

**MAGNITUDE OF OVERWEIGHT/OBESITY AND ASSOCIATED  
EATING PATTERNS AND EATING FREQUENCY AMONG  
PRIMARY SCHOOL CHILDREN IN ILALA DISTRICT,  
DAR ES SALAAM-TANZANIA IN 2021**

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**By**

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**A Dissertation Submitted in Partial Fulfillment of the Requirements  
for the Degree of Masters of Public Health  
Muhimbili University of Health and Allied Sciences  
October, 2021.**

**CERTIFICATION**

The undersigned certifies that she has read and here by recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **“MAGNITUDE OF OVERWEIGHT/OBESITY AND ASSOCIATED EATING PATTERNS AND EATING FREQUENCY AMONG SCHOOL CHILDREN IN ILALA DISTRICT-DAR ES SALAAM, TANZANIA 2021.”** In fulfillment of the requirements for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

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Dr. Jane Mlimbila,

(Supervisor)

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Date

**DECLARATION & COPYRIGHT**

**I, Pamela Silas Kipande,** declare that this Dissertation is my own original work and that it has not been presented and will not be presented at any other university for a similar or any other degree award.

**Signature .....** **Date.....**

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## **DEDICATION**

This work is dedicated to my beloved Mother Elizabeth Massawe, who since my academic career has been praying for me, supporting, encouraging and guiding me in the right way to reach this far! Also I dedicate this work to my late Daddy Mr. Silas Kipande who passed away by the time I was applying for my Master's degree, his encouragement and support towards my Academic Journey will forever be cherished.

## ABSTRACT

**Background:** Overweight in children is a condition in which a child has excess fat than optimally healthy. The prevalence of overweight and obesity has increased from 5.2% in 2013(1) to 15.9% and 6.7% overweight and obesity respectively in 2016 (2). In Tanzania, most nutritional interventions are directed towards under-nutrition, among the under-fives, with fewer nutritional assessments among school aged children.

**Objective:** To determine the magnitude of overweight and associated eating patterns and frequency among primary school children aged 10-13years in Ilala District.

**Methodology:** A cross sectional study conducted among standard 5 respondents from St Joseph, Muhimbili, Ilala, and Tusiime primary schools in Ilala District in Tanzania. Cluster sampling technique was used to select the respondents, two clusters; government and private schools were established. A random selection of two schools from each cluster from was done. Socio-demographic characteristics, food patterns and eating frequency were determined using a pre-tested 7-day Food frequency questionnaire with 48 items. Magnitude of overweight was determined by BMI for age and sex computed using measured weight and height. Data were analyzed using SPSS.

**Result:** A total of 374 primary school respondents were recruited in to the study. 206 were female, 188 were studying in private schools and 186 in government schools. Majority of the respondents 259 were aged 10-11 years. The magnitude of overweight and obesity was 14.44% and 23.26% respectively. Significant eating patterns of being overweight were found to be high consumption of fried breakfast snacks (AOR= 21.6, 95% CI: 5.56, 84.01), high consumption of sugar sweetened beverages (AOR=6.61, 95% CI: 1.29, 33.8) and high consumption of High calorie foods (AOR=2.26, 95% CI: 0.49, 13.89) and eating frequency of more than three meals per day (AOR=1.23, 95% CI: 0.32, 4.76).

**Conclusion:** The prevalence of overweight and obesity among primary school children in Ilala District is high and requires attention and deliberate intervention strategies such as moderation of foods sold around school environments that are highly associated with overweight, since school is where children spend most of their time.

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**ABBREVIATIONS**

BMI	Body Mass Index
CDC	Center for Disease Control
CI	Confidence Interval
FFQ	Food Frequent Questionnaire
LMICs	low-and middle-income countries
MUAC	Mid-Upper Arm Circumference
NCD	Non-Communicable diseases
SDGs	Sustainable Development Goals
SES	Social Economic Status
SPSS	Statistical Package for Social Sciences
US	United States
WHO	World Health Organization

## DEFINITIONS OF KEY TERMS

**Anthropometric measures:** Are series of quantitative measurements of the muscle, bone and adipose tissue used to assess the composition of the body.

**Body Mass Index:** Is a value derived from the mass and square height of a person and it is expressed in  $\text{kg/m}^2$

**Child:** A person under 18 years

**Eating frequency:** refers to the number of daily eating occasions

**Eating patterns:** refers to the variety or combination of different foods and beverage in a diet.

**Environmental factors:** refers to the external environment that influences food availability, physical activities and games

**Feeding practices:** refers to the behaviors that influence children's eating, food types and frequencies.

**Food Frequency Questionnaires (FFQ):** Is a method for collecting dietary data that uses a context-specific food list for estimating dietary intake and establishing the relationship between consumption patterns and health outcomes

**Food portion size:** Is the actual amount of food that is placed on the plate and eaten or drank at the time of consumption

**Food group:** Is a collection of foods that share a similar nutritional properties or biological classification.

**Obesity:** Is the excessive fat accumulation which may impair a child's health. Usually BMI at the 95th percentile or above are obese.

**Overweight:** weight that exceeds the threshold of a criterion standard or reference value. In children it is 85<sup>th</sup> <95<sup>th</sup> percentile.

**Normal weight:** In children is defined as BMI at the 5th and below the 85th percentile.

**Staple food:** food that is routinely eaten in quantities that constitutes a dominant portion of a diet.

## CHAPTER ONE

### 1. INTRODUCTION

#### 1.1 Background

Child Malnutrition in all forms is a major public health concern globally, and especially in low and middle income countries. Malnutrition refers to lack of proper nutrition either from insufficient nutrient and/or energy intake (under-nutrition) or excessive nutrient and/or energy intake (over-nutrition). Under-nutrition and over-nutrition both have effects on child's health and development (3) .

The United Nations Sustainable Development Goal 2 (SDG) target 2.2 calls upon countries to end all forms of malnutrition by 2030. In spite of this objective, available data shows an increasing trend of childhood overweight and obesity rates globally, with the fastest rise occurring in low-and middle-income countries (LMICs) (4). Preventive strategies such as risk factors identification and analysis, Health education and behavior change are essential in management and reduction of this epidemic.

The double burden of malnutrition refers to the dual burden of under and over-nutrition occurring simultaneously within a population. Under-nutrition has been associated with higher prevalence of infectious diseases(5) Epidemiological and demographical transition have led to the increases in overweight and obesity, while under-nutrition and infectious disease become past problems (6).The current double burden of malnutrition in many developing countries is brought about by a couple of risk factors, including increased urbanization, changing dietary patterns and lifestyles leading to a rapid rise in overweight among adults and children.

Overweight in children is a condition in which a child has excess fat than optimally healthy. The problem of overweight does not only affect adults but, also children and adolescents (7). In just 40 years the number of school-age children and adolescents with overweight has risen more than 10-fold, from 11 million to 124 million (8).

In the past, a fat and heavy child was perceived to be healthy, and the saying “the bigger the better” was widely accepted. The perception needs to change due to evidence that overweight in children is associated with serious health complications such as joint problems and musculoskeletal discomfort, asthma, type 2 diabetes and an increased risk of premature illness and death later in life (9).

Research has shown that the majority of overweight children live in Lower Middle Income Countries with over 30% higher rates than that of high-income countries (4). The World Health Organization (WHO) reported that over 340 million children and adolescents between the ages of 5 and 19, and 41 million under 5 years were either overweight or obese (4).

Overweight has become an epidemic in many parts of the world, according to research conducted in adults. However, there are limited data collected from adolescents and school aged children, among which the prevalence of overweight in this group is increasing. Some of the factors that hinder research of overweight in children and adolescents include the lack of comparable representative data from different countries, and the use of varying criteria for defining overweight among children in different age groups and sex (10).

According to World Health Organization Non-communicable diseases rose by 12.5% from 36 million in 2010 to 40.5 million in 2016 (8). Overweight is a risk factor for obesity and other non-communicable diseases, which are the leading causes of death worldwide.

