1981 in the United States of America (De Cock, Jaffe, & Curran, 2012). To date, UNAIDS estimates 36.7 million (30.8 – 42.9millions) people around the world were living with HIV/AIDS by the end of 2016. Of these, 34.5 million (28.8 million - 40. 2 million) were adults and children (< 15 years) were estimated at 2.1 million (1.7 million–2.6 million) (UNAIDS, 2017b).

Several studies have linked HIV prevalence to low social economic status. For example, the UNAIDS 90 – 90 -90 ambitious targets have documented that at least 25.5 million people living with HIV are in the sub-Saharan African region and the highest proportion 19.4 million are in Southern and Eastern African regions (UNAIDS, 2017a).

In Uganda, HIV/AIDS is believed to have been first identified as a strange disease associated with slimness among its patients. It's quoted that the first woman to die of HIV in Uganda was in 1983 at Kasensero landing site, Rakai district according to oral history (Wanjala, 2013). Today, an estimated 1.2 million adults aged 15 – 64 are living with HIV according to the ministry of the health survey. This is about 6.2 % of the total population (CDC, ICAP, & Ministry of Health - Uganda, 2017). In Bushenhyi district, the prevalence of HIV is 8.5% with approximately 12,000 adults living with HIV within the district (UNAIDS, 2014).

Historically, the global prevalence of malnutrition among HIV-positive adults has been shown to vary by region and severity of the disease. According to the CDC reports from Los Angeles, USA, the first cases of malnutrition in HIV-Positive adults were reported in the United States in June 1981, its relationship with malnutrition was clearly characterized by severe weight loss among male adult homosexuals HIV patients presenting with late-stage AIDS disease (CDC, 2001). At least 30 – 50 % of patients in developed countries and nearly 90% in developing countries have reported symptoms relating to malnutrition (Smith, Quinn, Strober, Janoff, & Masur, 1992). In the US, 21% of the Adult patients attending outpatients departments were known to have HIV associated weight loss (Süttmann *et al*, 1995).

1.1.2 Theoretical perspective

In this study, the researcher has adapted the social cognitive theory (SCT) to study the theoretical relationship between the prevalence of malnutrition and its selected risk factors among HIV-positive adult attending ART clinics in hospitals in Bushenyi. The SCT proposed by Albert Bandura in 1960 posits that the dynamic and reciprocal interaction between the environment (economic and social), the individual behavior (including dietary intakes) and health status (like HIV status) have a bearing on the nutritional outcomes (Bandura, 1986). According to this theory, individual factors such as physiological and pathological changes resulting from a patient's HIV status (Bandura, 1986). The physiological and pathological changes may include malabsorption, diarrhea, protein and carbohydrate deregulation and micronutrient deficiency. These will, in turn, interact with the patient's environment comprising social economic status such as access to quality of food, social support, health care services, dietary intake, peer and family support, tobacco smoking, alcohol intakes and economic factors, to influence patient overall nutritional outcomes indicated by BMI (Bandura, 1986).

The researcher, therefore, believes that this theory is relevant to this particular study since it tends to believe that HIV patients on ART for more than six months and adhering well to medication have restored immune system and those with poor adherence to medication will have a poor outcome basing on the foregoing interactions described above. This is applicable in describing the prevalence of malnutrition based on HIV status, types of malnutrition as well as selected risk factors (social, medical, economic) associated with different types of malnutrition among HIV patients in Bushenyi hospitals.

Low social economic status leads to the high prevalence of poverty and the development of malnutrition. These can be heightened by prolonged civil wars, displacement, collapse in social structures and the breakdown of the health systems (Accorsi *et al*, 2005; Magadi, 2011a, 2011b). A study that was done among children from such families in Sub Saharan Africa found that social economic status has a direct correlation to nutritional patterns of the children of patients in those families (Magadi, 2011a). In a follow-up study, involving households with HIV and AIDS patients who were predisposed to malnutrition the risk of HIV/ AIDS was shown to increase with nutritional status (Magadi, 2011b). These findings show that household nutrition has a bearing on the burden of disease in the homestead (Magadi, 2011b).

Managing patients with an HIV/AIDS history must be adjusted to offer continuous support, to ensure that they progress to full recovery (Filteau and Manno, 2013; Magadi, 2011b). From infection throughout the window period, HIV replicates inside white blood cells. This goes on through seroconversion in the asymptomatic phase to the symptomatic phase when signs and symptoms become obvious (Centers for Disease Control and Prevention, 2010). To eliminate the infection, the immune system recognizes and attempts to destroy the virus using lymphocytes, particularly the CD4 cells (Doitsh *et al*, 2014). Essential nutrients are required to mount strong immune responses (Aberman, Rawat, Drimie, Claros, and Kadiyala, 2014). Clinically, HIV/AIDS is categorized using a CD4 cell indicator i.e. not significant (stage 1 = $CD4 > 500/mm^3$), mild suppression (stage 2 = $350-499/mm^3$), advanced immunosuppression (stage 3 = $200-349/mm^3$) and severe immunosuppression (stage 4 = $< 200/mm^3$), thus making clinical management of the patients easier (WHO, 2005). Impairment of the immune system as a result of HIV/AIDS can lead to malnutrition-associated disorders thereby worsening the effect of the virus and contributing to more rapid progression to the disease (Filteau and Manno, 2013).

1.1.3 Conceptual perspective

Nutritional issues are common in HIV disease. At some point, almost everyone living with HIV will face challenges in maintaining good nutrition. Problems are related to HIV infection itself, food security and to the effects of anti-HIV therapy (Johansen & BSc, 2007). Certain ARVs affects nutrient utilization by affecting nutrient absorption, metabolism, distribution, or excretion. For example, certain protease inhibitors (PI), such as ritonavir and nelfinavir, can cause changes in the metabolism of lipids (fats), resulting in an elevation in blood cholesterol and triglyceride levels (Perct, 1979) as cited by Hadgu, Worku, Tetemke, & Berhe, (2013).

from 10.0% in Malawi in the southern African region (Takarinda *et al*, 2017a) to 12.3 % in the northeastern African region (Hailemariam, Bune, & Ayele, 2013). In Uganda, studies among HIV-positive adults in Arua clinic showed that 15.4% of HIV-Positive adults were malnourished of whom, 55.8% of them were severely malnourished ($BMI < 16 \text{ kg/m}^2$) and 44.2 % had moderate malnutrition ($BMI < 16 - 17 \text{ kg/m}^2$) (Ahoua *et al*, 2011a) . Studies in Bushenyi district have not adequately documented the prevalence of malnutrition among HIV-Positive adults but rather given more focus and priorities in studying child malnutrition: example, (Agaba,

Kikafunda, & Bambona, 2014) have shown that 46% of children are malnourished due to improper health and sanitation including HIV.

Malnutrition contributes to immune system impairment, making the body vulnerable to frequent illness and increasing its energy and nutrient demand, thereby accelerating disease progression. All adult people living with HIV require 10% more energy when asymptomatic and 20–30% or more when symptomatic. Children who are experiencing weight loss need between 50% and 100% more energy every day. There is no evidence that people living with HIV/AIDS require more protein and micronutrient than uninfected ones. Any micronutrient supplementation should not be more than one RDA unless the client is deficient (Agaba et al., 2014)

A low immunity as a result of HIV and AIDS can lead to a fatal prognosis of the health outcome of the patients and malnutrition has been found to be highly prevalent in households with affected patients (Magadi, 2011b). This would be due to the socio-economic and psychological effects the disease has on household members especially children (M. a Magadi, 2011a). Patients with HIV and AIDS spend more on healthcare services especially when there is need to manage secondary infections. Financial losses are due to double expenditures; firstly on less effective medications that are often used as first-line treatment options, and, secondly in buying costly drugs that are used to replace the first line ones that did not work, usually as a result of resistance which is a common phenomenon in HIV and AIDS patients (Ezeonwumelu *et al*, 2016). If healthcare service providers can recognize these parameters and adopt them to change how patients with HIV/AIDS is managed, more time and money can be spent on improving the diets of these patients.

Malnutrition is the outcome of imbalance of nutrient intake with physiological demand for growth, maintenance, and reproduction. People living with HIV are at a higher risk of malnutrition as HIV infection reduces food intake, lowering food absorption and increases nutritional needs even during early stages of HIV infection when no symptoms are apparent. The demand increases significantly during the course of the infection posing additional challenges to people living with HIV and their care providers.

Food and nutritional intake can affect adherence to antiretroviral drugs (ARVs) as well as their effectiveness. Food insecurity and inadequate knowledge of good nutrition thus, impede

management of the disease, particularly in resource-constrained settings where HIV is prevalent and health care services remain inadequate (WHO, 2009).

Food insecurity is both an outcome of and a contributor to the HIV/AIDS pandemic. Families with a member living with HIV are more apt to be poor and food insecure. HIV infections limit productivity leading, in turn, to loss of income while increasing health care costs. People living with HIV/AIDS often identify their highest priority need as food, and HIV affects food security (Mundial, 2007).

1.1.4 Contextual Perspective

Malnutrition is generally widespread in Uganda (Siedner *et al*, 2012), and strategies to curb it have been developed with the aim of reducing the impact among the most affected groups in the country's population (Namugumya, 2012). The Uganda Nutrition Action Plan (UNAP) 2011 – 2016), was developed with a goal of reducing the effects of malnutrition amongst children and women of reproductive age (Balikuddembe Kimuli, Hosseinzadeh - Attar, and Ardalan, 2016; Pelletier *et al*, 2013).

In Africa, the prevalence of malnutrition among HIV – positive adults has been shown to range from 10.0% in Malawi in the southern African region (Takarinda *et al*, 2017a) to 12.3 % in the northeastern African region (Hailemariam *et al*, 2013). In Uganda, studies among HIV-positive adults in Arua clinic showed that 15.4% of HIV-Positive adults were malnourished of whom, 55.8% were severely malnourished (BMI <16kg/m²) and 44.2 % had moderate malnutrition(BMI < 16 – 17 kg/m²) (Ahoua *et al*, 2011a). Studies in Bushenyi district have not adequately documented the prevalence of malnutrition among HIV-Positive adults but rather given more focus and priorities to studying child malnutrition: for example, Agaba, Kafunda, and Bambona (2014), have shown that 46% of children are malnourished due to improper health and sanitation including HIV (Agaba *et al*, 2014)

The contextual understanding of malnutrition in Uganda is further explained by Siedner *et al*, (2012); who has stated that the presence of malnutrition increased in the aftermath of political instability highlighted the association of malnutrition with infectious diseases such as HIV and AIDS (Olwedo, Mworosi, Bachou, and Orach, 2008),.

1.2 Problem Statement

Malnutrition is a global problem because it affects one in three persons globally in its two forms; undernutrition and over nutrition (International Food Policy Research Institute, 2016 & Blossner & De Onis, 2005). Malnutrition and its associated nutritional factors are important risk factors for a burden of diseases such as cardiovascular disease (Hubbert *et al*, 1983), diabetes (Mokdad *et al*, 2001), and Tuberculosis (Koethe & von Reyn, 2016). For People Living with HIV/AIDS (PLHIV) the Human Immunodeficiency Virus (HIV) compromises the nutritional status of infected individuals and in turn, malnutrition worsens the effects of the infections by weakening the immune system. Consequently, this accelerates disease progression and due to concurrent poor treatment outcomes there is the increased risk of death consequently causing high mortality rates. At the three selected hospitals in Bushenyi district, there is inadequate information on malnutrition prevalence among PLWHIV and information obtained from hospital records and personal accounts/interviews (anecdotal information) suggests that nutritional assessment, care and support for PLWHIV are very weak.

