ASSESSMENT OF NUTRITIONAL STATUS AND ITS ASSOCIATED FACTORS AMONG ADULT HIV PATIENTS ATTENDING CARE AND TREATMENT CENTERS (CTC) IN SONGWE REGION-TANZANIA

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ASSESSMENT OF NUTRITIONAL STATUS AND ITS ASSOCIATED FACTORS AMONG ADULT HIV PATIENTS ATTENDING CARE AND TREATMENT CENTERS (CTC) IN SONGWE REGION-TANZANIA.

By.

Magonyozi T. Thomas

Dissertation Submitted in the school of Public Health and Social Sciences in (Partial)fulfillment of the requirements for the award of the Degree of Master of Public Health. Muhimbili University of Health and Allied Sciences.

October, 2024.

CERTIFICATION

The undersigned certify that have read and hereby recommend for acceptance of dissertation entitled: **"Assessment of Nutritional Status And Its Associated Factors Among Adult HIV Patients attending Care and Treatment Centers (CTC) in Songwe Region-Tanzania"** in (partial) fulfillment of the requirements for the degree of Master of Public Health (MPH) of the Muhimbili University of Health and Allied Sciences (MUHAS).

.....

Dr. GERMANA LEYNA

(Supervisor)

.....

Date

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I,**Magonyozi Thobias Thomas**, hereby declare that this **dissertation** is entirely my own creation and has not been previously submitted to any other university for a similar or different degree, nor will it be submitted to any other university for any other purpose.

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DEDICATION

This dissertation is dedicated to my dear family (my wife and my child) for their lovely support and encouragement. Also, to my beloved parents for their lovely parental care, commitment and encouragement since my childhood up to now.

ABSTRACT

Background: Malnutrition is a major problem among people living with HIV/AIDS despite better nutrition intake these last few years. Poor absorption of nutrients and frequent opportunistic infections are to be considered in this regard. Nutritional intervention among this population is no longer a recommendation but a need.

Objective: This study aimed to assess the nutritional status and determinants of malnutrition among PLWHIV attending Care and Treatment Centers in Songwe Region.

Methods: This was an analytic, cross-sectional study conducted between May and June 2022 in four health facilities. Stratified sampling was used to select participants. Structured questionnaires and anthropometric measurements were used to collect data on nutritional status, socio-demographic information, clinical characteristics, and dietary diversity. Logistic regression analysis was applied to identify determinants of malnutrition using SPSS software.

Results: The study involved 390 participants, predominantly female (67.4%), with a mean age of 46.38 years. Most participants were married (54.4%), employed (55.9%), and resided in rural areas (68.6%). Clinically, 20.3% experienced HIV-related symptoms, with most in Stage II (44.9%) and a majority having a CD4 count >500 (62.3%). ART adherence was high at 90.8%. Nutritional assessments indicated that 76.7% were malnourished, with significant malnutrition rates associated with advanced clinical stages of HIV, lack of dietary counseling and support, comorbidities, and low dietary diversity. Logistic regression analysis revealed that advanced HIV stages increased malnutrition odds: Stage II (AOR 6.73), Stage III (AOR 6.27), and Stage IV (AOR 1.79), while lack of dietary counseling (AOR 5.18), nutritional support (AOR 3.84), and comorbidities (AOR 5.89) were also significant risk factors

Conclusion: The study concludes that malnutrition is highly prevalent among individuals living with HIV, particularly those in advanced stages and without dietary counseling. This highlights the urgent need for nutritional interventions in HIV care to improve health outcomes and treatment adherence. Integrating regular dietary assessments into standard management practices is essential for supporting the well-being of this vulnerable population.

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LIST OF ABREVIATIONS

- **AIDS-** Acquired Immunodeficiency Syndrome
- **ART**- Antiretroviral Therapy
- **BMI**- Body Mass Index
- **CD4-** Cluster of Differentiation 4
- **CTC-** Care and Treatment Centre
- **CHMT-**Council Health Management Team
- **EDTA-** Ethylene diaminetetraacetic Acid
- **GDP-** Gross Domestic Product
- **HIV-** Human Immunodeficiency Virus
- **MLT-**Medical Laboratory Technology
- **MUHAS-** Muhimbili University of Health and Allied Sciences
- **NBS-** National Bureau of Statistics
- **PLWHIV-** People Living with HIV
- **SPSS-**Statistical Package for Social Science
- **US$-** United State Dollar
- **RHMT-**Regional Healthl Management Team
- **WHO-** World Health Organization

DEFINITION OF TERMS.

Body Mass Index (BMI): Is a calculation based on the person's weight in kilograms divided by height in meters squared (kg/m^2) used to determine one's weight status. For adults, a normal BMI ranges from 18.5 to 24.9 kg/m^2.

Immunity: The body's ability to recognize infectious organisms or other foreign substances, resist the infective process, and preserve healthy body tissue.

Malabsorption Syndrome: Failure of the small intestine to absorb enough calories and fluids from food owing to various diseases or injury to intestine.

Malnutrition: The state of health that results from a person's dietary intake not being properly matched to their requirements-so that an individual has either too little (under nutrition) or too much (over nutrition) of nutrients.

PLWHIV: It refers to individuals who have been diagnosed with the Human Immunodeficiency Virus (HIV), which affects the immune system. HIV can lead to Acquired Immunodeficiency Syndrome (AIDS) if not treated effectively, but many people living with HIV can manage the virus with antiretroviral therapy (ART) to maintain a healthy life.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Globally, it is estimated that 37.7 million people were living with HIV in 2020, with 1.5 million new infections recorded that year. East and Southern Africa are the most affected regions, hosting 20.6 million people living with HIV (PLWHIV) and reporting 670,000 new infections in 2020(1). Despite these high numbers, there has been a significant reduction in new HIV infections by 52% since the peak in 1997. Additionally, AIDS-related deaths have decreased by 64% since their peak in 2004 and by 47% since 2010 (2).

HIV infection severely impacts an individual's ability to absorb, store, and utilize nutrients, leading to nutrient deficiencies, compromised immunity, and increased susceptibility to infectious diseases. Poor food intake and nutrient malabsorption further exacerbate HIV progression, resulting in weight loss and severe malnutrition, which are significant predictors of AIDS-related morbidity and mortality (3)

Sub-Saharan Africa has the highest prevalence of malnutrition globally, affecting 23.2% of its population, alongside the highest burden of HIV infection. According to the 2016 Global Nutrition Report, malnutrition incurs economic losses equivalent to 11% of Gross Domestic Product (GDP) annually in Africa and Asia. However, preventing malnutrition offers substantial economic benefits, delivering US$16 in returns for every US$1 invested (3,4).

The use of antiretroviral therapy (ART) without accompanying nutritional support, or vice versa, often leads to poor treatment responses and outcomes (5). In Tanzania, children under five from the poorest families are particularly affected by malnutrition. Ten regions account for 58% of all stunted children, and five regions account for half of the children suffering from severe acute malnutrition.

The decline in HIV prevalence in Tanzania can be partly attributed to increased ART coverage. Between 2017 and 2018, the number of people on ART increased by 59%. By 2015, about 47.6% of PLWHIV were on ART. However, despite these efforts, the HIV case fatality rate remains high, with 47,860 deaths in 2015 alone. These poor outcomes are linked to poor

viral suppression, continued immune suppression, poor nutritional status, opportunistic infections, and non-communicable diseases associated with chronic HIV/AIDS (6).

Improving nutritional status is crucial for addressing other risk factors among PLWHIV. Evidence suggests that food insecurity leads to poor outcomes, including compromised nutritional status, adherence to medication, and psychological well-being. In Tanzania, poor feeding practices are widespread and have been associated with undernutrition (6). Despite good response and adherence to ART among HIV patients in the Songwe region, many are unable to afford a balanced diet, leading to poor health outcomes.

Addressing these nutritional challenges can significantly improve the quality of life and health outcomes for PLWHIV, making it a vital component of comprehensive HIV care and treatment.