There are several factors that contribute to overweight, including level of physical activities such as sports and games and feeding practices, which have been widely reported to influence overweight (11). Most children are physically active and engage in sports, thus diet is a key factor associated with overweight among children(12). In order to address overweight among children an understanding of the association between feeding practices and overweight among children is necessary.

The government has established programs and strategies such the National Nutritional Strategy (NST) and the National Multisectoral Nutrition Action Plan (NMNAP) that address malnutrition including overweight/ obesity both in adults and children. Despite the



initiatives taken by the government of Tanzania in addressing overweight/obesity, the progress is relatively slow and more needs to be done especially in improving feeding practices among school going children.

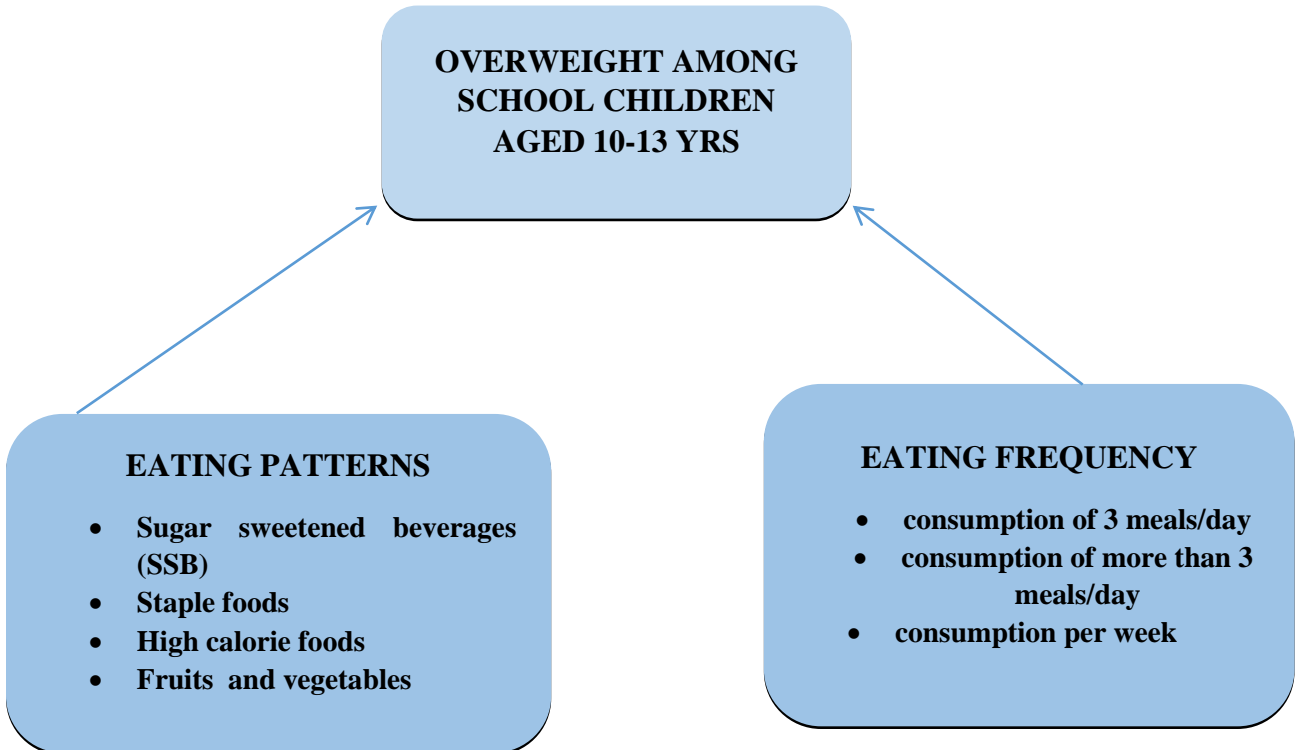
## **1.2 Problem Statement**

Overweight/obesity among school aged children is one of the most serious global public health challenges of the 21st century, affecting almost every country in the world. In just 40 years the number of school-age children and adolescents who are overweight has risen more than 10-fold, from 11 million to 124 million (8). In 2019, 18% of children aged 5–19 years and 6% of children younger than five years of age were overweight or obese globally. This shows an increased trend of weight gain in children as they grow.

In Tanzania, while there has been some interventions that have led to the progress towards reduction in the burden of under-nutrition, the problem of overweight and obesity, which is associated with diet related non-communicable diseases (DRNCDs) has been increasing in children and adults. Overweight in children under-five years increased from a prevalence of below 1% in the 1990s to about 4-5% in the 2010-2015 according to the TDHS. The 2015 level is at the cut-off of the WHA target for 2025 of keeping overweight in children to a prevalence of below 5% (13).

Although eating patterns are likely to influence health, data on relationship between eating patterns and frequency among children and overweight/obesity are sparse. And the impact of eating patterns on the risk of developing overweight/obesity. This study aimed at identifying the patterns and frequency that cause overweight/obesity in children.

### 1.3 Conceptual Framework



**Figure 1: Conceptual Framework**

The conceptual framework above describes the association between dietary patterns and eating frequency with overweight among school aged children. The conceptual framework has been derived from the American guideline and dietary recommendation for children and adolescents(14) and the Innocenti Framework on Food Systems for Children and Adolescents developed by UNICEF and Global Alliance for Improved Nutrition (GAIN) that comprises a set of drivers and determinants (food supply chains, external food environments, personal food environments, and behaviors of caregivers, children and adolescents), which together influence children and adolescents' diets (15). The component of external food environment has been adopted and made to suit the local context in terms of foods sold/available in school environments and in restaurants.

Healthy dietary patterns choices during childhood are necessary in overcoming overweight/obesity among children at the present and in future adults as the problem seems to begin from an early age and worsen in adulthood.

Changes in dietary patterns may explain the increase in body weight among children. Increase in the number of convenient and junk meals eaten away from home, at restaurants, and around school environment, snacking and meal-skipping especially breakfast are associated with overweight among school children. Diets of school-age children are also limited in diversity often characterized by nutrient-poor, monotonous plant-based diets. Additionally, in the context of the nutrition transition, school-age children are becoming more exposed to diets high in ultra-processed, energy-dense and nutrient-poor foods.

The school environments where children spend about two third of their time influence the way children access and consume food which is available, desirable and convenient. The way food is marketed and packed, and the sensory attributes of the food, such as taste, smell and appearance (food color). Relatively low prices of unhealthy foods, confectionaries and sugar sweetened soft drinks that are mainly available in many school settings contribute to unhealthy food choices among children who are mostly unaware of what constitutes a healthy eating pattern. Eating patterns among adolescents are of particular concern, as reflected by skipped meals and snacking.

## **1.4 Rationale**

This study serves as a call to action, alerting the public on the other rapidly rising form of malnutrition, overweight/obesity among school aged children and the eating patterns and frequency associated with overweight. The study also provides baseline information on the magnitude of overweight in a group that is often considered not at risk of over-nutrition. The information ought to support design of interventions to address all age groups that may experience overweight. Provide dietary information necessary for weight control from early growth stages. Promote healthy eating behaviors among children. Be useful for health policy makers, educators and other stakeholders in planning appropriate intervention programs that target primary school children.

## **1.5 Research Questions**

This study intends to answer the following question:

### **1.5.1 Main Question**

What is the magnitude of overweight and associated eating patterns and eating frequency among primary school children in Ilala district, Tanzania?

### **1.5.2 Specific questions**

1. What is the magnitude of overweight among primary school children in Ilala district?
2. What eating patterns are associated with overweight among primary school children Ilala district?
3. What is the association between eating frequency and overweight among primary school children in Ilala district?

## **1.6 Objective**

### **1.6.1 Broad Objective**

To determine the magnitude of overweight and associated eating patterns and eating frequency among primary school children in Ilala district, Dar es Salaam 2021.