Despite the high global burden of HIV/AIDS, in Africa, at least there has been more than a two-fold increase in the number of HIV-positive people receiving antiretroviral therapy (ART), which reached 10.3 million in eastern and southern Africa, the world's most affected regions between 2010 to 2015 (Takarinda *et al*, 2017a). Although, the scale-up of ART has resulted in a 66% decrease in AIDS-related deaths in the region since 2010. Malnutrition, characterized by low BMI, in sub-Saharan Africa, is still high and ranges between 10% to 33% (Uthman, 2008) 5.4% in Uganda (Ahoua *et al*, 2011b) This has been associated with poor treatment outcomes and increased mortality (Siedner *et al*, 2012). In Bushenyi, the prevalence of malnutrition among adult HIV-positive patients, who are on antiretroviral therapy, is not well- documented and this formed a basis for the study. The study was to assess the prevalence, types and risk factors associated with malnutrition among HIV-positive adults attending ART care clinics in Hospitals within Bushenyi District.

1.3 Study Objectives

1.3.1 General Objective

To assess malnutrition and its associated factors among HIV-positive Adults attending anti-retroviral therapy clinics at three selected hospitals in Bushenyi District

1.3.2 Specific Objectives

1. To establish the prevalence of malnutrition among adults attending antiretroviral therapy at Kampala International University- teaching Hospital, Ishaka Adventist Hospital and Comboni Hospital
2. To assess the socio-economic factors associated with malnutrition among HIV patients seeking medical care at Kampala International University- teaching Hospital, Ishaka Adventist Hospital and Comboni Hospital
3. To examine the nutritional and health factors associated with malnutrition among HIV adult patients seeking medical care at Kampala International University- teaching Hospital, Ishaka Adventist Hospital and Comboni Hospital.

1.4 Research Questions

1. What is the prevalence of malnutrition among adults attending antiretroviral therapy at Kampala International University- Teaching Hospital, Ishaka Adventist Hospital and Comboni Hospital?
2. What are the major socio-economic factors associated with malnutrition among adults attending antiretroviral therapy at Kampala International University-Teaching Hospital, Ishaka Adventist Hospital and Comboni Hospital
3. Which are the major health and nutritional factors associated with malnutrition among adults attending antiretroviral therapy at Kampala International University- Teaching Hospital, Ishaka Adventist Hospital and Comboni Hospital?

1.5 Significance of the Study

1.5.1 Importance to the Community

The main purpose of this study is to gather data that would guide and influence policy in the care of patients with HIV/AIDS. This will promote better planning of resources and allocation of

services by service deliverers which include the local health personnel, district health service leaders, Ministry of Health and the implementing partners. We also presume that our study information will guide MoH revise policies and service delivery at a local and national level in order to improve practices of managing malnutrition in adults living with HIV, for and this may translate into improved nutrition education and counseling in HIV-care units.

1.5.2 Importance to science

The current study gives information necessary for routine evaluation for malnutrition among HIV-positive adults and thus may guide intervention strategies. Our study also serves as a baseline for wider research projects in malnutrition among HIV positive adults in areas the same or different settings in the future.

1.6 Conceptual Framework

1.6.1 Drawing showing the Interaction of Variables

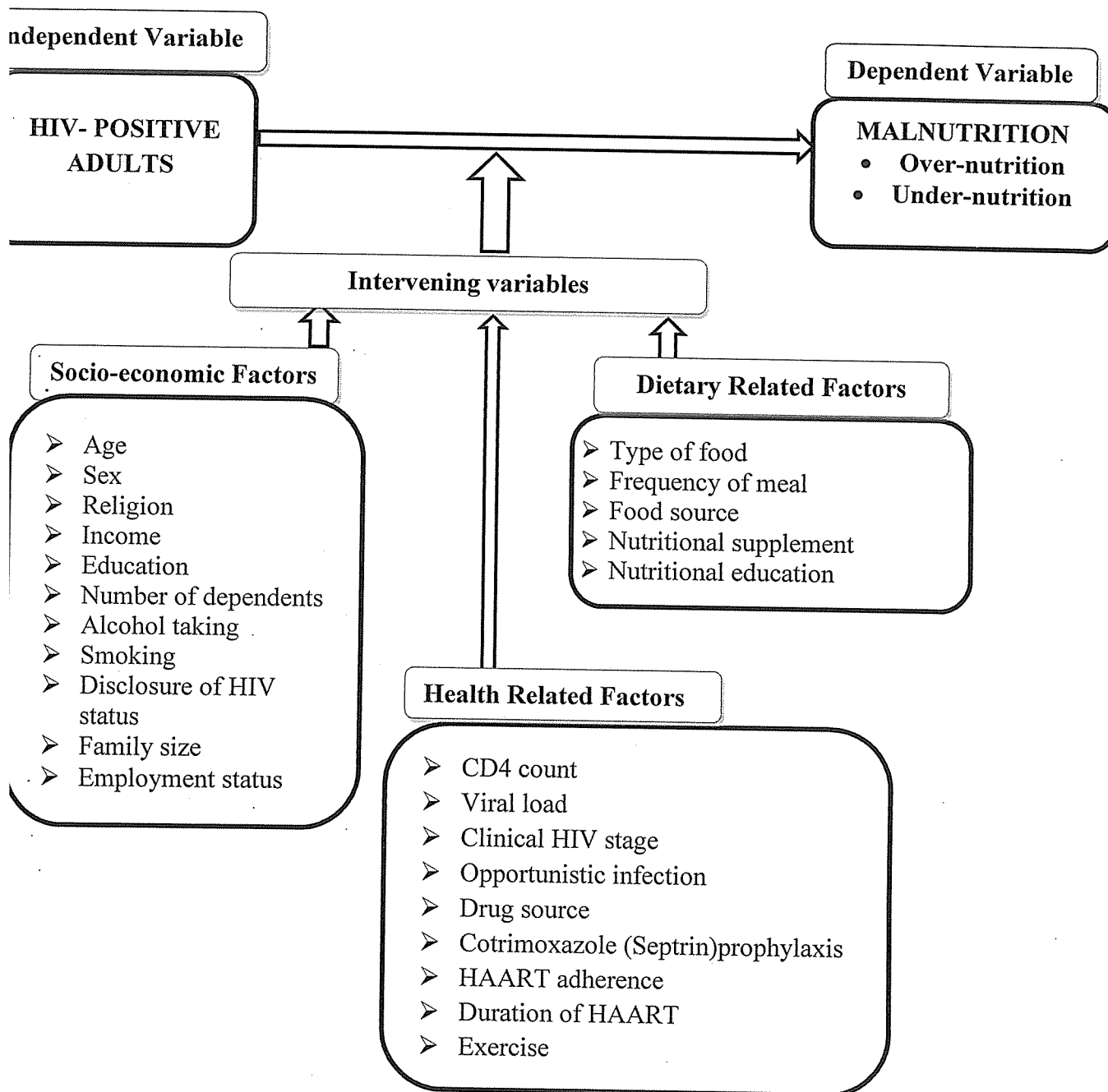


Figure 1: Conceptual Framework for the Study

Source: Self developed conceptual framework

1.6.2 Description of Conceptual Framework

In the conceptual framework depicted in figure 1 above, HIV-positive status was hypothesized to influence the type of malnutrition. An HIV-positive status was defined by the patient's diagnosis and presence of opportunistic infections, immunological status and biochemical status. The framework postulates that the status of the patient influences the types of malnutrition and risk factors associated with malnutrition. This relationship may be modified by intervening variables such as access to health care, the general condition of the community, nutritional policy as well as practices and the overall political or economic condition of the community where the patient lives.

CHAPTER TWO:

2.0 LITERATURE REVIEW

2.1 Malnutrition in Africa

Globally, malnutrition among HIV infected adults on ART is frequent and a marker for poor prognosis among HIV-infected subjects (Guenther *et al*, 1993). Malnutrition and Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS) are highly prevalent in Sub-Saharan Africa (Gedle *et al*, 2015). Takarinda et al., 2017 reported that the prevalence of malnutrition in adults with HIV and AIDS in sub-Saharan Africa is 10.3%. Information on the severity of the malnutrition among HIV-positive adults is limited in this region and yet most studies have emphasized on nutritional status of children (Hailemariam *et al*, 2013). A study conducted in West Africa shows that HIV-related malnutrition yielded an overall prevalence of 10.8% (95% CI 7.4% to 14.1%) with no statistically significant heterogeneity (prevalence = 0.0%, $p = .903$) (Uthman, 2008).

In a random cross sectional study of prevalence of malnutrition among adults on ART showed that the overall prevalence of malnutrition was 25.2% of which 49, 19, and 9 patients were mildly, moderately, and severely malnourished, respectively (Gedle *et al*, 2015). The prevalence estimates decreased with increasing wealth index and education attainment. The pooled prevalence of HIV-related malnutrition was higher among women residing in rural areas than among women residing in urban areas; and lower among women that were professionally employed than unemployed or women in agricultural or manual work (Uthman, 2008).

Another study on the prevalence of malnutrition among Ethiopian women adult women on ART showed that the prevalence of under nutrition (Body mass index $< 18.5 \text{ kg/m}^2$) was 42.3% (95% CI: 37.4% - 47.3%). Severe, moderate, and mild under nutrition, were reported to be among 2%, 10% and 20.3% respondents, respectively. The prevalence of wasting (percentage body weight loss $> 5\%$) was 75% (95% CI: 70.4% - 79.2%). Severe wasting accounted for 26.9% of respondents (Hadgu *et al*, 2013).

In Uganda, South Africa and Botswana, nutrition and micronutrient deficiencies, have been shown to play a crucial role in the degradation and impairment of growth and development in affected patients. The common practice of using antiretroviral drugs in these populations has been cautioned to avoid undue stress on the already overburdened healthcare system. It becomes difficult for the government to plan how best to serve HIV and AIDS patients when the number of malnourished individuals is high. This is because classical ARVs are made for an average patient but a malnourished patient creates new dynamics which may complicate treatment outcomes (Anabwani and Navario, 2005).

In Uganda, social disruptions due to war and disease epidemics have been identified as causes of malnutrition in HIV and AIDS patients. In Northern Uganda, infections with tuberculosis, Ebola, malaria and the general collapse of social structures after the war has severely backtracked control efforts against HIV and AIDS in the region (Accorsi *et al*, 2005). It is possible that efforts for disease control will get back on track following recent peace developments in the area.

In South Western Uganda, a 47% prevalence of malnutrition was shown to exist, compared with a 23% from the collective national population. The high prevalence has been associated with poverty, illiteracy, extended families and psychological effects of the disease in the community (Kikafunda and Namusoke 2006; Magadi 2011a).

However, political support has been shown to be important in the development of strong healthcare systems and in the control of HIV and AIDS in particular. In addition, Uganda's political environment has been supportive in promoting behavioral change by targeting social lifestyles of the community, collectively helping the country to reverse the HIV pandemic in that decade (Parkhurst and Lush, 2004)

1.2 Risk factors associated with malnutrition among HIV-positive Adults

Malnutrition can result from multiple factors, involving aspects of disease, mental and social behavior, thus if efficiently managed can improve outcome of treatment in an HIV AIDS patient (Aquino and Philippi, 2011). The growing controversy as to whether men or women and children are at increased risk of developing malnutrition continues as a result of social demographic factors (Burgos *et al*, 2012; Verbrugghe *et al*, 2013).

In Ethiopia, a study on the risk factor for malnutrition among adults on ART was conducted among 305 HIV-Positive adults patients by Gedle *et al*, (2015) and when multivariate logistic regression analysis was done it revealed that living in rural area, anemia, and intestinal parasitic co-infection were significantly associated with malnutrition (AOR = 1.98, 1.9, 2.85, respectively).

Africans with advanced HIV disease may also experience wasting and loss of fat-free mass secondary to several factors. Oral and gastrointestinal infections associated with HIV can make food difficult to ingest; other manifestations of advanced HIV disease can also interfere with an individual's ability to ingest nutrients. Additionally, elevated pro-inflammatory cytokines in untreated HIV infection, including interleukin-1, interleukin-6, and tumor necrosis factor which increases prevalence of malnutrition among HIV-Positive patients (Macallan *et al*, 1995).