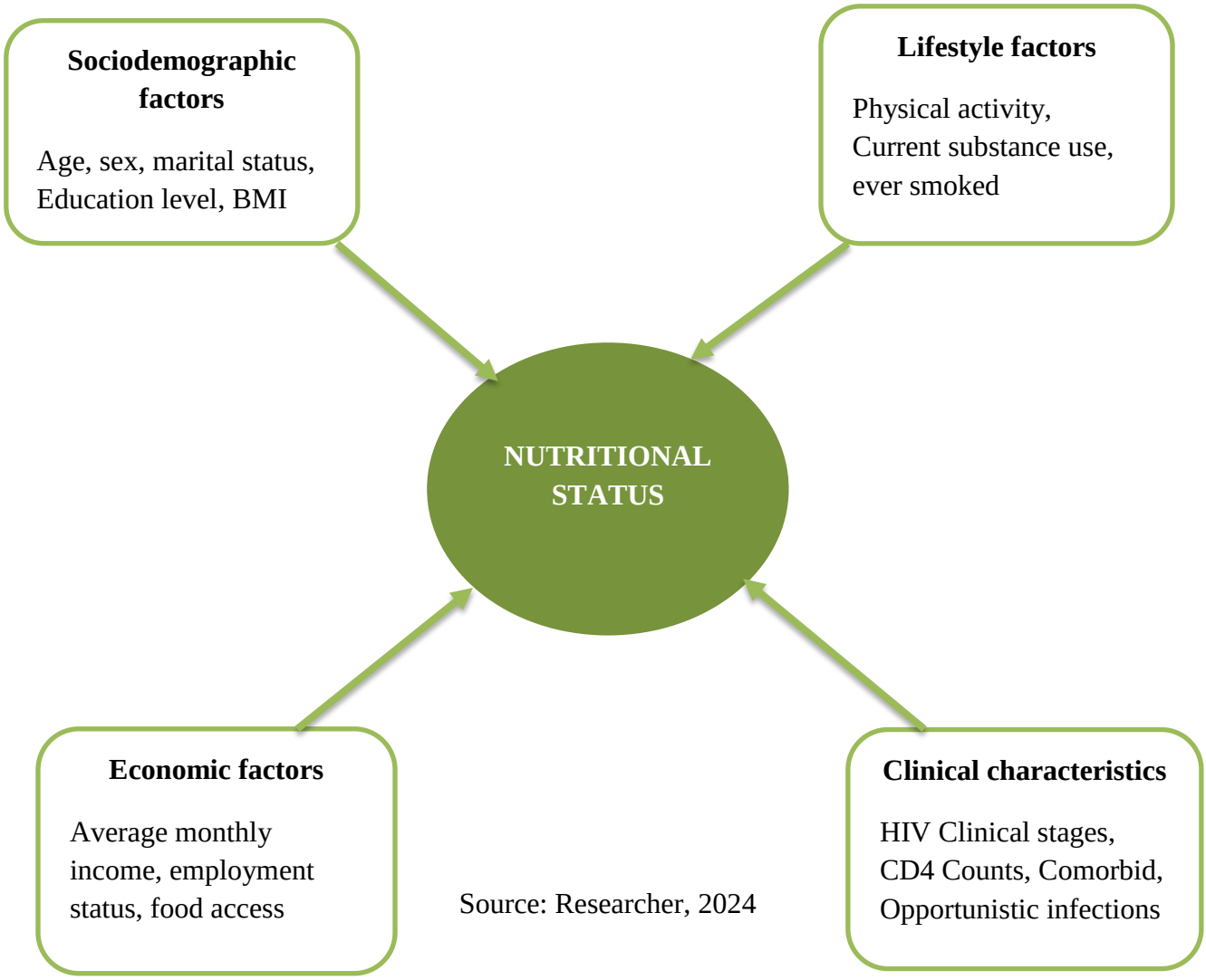
1.2 Problem statement and justification.

Despite a good response and adherence to ART among HIV patients in Songwe Region, poor feeding practices of most of the patients has become a great challenge toward getting strong immunity, which brings another challenge on the expected improvement. Literature shows that poor feeding practices in Tanzania and other developing countries have negative impacts on nutritional status of people living with HIV (7). Moreover, most of the other available studies have stipulated that economic status, education level, age, sex, place of residence, marital status and other socio-demographic factors have direct relationship with malnutrition.

In addition, many other studies tried to assess nutritional status of adult people living with HIV by using anthropometric measurements, clinical evaluation and other using dietary history. However, there is no any study done in Songwe Region to assess nutritional status of adult people living with HIV attending Care and Treatment Centers by using biochemical parameters. Therefore, this study will provide nutritional status of adult people living with HIV attending Care and Treatment Centers by using anthropometric measurements and confirmed with biochemical parameters and other associated factors that causes malnutrition. Findings from this study will recommend room for the provision of nutritional and material assistance.

1.3 Conceptual Framework for Malnutrition among PLWHIV

The conceptual framework in Figure 1 illustrates how socio-demographic factors, economic factors, lifestyle factors, and patient clinical characteristics influence the nutritional status of HIV patients. Socio-demographic factors, such as age, gender, and education level, can impact dietary habits, healthcare access, and support systems, ultimately affecting nutrition. Economic factors, including income level and employment status, determine food security and the ability to afford a balanced diet, which plays a crucial role in maintaining adequate nutrition. Lifestyle factors, such as physical activity level, alcohol consumption, and smoking, directly affect energy balance, metabolism, and nutrient absorption, potentially leading to malnutrition. Lastly, clinical characteristics like disease stage, treatment regimen, and presence of opportunistic infections can influence metabolic demands and nutrient requirements, affecting the body's ability to maintain a healthy nutritional status. This framework emphasizes understanding how these domains interact to influence the nutritional well-being of HIV patients, aiming to guide interventions to improve their health outcomes in the Songwe Region.



Source: Researcher, 2024

Figure 1: Conceptual Framework for Malnutrition among PLWHIV

1.4 Rationale

The findings from this study will provide significant benefits to various stakeholders in the Songwe Region and beyond. Primarily, people living with HIV (PLWHIV) in the region will benefit, as the study will offer insights into the prevalence and contributing factors of malnutrition within this vulnerable group. By identifying specific socio-demographic and clinical factors impacting their nutritional status, the study will enable healthcare providers to deliver more targeted nutritional counseling and support, which can improve patients' overall health and quality of life (8). Furthermore, the findings will assist policymakers by supplying evidence to inform region-specific nutrition policies and interventions, potentially reducing healthcare costs associated with HIV-related malnutrition and improving long-term health

outcomes. Nationally, addressing these findings could contribute to Tanzania's economic goals by supporting workforce productivity and reducing losses projected from poor nutritional health, as highlighted in prior estimates. In this way, the study aligns with broader public health priorities by fostering an improved understanding of HIV-related malnutrition, which can lead to sustainable and impactful change at the local and national levels.

1.5 Research Questions

1.5.1 Broad Research Question

What is the prevalence of malnutrition and its associated factors among adult people living with HIV attending Care and Treatment Centers in Songwe Region?

1.5.2Specific Research Questions

1. What is the prevalence of nutritional status among people living with HIV attending Care and Treatment Centers in Songwe Region?
2. What are the socio-demographic factors associated with nutritional status in PLWHIV in Songwe Region.?
3. What are the clinical factors associated with nutritional status PLWHIV in Songwe Region.?

1.6 Objectives

1.6.1 Broad objective

To assess the nutritional status and its associated factors among HIV patients attending Care and Treatment Centers (CTC) in Songwe Region.

1.6.2 Specific objectives

1. To determine prevalence of nutritional status among people living with HIV attending Care and Treatment Centers in Songwe Region
2. To determine socio-demographic factors associated with nutritional status among PLWHIV in Songwe Region.
3. To determine clinical factors associated with nutritional status among people living with HIV in Songwe Region.

CHAPTER TWO

2. 0 LITERATURE REVIEW.

2.1 Prevalence of malnutrition in People living with HIV

Malnutrition increases the susceptibility to infections by causing immune dysfunction in various ways. The depressed immune status can amplify HIV replication and accelerate progression of HIV disease to AIDS making a patient susceptible to different opportunistic and co-infections like tuberculosis, meningitis, pneumonia though tuberculosis is the common one (9).

According to WHO, adult malnutrition is defined as body mass index of less than 18.5 (BMI < 18.5kg/m^2). Malnutrition in people living with HIV is highly prevalent in many parts of the world especially in sub-Saharan Africa (10,11). An individual database meta-analysis of demographic health survey from sub Saharan countries has shown that prevalence of HIV related malnutrition ranges from 0.6%in Lesotho to 16.9% in Burkina Faso. It has also shown that overall prevalence in general population was 10.3% in Sub-Saharan Africa and 13.3% in Ethiopia (12).

The overall prevalence of malnutrition in general population was 19.2% (24/125), while severe malnutrition, BMI <16 was 8.8% and underweight, BMI 16-18-5 were 10.4% while the majority of participants, 80.8% had normal nutritional status (13). These results were closely similar to the results obtained by others research done in Tanzania, 18.4% (7), also the results did not differ much from those obtained in low and middle income countries like Kenya (23.6%), Nepal (19.9%), Ethiopia (23.2%) (9,12,14). Furthermore, demographic characteristics of participants in most studies showed that most of adult participants with age between 20-40 years showed malnutrition indicators both in Tanzania and Ethiopia (7).

Generally, different studies in different countries have shown that under nutrition is the major type of malnutrition facing people living with HIV compared to over nutrition (3,9,14).

2.2 Socio-demographic and economic factors in association with malnutrition in people living with HIV.

Socio-demographic factors like age, sex, marital status, religious, educational status, employment status, are other factors that contribute to malnutrition among people living with HIV in many countries. Based on studies done by Daka DW (2020), stipulated that, female patients had more malnutrition than male patients, 58% vs 42% respectively. Patients with age between 16-30 were more undernourished than any other age group (42%), married group were much undernourished than single, separated, divorced, widowed (44%, 18%, 15%, 8% and 15%), respectively; unemployed patients were more undernourished than their employed counterpart (62% vs 38%) and people with primary education were more malnourished than any other education level (15).Also several researches done and shows that, female had more malnutrition than male patients (42.9%, 13.5%) respectively, patients with age between 20-29years were more undernourished than any other age group (13) . This was similar to a research done by (2) conclude that, female were more undernourished than men (72.2%, 27.8%) respectively, also people with age less than 30 years old had more malnutrition than any other age group, unemployed people were much undernourished than employed counterpart (61.1%, 38.9%) respectively.