### **1.6.2 Specific Objectives**

1. To determine the magnitude of overweight among primary school children in Ilala district, Dar es Salaam.
2. To determine eating patterns associated with overweight among primary school children in Ilala district, Dar es Salaam.
3. To determine eating frequency associated with overweight among primary school children in Ilala district, Dar es Salaam.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

Prevalence of overweight and obesity is on rise worldwide and has become a serious global public health concern. Overweight affects all sexes, ages, races, socioeconomic groups, and ethnicities and it has been reported as a major risk factor for non-communicable diseases (1). Likewise overweight among children is increasing at a high rate worldwide regardless of the existing efforts for its management and prevention. Several factors have been reported as drivers for overweight. These include environmental factors such as food availability, playing ground availability, geographical location and dietary habits and feeding practices (16).

Overweight is contributed by increased Energy Intake and decreased energy expenditure. However, the specific dietary factors contributing to energy imbalance and the rising rate of overweight are not clearly understood. Several eating patterns have been reported to influence the rise in energy consumption hence, overweight. These patterns include increasing portion sizes, increasing contribution of snacks to total Energy Intake, increasing energy density of foods, and increasing consumption of food away from home (17).

### **2.1 Socio-demographic characteristics**

Switzerland, a high income country with the highest life expectancy and lowest prevalence rates of overweight and obesity worldwide, however variations exist between socio-demographic subgroups in the risk of developing NCDs that are highly associated with overweight(18). Mortality rates and causes of death also vary with age, sex and place of residence, whereas feeding practice is a major modifiable risk factor for most NCDs that are strongly influenced by socio-demographic and lifestyle determinants(18).Therefore, identifying determinants of dietary consumption is critical for testing whether they contribute to previously reported socio-demographic differences in disease prevalence.

Overweight results from complex interactions between social- economic, physical environment, genetic and lifestyle factors. Environmental factors such as the presence of fast-food outlets around school areas and homes may influence children's dietary pattern

toward high consumption of fast food that are typically high in fat, sodium and sugar, low in fibre and poor in essential micronutrients(19).

## **2.2 Magnitude of overweight among primary school children.**

Globally there are about 42 million overweight children with over 35 million living in developing countries. In Africa despite high levels of under-nutrition, overweight rates in children are increasing. The 2018 Global Nutrition Report indicated 4.6% of boys and 4.7% of girls aged 10-19 years were overweight globally, and in Africa 2.5% of boys and 3.9% of girls were reported to be overweight/ obese (20).

The prevalence of overweight among children and adolescents aged 7-18 years increased from 0.1 to 7.3% in China from 1985 to 2014. A greater prevalence increase was observed among higher socioeconomic status (SES) children. In Beijing, the capital city of China, the prevalence of overweight and obesity among preschool children was 19.44% in 2016 in Shijingshan District (21).

Overweight and obesity rates are increasing worldwide, the prevalence has almost doubled in 70 countries since 1980, In 2015 a total of 107.7 million children and 603.7 million adults were obese and 75% of the world's populations live in countries where overweight and obesity kills more people than underweight(22).

In Africa, the prevalence of overweight and obesity among children under five years of age was 5% in 2017, with an increase of almost 50% since 2000, from 6.6 million to 9.7 million in 2017 (23). Some parts of the African continent are more severely affected than others, as in 2017 the prevalence of overweight among children under five years of age in North Africa and Southern Africa was 10.3% and 13.7% respectively (23).

For over a long period of time Africa has been focusing on reducing and combating under-nutrition. And less focus and efforts have been put forward in addressing over-nutrition. It is time now for Tanzania and Africa at large to put in place strategies and initiatives needed to address both under-nutrition and over-nutrition and incorporated both into nutrition action plans and programs (6).

Prevalence of overweight is increasing in Tanzania, previously overweight was more common in developed countries and was also considered ill-health conditions for adults. In

recent years a progressive increase in developing countries and also among children and adolescents. Overweight prevalence rose from 3.6% in 1995 to 9.1% in 2004 (24). From 5.2% in 2013 to 15.9% and 6.7% overweight and obesity respectively in 2016 (1) (2). However there is lack of enough and current data and statistics to be used as baseline information for planning and implementing interventions addressing overweight/obesity among children in Tanzania, thus necessitating this study.

### **2.3 Eating patterns associated with overweight among primary school children.**

Dietary patterns consideration is important due to the increased nutritional related NCDs burden. The focus in nutritional epidemiology has been on nutrients and other food components. This has occurred due to under-nutrition and nutritional related Non-communicable diseases occurring as common diet-induced disease states. Demographic and epidemiologic transitions in high income countries, and in most low and middle income countries, have switched disease burdens. Chronic diseases such as CVD, cancer, and diabetes now account for 70% of mortality and 58% of morbidity (in terms of disability-adjusted life-years) globally, with overweight being the major risk factor(25).

Global changes in food production, preservation, marketing and consumption have highly influenced the dietary pattern, with a shift from locally available foods to increased intake of fast foods and sugar sweetened beverages among children especially around school environment (26).

In China dietary patterns have changed significantly in the past four decades along with the rapid economic development due to massive industrialization, children have been exposed to unhealthy food environments which would potentially facilitate unhealthy dietary patterns. China as the third-largest Coke market by volume and consumption of sugar sweetened beverages (SSBs) has become very popular among children (21).

The changing patterns of food consumption in West Africa from the major staples grown and consumed in most parts of Ghana, including maize, yams, plantains and cassava, which are often served with soups or used in making porridges and gruels. Over the years due to the introduction of rice and other cereal cultivation in most parts of Ghana resulted in



increased grain consumption and westernized/Asian foods due to convenient preparation methods (27).

Empirical assessment of dietary patterns of entire diets, is necessary in assessing complex diet-disease interactions Dietary patterns are also easier for the lay public to relate with and to modify for better health outcomes compared to using nutrients or individual foods (27). It is important that eating patterns of school-age children are assessed so as to design intervention appropriate for this age group. Nutritional education among school children is necessary in preventing diet-related diseases.

Food outlets around schools such as street vendors and fast food restaurants have a direct influence on children's diet and eating patterns, because in schools is where children spend most of their time. Intake of high energy, sugar and saturated fat intakes commonly sold in schools greatly influences overweight among school children(28).

#### **2.4 Eating frequency associated with overweight among primary school children**

Meal eating frequency and breakfast consumption have been reported to contribute to overweight and obesity among children. Breakfast skipping is associated with increased BMI. Meal timing and frequency can influence weight status. Infrequent meal patterns characterized by an irregular eating approach can lead to weight gain, increase hunger related hormones and lead to metabolic disturbance that may increase cardiovascular risk, contrary to lower frequency with regular timing may decrease weight gain risk(22).

Eating frequency and childhood weight have been inversely associated with excess weight gain among schoolchildren. Children consuming three meals per day gain more weight compared with children consuming 7 meals per day (including snacks) (29).

It is estimated that 12% to 34% of children and adolescents regularly skip breakfast, and this percentage is found to increase with age (30). There is an inverse association between breakfast intake and BMI. Breakfast consumption is associated with favorable nutrient intakes. Regular breakfast consumers may also benefit from physiologic mechanisms hypothesized to reduce appetite and subsequent risk of overweight.

In interventional study that was conducted on 226 children, aged 6 to 16 found that children who were provided 3 meals per day had an increased tendency to become

overweight, while those who had snacks in addition to the main meals per day in smaller portions were less likely to be overweight. Frequent meal consumption is said to control bodyweight, regulate appetite and daily energy compensation, increase carbohydrate-to-fat ratio of the diet(31).

Research has shown that skipping breakfast correlates with poor quality diet, increased likelihood of being obese and suffering from chronic diseases. These increased risks could be contributed by the unhealthy eating choices breakfast skippers make including consumption of more energy dense, high fat foods and sugar sweetened beverages in order to compensate for the missed breakfast the morning that consequently leads to weight gain(32).

Breakfast consumption has more benefits apart from nutritional status and weight management. Among all age groups, consumption of breakfast is associated with healthy status. In children, breakfast consumption helps in improving cognition and learning through improved attention and memory keeping(30).