In one analysis of the risk factors associated with malnutrition among adult HIV-positive Ethiopian women, a multivariate analysis revealed that household food insecurity [AOR = 1.85; 95% CI: 1.16, 2.86], inadequate dietary diversity [AOR = 1.19; 95% CI: 1.08, 1.75], anemia [AOR = 1.67; 95% CI: 1.05, 2.65] and absence of nutritional support [AOR = 0.34 95% CI: 0.22, 0.54], were independent predictors of under-nutrition (Hadgu *et al*, 2013).

The importance of various factors in the causation of wasting related to Human Immunodeficiency Virus (HIV), was conducted using quantitative analysis and linear structural modeling performed (Sheehan & Macallan, 2018)

Study on energy metabolism with data collected longitudinally and prospectively from 33 men positive for the Human Immunodeficiency Virus at 105 time points over a 3-year period before the era of Highly Active Antiretroviral Therapy. Measured variables included energy intake, total energy expenditure, resting energy expenditure, rate of change in weight, CD4 count, clinical status, appetite, and mood. Derived variables included energy balance, activity-related energy expenditure, and physical activity level. And the results showed that the primary determinant of energy balance is energy intake (Hills, Mokhtar, & Byrne, 2014).

A double blinded placebo-controlled study in Uganda looked at the different prevalence and risk factors associated with malnutrition among HIV-positive patients on ART in Kampala, showed that one of the most common forms of malnutrition (hematological abnormality) and cytopenias

were a frequent complication in HIV-infected adults at initiation of HAART in Uganda was at least 65% (Kyeyune *et al*, 2014). The presence of any cytopenia was associated with female sex, decreasing CD4 count and decreasing body mass index.

Anemia is the most common cytopenia and its prevalence varies with different definitions used and in different settings. A systematic review of studies documenting the prevalence or incidence of anemia in HIV-infected patient populations reported prevalence rates from 1.3% to 95% (Belperio & Rhew, 2004). In Europe and the United States, anemia occurs in about 35-65% of individuals before or at the start of highly active antiretroviral therapy (HAART) (Mocroft *et al*, 1999) and in Africa and Asia the prevalence ranges from 18% to 77% (Dikshit, Wanchu, Sachdeva, Sharma, & Das, 2009). In Uganda, the DART-MRC project trial reported a prevalence of 0.7% grade 4 anemia at week 4 in patients initiating triple combination antiretroviral therapy (ART) (Francis *et al*, 2006). Mugisha *et al*. 2008, found 18.9% anemic HIV-positive subjects in a rural cohort of HIV-infected and HIV negative adults. Mukaya *et al.*, (2009) reported 64.6% anemic patients attending the medical emergency ward of Uganda's national referral hospital, Mulago. The presence of anemia has been associated with faster disease progression and has been shown to independently predict survival (Moore, Keruly, & Chaisson, 1998).

Deficiencies caused by protein energy malnutrition (PEM, for example, kwashiorkor and marasmus) and micronutrient deficiencies are primarily due to poor nutritional behavior. Lack of iron, zinc, vitamin A, and iodine has been shown to be major sources of nutritional malnutrition in developing countries (Müller and Krawinkel, 2005). The age of the patient has also been related with malnutrition (Magadi, 2011b; Verbrugghe *et al*, 2013). Inadequate deworming, lack of nutritional supplements, poverty, low levels of education and missed hospital visits are other factors that are important in determining if individuals living in rural communities develop malnutrition (Monteiro, Akré, and Clugston, 2015; Rai, Kazuko, Ayako, and Yoshimi, 2002; Nette, Sifah, and Nartey, 2015).

Factors associated with under-nutrition among enrolled HIV adults patients in care showed that females when compared to males were less likely to have under nutrition [aOR = 0.31 (95% CI, .20–0.47)]. Compared to 15–24 year olds, those of older age were also less likely to have under nutrition; 35–44 years [aOR = 0.33 (95% CI, 0.14–0.76)] and ≥ 45 years [aOR = 0.43 (95% CI, .19–0.99)].

Those reporting difficulty in accessing food in the month prior to the survey had a higher likelihood of under nutrition [aOR = 1.67 (95%CI, 1.10–2.55)]. Having WHO HIV clinical stage 3 or 4 was associated with a two- fold higher odds of having under nutrition [aOR = 2.25 (95% CI, 1.34–3.77)]. No significant differences were noted in risk factors for under nutrition when stratified by rural/urban residence (Takarinda et al., 2017)

The prevalence of malnutrition has been shown to be significantly higher in HIV-positive adults compared with HIV-negative controls (Taylor, 2001). The contribution of diet has often been overlooked in the development of metabolic comorbidities in patients with HIV. Research from the United States, Brazil and Africa (Hendricks, Willis, Houser, & Jones, 2006) has demonstrated differences in dietary intake in many subgroups within the HIV-infected population, such as those who use recreational drugs and ART (Hendricks *et al*, 2006) and those with HIV-related wasting (Sheehan & Macallan, 2018).

Among patients receiving prescribed food supplements, the level of adherence to prescribed food was found to be 36.3% with a 95.0% response rate. With the exception of the educational status, other socio-demographic variables had no significant effect on adherence (Kebede & Haidar, 2014).

Although increased availability of first line HAART has significantly reduced mortality and morbidity amongst people living with HIV/AIDS (PLA), under nutrition and weight loss still persist and is becoming increasingly prevalent (Mangili, Murman, Zampini, & Wanke, 2006).

2.3 Types of malnutrition prevalent among HIV-positive Adults on ART

Globally, there is increasing interest about malnutrition (both under and over), which directly affects one in three people living in the world (Haddad *et al*, 2016; Blössner, De Onis, & Prüss-Ustün, 2005). HIV infection results in functionally defective metabolic ability of the individual level to absorb, store and utilize nutrients, thus resulting in nutrient deficiencies, compromised immunity and increased risk of acquiring infectious diseases (Katona & Katona-Apte, 2008). Insufficient food intake, together or with malabsorption, result in further progression of HIV-disease (Wheeler, 1999), and the subsequent weight loss and severe malnutrition that ensue are significant predictors of Acquired Immune Deficiency Syndrome (AIDS) related morbidity and mortality (Melchior *et al*, 1999).

In Zimbabwe, one study on the prevalence of different types of malnutrition among adults on ART, found that being overweight or obese was more prevalent than being underweight in HIV-positive patients enrolled on HIV treatment and care settings. It was also reported that this was more common in females, in those of older age and in those with increasing wealth index (Takarinda *et al*, 2017b).

2.4 General Integration of Literature Review

The literature reviewed above shows that HIV/AIDS is associated with an increased burden of under-nutrition even among adult ART patients worldwide. Studies around the world tend to indicate that the prevalence of malnutrition among adults HIV-Positive patients on ART is high but not uniform around the world with prevalence varying in different regions due to different factors.

The most common types of malnutrition shown according to different studies are micronutrient deficiencies with few studies relating malnutrition among HIV adults patient on ART to under nutrient or over nutrition as shown by the BMI scores.

Studies of malnutrition in Africa do not emphasize on diseases related malnutrition. Studies from Uganda define malnutrition from the perspective of orphaned children and women infected with HIV and AIDS, thus showing that the burden of malnutrition is not holistic in its definition.

These studies are exposing the gaps in the adult population which includes both women and men that is not presented in the proportion, particularly information on severity of malnutrition on total body water, body fat, and lean body mass. And a correlation of the factors associated with the risk of developing malnutrition has on HIV-positive adults in rural communities of Uganda also warrants investigation.

The review also reveals that western Uganda where the researcher intends to conduct this study has not been receiving attention in the previous studies yet, it is one area with high HIV prevalence and high rates of malnutrition among adults.

CHAPTER THREE:

3.0 METHODS

3.1 Study design

The study was cross-sectional. It focused on a sample of HIV-positive adult patients attending ART clinics in the selected Hospitals of Bushenyi District in order to gain insights into larger cases (all HIV-Positive adults). The study described and explained rather than predict the influence of HIV status on nutritional status among all HIV-positive patients.

3.2 Study area

The study was carried out at the Anti-retroviral clinics of Kampala International University Teaching Hospital (KIU-TH), Ishaka Adventist Hospital (IAH) and Comboni Hospital (CH). KIU-TH and IAH are located in the Ishaka- Bushenyi Municipality, in Bushenyi district (South western, Uganda), while CH is located in Igara West Constituency; Bushenyi district and lie approximately 320 KM and 335 KM from Kampala, Uganda's capital city respectively. All selected three hospitals are private non for profit hospitals. KIUTH also possess a private- public partnership with government of Uganda, where patients receive care at reduced costs. KIU-TH also serves as the main teaching site for the school of Medicine and Dentistry of Kampala International University- Western Campus (KIU-WC) while CH also serves as a practicum site for the students of the same KIU-WC. The choice of these three study sites was based on the fact that they have active ART clinics and they also act as referral units for a wide rural catchment area vested with peripheral health facilities KIU-TH and CH have two active ART clinic days per week with an average of 80 and 65 patients visits per day respectively. Both facilities have approximately 936 patients and 822 patients enrolled on ART therapy. IAH ART clinic is open every day of the week and has over 5210 patient enrolled on in-care ART services. The catchment area for these facilities includes the entire Southwestern Uganda with districts of

Mbarara, Sheema, Mitooma, Rukungiri, Kisoro, Kanungu, Ntungamo, Kirihura, Buhweju, Ibanda, Kamwengye, Isingiro, Kabale, Kasese, some parts of Western Uganda like Ntoroko, Bundibugyo, Kabarole, Kyenjojo, Kibale, some parts of Eastern Congo, Northwestern Tanzania, Northern Rwanda.

3.3 Study population

This study focused on HIV positive adults attending ART clinics at Kampala International University-Teaching Hospital, Ishaka Adventist Hospital and Comboni Hospital between the 19th May, 2018 and 26th July, 2018.

3.4 Selection Criteria

3.4.1 Inclusion Criteria

Potential participants were included into the study if they satisfied the following criteria:

HIV-positive patients aged 18 years and above enrolled on ART seeking Medicare care at Kampala International University-Teaching Hospital, Ishaka Adventist Hospital and Comboni Hospital

Patients whose health status allowed for physical measurement of the anthropometric parameters

Those who voluntarily consented to participate in the study

3.4.2 Exclusion Criteria

Adults who were critically ill; and on life support were excluded from the study

3.5 Sample Size Determination

The estimation of sample size was determined statistically using the Kish and Leslie (1965) equation shown below;

$$N = \frac{Z^2 P(1-P)}{d^2}$$

Equation 1: Kish and Leslie formula adapted from Lenth (2010)

Where;

n – Desired sample size

z – Standard deviation at 95% degree of accuracy the standard deviation is 1.96

p – Proportion of adults receiving HIV/AIDS care in health facilities, p is an estimate of prevalence $19.8\% = 0.198$

q = 1-p, q= 0.846

d – Acceptable Margin of error which is estimated at $5\% = 0.05$

Therefore,

n = 244 participants.

Therefore, a total of 253 participants were recruited in this study.

3.6 Sampling Technique

Hospitals were selected purposively and by convenience method. Simple random sampling was used to sample the study participants. This implies that study individuals were chosen entirely by chance and each member of the population has an equal chance of being included in the sample (Meng, 2013). Lots were drawn and participants were asked to pick a paper which had numbers 1 to 5. Individuals who were picked odd numbers were included in the study.

3.7 Data collection

Before collection of data, the principal investigator identified potential study participants using clinical physical examination aimed at obtaining the anthropometric parameters for malnutrition. He then explained the details of the study and invited patients to join the study. Also written informed consent was sought prior to recruitment of patients into the study.

3.7.1 Quantitative methods.

Questionnaires designed in English (appendix III) and translated in Runyankole were used to collect the socio-economic factors, the nutritional health factors associated with malnutrition of each consenting study participant in the best language they best preferred. The questionnaire had both open end and closed questions.

3.7.1 Reliability of the data collection tool

The study questionnaire was pre-tested before commencement of the study. Its assessment was conducted at CH and the pilot results were not included in study. The pilot test was aimed obtaining a reliability score for the study tools and using the Cronbach's alpha coefficient a reliability value of 0.7 was achieved and is considered as acceptable.