Most of studies done by other researches shows statistical significance or association between malnutrition and the ability of a person to have an access to enough and nutritious food, affording less than two meals per day, irregular income, and unemployment. The independent association between malnutrition and getting two or less meals per day that increased the likelihood of having nutrients insufficiency among people living with HIV (3). In addition, studies revealed that food insecurity was found to have significant association with under nutrition, in such a way that, patients without the ability to access and utilize enough and nutritious food had more rate of malnutrition than patients with food security (27% vs 9.7%). Further patients who cannot afford two meals or less per day had more likelihood of getting malnutrition than patients who can afford three and more meals per day (32.4% vs 13.2%)(13). These studies were similar to the studies done in Ethiopia and Nepal which

founded that, adult people living with HIV on ART or household with food insecurity had the highest chance of being undernourished (16).

2.3 Causes of malnutrition in People living with HIV.

People living with HIV are among the most vulnerable group experiencing malnutrition due to several interrelated factors. In facts mainly three factors that accelerate to malnutrition in people living with HIV. These are, immediate cause, underlying causes and basic cause. Immediate cause are those factors that directly act on individual, underlying cause are those factors that acts on households and community, while basic cause acts on the entire society but have greater or lesser impacts to a specific group within a society.

2.3.1 Immediate causes of malnutrition in PLWHIV and their mechanism of exposure.

- Disease/ infections

A person with HIV/AIDS is susceptible to different opportunistic and co-infections like tuberculosis, malaria, meningitis etc., due to decreased or compromised immune system. (WHO, 2022). Susceptibility to these multi-infections increases the chances of lack of appetite and decreases the rate of food absorption from the gut making the amount of nutrients absorbed to be lower than that required by the body hence a patient is under-nourished.

- Inadequate diet.

In practice, inadequate diet may arise as the result of decreased manpower to HIV patients to obtain appropriate diet or decreased nutrients absorption from the gut resulting from compromised immune system (4).Both two immediate causes of malnutrition makes a so-called c, where malnutrition increases the risk of infections while infections can cause malnutrition leading to vicious cycle

2.3.2 Underlying causes of malnutrition in people living with HIV

The underlying cause of malnutrition can be grouped into three categories: inadequate household food security, inadequate care and health services, and unhealthy household environments, like lack of access to safe water and effective sanitation. These three categories are interrelated where action on one factor can significantly associate with other factors.

- Inadequate household food security

According to Lizzie, (2018), Food security exists when all people at all-time has physical and economic access to sufficient, safe and nutritious food to meet their dietary needs. Food security comprises of availability of sufficient healthy food materials, access to food as well as proper utilization of the available food.

Most of people living with HIV have inadequacy of household food security because of decreased body's capacity to produce and obtain sufficient and quality food materials resulting from poor health status.

- Inadequate care

Caring practices is the way the vulnerable group like HIV patients, elders, children or sick people are fed, looked after, taught and guided. Caring responsibility is the part of household members and the society in general. Caring practices can be in terms of psychosocial behavior, ensuring balanced diet to a patient, protecting their health etc. According to the research done by Ann Burgess (2018), most of people living with HIV lack household and social care due to lack of enough education, cultural believes, and negligence to household members and the society in general, that decreases patient's health management leading to malnutrition (17).

- Unhealthy household environments

Unhealthy household environments encompass a range of factors, including inadequate access to safe water, lack of proper sanitation facilities, and poor hygiene practices. These conditions can significantly increase the risk of infectious diseases, particularly for people living with HIV (PLHIV), who may already have compromised immune systems (7). Many PLHIV experience a reduction in their working capacity, which, in turn, affects their socioeconomic well-being and makes it challenging to maintain a healthy living environment(18). Consequently, they are more vulnerable to frequent infections and illnesses that further impair their ability to earn an income, access nutritious food, and maintain adequate hygiene, ultimately heightening their risk of malnutrition. The "basic factors" refers to these fundamental issues that directly or indirectly impact health outcomes, such as lack of financial

resources, limited access to quality healthcare, and poor social support systems, all of which contribute to creating an unhealthy household environment and worsening malnutrition among PLHIV(9)

CHAPTER THREE

3.0 METHODOLOGY.

3.1 Study Area.

The study was conducted at selected care and treatment centers (CTC) for HIV patients in the Songwe Region, located at coordinates 9.10S, 32.90E, with a total area (land and water) of 27,656 km². The region bordered the countries of Zambia and Malawi to the south, and the Tanzanian regions of Rukwa and Katavi to the west, Tabora to the north, and Mbeya to the east. Songwe has four districts: Ileje district, Mbozi district, Momba district, and Songwe district. The local government areas that now comprise Songwe Region reported a combined population of 1,344,687 in the 2022 census, with 46% of the population being less than 15 years old (19).

The major economic activity conducted in the Songwe Region was agriculture, primarily crop cultivation, with both commercial crops (especially coffee and sunflower) and food crops (banana, maize, groundnuts, millet, cassava, and various types of fruits) being cultivated. Although domestic animal keeping was practiced in some households, it was on a small scale. Despite Songwe Region being among the top five regions in Tanzania for food production, it was also one of the regions where people suffered from malnutrition (20).

Songwe Region and its districts had various health services, including hospitals, dispensaries, and health centers, with both government and private ownership and suitable coverage. Songwe Region had approximately 42,250 people living with HIV, who were managed and cared for in different health centers within the region, with Songwe Regional Referral Hospital serving as the main center for all management (19).

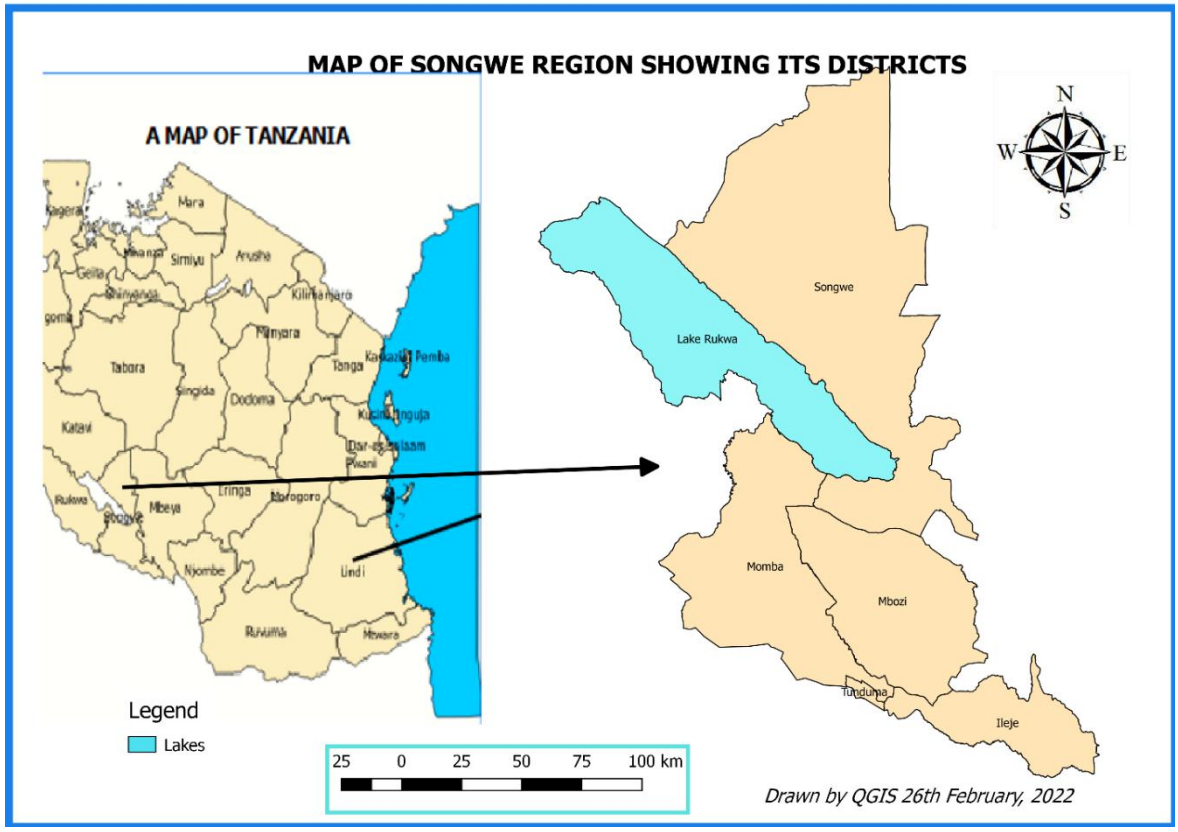


Figure 2: Geographical location of songwe Region and its District

3.2 Study Design

A facility-based cross-sectional study design was carried out involving patients attending the selected Care and Treatment Centers in Songwe Region from 8th May to 25th June 2022. This design was selected to allow collecting data from different individuals at a single point in time to allow calculation of the prevalence of nutritional status.

3.3 Target population

The target population was adult people living with HIV attending Care and Treatment Centers in Songwe Region who were on ART.

3.4 Study population

The study population was the selected adult people living with HIV attending Care and Treatment Centers in Songwe Region who were on ART who accepted, and signed the consent form.