Type of breakfast consumed is an indicator of nutritional status. Some studies have shown that breakfast cereal consumption in both children and adults is associated with a lower BMI compared to other breakfast types. However fewer children and adolescents take cereal for breakfast. The place where children take breakfast is significant in determining the food choice and diet quality. In most cases, school breakfast which consists of porridge, a cup of milk/ tea and bread contributes positively to the children's health status as compared to taking breakfast at home that in most cases is associated with high fat content snacks. Moreover, children who do not eat breakfast neither at school nor at home tend to purchase more unhealthy snacks later on during the day that may cause weight gain(32).

Various nutritional epidemiological studies have assessed the association between eating frequency and patterns with overweight/obesity risk among children and adolescents. However the association is still not very well understood and more research in this area is necessary in order to broaden up knowledge and information for clarity.

## CHAPTER THREE

### 3.0 METHODOLOGY

#### 3.1 Study design

The study employed Cross Sectional design, by adopting quantitative data approaches for determining the magnitude of overweight and associated eating patterns and frequency among primary school children in Ilala district, Dar es Salaam. Quantitative approach was used as it uses quantifiable data to articulate facts, quantify problems and reveal patterns (33). Cross-sectional design was suitable for this study as it was able to estimate magnitude of overweight and explore the association between study variables and overweight at a single point in time, given the limited resources, it was the best approach (34).

#### 3.2 Study population

The study population was school children in standard 5 aged 10-13 years from St Joseph, Muhimbili, Ilala, and Tusiime primary schools in Ilala District in Tanzania. Children aged 10-13 years were selected because they are more at risk of being overweight due to physiological development, which is usually characterized by excessive eating (35). Also the ability to adequately identify foods and recall dietary information is age-dependent thus children aged 10-13 years that participated in the study were capable of recalling and giving correct dietary information that was required(36).

#### 3.3 Inclusion criteria

1. Primary school children aged 10-13 years who were in standard 5 in selected schools in Ilala district were eligible to participate. Respondents who were in standard 5 and meeting the age criteria were considered eligible for participation.
2. Standard five pupils whose parents consented for their participation by signing and returning a written consent letter sent to them by the school administration through their children prior conducting the study.

### 3.4 Exclusion criteria

1. Primary school children below and above 10-13 years who were in standard 5 in selected schools in Ilala district were not eligible to participate. Because the ability to adequately identify foods and recall dietary information is age-dependent.
2. Standard 5 pupils whose parents did not consent for their participation by signing and returning the consent letter prior the study were considered not eligible for participation.

### 3.5 Sample size and selection

To estimate sample size Fischer's formula was used (37). The estimate was based on a 95% confidence level, with proportion of overweight of (17.7%) (1) and adjusting for 10% non-response rate.

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

Where:

**n** = desired sample size

**z** = level of confidence limit set at 95% which is equal to 1.96

**p** = Estimated prevalence of overweight among primary school children based on the study done in Dar es salaam which had the prevalence of 17.7% (1).

**e** = estimated marginal error around p (5%)

$$n = \frac{1.96^2 \times 0.177(1 - 0.177)}{0.05^2} = 223.84 \sim 224$$

Design Effect = 1.5 (2)

Response Rate = 90%, Thus adjusting for non-response and heterogeneity between clusters

$$n = 224 \times 1.5 \text{ DE} \times 1.11 = 372.96 \sim 373$$

Thus the estimated minimum sample size was 373 participants.

### **3.6 Sampling Procedure**

Cluster sampling technique was employed. A sampling frame of all primary schools in Ilala was obtained from District Education Director, from which two clusters of public and private schools were established. Then random selection of two schools from each cluster was done.

Introduction letters to each selected school were provided by the Municipal Education and Vocational Training officer and presented to the school's head teachers. The head teachers gave pupils consent letters to be given to their parents in order to consent for their participation in the study three days before conducting the study.

Upon arrival at the selected school, pupils were briefly addressed about the study aims and the procedures to be followed, those who were willing to join the study were given assent forms to read and affirm for their participation. All pupils in standard 5 that met the inclusion criteria and whose parents consented for their participation were selected from each school. However, due to ethical consideration, all the students in standard 5 who had their parent's consent to participate filled the questionnaire and weight and height measurements were taken and those who were below and above 10-13 years were excluded during data entry and analysis and obtained at least 93 pupils (373 pupils/ 4 schools) from each school.

### **3.7 Study area**

This study was conducted in Ilala district. Ilala was selected for this study because it is an urban setting, previous studies shows that overweight is more prevalent among school children in urban areas and in cities (2).

Ilala district has a total surface area of 210 sq.kms. 3.1 sq.kms is water area, leaving 98.5% of the area as land area (207.0sq.kms). The District has a total population of 1,220,611 people of which 595,928 are males and 624,683 are females(38). In 2013, the city had 165 primary schools, where 105 schools were government owned and 60 were private owned (census, 2012).

According to research conducted to determine the blood pressure profiles and risk factors associated with elevated blood pressure among primary school children in Dar es Salaam, revealed a high proportion of children with elevated blood pressure of 15.2% (pre-hypertension 4.4% and hypertension 10.8%) which was associated with overweight/obesity (39).

### **3.8 Variables**

#### **3.8.1 Dependent variable**

The study consisted of one main dependent variable;

- **Overweight among primary school children**

#### **3.8.2 Independent variables**

This study consisted of three main independent variables, Magnitude of overweight, food patterns associated with overweight and eating frequency associated with overweight among school children.

- **Magnitude of overweight among primary school children**

Magnitude of overweight was determined by Body mass index (BMI) for age and sex Calculated using the measured weight and height, and categorized as per the CDC Growth Charts. Weight (kg) and height (cm) measurement were carried out by following the standard procedures. Standing height was measured using the Lankay power tape YH-14 (made in China) to the 0.1 cm. Body weight was measured with a portable Seca electronic weighing scale (SECA, Hamburg, Germany) to the nearest 0.1 kg (27). All measurements were taken at school with participants wearing their usual school uniform but without shoes and items in pocket or any heavy clothing like jacket or sweater. Interference of complex hairstyles with height measurements were reduced by encouraging participants to let hair down when possible. All anthropometric measurements were taken in duplicate so as to control for errors.

- **Food patterns associated with overweight among primary school children**

Four dietary pattern groups were used based on the priori approach that uses prior defined criteria to construct dietary pattern and scores, the scores divide individuals according to how their eating behavior is close to the investigated pattern, based on presumed health effect (40). The patterns were “Sugar Sweetened Beverages”, “staple foods”, “Fruits and Vegetables” and “High calorie foods”.

- **Eating frequency associated with overweight among school children**

A 7-day Food frequency questionnaire was used to record food consumption and drinks taken by children while at home and school within a week. Consumption of food items were calculated as the summation of the number of times each constituent food item(s) was consumed divided by 7 days and obtained an average score of consumption within the 7days. The average scores were grouped as 0-1= low consumption, 2-3=moderate consumption and 4- >5= high consumption. This scoring method has been previously used to assess dietary patterns and associated risk factors among school age children in urban Ghana (41).

- **Demographic characteristics** of the study participants; Age, Sex, type of school attended and proximity to the school were analysed by descriptive analysis.

### **Term definition**

Eating frequency: refers to the number of daily eating occasions

Eating patterns: refers to the quantity, variety or combination of different foods and beverage in a diet

Sugar Sweetened Beverages: These were defined as any drink with added sugar or other sweeteners and artificial flavors, including non-diet soft drinks/sodas, energy drinks and flavored packed juices, sweetened tea, and coffee drinks.

Staple food: These were defined as foods that were routinely eaten in quantities that constitute a dominant portion of a diet such as rice, beans, cooked bananas, ugali, maize and other cereals.

Natural foods: These were defined as foods that have undergone minimal processing and contain no preservatives or artificial additives, such as fresh fruit juices, fruits and vegetables.

High calorie foods: These were defined as foods high in fat, salt and sugar, low in fibre and poor in essential micronutrients.

Data was collected using food frequent questionnaire with structured questions organized into Four sections as follows, (I) demographic characteristics of respondents (II) questions related to habitual diet (III) eating patterns and (IV) Anthropometric measures. The selected respondents were interviewed basing on the structured questions. Pupils were encouraged to indicate food consumed over the past week that was not included in the list of food provided. The tool was first prepared in English and translated to Kiswahili, a medium language for easy communication.