3.8 Data Analysis

Univariable and multivariable logistic regression models were used to assess for the relationships between the socio-economic, health and nutritional risk factors for malnutrition among HIV positive patients on ART after adjustment for confounding variables. SPSS version 20 was used for all other analysis. Associations with study risk factors were estimated as crude odds ratio (COR). Confidence level of 95% was used and a $p\text{-value} \leq 0.05$ was considered to be statistically significant.

3.9 Quality control

The questionnaire that was used to assess risk factors was pre-tested in a pilot study prior to its use in the main study. Measurements on MUAC were repeated by two independent research assistants and the average of the readings was considered to improve on its reliability. The PI ensured completeness of data collection protocols at the end of each study day. Additionally, data was cleaned up to avoid errors and the PI performed regular back up of data.

3.10 Ethical considerations

The study was approved by the Postgraduate Studies and Research Directorate (PGSRD) of KIU-WC, and the Kampala International University Western Campus Research Ethic Committee (KIU REC).

Permission to carry out the study at KIU-TH was sought from the executive director of the hospital. At IAH and CH permission was granted by the hospital administrators. All the Heads of Departments of the ART clinics at the respective facilities also gave permission to the PI to interview participants after obtaining their written consent. Individual written consent (Appendix I) was obtained from each participant after the purpose and objectives of the study were

explained to them. The research project was registered with Uganda National Council of Science and Technology (UNCST) under registration number HS 2434

3.11 Confidentiality

Confidentiality and privacy of all information obtained on research participants was ensured through use of code numbers and not names. All participants' credentials and location were coded. The researcher used simple language to ensure that the terms for participation in the study are clear to the participant. Effort was made to seek patient's consent in privacy. Patient's consent forms bearing names were kept separately from other study documents. The information was kept confidential under lock and key and was addressed in a way that does not reveal the participant identity. Research data were stored on a password-protected computer.

3.12 Risks

There were no physical risks since the PI strictly used questionnaire to obtain information. Assessment of anthropometric parameters like Height, and weight, Hip waist circumference followed non-invasive procedures.

3.13 Benefits

There were no direct benefits. Participants in the study did not receive any financial incentives or rewards in any kind. Participation was fully voluntary.

Participants will benefit from the study when information gathered contributes to improvement in policy for the promotion of healthcare in this sector and to the body of knowledge in the field of malnutrition in HIV-positive adults while future researchers can use as secondary data for their studies

3.14 Balancing risk and Benefits

The benefits for participation in the study outweigh any associated risks that an individual may have. It would benefit the community and science as well.

3.15 Protection of participants

No trauma was inflicted to the participants. The study would not affect the routine health services the participants are receiving at the Hospital. The only protection would be against stigmatization which would be done by ensuring privacy and confidentiality.

3.16 Involvement of community

The study was conducted at the hospitals because of confidentiality. However, at the end of the study finding will be disseminated to District stakeholder and health providers to guide policy in management of malnutrition and care for HIV-positive adults.

3.17 Participants' participation

The involvement in this study was voluntary and participants were not coerced or forced to be interviewed during the study. They were free not to answer any question that they would prefer to opt out. Any participant was free to withdraw from study anytime at will without being disadvantaged in terms of medical care they were receiving at the time of the study in any way.

3.18 Dissemination of findings

Copies of this report will be shared with the administrative heads at each health center. Also a copy will be deposited at the PGSRD and at the main library of KIU-WC. A peer reviewed manuscript will be submitted to the Journal of African Health Sciences, indexed on PubMed. A press release will be made available after publication.

CHAPTER FOUR:

4.0 RESULTS

4.1 Study Participants and Study Area

The study was conducted between May, 2018 and July, 2018 at the ART clinics of KIU-TH, IAH and CH. A total of 253 HIV positive participants underwent physical examination for anthropometric parameters characteristic of malnutrition after satisfying the inclusion criteria. 164/251 (63.3%) were from eleven (11) districts in the south western region of Uganda, 71/251 participants were from five (5) districts of Western Uganda, 10/251 (4.0%) were from Eastern Cong, 4/251 (1.6%) were from Northern Tanzania while 2/251 (0.8%) were from Northern Rwanda. The mean age of the study participants was 33.4 years (range: 23.6-57.6 years: median: 30 years), 48.6% of the participants had their age in the range of 18 – 35 yrs. Also a majority were unmarried (66.9 %). Most of the participants reported to having attained primary level education as shown in **Table 1**.

4.2 Prevalence of under and over nutrition among study participants

Our study assessed 275 adults and recruited 253 as required by the sample size calculation. We excluded 24 subjects. Seventeen (17) were ≤ 18 years of age and seven (7) declined to participate in the study. All our study participants were HIV positive. The prevalence of malnutrition among our study participants by BMI measurements was established at 34.8 % (10.3% under nutrition and 24.5% over nutrition) as shown in **Figure 2**.

The study showed an overall malnutrition prevalence of 34.78%, 95CI: 28.93 – 41.00 in which 10.3% was due to under nutrition and 24.5% was due to over nutrition. Malnutrition prevalence at the health centers was in the order of Comboni > KIU-TH > SDA as shown in **Table 2**.

Table 1: Socio-demographic characteristics of study participants

Characteristic		N=253(%)
Age (in years)	18 – 35	122(48.6%)
	36 – 54	84(33.5%)
	≥ 55	45(17.9%)
Marital status	Married	83(33.1%)
	Unmarried	168(66.9%)
Sex	Females	139(55.4%)
	Males	112(44.6%)
Education Level	None	10(5.5%)
	Primary	146(56.2%)
	Secondary	68(27.1%)
	Tertiary	28(11.2%)
Religion	Catholic	114(45.4%)
	Protestant	52(20.7%)
	Pentacostal	4(1.6%)
	Muslim	81(32.3)
Occupation	Student	2(0.8%)
	Peasant	186(74.1%)
	Business	42(16.7%)
	Professional	21(8.4%)
Having regular meals	YES	55(21,9%)
	NO	196(78.1%)
Alcoholism	Alcoholic	165(65.7%)
	Non-alcoholic	86(34.3%)

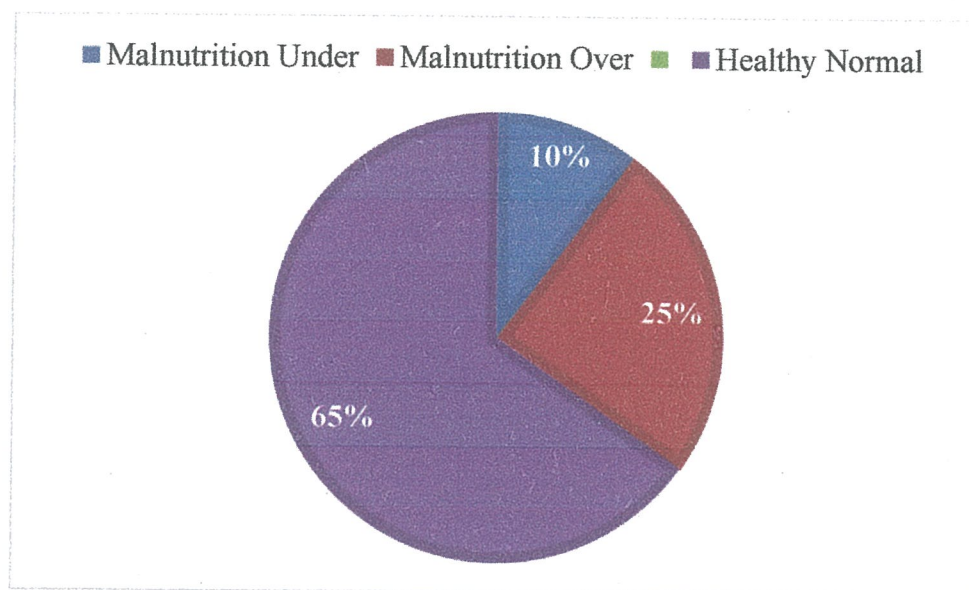


Figure 2 Prevalence of malnutrition among the participants.

Table 2 Proportion of under and over nutrition and over all prevalence of malnutrition amongst different health centers handling HIV patients in Bushenyi district.

Health center	N	Frequency (%) of malnourished patients		Prevalence of malnutrition	
		Under nutrition	Over nutrition	Value (n)	95% CI
KIU-TH	85	9(3.6)	23(9.1)	37.65(32)	27.36 – 48.82
SDA	83	3(1.2)	18(7.1)	25.30(21)	16.39 – 36.04
Comboni	85	14(5.5)	21(8.3)	41.18(35)	30.61 – 52.38
Overall	253	26 (10.3)	62 (24.5)	34.78(88)	28.93 – 41.00

KEY: N = number of participants from each health center, n = number of malnourished patients, CI = confidence intervals, KIU-TH = Kampala International University Teaching Hospital; SDA = Seventh Day Adventist Hospital.

In addition, mean waist hip ratio for presence of under and over nutrition was 0.855 ± 0.011 and 0.834 ± 0.012 respectively. In addition, mean BMI for under and over nourished patients was 16.981 ± 0.191 and 30.06 ± 0.994 respectively. Furthermore, mean MUAC was 22.65 ± 0.380 cm and 27.49 ± 0.560 cm for under and over nutrition in which significant differences were found ($P < 0.05$) as shown in **Table 3**.

Table 3 Mean WHR, BMI and MUAC in malnutrition among study participants.

Malnutrition index	Under nutrition			Over nutrition		
	Absent	Present	P values	Absent	Present	P values
	Mean \pm SEM			Mean \pm SEM		
WHR	0.835 ± 0.005	0.855 ± 0.011	0.158	0.838 ± 0.004	0.834 ± 0.012	0.660
BMI (kg/m^2)	24.032 ± 0.380	16.981 ± 0.191	0.000	21.11 ± 0.175	30.06 ± 0.994	0.000
MUAC (cm)	25.54 ± 0.213	22.65 ± 0.380	0.000	24.51 ± 0.168	27.49 ± 0.560	0.000

Furthermore, mean cut off limits for MUAC, WHR and BMI in this study amongst female and male participants as shown in **Table 4**.

Table 4 Mean MUAC, WHR and WHR amongst females and male HIV patients in south western Uganda

Dependent Variable	Sex	Mean \pm SEM	95% Confidence interval
MUAC (cm)	Female	25.398 ± 0.280	24.846 – 25.951
	Male	25.063 ± 0.293	24.485 – 25.640
WHR	Female	0.825 ± 0.006	0.813 – 0.837
	Male	0.849 ± 0.006	0.837 – 0.861
BMI	Female	24.491 ± 0.500	23.506 – 25.476
	Male	22.010 ± 0.523	20.980 – 23.039

The study further on showed that mild thinness was most prevalent in the undernourished population (5.1%) and among these, males had an odds of 0.937 (95% CI: 0.1114 – 7.728) of mild thinness. In addition, over nourished participants were mainly associated with pre-obesity (19.4%) in which the risk was 1.034 times greater in males than being thin (OR: 1.034 95% CI: 0.158 – 6.764) as shown in **Table 5**.

Table 5 Malnutrition level distribution and odds ratios amongst female and male participants.

Malnutrition		Females	Males	Total	P value	Odds ratio	
level		Frequency (%)				Value	95% CI
Under nutrition (N = 26)	Severe thinness	3(1.2)	2(0.8)	5(2.0)	0.580	1	–
	Moderate thinness	5(2.0)	3(1.2)	8(3.2)	0.928	0.900	0.091 – 8.899
	Mild thinness	8(3.2)	5(2.0)	13(5.1)	0.952	0.937	0.114 – 7.728
Over nutrition (N = 62)	Pre-obese	29(11.5)	20(7.9)	49(19.4)	0.972	1.034	0.158 – 6.764
	Obese class I	4(1.6)	0(0.0)	4(1.6)	0.999	0.000	–
	Obese class II	9(3.6)	0(0)	9(3.6)	0.999	0.000	–

4.3 Major social risk factors associated with malnutrition in the study population.

Occurrence of under nutrition was common amongst females, who were least educated and consumed alcohol as compared to males, showing that this is the major social group associated with the condition as shown in **Table 6**.