3.5 Criteria Eligibility

3.5.1. Inclusion criteria

1. Adult patients (18 years and older) who were living with HIV and attending Care and Treatment Centers (CTC) in Songwe Region.
2. Patients who provided informed consent to participate in the study

3.5.2. Exclusion criteria

1. Patients who were unable to speak Swahili fluently.
2. Patients with conditions or circumstances that could interfere with accurate nutritional assessment, such as acute illness or hospitalization during the study period

3.6 Data collection procedures and tools.

The data collection process began with preparation, where ethical approval was obtained from the relevant authorities, ensuring adherence to all guidelines. Two research assistants received comprehensive training covering the ethical considerations and the effective use of the data collection tools. During participant recruitment, eligible patients attending Care and Treatment Centers (CTC) were identified through a screening process aligned with predefined inclusion and exclusion criteria. Informed consent was then obtained from participants who met the eligibility requirements, guaranteeing voluntary and well-informed participation. The actual data collection involved conducting structured interviews using semi-structured questionnaires, which gathered essential socio-demographic, clinical, and behavioral information from participants. Anthropometric measurements, including weight and height, were recorded, along with clinical parameters like CD4 count. Finally, dietary diversity and patterns were assessed through a food frequency questionnaire, ensuring a comprehensive understanding of the participants' nutritional profiles and potential factors influencing their health.

3.6.2 Data collection tools.

The data was collected using a semi-structured interviewer-administered questionnaire.

Semi-Structured Questionnaire was used to gather information's of the following categories;

i. Socio-demographic characteristics (age, sex, marital status, education level, occupational status, residence, monthly income).
ii. Clinical characteristics (HIV diagnosis duration, HIV symptoms, clinical stage, recent CD4 count, , ART status, ART duration, ART adherence, opportunistic infections, comorbid conditions, substance use, smoking, alcohol consumption).
iii. Behavior characteristics (Eating difficult, nutritional support and diet counselling, physical activity)
iv. Dietary diversity was assessed using a frequency food questionnaire, where participants reported their intake of various food groups, including roots and tubers, starchy staples, dark green leafy vegetables, vitamin A-rich fruits and vegetables, other fruits and vegetables, organ meats, meat and fish, eggs, legumes, nuts and seeds, and milk and milk products. The questionnaire prompted participants to indicate the frequency of consumption of these items over a specified period, such as daily, weekly, or monthly. A cut-off point was established based on the total number of different food groups consumed, with a higher score indicating greater dietary diversity. This method allowed for a comprehensive assessment of the variety of foods consumed, leading to the calculation of an overall dietary diversity score that reflected the breadth of food groups consumed by each participant.
v. Anthropometric measurements Height and weight of the participants.

3.7 Study Variables

The study aimed to assess the nutritional status and its associated factors among people living with HIV attending Care and Treatment Centers (CTC) in the Songwe Region.

3.7.1 Dependent Variable

In the present study, the nutritional status of the respondents was the dependent variable. It was measured by means of Body Mass Index.

BMI was computed by the following formula:

$$BMI = \text{Weight (kg)} / \text{Height (m)}^2$$

Weight was measured on a calibrated weighing scale to 0.1 kg accuracy.

Height was measured on participants who stood against a marked wall.

BMI categories were classified as below, based on the WHO criteria:

< 18.5: Underweight

18.5 to 24.9: Normal weight

25 to 29.9: Overweight

≥30: Obesity

This classification gave a standardized way of grading the nutritional status of respondents.

3.7.2 Independent Variables

The independent variables were the following attributes:

Socio-demographic Factors

i. Age (in years)
ii. Sex: Male or Female
iii. Marital Status: never married, married, widowed, divorced
iv. Level of Education: no formal education, primary, secondary, College/University
v. Employment Status: Self -employed, Formal employed, not employed
vi. Residence Area: rural, urban
vii. Mean Monthly Income in Tanzanian Shillings, According to Income Categories, which is TZS 100,000

Clinical Characteristics:

i. HIV diagnosis duration,
ii. HIV clinical stage-who staging
iii. Month/years on ART
iv. Opportunistic infection (Yes/No)
v. HIV symptoms,
vi. recent CD4 count,
vii. ART adherence

Behavior characteristics

i. Eating difficult
ii. Nutritional support
iii. Dietary counselling
iv. Physical activity

Determination of the dietary diversity: This objective was achieved by assessing patients' dietary intake over the previous days using a food frequency questionnaire (FFQ), developed based on recommendations from FAO and FHI 360 (2016), Kennedy and Dop (2011), and Lukmanji *et al.* (2008). The questionnaire also gathered information about previous dietary habits, appetite, eating problems or disorders, and food practice behaviors.

The food frequency questionnaire was used for the dietary assessment. The food that was commonly consumed was then decided to represent the findings of the assessment of nutrition status. The results were then assessed using dietary variety score methodologies. Food groups that were specifically targeted were starchy staples, nuts, and seeds; these food groups were correlated with the patients' body mass index. Second, foods such as dark green leafy vegetables, various fruits and vegetables high in vitamin A, organ meat, meat and fish, eggs, milk, and dairy products were included to demonstrate that an individual has enough nutrients for healthy immune system operation. In addition, an individual's blood albumin level was determined by their consumption of organ meat, fish, eggs, milk, and milk products.

Anthropometric measurement

Height and weight were measured using calibrated digital scales, following the guidelines set forth by the World Health Organization (1996). Each measurement was taken as a single reading to ensure accuracy, with height recorded to the nearest 0.1 cm and weight to the nearest 0.1 kg. These measurements were then used to calculate the body mass index (BMI) of the study participants, providing a standardized assessment of their nutritional status.

3.8 Sampling and sample size

The sampling of participants for the study was conducted across four health facilities in the Songwe Region, strategically selected based on the number of HIV-positive clients receiving Comprehensive Care and Treatment (CTC) services. Facilities with the highest CTC client populations in each district were targeted to ensure representation of the broader HIV-positive community.

Health Facility Selection: The facilities with the largest CTC client bases were identified.

Random Selection: A random selection was conducted among these top-performing facilities to eliminate bias, ensuring the chosen facilities represented the diverse characteristics of the CTC client population.

Participant Distribution: Songwe Regional Referral Hospital: 122 participants, Vwawa District Hospital: 110 participants, Tunduma Health Centre: 88 participants, Mlowo Dispensary: 70 participants

Stratified random sampling was employed to ensure that the sample was balanced and representative of the nutritional status of people living with HIV (PLHIV) across different districts, minimizing selection. bias and enhancing the generalizability of the findings.

Table 1: Sampling frame

SN	Name of Health Facilities	Sample
01.	Songwe RRH	122
02.	Vwawa District Hospital	110
03	Tunduma Health Centre	88
04.	Mlowo Dispensary	70
		Total: 390

3.8.2 Sample size

Sample size calculation was performed to estimate the sample size required to determine the nutritional status and associated factors in people living with HIV in Songwe Region with a desired level of precision, using the following formula:

$$n=\frac{Z^2 P (1-P)}{e^2}$$

Whereby;

n = sample size required

z=1.96 corresponding to 95% confidence level

p = Prevalence of malnutrition (25.9%) as seen in study conducted at Ethiopia among PLWHIV on ART by Data et al, 2020 (15)

e= Maximum error of the study, which is 0.05.

$$n = \frac{(1.96)^2 \times 0.259 \times (1-0.259)}{(5)^2} = 294.91$$

Including 10% non-response rate = 295+ 95 = 390

Therefore, the required sample size for this study was 390 adult PLWHIV.

3.9 Data quality assurance

The questionnaire was developed by adapting and modifying existing tools based on relevant literature to suit our specific context. Initially prepared in English, it was translated into Swahili, and then back translated into English by a bilingual expert to verify consistency and accuracy. Research assistants were trained thoroughly on the questionnaire and data collection procedures, and the instrument was pre-tested on 20 pre-ART and ART clients at a nearby health center one week prior to the main survey. This pre-testing allowed us to identify and address any ambiguities or issues in the questionnaire. Throughout the data collection period, the principal investigators closely monitored the process on a daily basis, ensuring adherence to protocols and addressing any arising concerns immediately.

3.10 Data analysis plan

The collected data were subsequently pre-coded and entered into a computer using Microsoft Excel Spreadsheet, followed by export to SPSS version 25 for analysis. Information was summarized using frequency tables and cross-tabulations. The chi-squared test was utilized to establish associations between the independent variable (Sociodemographic, clinical and behavioral factors), and dependent variables (nutritional status). Logistic regression analysis was conducted to evaluate the associations of various factors with the level of nutritional status. Variables with a p-value of less than 0.2 in the bivariate analysis were included in the final model. A p-value of ≤ 0.05 at a 95% confidence interval (CI) was considered statistically significant.

3.11 Ethical considerations

The research protocol was submitted to the institutional review board of Muhimbili University of Allied Sciences, which granted ethical clearance after review and approval. Permission to conduct the research was provided by the relevant municipality health departments and the managing medical officers in the respective health facilities. Participation for each client in interviews was voluntary, confidential, and based on informed consent. Before the start of each interview, participants were provided with information about the research purpose, expected outcomes, and potential benefits. Participants who agreed to be involved in the

research signed a consent form, after which the questionnaire and measurements like weight, height, and blood sample collection followed.

3.12 Dissemination of the Research Findings

The study report will be made accessible at the MUHAS library for public use. Additionally, copies will be distributed to the Mbozi District Council, Mbozi Council Health Management Team (CHMT), Songwe Regional Administrative Secretary's office, Songwe Regional Health Management Team (RHMT), and the Songwe Region Nutritional Committee to promote the implementation of improved nutritional status for individuals living with HIV. The findings will also be presented at several local conferences, including those organized by the National Institute for Health Research and the Tanzania Health Committee. Furthermore, to reach a broader audience and enhance knowledge, the study will be submitted for journal publication, ensuring the findings are available for public consumption.