### **3.9 Investigation tools and validity and reliability issues**

Tool for data collection was the food frequent questionnaire with structured questions. Content validity and relevance of the tool was pre-tested among school children in one non-participating primary school found in the study area. Suggestions and shortcomings that were observed during pre-test study were taken into consideration, and finally, a comprehensive questionnaire for the study was finalized.

### **3.10 Data analysis**

#### **3.11 Data entry**

Data were entered, cleaned by getting rid of extra spaces, spell checking and select and treat all blank cells and coded by using excel then transferred to SPSS version 23 for analysis.

#### **3.12 Data processing and analysis**

Data analysis was done using SPSS version 23 as it could take data from almost any type of file and use them to generate tabulated reports, charts and plots of distribution and trends and performed highly complex data manipulation and analysis with simple instructions.



**Univariate data analysis;** during descriptive analysis, continuous variables were summarized using mean and standard deviation while categorical variables were summarized using proportions, then presented in tables and graphs. Frequency distributions were used to describe socio-demographic variables sex, age, and type of school attended, amount of money given to spend at school.

**Bivariate Analysis;** Bivariate analysis was undertaken to test for associations between the dependent variable, overweight and the independent variables, eating patterns and eating frequency using Pearson's chi-square of Fischer's exact test where appropriate.

**Multivariable analysis;** all variables which showed an association using bivariate analysis (p-value <0.2) were fitted into the multiple logistic regression model by the stepwise (forward selection) method to test for the association of each with the dependent variable at the 95% confidence level. The P-values and 95% confidence intervals (CI) for adjusted odds ratios (AOR) were used to confirm significance of the associations. P-values less than 0.05 were considered statistically significant.

### **3.13 Ethical issues**

Ethical clearance to use human subjects was obtained from the Muhimbili University of Health and Allied Sciences Human Studies Ethics Committee Ref. No. DA 282/299/01.C/789. Permit to visit schools was sought from Ilala district executive director. Prior to data collection parents/caregivers on invitation by the headmasters/headmistresses were informed and briefed about the objectives, significance, and benefits of the study. Parents/caregivers, who gave consent of their children's participation, had to sign the informed consent form to affirm their willingness. Parents who did not give consent, their children did not participate in the study. Verbal and written assent were obtained from each child before participation. Confidentiality of information was adhered to by using unique identification numbers on the data collection tools instead of respondent's names. Report results were disseminated to the head teachers of the participating schools, and respondents who were overweight and/or obese received nutritional counseling and dietary recommendations on how to maintain normal body weight. Nutritional education was given to all respondents.

## CHAPTER FOUR

### 4.0 RESULTS

#### 4.1 Socio-demographic characteristics

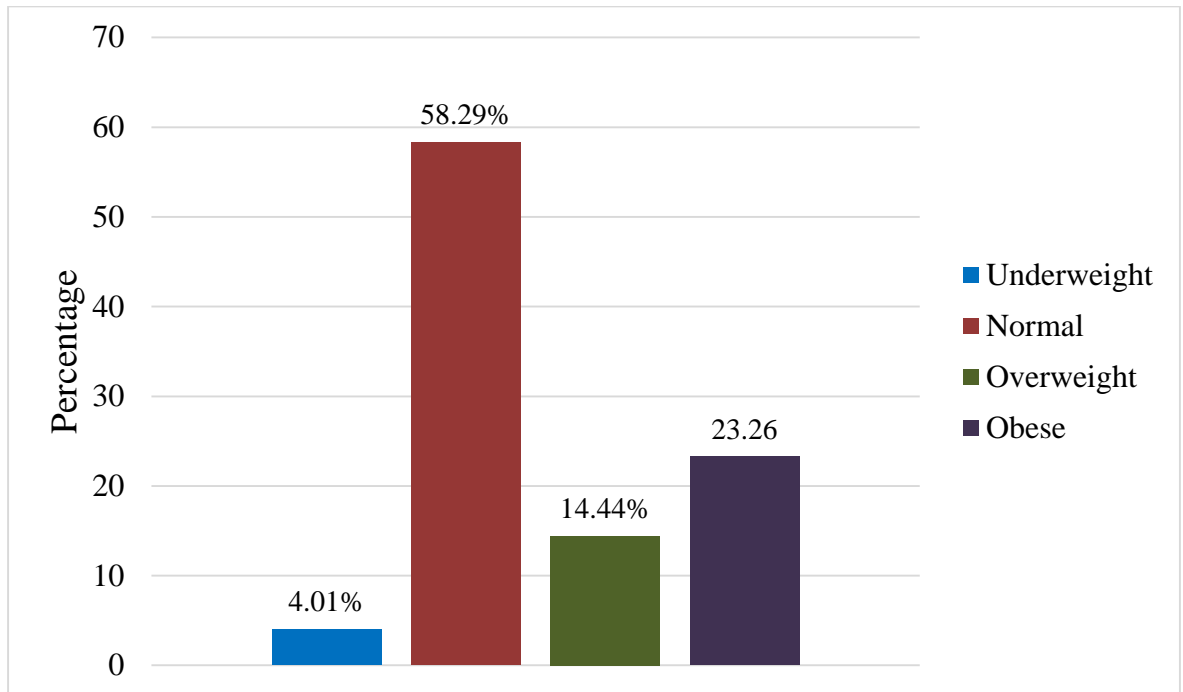
A total of 374 respondents were recruited and participated in the study. Where 206 (55.08%) were female. 188 (50.27%) were studying in private schools. Majority of the pupils 259 (69.25%) were aged 10-11 years. (Table 1)

**Table 1: Socio-demographic characteristics among primary school children aged 10-13 years in Ilala District, Dar es salaam, 2021, (N=374).**

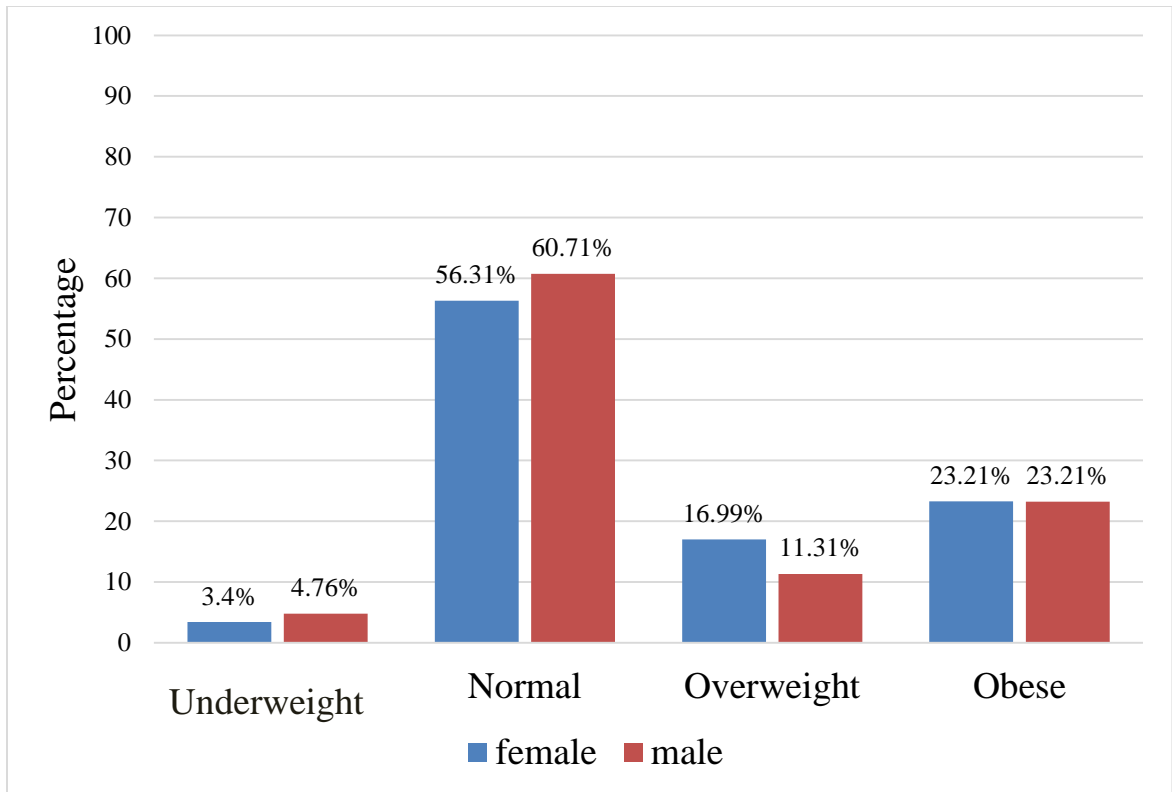
Variable	Frequency	Percentage
<b>Age</b>		
10 to 11	259	69.25
12 to 13	115	30.75
<b>Sex</b>		
Female	206	55.08
Male	168	44.92
<b>School type</b>		
private	188	50.27
government	186	49.73

## 4.2 Magnitude of overweight

Anthropometric measurements were taken from 374 respondents and BMI calculated. The mean BMI was 19.5 (4.5 SD). The prevalence of overweight and obesity among school children aged 10-13 years was 14.44% and 23.26% respectively.