Table 6 Major social demographics and odds ratios in the study population with under nutrition.

Parameter	Variable	Frequency (%) of participants with under nutrition	P	Odds ratio
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		Absent	Present	Total	value	Value	95% CI
Sex	Female	116(46.0)	15(6.0)	131(52.0)		1	–
	Male	111(44.0)	10(4.0)	121(48.0)	0.430	0.695	0.282 – 1.714
Education level	None	16(6.3)	5(2.0)	21(8.3)	0.205	1	–
	Primary	92(36.5)	9(3.6)	101(40.1)	0.125	0.372	0.105 – 1.328
	Secondary	71(28.2)	5(2.0)	76(30.2)	0.079	0.283	0.069 – 1.155
	Tertiary	48(19.0)	6(2.4)	54(21.4)	0.746	0.784	0.180 – 3.414
Marital status	Married	90(35.7)	5(2.0)	95(37.7)		1	–
	Single	137(54.4)	20(7.9)	157(62.3)	0.070	2.563	0.926 – 7.095
	Alcohol	51(20.2)	11(4.4)	62(24.6)	0.407	1	–
Lifestyles	Smoking	19(7.5)	0(0)	19(7.5)	0.998	0.000	–
	Drug abuse	8(3.2)	0(0)	8(3.2)	0.998	0.000	–
	Never	149(59.1)	14(5.6)	163(64.7)	0.088	0.459	0.187 – 1.124

In addition, over nutrition was associated more with females (males, OR = 0.002, 95% CI: 0.197 – 0.707). The odds of being over nourished were 3 x greater amongst those who had a secondary and tertiary level of education while amongst those who had a primary education level, the odds ratio was 2.364 (95% CI: 0.618 – 9.039) as compared to those who had never studied as shown in **Table 7**.

Table 7 Major social demographics and odds ratios in the study population with over nutrition.

Parameter	Variable	Frequency (%) of participants with over nutrition	P	Odds ratio
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		Absent	Present	Total	value	Value	95% CI
Sex	Female	90(3(5.6)	42(16.6)	132(52.2)		1	–
	Male	101(39.9)	20(7.9)	121(47.8)	0.002	0.373	0.197 – 0.707
Education level	None	19(7.5)	3(1.2)	22(8.7)	0.436	1	–
	Primary	77(30.4)	24(9.5)	101(39.9)	0.209	2.364	0.618 – 9.039
	Secondary	55(21.7)	21(8.3)	76(30.0)	0.110	3.041	0.776 – 11.914
	Tertiary	40(15.8)	14(5.5)	54(21.3)	0.148	2.900	0.688 – 12.265
Marital status	Married	71(28.1)	24(9.5)	95(37.5)		1	–
	Single	120(47.4)	38(15.0)	158(62.5)	0.827	0.928	0.476 – 1.811
Lifestyles	Alcohol	45(17.8)	18(7.1)	63(24.9)	0.490	1	–
	Smoking	15(5.9)	4(1.6)	19(7.5)	0.394	0.571	0.157 – 2.071
	Drug abuse	7(2.8)	1(0.4)	8(3.2)	0.464	0.439	0.048 – 3.986
	Never	124(49.0)	39(15.4)	163(64.4)	0.144	0.593	0.294 – 1.196

4.4 Major economic risk factors associated with malnutrition in the study population.

Being unemployed increased the odds by 1.757 (95% CI: 0.724 – 4.264) of getting undernourished. In addition, patients who relied heavily on private sponsors to help them acquire medications had an 8 x risk of getting undernourished when compared against those who get free medications provided by the government as shown in **Table 8**. Furthermore, over nutrition was associated with beginning employed, being able to save money and acquiring free government drugs as shown in **Table 9**.



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Table 8 Major economic risk factors in the study population to under nutrition.

Parameter	Variable	Frequency (%) of participants with under nutrition			P value	Odds ratio	
		Absent	Present	Total		Value	95% CI
Employed	Yes	161(63.9)	16(6.3)	177(70.2)	–	1	–
	No	66(26.2)	9(3.6)	75(29.8)	0.212	1.757	0.724 – 4.264
Savings	Possible	42(17.8)	6(2.5)	48(20.3)	–	1	–
	Impossible	170(72.0)	18(7.6)	188(79.7)	0.488	0.704	0.261 – 1.898
Payment for drugs	Gov’t	159(63.1)	13(5.2)	172(68.3)	0.000	1	–
	Self	57(22.6)	4(1.6)	61(24.2)	0.796	0.858	0.269 – 2.740
	PS	11(4.4)	8(3.2)	19(7.5)	0.000	8.8895	3.045 – 25.983

KEY: Gov’t = government, PS = private sponsor.

Table 9 Major economic risk factors in the study population to over nutrition.

Parameter	Variable	Frequency (%) of participants with over nutrition			P value	Odds ratio	
		Absent	Present	Total		Value	95% CI
Employed	Yes	132(52.2)	45(17.8)	177(70.0)		1	–
	No	59(23.3)	17(6.7)	76(30.0)	0.629	0.842	0.419 – 1.693

Savings	Possible	38(16.0)	11(4.6)	49(20.7)		1	—
	Impossible	141(59.5)	47(19.8)	188(79.3)	0.808	1.100	0.509 – 2.375
Payment for drugs	Gov't	120(47.4)	52(20.6)	172(68.0)	0.209	1	—
	Self	52(20.6)	10(4.0)	62(24.5)	0.077	0.502	0.234 – 1.078
	PS	19(7.5)	0(0)	19(7.5)	0.998	0.000	—

For this assessment the association of socio-economic and nutritional factors associated with malnutrition for all 251 participants was assessed using crude odds ratios (COR). Factors like care giver un-employment, food insecurity (little or lack of), single parenthood, overconsumption of fat foods produced higher odds of association to the malnutrition outcome among our participants. All our study participants gave negative response to seeking nutritional counseling and taking nutritional supplements and as thus these two parameters were not included in the analysis as shown in **Table 10**.

Table 10 Socio-economic and nutritional factors associated with malnutrition

Variable	COR (95% CI)	p-value
Socio-Economic Factors		
Un- employed	0.3 (0.04-2.1)	0.2
Employed	0.7 (0.05-9.6)	0.16
Possible to save	1.2 (0.01-51.8)	0.005
No savings	1.08 (0.1-16.6)	0.005
Payment of Drugs		
Government	1.4 (0.1-24.5)	0.008
Self	0.8 (0.03-2.4)	0.06
Private Sponsor	0.3 (0.2-22.9)	0.02
Nutritional Factors		
Food source		
Farm/plantation	0.96 (0.6-51.4)	0.008
Local shops	0.72 (0.02-7.2)	0.13
Government	0.04 (0.8-3.8)	0.11
No of daily meals		
Two	1.5 (0.1-16.6)	0.007
Three	0.2 (0.01-2.2)	0.03
Four	0.9 (0.01-1.9)	0.28
Major food type		
Carbohydrates	0.18 (0.01-3.8)	0.96
Proteins	0.91 (0.5-36.6)	0.19
Fat	1.1 (0.7-48.8)	0.005
Balanced diet	1.8 (0.03-4.5)	0.007

4.5 Major health risk factors associated with malnutrition in the study population.

Under nutrition was most prevalent amongst participants who had Stage 2 HIV/AIDS, although the odds were lower (OR: 0.329, 95% CI: 0.136 – 0.796) when compared to those in Stage 1. Adherence to HAART was found to be low amongst the study participants, and in these odds of under nutrition were very high (OR: 2.956, 95% CI: 0.383 – 22.801) when compared to those who were adhering to the therapy. Also, the presence of more than one opportunistic infection in the last 6 months increased the risk of developing under nutrition more than two times i.e. OR = 2.452; 95% CI: 0.835 – 7.207 than those who were healthy in this period. Furthermore, a majority of the under nourished participants never exercised (61.3%) and these had a higher chance of developing under malnutrition as compared to those who regularly exercised. In addition, a unit increase in family members in a home increased (OR = 1.204, 95% CI: 0.711 – 2.039) the risk of under nutrition as shown in **Table 11**.

Over nutrition was associated with Stage 2 and 3 of HIV/AIDS since these increased the odds 2 to 6 times respectively as compared to stage 1, although a majority of participants had stage 2 HIV/AIDS. A majority of the participants adhered to HAART treatment although a failure to adhere to the therapy increased the risk (OR = 3.52, 95% CI: 780 – 15.878) when compared to those who adhered. In addition, the lack of opportunistic infections (OR = 0.331) decreased the risk of over nutrition while a lack of exercise increased the risk (OR = 1.289, 95% CI: 0.683 – 2.434) to over nutrition as shown in **Table 12**.

Table 11 Major health risk factors in the study population to under nutrition.

Parameter	Variable	Frequency (%) of participants with under nutrition			P value	Odds ratio	
		Absent	Present	Total		Value	95% CI
AIDS stage	Stage 1	88(34.8)	18(7.1)	106(41.9)	0.048	1	
	Stage 2	121(47.8)	8(3.2)	129(51.0)	0.014	0.329	0.136 – 0.796
	Stage 3	18(7.1)	0(0)	18(7.1)	0.998	0.000	–
Health counselling	Yes	204(81.0)	24(9.5)	228(90.5)		1	–
	No	22(8.7)	2(0.8)	24(9.5)	0.739	0.771	0.167 – 3.556
Adherence to HAART	Yes	24(9.5)	1(0.4)	25(9.9)		1	–
	No	203(80.3)	25(9.9)	228(90.1)	0.299	2.956	0.383 – 22.801
Opportunistic infections	None	206(81.7)	21(8.3)	227(90.1)		1	
	≥ 1	20(7.9)	5(2.0)	25(9.9)	0.103	2.452	0.835 – 7.207
Freq. of exercise	Often	89(35.2)	9(3.6)	98(38.7)		1	–
	Never	138(54.5)	17(6.7)	155(61.3)	0.949	1.029	0.430 – 2.461

Mean patients at home	1.68 ± 0.14	1.12±0.29	0.184 ^a	0.388	0.807	0.496 – 1.314
Mean infections in last 6 months	1.09 ± 0.02	1.19 ± 0.08	0.094 ^a	1.0 00	0.000	–
Mean CD4 count of patients	392.19 ± 65.69	336.00 ± 0.00	0.838 ^a	0.798	0.999	0.990 – 1.008
Mean family members	5.00± 0.20	3.69 ± 0.40	0.024 ^{a*}	0.028	0.763	0.600 – 0.971
Mean of dependents at home	1.46 ± 0.12	1.08 ± 0.33	0.317 ^a	0.490	1.204	0.711 – 2.039

KEY: CI: confidence interval; Superscripts, a = ANOVA conducted and * = significant differences exist.

Table 12 Major health risk factors in the study population to over nutrition.

Parameter	Variable	Frequency (%) of participants with over nutrition			P value	Odds ratio	
		Absent	Present	Total		Value	95% CI
AIDS stage	Stage 1	91(36.0)	15(5.9)	106(41.9)	0.002	1	–
	Stage 2	92(36.4)	37(14.6)	129(51.0)	0.009	2.485	1.252 – 4.931
	Stage 3	8(3.2)	10(4.0)	18(7.1)	0.001	6.555	2.174 – 19.763
Health counselling	Yes	23(9.1)	2(0.8)	25(9.9)		1	–
	No	168(66.4)	60(23.7)	228(90.1)	0.193	0.428	0.119 – 1.535
Adherence to HAART	Yes	169(67.1)	59(23.4)	228(90.5)		1	–
	No	21(8.3)	3(1.2)	24(9.5)	0.102	3.520	0.780 – 15.878
Opportunistic infections	None	75(29.6)	23(9.1)	98(38.7)		1	–
	≥ 1	116(45.8)	39(15.4)	155(61.3)	0.154	0.331	0.072 – 1.514
Freq. of exercise	Often	75(29.6)	23(9.1)	98(38.7)		1	–
	Never	116(45.8)	39(15.4)	155(61.3)	0.433	1.289	0.683 – 2.434

Mean patients at home	1.55 ± 0.148	1.84 ± 0.265	0.337 ^a	0.273	4.057	0.332 – 49.581
Mean infections in last 6 months	1.12 ± 0.024	1.03 ± 0.023	0.042 ^{a*}	1.00	0.00	—
Mean CD4 counts	346.67 ± 80.539	490.20 ± 74.031	0.305 ^a	0.127	1.005	0.999 – 1.011
Mean family members	4.69 ± 0.156	5.40 ± 0.534	0.082 ^a	0.335	0.457	0.093 -2.242
Mean of dependents	1.31 ± 0.131	1.76 ± 0.239	0.092 ^a	0.765	1.421	0.143 – 14.164

KEY: superscript a = ANOVA conducted and * = significant differences exist.