CHAPTER FOUR

RESULTS

4.1 Socio demographic characteristics of the study participants

The study included 390 participants with a mean age of 46.38 years (SD ±12.19). Most participants 210 (53.8%) were between the ages of 26 and 49. A higher proportion of the participants were female 260 (67.4%).In terms of marital status, the more than half were married 212 (54.4%), 113 (29.0%) had no formal education, 218 (55.9%) were employed and majority resided in rural areas 264 (68.6%). A lillte over a half 56.9% earned between TZS 100,000 and TZS 300,000.As shown in the table 2 below

Table 2: Socio demographic characteristics of the study participants (n=390)

Variables	Frequency (n)	Percent (%)
Age	Mean ±SD (46.51±12.19)	
20-25years	20	5.1
26-49 years	210	53.8
≥50 years	160	41.0
Sex		
Male	127	32.6
Female	263	67.4
Marital status		
Single	125	32.1
Married	212	54.4
Separated or divorced	38	9.7
Widow	15	3.8
Education level		
No formal education	113	29.0
Primary education	102	26.2
Secondary education	109	27.9

College /University	66	16.9
Occupational status		
Unemployed	72	18.5
Self-employed	100	25.6
Employed	218	55.9
Resident		
Urban	121	31.4
Rural	264	68.6
Monthly income (TSH)		
<TZS100000	46	11.8
Between TZS100000-300000	222	56.9
≥TZS300,000	122	31.3

4.2 Clinical characteristics of the study participants

Among the 390 participants, 20.3% experienced HIV-related symptoms. Most were in Stage II (44.9%), and the majority had a CD4 count >500 (62.3%). Most participants (87.9%) were on ART, with 88.7% having been on ART for more than 12 months. Opportunistic infections were reported by 7.4%, and 3.6% had comorbid conditions. As shown in the table 3 below

Table 3: Clinical characteristics of the study participants

Variables	Frequency (n)	Percent (%)
HIV related symptoms		
Yes	79	20.3
No	311	79.7
Clinical Stage		
Stage I	42	10.6
Stage II	175	44.9
Stage III	145	37.2
Stage IV	28	7.2
CD4 Count		
<200	38	9.7
200-500	109	27.9
>500	243	62.3
ART Status		
No ART use	47	12.1
Use ART	343	87.9
ART Duration (Months)		
≤12	39	11.3
>12	307	88.7
Opportunistic infections		
Yes	29	7.4
No	361	92.6
Comorbid		
Yes	14	3.6
No	376	96.4

Behavioral characteristics

Adherence to ART was predominantly good (90.8%). A large majority (93.3%) did not have eating difficulties, and 86.4% had received dietary counseling. Nutritional support was provided to 42.6%, 12.1% had smoked cigarettes, and 13.8% consumed alcohol. As shown in the table 4 below

Table 4: Behavioral characteristics

Variables	Frequency (n)	Percent (%)
ART Adherence		
Good	354	90.8
Fair	16	4.1
Poor	20	5.1
Eating difficult		
Yes	26	6.7
No	364	93.3
Dietary Counselling		
Yes	337	86.4
No	53	13.6
Nutritional support		
Yes	166	42.6
No	224	57.4
Ever smoked cigarettes		
Yes	47	12.1
No	343	87.9
Alcohol consumption		
Yes	54	13.8
No	336	86.2
Dietary diversity		
High dietary diversity	309	79.2
Low dietary diversity	81	20.8

4.4 Level of malnutrition

The study assessed the malnutrition level of PLWHIV and found that 31.3% were underweight, 23.1% were normal weight individuals, 19.7% were overweight group and 25.9% were found to be obese. As shown in the figure 3 below;

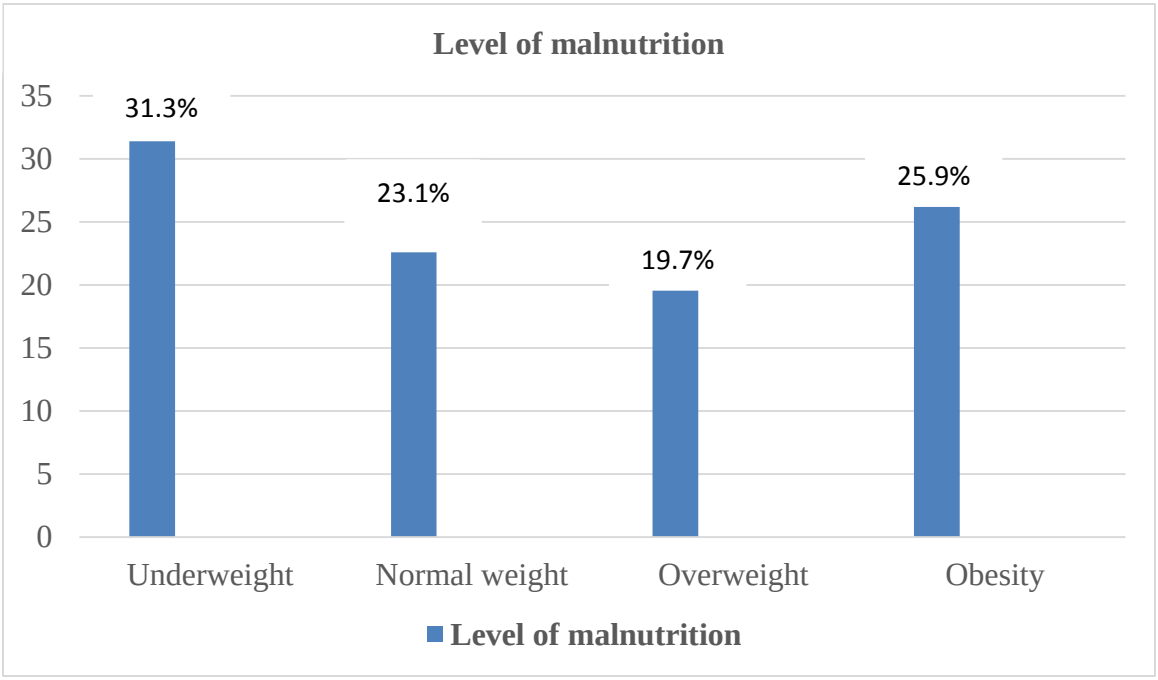


Figure 3: A bar graph, showing the level of malnutrition among HIV patients attending at CTC Centre in Songwe region.

4.5 Prevalence of Nutritional Status

Regarding the nutritional status of the participants, 76.7% had malnourished, while 23.3% were malnourished .As shown in the figure four below.

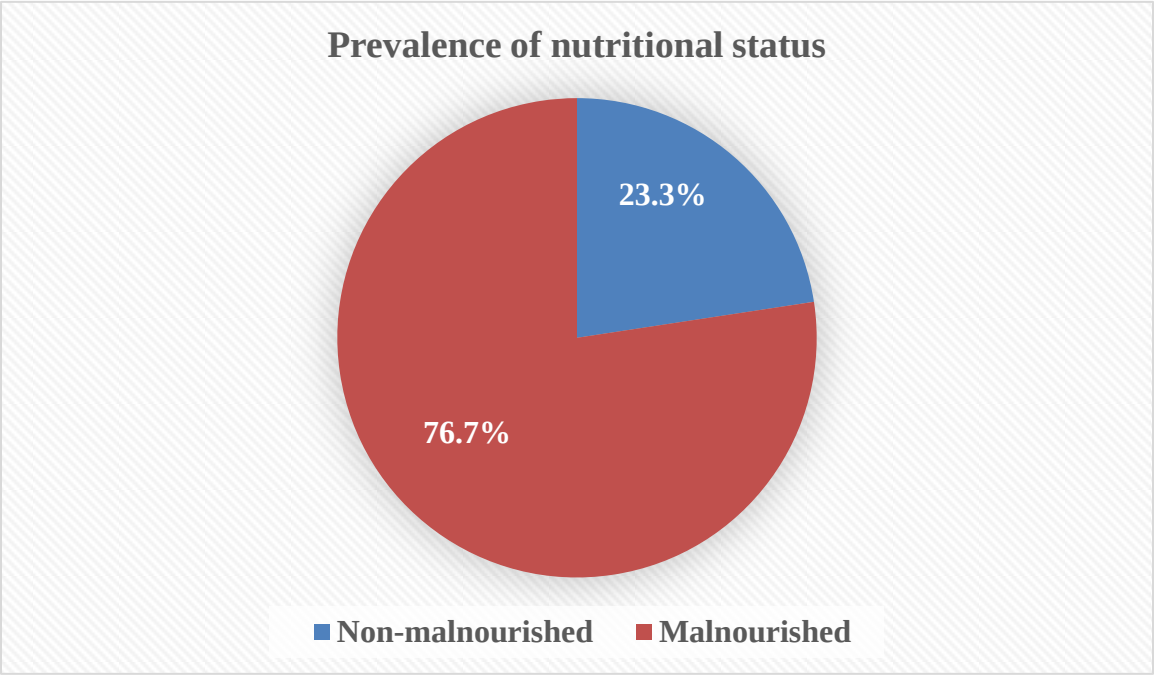


Figure 4: A pie chart showing the prevalence of nutritional status among HIV patients attending at CTC in Songwe Region.