**Figure 2: Magnitude of overweight among primary school children**



**Figure 3: BMI distribution by sex**

### 4.3 Bivariate analysis

Association between food patterns, eating frequency and overweight among school children aged 10-13 years were analyzed using SPSS and the variables with P-value  $<0.05$  were considered significantly related to the outcome (overweight) at 95% CI. Odds ratio was used as the measure of association between the independent factors and the dependent factor.

#### 4.3.1 Food patterns associated with overweight

Table 3 shows the variables of food patterns and their association with overweight. Respondents who had high consumption of high calorie foods had 7 times higher odds of being overweight compared to respondents who had low consumption of high calorie foods (COR=7, 95% CI: 2.8, 18.5). Respondents who consumed moderate amount of high calorie foods had 1.38 times higher odds of being overweight compared to respondents who had

low consumption of high calorie foods (COR = 1.38, 95% CI: 0.6, 3.4) although not statistically significant. Respondents who had high consumption of sugar sweetened beverages had 4.1 times higher odds of being overweight compared to respondents who had low consumption of sugar sweetened beverages (COR=4.1, 95% CI: 1.69, 9.95). Respondents who consumed moderate amount of sugar sweetened beverage had 1.5 times higher odds of being overweight compared to respondents who had low consumption of sugar sweetened beverages (COR=1.5, 95% CI: 0.69, 3.32) although not statistically significant. Respondents who had high consumption of natural foods such as fruits, vegetables and natural fruit juices had 0.02 times higher odds of not developing overweight compared to respondents who had low consumption of natural foods (COR=0.02, 95% CI: 0.009, 0.08). Respondents who consumed moderate amount of natural foods had 0.03 times higher odds of not developing overweight compared to respondents who had low consumption of natural foods (COR = 0.03, 95% CI: 0.003,0.115). Other eating patterns like consumption of staple foods, foods bought at school and foods provided at school were not statistically significant associated with overweight.

**Table 2: Food patterns associated with overweight among primary school children aged 10-13 years in Ilala District, Dar es salaam 2021, (N=374).**

Eating patterns	Overweight		OR(95% C.I)	P-value
	Yes (%)	No (%)		
<b>High calorie food</b>				0.00
High consumption	21(39.6)	32(60.4)	7(2.8,18.5)	
Moderate consumption	23(11.3)	180(88.7)	1.38(0.6,3.4)	
Low consumption	10(8.5)	108(91.5)	reference	
<b>Sugar sweetened beverages</b>				0.00
High	17(29.8)	40(70.2)	4.1(1.69,9.95)	
Moderate	24(13.4)	155(86.6)	1.5(0.69,3.32)	
Low	13(9.4)	125(90.6)	reference	
<b>Natural food</b>				0.00
High	5(2.6)	185(97.4)	0.02(0.009,0.08)	
Moderate	2(2.4)	82(97.6)	0.03(0.003,0.115)	
Low	47(47)	53(53)	reference	
<b>Staple food</b>				0.57
High	4(10.3)	35(89.7)	0.53(0.12,1.95)	
Moderate	38(4.2)	229(85.8)	0.77(0.37,1.74)	
Low	12(17.7)	56(82.3)	reference	
<b>Food bought at school</b>				0.01
Fried snacks	21(10.4)	181(89.6)	0.19(0.06,0.72)	
Sugary beverages	10(18.9)	43(81.1)	0.39(0.1,1.64)	
Confectionaries	6(37.5)	10(62.5)	reference	
<b>Food provided at school</b>				0.41
Carbohydrate rich	54(14.5)	316(85.4)	0.68(0.07,34.27)	
Protein rich	0	4(100)	Reference	

#### **4.3.2 Eating frequency associated with overweight**

Table 3 shows the variables of eating frequency and their association with overweight. Respondents who consumed fried snacks for breakfast such as buns, pancakes and the alike had 18.2 times higher odds of being overweight compared to respondents who consumed non-fried snacks such as bread, boiled yams and sweetpotatoes for breakfast (COR=18.2, 95% CI: 6.96, 59.78). Other frequency related factors such number of meals eaten per day, consumption of breakfast before going to school, number of times of taking breakfast per week, food type carried to school and frequency of buying foods sold at school per week were not statistically significant associated with overweight.

**Table 3: Eating frequency associated with overweight among primary school children aged 10-13 years in Ilala District, Dar es salaam 2021, (N=374).**

Eating frequency	Overweight		OR(95% C.I)	P-value
	Yes (%)	No (%)		
<b>Meals per day</b>				0.12
More than 3	16(19.75)	65(80.25)	1.65(0.81,3.26)	
Less than or equal to 3	38(12.97)	255(87.03)	Reference	
<b>Breakfast before going to school</b>				0.30
Yes	38(15.83)	202(84.17)	reference	
No	16(11.94)	118(88.06)	0.72(0.36,1.39)	
<b>Days breakfast taken before school/week</b>				0.93
5 days	30(15.87)	159(84.13)	reference	
Less than 5 days	8(15.38)	44(84.62)	0.96(0.36,2.35)	
<b>Breakfast preference</b>				0.00
Fried snacks	49(30.43)	112(69.57)	18.2(6.96,59.78)	
Non-fried snacks	5(2.35)	208(97.65)	reference	
<b>Foods carried to school</b>				0.54
Yes	13(12.62)	90(87.38)	0.81(0.38,1.63)	
No	41(15.13)	230(84.87)	reference	
<b>Type of food carried to school</b>				0.60
Protein rich	3(18.75)	13(81.25)	1.85(0.12,108.84)	
Carbohydrate rich	6(15.38)	33(84.62)	1.45(0.14,75.15)	
Fat rich	5(11.9)	37(88.1)	1.08(0.1,57.4)	
Fruits	0	8(100)	reference	
<b>Frequency of buying food at school/ week</b>				0.41
5 days	18(12.08)	131(87.92)	0.74(0.35,1.58)	
Less than 5 days	19(15.57)	103(84.43)	reference	



#### 4.4 Multivariable analysis

Table 4 shows multiple logistic regression analysis results. Factors with p-value less than 0.2 in bivariate analysis were incooperated in the model to assess for their individual effect on overweight while controlling for other factors. In the final multivariate logistic regression, the following were identified as factors independently associated with overweight among primary school children aged 10-13 years in Ilala District.