4.6 Major nutritional risk factors associated with malnutrition in the study population

A majority of the participants claimed to eat a balanced diet, and the risk on development of under nutrition was low as compared with eating carbohydrates (OR = 0.491, 95% CI: 0.183 – 1.315). In addition, a low risk was associated with eating more than one meal a day, showing that eating few meals per day would increase the risk of one being under nourished. In addition, abstinence from nutritional supplements increased the risk to under nutrition (OR = 2.934, 95% CI: 0.636 – 13.542) as shown in **Table 13**.

Table 13 Major nutritional risk factors in the study population to under nutrition.

Parameter	Variable	Frequency (%) of participants with under nutrition			P value	Odds ratio	
		Absent	Present	Total		Value	95% CI
Major food	Carbohydrates	54(21.3)	12(4.7)	66(26.1)	0.570	1	
	Fast foods	9(3.6)	1(0.4)	10(4.0)	0.921	0.892	0.093 – 8.503
	Balanced diet	157(62.1)	13(5.1)	170(67.2)	0.157	0.491	0.183 – 1.315
	Protein	7(2.8)	0(0)	7(2.8)	0.999	0.000	–
No. of daily meals	One	4(1.6)	1(0.4)	5(2.0)	0.752	1	–
	Two	139(55.6)	20(8.0)	159(63.6)	0.406	0.329	0.024 – 4.527
	Three	71(28.4)	5(2.0)	76(30.4)	0.295	0.222	0.013 – 3.715
	Four	10(4.0)	0(0)	10(4.0)	0.999	0.000	–
Nutritional supplements taken	Often	59(23.3)	2(0.8)	61(24.1)	–	1	–
	Never	168(66.4)	24(9.5)	192(75.9)	0.168	2.934	0.636 – 13.542

Nutritional counselling	Yes	137(54.2)	15(5.9)	152(60.1)	–	1	–
	No	90(35.6)	11(4.3)	101(39.9)	0.685	1.230	0.453 – 3.715
Major food source	Farm	103(40.7)	9(3.6)	112(44.3)	0.848	1	–
	Local shops	119(47.0)	17(6.7)	136(53.8)	0.565	1.313	0.519 – 3.323
	Government	5(2.0)	0(0)	5(2.0)	0.000	0.000	–

In addition, over nutrition was highly associated with the consumption of highly protein foods (OR = 3.540, 95% CI: 0.604 – 20.738) as compared to carbohydrate foods. In addition, the eating 3 meals a day would subsequently increase the risk of being over nourished (OR = 1.1416) as compared to one who eats a single meal a day as shown in **Table 14**.

Table 14 Major nutritional risk factors in the study population to over nutrition.

Parameter	Variable	Frequency (%) of participants with over nutrition			P value	Odds ratio	
		Absent	Present	Total		Value	95% CI
Major food	Carbohydrates	57(22.5)	9(3.6)	66(3.6)	0.327	1	
	Fast foods	9(3.6)	1(0.4)	10(4.0)	0.985	0.978	0.100 – 9.562
	Balanced diet	121(47.8)	49(19.4)	170(67.2)	0.116	1.996	0.842 – 4.730
	Protein	4(1.6)	3(1.2)	7(2.8)	0.161	3.540	0.604 – 20.738
No. of daily	One	4(1.6)	1(0.4)	5(2.0)	0.111	1	–
	Two	130(52.0)	29(11.6)	159(63.6)	0.693	0.602	0.049 – 7.444

meals	Three	48(19.2)	28(11.2)	76(30.4)	0.791	1.1416	0.108 – 2.231
	Four	7(2.8)	3(1.2)	10(4.0)	0.907	0.843	0.048 – 14.693
Nutritional supplements taken	Often	46(18.2)	15(5.9)	61(24.1)	–	1	–
	Never	145(57.3)	47(18.6)	192(75.9)	0.930	1.035	0.480 – 2.231
Nutritional counselling	Yes	114(45.1)	38(15.0)	152(60.1)	–	1	–
	No	77(30.4)	24(9.5)	101(39.9)	0.859	1.067	0.522 – 2.180
Major food source	Farm	84(33.2)	28(11.1)	112(44.3)	0.967	1	–
	Local shops	102(40.3)	34(13.4)	136(53.8)	0.794	1.088	0.579 – 2.043
	Government	5(2.0)	0(0)	5(2.0)	0.999	0.000	–

CHAPTER FIVE

5.0 DISCUSSION, CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

5.1 Discussion

The current study was undertaken to determine the prevalence of malnutrition and its associated factors among adults attending antiretroviral therapy clinics in Bushenyi district. It involved assessment of the socio-economic factors associated with malnutrition and examining the nutritional and health factors associated with malnutrition among HIV adult's patients seeking medical care at these clinics. This chapter therefore, presents a discussion of the results obtained within the context of the objectives and research questions as outlined in chapter one.

5.1.1 Study participants

This was a multi-center hospital based study conducted at KIU-TH, IAH and CH and 251 participants were recruited into the study. All the participants were HIV positive adults. 66.9% were the unmarried (single, divorced, single parenthood and widow(er)) while 33.1% were married participants. The mean age of the study participants was 33.4 years (range: 23.6-57.6 years: median: 30 years), 48.6% of the participants had their age in the range of 18 – 54 yrs (**Table 1**). The role of adults in the propagation of HIV has been recognized (Kim *et al.* 2011), showing their importance in understanding the disease burden on the population since elderly persons have been shown to be at a high risk of developing malnutrition (Agarwal, Miller, Yaxley, & Isenring, 2013).

5.1.2 Prevalence of under nutrition and over nutrition among study participants

The prevalence of malnutrition among our study participants by BMI measurements was established at 34.8 % comprising 24.5% over nutrition and 10.3% under nutrition (**Table 2** and **Table 3**). This is in agreement with a study conducted at Mbarara Regional Referral Hospital, showing that the burden of disease affects the entire HIV population irrespective of age (Kikafunda & Namusoke, 2006; Magadi, 2011). However a similar study conducted in Ethiopia reported a prevalence of 25.2% in which emphasis was placed on under nutrition and this result is higher than our study findings in relation to under nutrition (Gedle *et al.*, 2015). This suggests that the most common form of malnutrition among HIV Positive adults in Bushenyi district is over nutrition (**Figure 2**). This finding can be attributed to the fact that Bushenyi district is

known to have plenty of food and many implementing partners support HIV/AIDS treatment in this area.

In the current study, the use of BMI and MUAC as variables for diagnosis of malnutrition was re-emphasized due to significant differences being identified between presence and absence of the disease (**Table 4** and **Table 5**). These findings are in agreement with previous findings which showed their relevance in clinical diagnosis of nutritional status in patients (Sagun *et al.* 2014). In addition, the study showed that MUAC cut off points of 27.49 ± 0.560 are reliable for diagnosis of over nutrition and this was a new finding from the study, showing a need for more studies in the development of national reference values for each nutritional category. In this study a majority of under nourished participants had mild thinness and the risk was lower in males.

5.1.3 socio-economic factors associated with malnutrition among the participants

Major social factors associated with under nutrition amongst HIV patients were; being a female, illiterate, and alcohol consumer (**Table 6** and **Table 8**) while over nutrition was associated with patients who are females, attained at least a secondary level of education (**Table 7** and **Table 9**). Previous findings in Uganda had shown malnutrition to be associated with children coming from families of low social status (Kikafunda & Namusoke, 2006; Magadi, 2011). However, current evidence being provided is that a low social background predisposes adult HIV patients to under nutrition while a high social background predisposes HIV patients to over nutrition. In Ethiopia under nutrition was associated with poverty and illiteracy rich and educated are low at risk of developing malnutrition amongst HIV patients (Uthman, 2008). Economically, being unemployed and relying on a private sponsor to buy medications for opportunistic infections increased the risk of under nutrition while being employed, able to save money and having continual access to free government drugs increased the risk of over nutrition. These observations show that disadvantaged persons need to be supported with income generating activities, so that their reliance on third parties (usually relatives) to buy medications is reduced as this would reduce on the risk of them developing under nutrition (**Table 10**).

5.1.4 Health and nutritional factors associated with malnutrition among the study participants

The major health risk factors associated with under nutrition among HIV adult patients identified in the study were AIDS stage 1, low adherence to HAART, not exercising and presence of opportunistic infections as well as having many family members at home (**Table 11**) while over nutrition was associated with stage 2 and 3 HIV/AIDS, good adherence to HAART, and absence of opportunistic infections as well as a lack of exercise (**Table 12**). These observations show that under nourished patients are often persons who would be dealing with the stigma of HIV/AIDS since these often have a low adherence to HAART as compared to those who have already accepted the disease and continually are on therapy (Mburu *et al.* 2013). Patients who are malnourished are often between stage 1, 2 and 3; with HIV patients in stage 2 and 3 having pre-obesity. The over nutrition status would be due to their enhanced socio-economic status, which helps these patients access medications promptly, leading to a low incidence of opportunistic infections amongst them. In addition, patients with advanced HIV/AIDS may generally appear to be very health, showing a need for the general community in Bushenyi to routinely conduct laboratory tests before sexual intercourse. This is important since a study at The Johannesburg Hospital (South Africa) has been able to show that HIV clinical presentation may be similar to the general population (Julius *et al.* 2011), thus making a reliance on clinical presentation of a patient (under nutrition) unreliable, especially amongst HIV patients from improved socio-economic backgrounds. In a study conducted amongst HIV patients in the United Kingdom, late presentation of patients led to increased opportunistic infections (O'Farrell *et al.* 1995), showing a need by the HIV focal groups in Uganda to pay a close attention on the prevalence of under nutrition amongst patients in rural communities, through improved planning to include HIV adults in community outreach activities as this would help reduce on the malnutrition burden within the country.

Nutritionally, presence of under nutrition was high (**Table 13**) in patients who had carbohydrates as their major food, eating once a day and no food supplements being taken. High carbohydrate foods would predispose patients in this community to protein energy malnutrition which is highly prevalent in developing countries like Uganda (Müller & Krawinkel, 2005). It appears the

low socio-economic status makes it difficult for under nourished HIV adult patients to access highly protein foods (such as milk, beef and eggs) and local foods like bananas and millet continue to constitute their major dietary source, leading to a high disease burden in a region associated with plentiful animal protein sources (Kikafunda, 2014). On the other hand, over nutrition (**Table 14**) was associated with consumption of majorly protein foods and eating three meals in a day. The high socio-economic status of over nourished patients implies that they have the ability to afford highly nutritious foods which are important for their health status (Magadi, 2011). In this community, it's important to re-emphasize the need for nutritional counseling as it appears some patients are over eating these protein foods and some are suffering from a deficiency through revised prioritization of community outreach activities (Bandura, 1986; Monteiro, Akre, & Clugston, 2015; Rai *et al.* 2002. Tette, Sifah, & Nartey, 2015)

5.2 Conclusions

The study showed that;

- 5.2.1 An overall malnutrition prevalence of 34.78% in an adult HIV population of Bushenyi in which under nutrition and over nutrition prevalence was 10.3% and 24. 5% respectively.
- 5.2.2 Major socio-economic factors associated with under nutrition were high amongst women, illiterate, alcoholic and unemployed as well as relying on a private sponsor to pay for medications for under nutrition. On the other hand, being female, highly educated, employed and able to save money was associated with high over nutrition showing that the prognosis in malnutrition is affected by the social class of the patients.
- 5.2.3 Major health factors associated with under nutrition were stage 1 HIV, low adherence to HAART, not exercising and presence of opportunistic infections showing that this status is common amongst those who are not actively seeking medical assistance, or those with a low access to medications. Furthermore, over nutrition was associated with patients in advanced HIV (i.e. stage 2 and 3), good adherence to HAART and absence of opportunistic infections showing that persons who have access to medications appear healthier than those who don't in Bushenyi district.
- 5.2.4 Nutritionally, under nourished HIV patients in Bushenyi have access to one meal per day, with no access to food supplements and it's mainly carbohydrate while over nourished

HIV patients have access to more than two meals per day, have access to food supplements, and protein foods.