4.6 Distribution of nutritional status by socio demographic characteristics

There was relationship between socio-demographic characteristics and nutritional status whereby the age, sex and occupational status had shown statistical significance as shown in the figure 5 below;

Table 5: Distribution of nutritional status by socio demographic characteristics

Variables	Nutritional Status		P-Values
	Normal	Malnourished	
Age			
20-25years	13 (65.0)	7 (35.0)	0.000
26-49 years	39 (18.6)	171 (81.4)	
≥50 years	39 (24.4)	121 (75.6)	
Sex			
Male	38 (29.9)	89 (70.1)	0.041
Female	53 (20.2)	210 (79.8)	
Marital status			
Single	32 (25.6)	93 (74.4)	
Married	49 (23.1)	163 (76.9)	0.644
Separated or divorced	6 (15.8)	32 (84.2)	
Widow	4 (26.7)	11 (73.3)	
Education level			
No formal education	29 (25.7)	94 (74.3)	0.201
Primary education	17 (16.7)	85 (83.3)	
Secondary education	31 (28.4)	78 (71.6)	
College or University	14 (21.2)	52 (78.9)	
Occupational status			
Unemployed	25 (34.7)	47 (65.3)	0.041
Self-employed	21 (21.0)	79 (79.0)	
Employed	45 (20.6)	173 (79.4)	
Resident			
Urban	25 (20.3)	98 (79.7)	0.369
Rural	66 (24.7)	201 (75.3)	
Monthly income (TSH)			
<100000	13 (28.3)	33 (71.7)	
100000-300000	53 (23.9)	169 (76.1)	0.546
>300,000	25 (20.5)	97 (79.5)	

4.7 Distribution of nutritional status by clinical characteristics

Clinical characteristics related nutritional status was seen for clinical stage where an increasing rate of malnutrition from 71.4% in Stage I to 85.7% in Stage IV (p-value <0.05). Opportunistic infection has also revealed statistical significance in relation to nutritional status, whereby 79.3% compared to 76.5%, and a p-value of 0.011. The comorbid conditions were related to the prevalence of malnutrition at 85.7% as compared to subjects without such conditions at 76.3% with a significant p value of 0.003 as shown in the table 6 below.

Table 6: Distribution of nutritional status by clinical characteristics

Variables	Nutritional Status		P-Values
	Normal	Malnourished	
HIV related symptoms			
Yes	15 (19.0)	64 (81.0)	0.372
No	76 (24.4)	235 (75.6)	
Clinical Stage			
Stage I	12 (28.6)	30 (71.4)	
Stage II	46 (26.3)	129 (73.7)	0.008
Stage III	29 (20.0)	116 (80.0)	
Stage IV	4 (14.3)	24 (85.7)	
CD4 Count			
<200	9 (23.7)	29 (76.3)	0.907
200-500	27 (24.8)	82 (75.2)	
>500	55 (22.6)	188 (77.4)	
ART Status			
Pre-ART	13 (27.7)	34 (72.3)	0.464
ART	78 (22.7)	265 (77.3)	
ART Duration			
≤12months	12 (30.8)	27 (69.2)	0.314
>12months	69 (22.5)	238 (77.5)	
Opportunistic infections			
Yes	6 (20.7)	23 (79.3)	0.011
No	85 (23.5)	276 (76.5)	
Comorbid			
Yes	2 (14.3)	12 (85.7)	0.003
No	89 (23.7)	287 (76.3)	

4.8 Distribution of nutritional status by behavioral characteristics

Malnutrition rates were also described for participants who did not receive nutritional support, at 81.7%, as opposed to those who did, where the rate was 69.9%, which was highly statistically associated (p value <0.05). Also, dietary diversity shown statistically significant with those with high diversity compared to the counterpart (p value <0.05) as shown in the table 7 below.

Table 7: Distribution of nutritional status by behavioral characteristics

Variables	Nutritional status		P-value
	Normal	Malnourished	
ART Adherence			
Good	79 (22.3)	275 (77.7)	0.060
Fair	3 (18.8)	13 (81.3)	
Poor	9 (45.0)	11 (55.0)	
Eating difficult			
Yes	6 (23.1)	20 (76.9)	1.000
No	85 (23.4)	279 (76.6)	
Dietary Counselling			
Yes	83 (24.6)	254 (75.4)	0.162
No	8 (15.1)	45 (84.9)	
Nutritional support			
Yes	50 (30.1)	116 (69.9)	0.008
No	41 (18.3)	183 (81.7)	
Ever smoked cigarettes			
Yes	13 (27.7)	34 (72.3)	0.464
No	78 (22.7)	265 (77.3)	
Alcohol consumption			
Yes	11 (20.4)	43 (79.6)	0.729
No	80 (23.6)	256 (76.2)	
Dietary diversity			
High dietary diversity	4 (4.9)	77 (95.1)	0.000
Low dietary diversity	87 (28.2)	222 (71.8)	

4.8 Logistic regression of factors associated with Nutritional Status

In the logistic regression analysis of factors associated with nutritional status, several key variables demonstrated significant associations. Notably, advanced clinical stages of HIV were linked to increased odds of malnutrition: participants at Stage II had an adjusted odds ratio (AOR) of 6.73 (95% CI: 2.45-25.51, p = 0.005), Stage III had an AOR of 6.27 (95% CI: 2.95-19.21, p = 0.002), and Stage IV had an AOR of 1.79 (95% CI: 1.03-6.27, p = 0.045) compared to Stage I. Additionally, the lack of dietary counseling (AOR = 5.18, 95% CI: 3.27-12.83, p = 0.007) and nutritional support (AOR = 3.84, 95% CI: 2.49-7.72, p = 0.007) significantly increased the odds of malnutrition. Comorbidities also played a role, with an AOR of 5.89 (95% CI: 1.63-21.26, p = 0.007) indicating higher malnutrition risk. Lastly, participants with low dietary diversity were more likely to experience malnutrition, reflected by an AOR of 4.86 (95% CI: 1.65-15.11, p = 0.041), as shown in the table 8 below.

Table 8: Logistic regression of factors associated with Nutritional Status

Factors	Univariate analysis	Multivariate analysis	
	COR (95% CI)	AOR (95% CI)	P-value
HIV related symptoms			
Yes	1.380 (0.743-2.562)	0.976 (0.52-1.734)	0.884
No	Ref	Ref	
Clinical Stage			
Stage I	Ref	Ref	
Stage II	0.417 (0.119-1.458)	6.73 (2.45-25.51)	0.005
Stage III	0.467 (0.154-1.419)	6.27 (2.95-19.21)	0.002
Stage IV	0.667 (0.214-2.072)	1.79 (1.03-6.27)	0.045
ART Duration			
≤12months	Ref	Ref	
>12months	0.652 (0.314-1.355)	0.56 (0.26-1.19)	0.157
Dietary Counselling			
Yes	Ref	Ref	
No	0.544 (0.246-1.201)	5.18 (3.27-12.83)	0.007
Nutritional support			
Yes	Ref	Ref	
No	0.520 (0.324-0.835)	3.84 (2.49-7.72)	0.019
Opportunistic infections			
Yes	1.181 (0.465-2.995)	1.66 (0.69-3.97)	0.278

No	Ref	Ref	
Comorbid			
Yes	1.861 (0.409-8.471)	5.89 (1.63-21.26)	0.007
No	Ref	Ref	
Alcohol consumption			
Yes	1.222 (0.602-2.480)	1.59 (0.83-3.03)	0.162
No	Ref	Ref	
Dietary diversity			
High dietary diversity	7.544 (2.679-21.242)	Ref	0.041
Low dietary diversity	Ref	4.86 (1.65-15.11)	

CHAPTER FIVE

5.1 DISCUSSION

This study aimed to assess the nutritional status and associated factors among HIV patients attending Care and Treatment Centers (CTC) in the Songwe Region. The findings revealed that 23.3% of participants were malnourished, contrasting sharply with a study conducted in Cameroon, where the malnutrition rate was significantly higher at 63.2% (21).This discrepancy may be attributed to differences in socioeconomic conditions, food habits, cultural practices, and healthcare awareness across the regions. Moreover, improvements in healthcare services in the Songwe Region could contribute to the observed lower malnutrition rates, supporting the notion that access to quality healthcare impacts nutritional (21)These differences highlight the importance of context in interpreting nutritional status among people living with HIV (PLWHIV).

In examining the first specific objective, which sought to determine the prevalence of nutritional status among PLWHIV, this study's findings of 23.3% malnutrition align with previous literature, albeit with lower prevalence compared to other regions. For instance, a study in Temeke, Tanzania, reported an overall malnutrition prevalence of 19.2% and severe malnutrition at 8.8% (13). The variances in findings may stem from differing urbanization levels and economic statuses, which affect access to diverse food options, healthcare quality, and nutritional knowledge.

Addressing the second specific objective regarding socio-demographic factors, this study found no statistically significant associations between socio-demographic characteristics such as age, sex, marital status, education, residency, and income and nutritional status. This contrasts with findings from Nepal, where educational status and marital status were associated with malnutrition (9) , and studies in Ethiopia that identified age, gender, and occupation as influential factors (22,23).This discrepancy underscores the need for further exploration into how these socio-demographic factors interact with nutritional outcomes in diverse contexts.

On the other hand this study revealed that unemployed participants were more likely to be malnourished, a finding supported by research from Ethiopia, which indicated that unemployment exacerbates poverty and limits food access (17). Additionally, a strong association was found between clinical stages of HIV, presence of comorbidities, and malnutrition this study revealed a strong association between clinical stages, presence of comorbid, with malnutrition on multivariate analysis. Clinical stage IV and presence of comorbid was associated with higher prevalence of malnutrition. This is in consistency to study done in Zimbabwe (3) and Ethiopia (18),Participants in clinical stage IV were particularly vulnerable, highlighting the need for targeted interventions for those at advanced disease stages.