Respondents who reported to be taking fried food snacks for breakfast were almost twenty two times more likely to being overweight compared to respondents who reported to be taking non-fried breakfast snacks in the past one week (AOR= 21.6, 95% CI, 5.56, 84.01). The odds of being overweight were 1.23 times greater among respondents who reported to eat more than three meals per day compared to respondents who reported to eat only three meals per day (AOR= 1.23, 95% CI, 0.32, 4.76). The odds of being overweight were 60% higher for respondents who reported to buy fried snacks at school as compared to respondents who reported to buy confectionaries such biscuits, chocolates, cakes and sweet at school (AOR= 0.06, 95% CI, 0.01, 0.45). The odds of becoming overweight were 21% higher among respondents who reported to buy sugar sweetened beverages such as sodas, packed juices and energy drinks as compared to respondents who bought confectionaries while at school (AOR= 0.21,95% CI, 0.03, 1.67). Respondents who reported to have high consumption of natural foods such fruits, vegetables and fresh fruit juices were 30% less likely to become overweight compared to respondents who reported to have low consumption of natural foods (AOR= 0.03, 95% CI, 0.01, 0.11). Respondents who reported to have moderate consumption of natural foods such fruits, vegetables and fresh fruit juices were 20% less likely to become overweight compared to respondents who reported to have low consumption of natural foods (AOR= 0.02, 95% CI, 0.004, 28.34). Respondents who reported to have high consumption of high calorie foods were almost three times more likely to become overweight compared to respondents who reported to have low consumption of high calorie foods (AOR= 2.62, 95% CI, 0.49, 13.89). Respondents who reported to have moderate consumption of high calorie foods showed no significant difference in developing overweight compared to respondents who reported to have low consumption of high calorie foods (AOR= 1.23, 95% CI, 0.30, 4.99). (Table 4).

**Table 4: Multiple logistic regression: Independent predictors of overweight among school children aged 10-13 years in Ilala District, Dar es salaam 2021, (N=374)**

<b>Variable</b>	<b>Adjusted OR</b>	<b>95% CI</b>	<b>P-value</b>
<b>Breakfast preference</b>			
Non fried food	reference		
Fried food	21.6	(5.56, 84.01)	0.00
<b>Meals per day</b>			
More than 3	1.23	(0.32, 4.76)	0.76
Less than or equal to 3	reference		
<b>Food bought at school</b>			
Fried snacks	0.06	(0.01, 0.45)	0.01
Sugary beverages	0.21	(0.03, 1.67)	0.14
Confectionaries	reference		
<b>Natural food</b>			
High	0.03	(0.01, 0.11)	0.00
Moderate	0.02	(0.004, 28.34)	0.99
Low	reference		
<b>Sugar sweetened beverages</b>			
High	6.61	(1.29, 33.80)	0.02
Moderate	3.49	(0.95, 12.78)	0.06
Low	reference		
<b>High calories food</b>			
High	2.62	(0.49, 13.89)	0.26
Moderate	1.23	(0.30, 4.99)	0.78
Low	reference		

## CHAPTER FIVE

### 5.0 DISCUSSION

In this chapter, we will discuss the significant variables that are associated with overweight among school children. The aim of the study was to determine the magnitude of overweight and associated eating patterns among primary school children aged 10-13 years in Ilala District. Four distinct dietary patterns were established among respondents sugar sweetened beverages (SSB), staple foods (SF), natural foods (NF) and high calorie foods (HF). The SSB was characterized by intake of energy drinks, soft drinks, and any sugar/sweetener added drink other than natural drinks. The SF was characterized by consumption of cereals and grains, cooked bananas and legumes. NF was characterized by intake of vegetables, fruits and fresh fruit juices. HF characterized by consumption of foods high in fat, salt and low in fiber.

#### **Prevalence of overweight among primary school children aged 10-13 years in Ilala District**

In this study, the magnitude of overweight among primary school children was found to be 14.44% and the magnitude of obesity was 23.26%. Almost a Similar magnitude of overweight 15.9% was reported by Pangani I, *et al* but the magnitude of obesity revealed by this study was higher compared to that reported Pangani I, *et al* of 6.7% in a study conducted in Dar es salaam city among school children aged 8-13 years(2).

Other studies done in Dodoma and Kinondoni among a similar population had reported the magnitude of overweight to be 4.2% and 8.6% respectively(42). Another study by Haji C, *et al* in Urban Arusha, Tanzania among 7-17 year old school children reported the prevalence of overweight to be 5.1%(43). In a study done by Renatha p, *et al* in sub-Saharan Africa, reported the prevalence of overweight and obesity to be more than 10% in many African countries including South Africa, Uganda, Cameroon, Nigeria and Ethiopia(20) which is in consistent with the findings from this study. The 2018 Global Nutrition report, reported the prevalence of overweight among boys and girls was 4.6% and 4.7% respectively, globally. While in Africa 2.5% and 3.9% of boys were overweight(20).

In contrary to the findings from this study, were the prevalence of overweight was high among girls than boys, 16.09% and 11.31% respectively. But similar to the global prevalence, which shows higher prevalence among girls compared to boys.

Differences and similarities in prevalence were attributed by difference and similarity in study methodology, study age population and difference in study geographical areas. The prevalence of overweight of this study proves the existence of the problem and calls for attention and appropriate intervention.

### **Food patterns associated with overweight among school children aged 10-13 years in Ilala District**

The study also found that, respondents who reported to buy fried snacks at school were 60% more likely to become overweight compared to respondents who reported to buy confectionaries while at school. Whereas respondents who reported to buy sugar sweetened beverages were 21% more likely to develop overweight as compared to who bought confectionaries at school. These findings are comparable with a scoping review study that assessed the drivers of overweight and obesity studies conducted in Africa (11). Also other studies by T. Mosha and S. Fungo conducted in Dodoma and Moshi Municipalities (42), Kaiyuan M., *et al*(21) and Pacific *et al*(20) reported on sugar sweetened beverages and snacking on high fat foods that are mainly sold at schools to be associated with overweight among school children. This might be due to high availability and affordability of such foods around most school environments.

In this study, respondents who had high consumption of natural foods were 30% more protected against overweight compared to respondents who had low consumption of natural foods. Similar previous findings were reported by Martha J, *et al* in a study conducted among pre-adolescents attending schools in Midwest revealed majority of students, more than 50% reported that their intake of fruits and vegetables was less than three days per week(44).

Respondents who reported to have high consumption of sugar sweetened beverages were almost 7 times more likely to become overweight compared to respondents who had low

consumption of sugar sweetened beverages. Also respondents who reported moderate consumption were 3 times more likely to become overweight compared to respondents who had low consumption. These findings are consistent with other findings from literatures, a study conducted in China by Kaiyuan M, *et al* among pre-school children in Dongcheng District of Beijing (21), Desmond Broderick and Gerry Shiel in Dublin Ireland among primary school children(45), Roxana T, *et al* in a study conducted in Puerto Rico among a group of 12 years children from four public schools in an assessment on physical environment, diet quality and body weight. They found significant association between sugar sweetened beverages and a higher risk of overweight/obesity.

### **Eating frequency associated with overweight among school children aged 10-13 years in Ilala District**

Respondents who reported to take breakfast with fried snacks were twenty one times more likely to develop overweight compared to respondents who reported to take non-fried snacks for breakfast. A study done by Cicy Li, (32) observed significant association between types of snacks taken for breakfast and overweight which is consistence to the findings from this study. Thus, consuming a low fat breakfast and snacks, such as cereals and fruits is a potential way to prevent overweight among children. Another research done by Anna Kawalec and Krystyna Pawlas among a group of polished children aged 7 to10 years in Poland, showed that, the number of children who usually (more than 5 times per week) take breakfast ate a sandwich for breakfast was 94 (47%), and that of those who habitually eat cereal and milk or porridge was 29 (14.5%). Only 7% of children consumed fruit or vegetables for breakfast daily, and 26.5% never ate fruit or vegetables for breakfast. Concluding that that most children eat breakfast regularly, but the meal composition and quality should be improved(46).

Surprisingly, respondents who had more than three meals per day were almost two times likely to become overweight compared to respondents who reported to eat only three meals per day. These findings are contrary to the findings in many literatures which showed that Children consuming three meals per day gain more weight compared with children consuming 7 meals per day including snacking. In a meta-analysis of 10 cross-sectional

studies in children concluded that those with the highest reported eating frequency had 22% lower odds of being overweight or obese as compared to those with the lowest reported eating frequency (OR: 0.78; 95% CI 0.66–0.94) (29). Timlin, *et al* reported inverse associations between breakfast frequency and BMI (30). Panagiota K., *et al* revealed that high eating frequency, as compared with the low eating frequency was associated with a beneficial effect regarding body weight status in children and adolescents (31). This could be due to the type and quantity foods taken for snacking. A large proportion of children who reported to have more than 3 meals per day, consumed carbohydrate and fat rich snacks such as potato chips that are carbohydrate rich and normally deep fried which may lead to weight gain.