5.3 Limitations of the study

Information acquired in the study was from 3 major health centers in Bushenyi district. A holistic picture would be acquired if more health centers in the district are included to gain a wider interpretation on the subject.

5.4 Recommendations

Incentives to improve on the socio-economic status of malnourished HIV adult patients would help improve on their nutritional and health habits.

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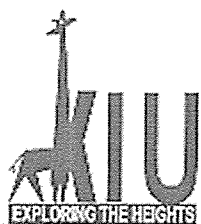
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APPENDICES

Appendix i: BMI Reference Values

Table 15 WHO BMI CUT OFF POINTS USED TO DIAGNOSE MALNUTRITION

Classification		BMI (Kg/m ²)	
Parameters	Variables	Principal cut-off points	Additional cut-off points
Malnutrition	Underweight	< 18.50	<18.50
	Severe thinness	< 16.00	< 16.00
	Moderate thinness	< 16.00 – 16.99	16.00 – 16.99
	Mild thinness	17.00-18.49	17.00-18.49
Normal Range		18.50-24.99	18.50-22.99
			23.00-24.99
Overweight		≥ 25.00	≥ 25.00
Pre-obese		22.5 -29.99	25.00-27.49
			27.50-29.99
Obesity	Obese	≥ 30.00	≥ 30.00
	Obese class I	30.00-34.99	30.00-32.49
			32.50-34.99
	Obese class II	35.00-39.99	35.00-37.49
			37.50-39.99
	Obese class III	≥ 40.00	≥ 40.00



Appendix ii: Informed Consent: Version Five (English)

KAMPALA INTERNATIONAL UNIVERSITY WESTERN CAMPUS

I am Dr. Odwee Ambrose a student of Public Health at KIU western Campus carrying out a study on Prevalence of Malnutrition and its associated factors among HIV- positive adults attending anti-retroviral therapy clinics in selected Hospitals in Bushenyi District.

You are requested to participate in this study. Please read the following information below.

Purpose of the research:

To determine the Prevalence of malnutrition and its associated factors among HIV-positive adults attending anti-retroviral therapy clinics at selected Hospitals in Bushenyi District

Participant selection:

200 participants from ART clinics in selected Hospitals in Bushenyi will be interviewed

Procedure to be followed:

Taking part in this study is voluntary. If you agree to be in this study, we will conduct an interview with you. The interview will include questions about your social economic status, dietary and health related issues. The interview will take about 10 minutes to complete. With your permission, we will also take measurement of your height, weight, mid upper arm circumference, Hip circumference, and waist circumference.

Research description

This is a study focusing on adult HIV- positive patient receiving anti-retroviral therapy at selected Hospitals in Bushenyi District. The main aim is to assess the prevalence of malnutrition and it's associated risk factors among HIV-positive adults attending anti-retroviral therapy clinics at selected hospitals located in Bushenyi District. This will help improve quality of

services. Information will be collected for month through interviewing clients attending ART clinic.

Risks

There will be no physical risks since the researcher will use questionnaire to obtained information. In addition, the normal routine assessment of Height, and weight, Hip waist circumference measurement and no invasive procedure will be used. However, there is a potential risk of social harm if there is breach of confidentiality since the study involves HIV-Positive patients.

Benefits

There will be no direct benefits. Participants in the study will not receive any financial incentives. However, there may be indirect benefits from the study since the information gathered from the study will add to the body of knowledge

The information from this study will add to the body of knowledge in the field of Malnutrition in HIV-positive Adults where future researcher can use as secondary data to their study

Confidentiality

Utmost Confidentiality and privacy will be maintained. Participant credentials and location will be coded. The researcher will use simple language to ensure that the terms for participation in the study are clear to the participant.

The information will be kept confidential and will be addressed in a way that does not reveal the participant identity. Privacy will be provided in a separate clinical room, but where room is not available; the researcher will look for a friendly corner where he will interact with the participant's one at a time.

Compensation

No anticipated physical damage because the tool used will be questionnaires, routine measurement of height, weight. The whole process is expected to take about 10 minutes. There will be no re-imbursement for time loss, or money spent. The study will be conducted during routine visit of the participants to the Hospitals to get services from ART clinics.

Contacts

If you have, any questions please feel free to ask the researcher, on the telephone numbers below:

Researcher:

Tel 0776405614/0754797472

KIU REC

Tel: 0706 737387

Voluntary participation

Participating in this study is voluntary. You have the right to refuse to take part in this study. It will not affect the services you are receiving from this Hospital.

Participants Acceptance

I have read and understood all the information provided, I have asked questions and they have been answered to my satisfaction.

I now understand what the research is about and the role I have to play in the research and the copy of this form will be given to me.

I am prepared to participate

I am not prepared to participate

(Tick what is applicable).

Participant names.....Signature/thumb print.....Dates

Witness names.....Signature.....Date

Researcher name Signatures Date.....

Appendix iii: Questionnaire (English Version)

Objectives (i), (ii), and (iii): Determining the prevalence of malnutrition and its associated factors among HIV- positive adults attending anti-retroviral therapy clinics at selected Hospitals in Bushenyi District

Thank you for accepting to participate in this study. Please complete this questionnaire by providing honest responses to the questions below. In case you are in doubt of the implications of any question, ask for clarifications in case need should arise.

	QUESTIONS		Response
Anthropometric measurements	Q1	Age(Years)	
	Q2	Height (Cm)	
	Q3	Weight (kg)	
	Q4	MUAC(cm)	
	Q5	Waist circumference (cm)	
	Q6	Hip circumference (cm)	
	Q7	Sex : 1= male , 2= female	
Socio economic status	Q8	Education level 1= none; 2 = primary; 3 = secondary; 4 = college= 5 = University	
	Q9	Marital status 1 = married; 2 = single 3 = widowed 4 = separated	
	Q10	Employed: 1 = yes; 2 = no 3 = self employed	
	Q11	Average monthly income:	
	Q12	Average monthly expenditure:	
	Q14	Numbers of dependents	
	Q15	Smoking: 1 = yes; 2 = no	
	Q16	Alcohol consumption: 1 = yes; 2 = no	
	Q17	Class of income: low , medium high	
	Q18	Numbers of family members	
	Q19	Number of infected patients in your homestead	

		(including yourself)	
	Q20	Number of infections in last 6 months	
	Q21	Who pays for the drugs; 1 = free (gov't); 2 = myself; 3 = sponsor	
	Q22	Limb movement challenges 1 = yes, 2 = no (if yes, state affected Limb and treatment taken)	
	Q23	How often do you exercise 1 = often; 2 = never	
	Q24	Risk behavior like drug abuse; 1 = no 2= Yes	
	Q25	Have you received health , counseling before 1 = yes; 2 = no	
Dietary Status	Q26	What food do you eat?	
	Q27	How many major meals do you eat in a day on average	
	Q28	On average, where do you get your food? 1 = Free (gov't); 2 = Farm; 3 = Local market/shops	
	Q29	Do you take nutritional supplements? 1 = often; 2 = never (if often, list them)	
	Q30	Have you received nutritional counseling before 1 = Yes; 2 = No if yes: state source:	

Patient Record: CD4 Count.....
 Viral Load.....
 Clinical Staging.....
 HAART combination.....

Thank You for your Participation

APPENDIX iv: RUNYANKOLE VERSION OF THE INFORMED CONSENT

EKIHANDIIKO EKIRIKUHAMYA OKWESHARIRAMU KUBA OMWE AHA BARAKWORWEHO OKUCOONDOZA BWANYIMA Y'OKUSHOBORORERWA

ENTURIKIRIRO

Ninye Omushaho Ambrose Odwee, Omwegi w'ebyamagara n'emiturire y'abantu omunsi (ebya nyanga oburofa) aha itendekyero rikuru erya Kampala International University (KIU) (eitagi erya Ishaka Bushenyi) eririkumanywa nka Western Campus. Nincondooza aha miriire y'abantu bakuru abeine akakooko ka sirimu (munywengye) abarikutungira emibazi yaabo aha marwariro gamwe omuri disiturikiti ya Bushenyi.

OMUTWE GW'OKUCONDOOZA

Obwingi bw'abarikurya kubi hamwe n'ebirikureeta okurya kubi omu bantu bakuru abarikutuura akakooko ka sirimu (munywengye) abarikutungira emibazi omu ga mwe aha marwariro ga Bushenyi.

OMUCONDOOZA: Omushaho Ambrose Odwee.

OKUSHABA

Noshabwa kuza omu kucondooza oku, kandi torikugyemwa. Niiwe wenka orikweshariramu. Ku rikwiriza kuza omu kucondooza oku, nk'omwe aha barakworweho okucondooza, noija kubuuzibwa ebibuuzo ahari ebi:

- Eby'amaka gawe nk'omukazi n'abaana baawe, eby'entasya, obwegyese, n'ebindi nkebyo.
- Eby'endya yaawe
- Eby'amagaara gaawe goona okutwarira hamwe

Bwanyima nooza kupimwa tumanye oburemezi bwawe, obureingwa bwaawe, hamwe obuhango bwaawe omu manyaanya n'omunyugunyu. Okubuuzibwa n'okupimwa kwawe, ikijja kutwara edakiika nka ikumi zonka.

OMUGASHO GW'OKUCONDOOZA OKU

Iwe nk'omuntu, nobaasa obutagira kihango eki oratungye ky'oburiho kandi n'obwiire bwaawe obu oratemu tibw'okushashurwa. Ekirungi, okuba kwawe omukucondooza oku nikuza kutwaara obwiire bukye (nk'edakiika ikumi zonka) kandi ebirarugye omukucondooza oku nibaasa kuyamba omukureberera basirimu omubiro by'omumaisho.

Okucondooza oku nikwiija kuzoora obwingi bw'abarwaire abarikurya kubi omuri Bushenyi Disitirikiti kandi obwo beine akooko ka sirimu, kandi kugaruke gutangaaze ebirikubaretera okurya kubi. Eki nikiza kuyamba bakuru b'ebyamagara omuri Bushenyi kumanya ebyokukora omu kurwanisa okurya kubi omu bantu abagambwaho aha ruguru. Kandi ebirarugye omu kucondooza oku, nibyeija kuyamba abarikucondooza aba nyensya.

EBIZIBU EBIRI OMU KUONDOOZA OKU

Tihariho kizibu kyoona ekirabe aha mubiri gwaawe bwanyima y'okupimwa. Shana omucondooza yagambisibwa eby'endwara yaawe. Kwonka ninkuhamiza ngu eki tikirabeho.

OKUKUUMA EBIHAMA BY'OKUCONDOOZA

Ninkuhamiza ngu okucondooza oku nikuza kukorwa omu kihama, kandi tihariho ondiiho muntu oreije kumanya eby'okucondooza oku. Okubuuzibwa, nokupimwa nibyeija kukorerwa omu kishengye nari shi omwanya gwoona ogwehereire.

ESIMU Z'ABACONDOOZA.