This study also revealed that drug adherence was not statistically significant associated with malnutrition however study one in Ethiopia 2020 revealed contrary where HIV patients who had poor ART adherence were nearly four times higher risks of developing under nutrition when compared to counterparts (18). Study done in Ethiopia revealed patients who had good drug adherence had less likely to develop under nutrition this may be due to reducing the dietary intake and nutrient absorption (21)

Furthermore, this study noted that dietary diversity was significantly associated with malnutrition; participants with inadequate dietary diversity had higher odds of being malnourished. This finding aligns with studies from Ethiopia and Tanzania, emphasizing the importance of food diversity as an indicator of food security (7,17) Additionally, the lack of dietary counseling emerged as a critical factor, corroborated by research from Tanga, Tanzania, where improved nutritional knowledge through counseling reduced malnutrition prevalence (24).Educational interventions focusing on nutritional needs and dietary practices are crucial for enhancing the well-being of PLWHIV (22,25).

In conclusion, while this study highlights important associations between nutritional status and various factors among PLWHIV in the Songwe Region, the findings also reveal significant

differences compared to other studies. Future research should continue to explore these associations, considering the contextual factors that influence nutritional outcomes.

5.1.1 Limitations of Study

1. The cross-sectional design limits the ability to establish cause-and-effect relationships among variables.
2. Self-reported data on dietary practices and ART adherence may introduce recall bias, affecting the reliability of the findings.

5.1.2 Study Strengths

i. The use of standardized and validated tools to measure nutritional status, enhances the accuracy of the results despite the cross-sectional design.
ii. A diverse sample in terms of age, sex, and education level helps improve the generalizability of findings, providing valuable insights into malnutrition among PLWHIV in the region

5.2 CONCLUSION AND RECOMMENDATIONS

5.2.1 CONCLUSION

The study concludes that malnutrition is significantly prevalent among individuals living with HIV, especially among those in advanced clinical stages and those who do not receive dietary counseling. This underscores the critical need for comprehensive nutritional interventions within HIV care. By addressing nutritional deficiencies, healthcare providers can enhance health outcomes, improve treatment adherence, and ultimately support the overall well-being of patients. The findings emphasize the importance of integrating regular dietary assessments and nutritional support into standard HIV management practices to better meet the needs of this vulnerable population.

5.2.2 RECOMMENDATIONS

i. To improve nutrition counseling and support for the HIV-infected to reduce the prevalence of malnutrition.

ii. To improve management of opportunistic infections and comorbidities to decrease their overall impact on nutritional status. This would include increased monitoring and intervention for those clients in advanced stages of HIV to prevent further nutritional deterioration.

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LIST OF APPENDICES

APPENDIX I: INFORMED CONSENT FORM (ENGLISH VERSION)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED HEALTH SCIENCES

DIRECTORATE OF RESEARCH AND PUBLICATIONS

ID. NO ☐

CONSENT FORM FOR PARTICIPATING IN A RESEARCH STUDY

Hello greetings! My name is **Magonyozi T. Thomas,** a student at Muhimbili University of Health and Allied Sciences (MUHAS) in the School of Public Health and Social sciences. I am doing research on nutritional status and its associated factors among people living with HIV attending Care and Treatment Centers (CTC) in Songwe Region.

The aim of the Study

This study aims to determine the prevalence and factors associated with Malnutrition among people living with HIV in Songwe Region. The findings of this study will serve as a helpful guide for the government and other stakeholders to plan suitable nutritional intervention for the community. Will also provide an understanding on adult patient's awareness about their health status as well as reduce morbidity and mortality caused by chronic malnutrition among people living with HIV.

Procedure

I would like you to participate in this study. You are selected because you are among the key persons that you may have rich information on this issue. If you choose to participate you will be interviewed for about 30 minutes

Confidentiality

Your particulars will not be documented anywhere in this study, only a number will be assigned to represent you in order to help identify your interview responses.

Right to refuse or withdraw

It is your choice to participate in this study. Also, you don't have to talk about anything you don't want to and you may end the interview at any time. However, I encourage you to participate because your views are very important in this study.

Benefits

Participating in this study may not benefit you personally, but might provide useful information that will be beneficial to entire community.

Risks

There will be no any harm to you as a result of participation in this study

Whom to Contact

In case of any inquiry please contact the principal investigator, Magonyozi T. Thomas student from MUHAS, P. O. BOX 301, Mbozi-Songwe, mobile number +255 713085000/0767077504, If you ever have questions about your rights as a participant, you may call **Dr. Bruno Sunguya**, the Chairperson of the Senate, Research and Publications Committee, MUHAS. P.O. Box 65001, Dar es Salaam-Tanzania, Tel(+2552150302-6).

Signature

Do you agree to participate? Put a tick in appropriate box

Participant agrees ☐ participant does NOT agree ☐

I, ……... have read the contents of this form and understood. My questions have been answered I agree to participate in this study.

Signature of participant……...Date…….

Signature of researcher ……. Date…….

APPENDIX II: FOMU YA RIDHAA KUSHIRIKI UTAFITI

CHUO KIKUU CHA TIBA NA SAYANSI SHIRIKISHI, MUHIMBILI

KURUGENZI YA UTAFITI NA MACHAPISHO

Namba ya utambulisho: _____

Kichwa cha utafiti: Kujua ukubwa na sababu zinazopelekea tatizo la utapiamlo kwa watu wazima wanaoishi na upungufu wa kinga mwilini wanaopata huduma kwenye vituo vya utunzaji na matibabu Mkoa wa Songwe.

Naitwa **Magonyozi T. Thomas**, Mwanafunzi katika chuo kikuu cha afya na sayansi shirikishi Muhimbili. Umeombwa kushiriki katika utafiti huu kwasababu utasaidia kujua ukubwa wa tatizo la utapiamlo na visababishi vyake na kupatia Ufumbuzi.

Lengo la Utafiti

Umeombwa kuwa mshiriki katika utafiti huu. Unaweza kujitoa muda wowote na wala hakuna madhara ya kushiriki katika utafiti huu.

Ushiriki Na faida

Ukikubali kushiriki katika utafiti huu, utatakiwa kujaza dodoso kuhusiana na taarifa binafsi na taarifa kuhusu utapiamlo na vilevile kujibu maswali utakayoulizwa kuhusiana na ufahamu juu ya utapiamlo

Usiri

Taarifa zote zitakazokusanywa kutoka kwako ni siri na haiwezi kutumika nje ya lengo la utafiti huu.

Mawasiliano

Ukiwa na swali lolote kuhusu utafiti huu, uko huru kuwasiliana na mtafiti mkuu: Magonyozi T. Thomas (+255713085000), au Daktari, **Bruno Sunguya** Mwenyekiti IRB MUHAS. P.O. Box 65001, Dar es Salaam-Tanzania, Tel+2552150302-6)

Kama umekubali kushiriki, tafadhali saini fomu hii

Saini ya mtafiti mkuu……Tarehe…….

Saini ya Mshiriki……...Tarehe……

APPENDEX: III STRUCTURED QUESTIONNAIRE (ENGLISH VERSION)

1. **Name of Health Facility ……..……**
2. **Name of Researcher……**
3. **Date …….**

Put tick to the corresponding answer and fill in the gaps

TO CLIENT

Section A: Socio-demographic characteristic

CODE	Questions	Response
QN1.	Age (years)……	
QN2.	Sex	i. Male ii. Female
QN3.	Marital status	i. Single ii. Married iii. Separated or divorced iv. Widow
QN4	Education Level	i. No formal education ii. Primary education iii. Secondary Education iv. College or University
QN5.	Occupational status	i. Unemployed ii. Employed iii. Self-employed
QN6.	Resident	i. Urban ii. Rural
QN7.	Monthly income	i. <TZS100,000Tsh ii. Between TZS100,000-300,000Tsh iii. ≥TZS300,000Tsh

Section B:Clinical Characteristics

CODE	QUESTIONS	RESPONSE
QN8.	HIV Diagnosis (years)…..	
QN9.	HIV Related symptoms	i. Yes ii. No
QN10.	Clinical Stage	i. Stage I ii. Stage II iii. Stage III iv. Stage IV
QN11	Recent CD4 Count……	
QN12.	ART Duration (Months)…….	
QN13.	Opportunistic infections	i. Yes ii. No
QN14.	Comorbid	i. Yes ii. No

Section C:Behavioral characteristics

CODE	QUESTIONS	RESPONSE
QN15.	ART adherence	i. Good ii. Fair iii. Poor
QN116.	ART status	i. Pre-ART ii. ART
QN17.	Eating Difficult	i. Yes ii. No
QN18.	Dietary Counselling	i. Yes ii. No
QN19.	Nutritional support (Food aid)	i. Yes ii. No
QN20.	Ever smoked cigarettes	i. Yes ii. No
QN21.	Alcohol consumption	i. Yes ii. No

Section D: Investigation of Dietary Intake Using a Nutritional Questionnaire

Please estimate the average number of meals you consume for each food mentioned below and indicate the number of meals as per month, week, or day.

Food types / Number of meals	Less than 1 per month	1-3 per month	1 per week	2-4 per week	5-6 per week	1 per day	2-3 per day	4-5 per day	More than 6 per day
Carbohydrates (grains, starchy foods, tubers, legumes, vegetables, cooking oils, etc.)									
Legume seeds (cowpeas, beans, soybeans, pigeon peas, lentils).									
Peanut and oilseed varieties (all types of peanuts, sunflower seeds, pumpkin seeds, etc.)									
Dark green leafy vegetables (amaranth, pumpkin leaves, cassava leaves)									
Other vegetables and fruits rich in vitamin A, such as (spinach, sweet potatoes, pumpkins, mangoes, watermelon, papaya, grapes, passion fruit).									
Other types of vegetables and fruits (eggplant,									

okra, green beans, ripe bananas, pineapple, cabbage, oranges)									
Consumption of domestic animal products such as (beef liver, chicken liver, kidneys, intestines).									
All types of meat and fish (all types of fish, chicken, and beef)									
Eggs, all types of eggs, egg yolk, egg white									

Section E: Clinical measurements

CODE	QUESTIONS	RESPONSE
QN36.	Body weight (Kg)……..	
QN38	Body height (Cm)……...	

THANK YOU FOR YOUR PARTICIPATIONS

APPENDEX IV: DODOSO (SWAHILI)

Jina la kituo cha afya ……

Jina la mtafiti…….

Tarehe ……

Weka alama ya vyema kwenye jibu unaloona sahihi na jaza nafasi iliyo wazi

KWA WATEJA

Sehemu A: Tabia za kijamii za washiriki

Namba	Maswali	Majibu
1.	Umri (Kwa miaka)……	
2.	Jinsia	i. Me ii. Ke
3.	Hali ya ndoa	i. Sijaowa au kuolewa ii. Nimeoa au nimeolewa iii. Tumeachana iv. Mjane au Mgane
4	Kiwango cha elimu	i. Sijasoma ii. Msingi iii. Sekondary iv. Chuo cha kati au chuo kikuu
5.	Kazi	i. Sijaajiliwa ii. Nimeajiliwa iii. Nimejiajili
6.	Makazi	i. Mjini ii. Kijijini
7.	Kipato kwa mwezi	i. <100,000 ii. Between TZS 100,000-300,00 iii. ≥TZS100,000

Sehemu B: Tabia na Sifa zinazohusiana na hali ya afya."

Namba	Maswali	Majibu
8.	Ugunduzi wa hali ya kiafya (miaka)..."	
9.	Dalili zinazohusiana na hali ya kiafya	i. Ndio ii. Hapana
10.	Hatua ya ugonjwa ulipofikia	i. Hatua ya I ii. Hatua ya II iii. Hatua ya III iv. Hatua IV
11.	Kiwango cha CD4 kwa sasa……	
12.	Muda wa matumizi ya ARV (Kwa miezi)…	
13.	Magonjwa nyemelezi	i. Ndiyo ii. Hapana
14.	Tatizo la Maradhi Yanayoambatana	i. Ndiyo ii. Hapana

Sehemu C: Tabia za Mtindo wa Maisha

SN	Maswali	Majibu
15.	Utekelezaji wa ARV	i. Mzuri ii. Mdogo iii. Mbaya
16.	Kula kwa shida	i. Ndiyo ii. Hana
17.	Ushauri wa lishe	i. Ndiyo

		ii. Hapana
18.	Msaada wa Lishe (Msaada wa Chakula)	i. Ndiyo ii. Hapana
29.	Umewahi kuvuta sigara	i. Ndiyo ii. Hapana
20.	Matumizi ya Pombe	i. Ndiyo ii. Hapana

UCHUNGUZI KUHUSU ULAJI KWA KUTUMIA DODOSO LISHE

Tafadhali kadiria wastani wa idadi ya milo unayokula kwenye kila chakula tajwa hapa chini na utaje idadi ya milo iwe ni kwa mwezi, wiki au siku.

Aina ya chakula / **Idadi ya milo**	Hakunaauchiniyamara1kwamwezi	Mara1-3kwamwezi	Mara 1 kwa wiki	Mara 2-4 kwa wiki	Mara 5-6 kwa wiki	Mara 1 kwa siku	Mara 2-3 kwa siku	Mara 4-5 kwa siku	Zaidi ya mara 6 kwa siku
Vyakulavyawanga(nafaka,viazivitamu,viazimviringo,magimbi,mihogonandizimbichizakupikan.k)									
Mbegujamiiyakundekunde(njegere,maharagwe,soya,kunde,dengu)									
MbeguJamiiyakaranganambeguzamafuta(jamiizotezakaranga,mafutanambeguzamabogae.t.c)									
Mbogazenyerangiyakijanikibichiiliyokolea(mchicha,majaniyamaboga,kisamvu)									
MbogazinginenaMatundayenyevitamini Akwawingi,kamavile(spinachi,mahindinjano,maboga,maembe,tikiti,papai,zabibu,pasheni)									
Ainazinginezamboganamatunda(Bilinganya,bamia,maharagemachanga,ndizimbivu,nanasi,kabich,machungwa									
Ulajiwanyamazandanikama(mainiyang'ombe,mainiyakuku,fi									

go,utumbo)									
Ainazotezanyamana samaki (ainazotezasamaki,kukunanyamayangombe)									
Mayai,ainazotezamayai,kiinichayai,utemweupewayai									

Sehemu D: Tathmini ya hali ya lishe

Namba	Maswali	Majibu
31.	Uzito wa mwili (Kilogramu)	
32.	Urefu wa mwili (Sentimita)	

ASANTE KWA USHIRIKI WAKO.

APPENDEX V: ETHICAL CLEARANCE

JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

MKOA WA SONGWE
Anuani ya Simu: "REGCOM"

Simu Na: 025 - 2580306/5
025 – 2957397
Nukushi: 025 – 2580306
Barua pepe:ras@songwe.go.tz
Tovuti: www. Songwe.go.tz
Unapojibu tafadhali taja:

OFISI YA MKUU WA MKOA,
S.L.P 23,
2 Nselewa Mkoani RD,
54202 MLOWO – MBOZI

Kumb.Na. BA.11/222/01E/70

27, Mei, 2024

Mkurugenzi wa Mji,
Halmashauri ya Mji wa Tunduma,
S. L. P. 73,
TUNDUMA.

Mkurugenzi Mtendaji,
Halmashauri ya Wilaya ya Mbozi,
MBOZI.

Mganga Mfawidhi,
Hospitali ya Rufaa ya Mkoa,
S.L.P 301,
SONGWE

Yah : KUMTAMBULISHA MTUMISHI MAGONYOZI T.THOMAS KWA AJILI YA UTAFITI KATIKA VITUO VYA HUDUMA ZA AFYA.

Tafadhali husika na somo tajwa hapo juu.

2. Ofisi ya Mkuu ya Mkuu wa Mkoa ilipokea barua yenye Kumb.Na.HD/MUH/T.742/2020 ya tarehe 24/05/2024 toka Chuo cha Afya Muhimbili yenye somo tajwa hapo juu, ikimtambulisha mtumishi kwa ajili ya kufanya utafiti juu ya kuhakiki hali za lishe za wateja wanaohudhulia kwenye vituo vya tiba na matunzo katika Mkoa wa Songwe.

3. Kwa barua hii unaombwa kumpa ushirikiano ili kufanikisha tafiti hii (Orodha ya vituo imembatishwa).

4. Nakutakia utekelezaji mwema.

W.P. Myuyu
KAIMU KATIBU TAWALA MKOA

KATIBU TAWALA MKOA
SONGWE

ORODHA YA VITUO VYA UTAFITI

NA	MAMLAKA	VITUO
1	Hospitali ya Mkoa	SRRH
2	MBOZI DC	Vwawa Hospital,Mlowo Dispensary,
3	Tunduma TC	Tunduma HC

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/2211 Date: 24/05/2024

MUHAS-REC-05-2024-22
MAGONYOZI T. THOMAS,
SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES,
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: "ASSESMENT OF NUTRITIONAL STATUS AND ITS ASSOCIATED FACTORS AMONG ADULT HIV PATIENTS ATTENDING CARE AND TREATMENT CENTRES (CTC) IN SONGWE REGION – TANZANIA".

Reference is made to the above heading,

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 24/05/2024
EXPIRATION DATE OF APPROVAL: 24/05/2025

STUDY DESCRIPTION:
Purpose:

The purpose of this Study is to assess the nutritional status and its associated factors among adult HIV patients attending care and treatment centers (CTC) in Songwe region – Tanzania.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015363.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Nahya S. Masoud

For Chairperson, MUHAS Research and Ethics Committee



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MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES

DISSERTATION PROPOSAL

TITTLE: ASSESSMENT OF NUTRITIONAL STATUS AND ITS ASSOCIATED FACTORS AMONG ADULT HIV PATIENTS ATTENDING CARE AND TREATMENT CENTERS (CTC) IN SONGWE REGION-TANZANIA.

NAME: MAGONYOZI T. THOMAS

REGISTRATION NUMBER: HD/MUH/T.742/2020

SUPERVISOR NAME: Dr. GERMANA LEYNA

CO- SUPERVISOR: Ms. SAIDAH BAKAR

April, 2022.

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ASSESSMENT OF NUTRITIONAL STATUS AND ITS ASSOCIATED FACTORS AMONG ADULT HIV PATIENTS ATTENDING CARE AND TREATMENT CENTERS (CTC) IN SONGWE REGION-TANZANIA.

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