Ku wakuba oine ekibuuzo kyoona oine orusa kubuuzabantu aba:

- Omucondooza aha namba y'esimu: 0776405614/0754797472
- Abarikukureberera omucondooza namba y'esimu: 0706737387

OKWESHARIRAMU KUZA OMU KUONDOOZA OKU.

Okuza omu kucondooza oku n'okweshariramu. Oine orusa kwikiriza neinga kwanga kuza omu kucondooza oku. Okanga kwaawe kuza omu kucondooza oku tihaine eki kirahindure aha bujanjabi bwaawe omu irwariro eri nangwa na distirikiti okutwarira hamwe.

OKWIKIRIZA KUZA OMU KUCONDOOZA

Namara kushoma/kushomerwa ekihandiiko eki kyoona kandi nayetegyereza kurung ebikwatiraine no’kucondooza oku kandi n’ekinshemereire kukora. Ebi naba ntakyengire kurungi naheebwa omugisha nabuuzza kandi nashobororewa kurungi nayetegyereza.

Twikirizana ngu ekihandiiko eki bamparezeho kope (copy) twaheza kuteekaho omikono

Nikiriza nyekundire kuza omu kucondooza oku -----

Nayanga kuza omu kucondooza oku -----

-----	-----	-----
Amaziina g’orakworweho okucondooza	Omukono/Ekinkumu	Ebiro by’okwezi
-----	-----	-----
Amaziina go’omujurizi owaba ariho	Omukono/Ekinkumu	Ebiro by’okwezi
-----	-----	-----
Amaziina g’omucondooza	Omukono	Ebiro by’okwezi

APPENDIX v: RUNYANKOLE VERSION OF THE QUESTIONNAIRE

Omutwe gw'okucondooza: Obwingi bw'abarikurya kubi hamwe n'ebirikureeta okurya kubi omu bantu bakuru abeine akakooko ka sirimu abarikutungira ebimazi omu gamwe aha marwariro ga Bushenyi.

Webare kwikiriza kuza omu kucondooza oku. Noshabwa kugaruhamu ebibuuzo ebihandiikirwe ahaifo. Hagira eki otayeteyereza kurungri, obuuze oshobororerwe, bwanyima ebibuuzo bigumuzemu. Ahandi noza nokupimwa , noshabwa kukwatanisa naitwe omuri ebi byoona.

		EBIBUZO/EBIPIMO	EBIRIKURUGAMU
	1	Emyaka	
	2	Obureingwa (cm)	
	3	Oburemeezi (kg)	
	4	Obuhango bw'ekicweka kyo'omukono ekyahaiguru	
	5	Obuhango bw'omumanyaanya	
	6	Obuhango bw'omunyugunyu	
	7	Obuhangwa bwaawe	(1) omushaija (2)omukazi
	9	Washweire ninga oshwiirwe? 1 nashweire/nshweirwe 2 tinkashweire/tinkashweirwe	
	10	Oine omurimo? 1.Eego 2.Ngaaha	

	12	Buri kwezi notatsya/notunga Shilingi zingahi?	
	13	Noshohoza shilingi zingahi buri kwezi?	
	14	Entaatsya yaawe nogireeba ota? <ul style="list-style-type: none"> • Eri ahaiguru • Eri rwagati • Eri ahansi 	
	15	Noreberera abantu bangahi?	
	16	Noreesa? <ul style="list-style-type: none"> 1.Eego 2. Ngaaha 	
	17	Nonywa amaarwa <ul style="list-style-type: none"> • Eego • Ngaaha. 	
	18	Omuka yaawe harimu abantu bangahi ?	
	19	Omuka yaawe n'abantu bangahi abeine akakooko ka sirimu (naiwe obarirwemu)	
	20	Nibangahi abamanyire ngu beine akakooko ka sirimu omu myezi mukaga ehingwire?	
	21	Nooha orikushashurira emibazi? <ul style="list-style-type: none"> • Neya busha • Ninyeshashurira 	

		<ul style="list-style-type: none"> • Haine orikunshashurira----- 	
	22	<p>Oine okugumirwa omukozesa emikono yaawe neinga amaguru?</p> <ul style="list-style-type: none"> • Eego • Ngaaha 	
	23	<p>Nookora ebisasayizi emurindi engahi</p> <p>Omu kweezi?.....</p> <p>1.Emirundi mingi</p> <p>2. Tinkukira kubikora</p>	
	24	<p>Nokora ebintu ebi</p> <ul style="list-style-type: none"> • Okurya emibazi ya katabura bwonko? 	
	25	<p>Oratungireho okuhumurizibwa omu by'amagara n'oburware (Haine omuhumuriza oragaaniireho naiwe aha by'agara gaawe)?</p>	
	26	<p>Nokira kurya byokurya ki?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	
	27	<p>Ka ndi nokira kukozeza mboga ki?</p> <p>.....</p>	

		
29	Eby'okurya byaawe nobyeiha nkahi?	<ul style="list-style-type: none"> • Omu misiri yangye • Omukatare/ omumaduuka • Omu bataahi n'abanyabuzaare • N'ebya busha (gavumenti) 	
30	Haine emibazi eyi abashaaho bakuhaire eyi orikwongyera aha yaawe okukuhweera omuringo gw'ebyokurya (erikukozesibwa nk'ebyokurya) ?	<ul style="list-style-type: none"> • Eego • Ngaaha 	
31	Oratungireho okwegyesibwa omu by'endya yaawe?	<p>1.Eego</p> <p>2. Ngaaha</p>	
32	Nooha owakwegyeise omu byendya?		

Weebare kwejumba

APPENDIX vi: WORK PLAN

Activity	Sept. 2017	Aug. 2017- Nov.2017	Sep. 2017- April 2018	May 2018	June 2018	July 2018	August 2018
Concept presentation							
Proposal presentation SRD approval							
EC review approval							
Data collection analysis							
Reporting and presentation							
Dissemination of results publication							

APPENDIX vii: KIU-REC APPROVAL



KAMPALA
INTERNATIONAL
UNIVERSITY

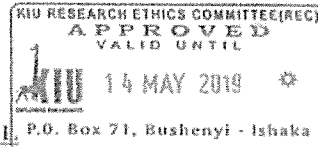
Western Campus
P.O. BOX 71 Ishaka, Uganda
Tel: +256 758 096 775
Email: kiurec2017@kiu.ac.ug
Website: www.kiu.ac.ug

RESEARCH ETHICS COMMITTEE (REC)

14 MAY 2018

Our ref: SF2017/04

ODWEE AMBROSE
Postgraduate Student
KIU WC



APPROVAL OF YOUR PROPOSAL

Submitted Proposal: "PREVALENCE OF MALNUTRITION AND ITS ASSOCIATED RISK FACTORS AMONG HIV-POSITIVE ADULTS ATTENDING ANTI-RETROVIRAL THERAPY CLINICS AT SELECTED HOSPITALS IN BUSHENYI DISTRICT, UGANDA" Nr UG-REC- 023/2017/04

Reference is made to the above Protocol, which you submitted to the Research Ethics Committee (REC) for ethical review and approval. It has been noted that all the concerns raised earlier by the Committee, in its meeting of 21st March 2018, have been properly responded to.

This is, therefore, to inform you that your study has been approved; following an Expedited Review. You may now proceed with preparations to implement the research. Please note that this approval is for a period of one year.

As Principal Investigator, you are expected to fulfill the following conditions; which are part of the approval process regarding your study:

1. You are required to register the Protocol with the Uganda National Council for Science and Technology, according to the guidelines of the Council, for final clearance to undertake the research.
2. Any changes/amendments and/or additions to the Protocol, Consent Form and/or Data Collection Tools must be submitted to the REC for review and approval prior to activation of the changes.
3. Reports of unanticipated problems involving risks to participants should be submitted to REC.
4. Only the approved Consent Forms should be used in enrolling participants. For that purpose, therefore, you should retain all signed Consent Forms on file;
5. In order to continue with the study beyond the approved period, a Continuing Review Application must be submitted to the REC ten weeks prior to the indicated expiration date of the approval.

"Exploring the Heights"



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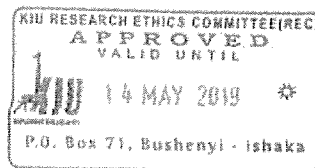
Western Campus
P O BOX 71 Ishaka, Uganda
Tel: +256 758 096 775
Email: kiurec2017@kiu.ac.ug
Website: www.kiu.ac.ug

RESEARCH ETHICS COMMITTEE (REC)

The documents approved in this Application Process are listed below:

Document	Language	Version
Protocol	English	Version 5
Protocol Application Form	English	Version 1
Data Collection Tools (Questionnaire)	English/Runyankole	Version 5
Informed Consent Document	English/Runyankole	Version 5


Dr. Patrick Mbyemeire
KIU REC DEPUTY CHAIRPERSON



APPENDIX viii: HOSPITALS ADMINISTRATIVE CLEARANCE



ISHAKA ADVENTIST HOSPITAL

Established in 1930

Bushenyi - Ishaka Township
P.O. Box 111, Bushenyi
UGANDA, EAST AFRICA

Tel: +256 032-790146 E-mail: ishahosp@igad.ac.ug

May 15, 2018

THE EXECUTIVE SECRETARY,
UGANDA COUNCIL FOR SCIENCE AND TECHNOLOGY

Dear Sir/ Madam

RE: ADMINISTRATIVE CLEARANCE LETTER FOR ODWEE AMBROSE

Reference is made to Research Ethical committee (~~KU~~-REC) ref: SF2017/04 approval for the study prevalence of malnutrition and its associated risk factors among HIV positive adults attending anti-retroviral therapy clinics at selected Hospitals in Bushenyi District.

This is to re affirm that he has been granted permission to conduct this study at Ishaka Adventist Hospital.

Thank you.


Dr. Musinguzi Brian
ASST. MEDICAL DIRECTOR



KAMPALA-INTERNATIONAL
UNIVERSITY- TH

P.O. BOX 71 ISHLAKA UGANDA
TEL: 256200923534
www.kiu.ac.ug

OFFICE OF THE EXECUTIVE DIRECTOR

21st May 2018

THE EXECUTIVE SECRETARY,
UGANDA NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

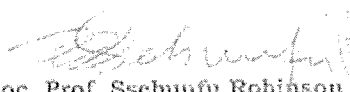
Dear sir/ madam

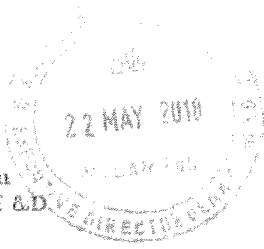
REF: ADMINISTRATIVE CLEARENCE LETTER FOR ODWEE AMBROSE

Reference is made to Research Ethic committee (KIU-REC) ref: SF2017/04 approval for the study "prevalence of malnutrition and its associated risks factors among HIV-positive adults attending anti-retroviral therapy clinics at selected Hospitals in Bushenyi District".

This is to re-affirm that he has been granted permission to conduct this study at Kampala International University-Teaching Hospital.

Thank you.


Assoc. Prof. Ssebunfu Robinson
Executive Director/ Dean FCM & D



"Exploring the Heights"

* Assoc. Prof. Ssebunfu Robinson: Executive Director /Dean 0772567248 email: rsg@kiu.ac.ug
Dr. Akib Sural: Deputy Executive Director/Associate Dean 0752674679 email: asural@kiu.ac.ug

APPENDIX ix: UNCST REGISTRATION



Uganda National Council for Science and Technology

P.O.Box 6884 Kampala Tel: +256-414-250499 Fax:

RECEIPT

No. 11605

Date: 08/14/18

Received with thanks from Odwee Ambrose (HS 2434)

The sum of Shillings/US Dollars **** ONE HUNDRED NINETY THOUSAND UGX AND 0 CENTS

Being payment for S & T Research & Admin Clearance Fees

Cash/Cheque No. :

UGX 190,000.00

UGANDA NATIONAL COUNCIL
FOR SCIENCE & TECHNOLOGY
P. O. BOX 6884, KAMPALA

Signature & Official Stamp