### **5.1 Study strength**

The study revealed the magnitude of overweight and the significant associated eating patterns and eating frequency among school children aged 10-13 years in Ilala District

### **5.2 Study limitations and mitigations**

The use of FFQ which relies on respondent memory may have introduced recall bias which could have affected the findings. However, dietary intake assessments using FFQ have shown to be reliable in revealing usual food patterns intake which was the aim of the study. Respondents were scared of participating in the study as they thought it was among the COVID-19 vaccination procedures. After a clear elaboration of the study aims and procedure majority of them were willing to participate. Some of the parents did not consent for their children's participation thinking it was another way of administering COVID-19 vaccine. However by collaborating with the school teachers in communicating with parents giving clear explanations made the study successful.

## **CHAPTER SIX**

### **6.0 CONCLUSION AND RECOMMENDATION**

#### **6.1 CONCLUSION**

The prevalence of overweight (14.44%) and obesity (23.26%) among school children in Ilala District is high and requires attention and deliberate intervention strategies. High consumption unhealthy foods such as fried snacks and sugar sweetened beverages that are mostly sold in school environment, snacking on high calorie foods such chips and low consumption of natural foods such as fruits and vegetables were the main causes of overweight among school children. It is therefore recommended that moderation of foods sold around school environments so as to reduce the accessibility of junk foods and sugary beverages that are highly associated with overweight among school children, consumption of non-fried breakfast snacks such as cereals and eating between meals should consist of light meals such as pastas, fresh juices, fruits and vegetables served in small portion sizes.

#### **6.2 RECOMMENDATION**

This study strongly advices on the following to be done in addressing overweight among school children

- Children should be guided by parents and guardians and practice eating natural foods and drinks such as fruits and fresh juices that fulfill nutritional requirements rather than drinking sugar sweetened drinks.
- Parents should ensure high calorie foods that contain low nutritional value and sugar sweetened beverages should be consumed as occasional foods only.
- The school administration should limit and moderate foods sold around school environments by imposing strict rules that guide and limit food vendors on foods to sell so as to reduce the accessibility of junk foods and beverages that are highly associated with overweight among school children.
- The government should revise the primary school curriculums and incorporate food and nutritional education so that school children are well informed about healthy dietary choices and the consequences of unhealthy dietary options.

- Parents/guardians who provide their children with more than three meals per day should provide lighter meals such pastas, fruits and vegetables for snacking and served in small portion sizes.

### **6.3.1 Area for further research**

- Studies to estimate portion size associated with overweight among school children.
- More studies should be done in assessing obesity in the similar population as this study revealed a higher prevalence of obesity.
- More studies are needed to better understand how eating frequency is associated with overweight and obesity.



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**APPENDICES****Appendix I: QUESTIONNAIRE (English version)****MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED HEALTH SCIENCES****SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES****THE MAGNITUDE OF OVERWEIGHT/OBESITY AND ASSOCIATED EATING PATTERNS AND EATING FREQUENCY AMONG PRIMARY SCHOOL CHILDREN IN ILALA DISTRICT, 2021.**

I would like you to help me in answering the questions in this questionnaire. This is a survey, not a test. Your answers will help identify the eating patterns associated with overweight, hence help in making healthy food choices and improve nutritional status among school children of your age in Tanzania. Participation is voluntarily and your answers will remain confidential.

Thank you very much for your time.

Questionnaire number \_\_\_\_\_

Name of school \_\_\_\_\_

**PART I: DEMOGRAPHIC CHARACTERISTICS: please put a tick where appropriate**

1. Sex:

a) Male ( )

- b) Female ( )
- 2. How old are you?
  - a) 10 ( )
  - b) 11 ( )
  - c) 12 ( )
  - d) 13 ( )
- 3. Type of school attended
  - a) Private School ( )
  - b) Government School ( )

## **PART II: QUESTIONS RELATED TO DIETARY HABITS**

- 4. Are you given any money for buying food or drinks while at school or outside home?
  - a) Yes ( )
  - b) No ( )
- 5. If yes, on average how much money are you given per day?
  - a) 100-500
  - b) 550-1000
  - c) > 1000
- 6. How many times per week do you buy foods/ drinks sold in school or away from home?
  - a) Once
  - b) 2-4times
  - c) 5-7 times
  - d) Never

7. What foods do you usually buy at school or away from home? \_\_\_\_\_
8. Are you given lunch at school?
- a) Yes ( )
  - b) No ( )
9. If yes, what foods are you usually given at school? \_\_\_\_\_
10. Do you carry food from home to take to school?
- a) Yes ( )
  - b) No ( )
11. If yes, what foods do you usually take to school? \_\_\_\_\_
12. How many times do you eat per day?
- a) Once ( )
  - c) 2 times ( )
  - d) 3 times ( )
  - e) 5-7 times ( )
13. Do you usually take breakfast before going to school?
- a) Yes ( )
  - b) No ( )
14. If yes, on average how many days per week do you take breakfast?
- a) Once per week ( )
  - b) 2-4 days ( )
  - c) 5-7 days ( )
15. At what time in the morning do you take breakfast?



a) 6 am ( )

b) 7 am ( )

c) 8 am ( )

d) 10 am ( )

16. What type of foods do you usually prefer taking for breakfast? \_\_\_\_\_

**PART III: 7 days Food Frequency Questionnaire (FFQ) assessing FOOD TYPES and EATING FREQUENCY**

Please indicate whether you ate any of the following foods during the past one week and how often? (Please tick)

S/NO	Pattern Code	Food item	Frequency						
			> 5 times a week	4 times a week	3 times a week	2 times a week	Once per week	Not eaten at all	
17									
18	SF	Bread (white/brown)							
19	HF	<b>Fried breakfast snacks:</b> chapatti, vitumbua, sambusa, maandazi, Kebab/samosa/catlace							
20	SF	Boiled yams/cassava							
21	SF	Maize and beans (makande)							
22	SF	Porridge (maize or millet)							
23	SF	Rice and beans							
24	HF	<b>Spreadings:</b> mayonnaise, magarine, chocolate spread(nutella), peanut butter, jam							
25	HF	<b>Snacks (confectionaries):</b> cakes, biscuits, chocolates,							

		candies, lollipops, cookies						
26	SF	Pilau						
27	SF	Plain rice						
28	SF	Plantain						
29	HF	Meat (cow, goat, sheep)						
30	HF	Fish and seafood						
31	HF	Poultry						
32	HF	Eggs (fried/boiled)						
33	HF	Yoghurt						
34	NF	<b>Fruits</b> : Pineapple, Watermelon, Apple, Orange, Mango, Banana, Avocado ,pear, Pawpaw						
35	SSB	<b>Soft drinks</b> :(coca cola, fursana, apple punch, fanta etc), Tea, Coffee						
36	NF	Fresh milk						
37	NF	Flavoured milk						
38	HF	Fried potato/ chips, cassava, Burgers,						
39	HF	Fried chicken, mishikaki						
40	HF	Ice-cream/ ice-lollies						
41	SF	Peas, beans, choroko,						

		kunde, cowpeas, bambara, soya beans,						
42	SSB	Energy drink (Mo enery, redbull, azam energy etc.)						
43	SF	Ugali						
44	NF	<b>Fresh fruit juices:</b> Roselle juice, mango juice, pineapple juice, tropical juice etc						
45	HF	Fruit juice (packed)/ artificial juices						
46	NF	<b>vegetables:</b> <i>Amarantus</i> , spinach, chinese, tembele, majani ya maboga , cabbage, carrots etc						

#### **PART IV: ARTHROPOMETRIC MEASURES**

47. Weight.....Kg. (will be measured by researcher)

48. Height.....Cm. (will be measured by researcher)

BMI.....

**Appendix II: DODOSO (Toleo la kiswahili )****CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI****KITIVO CHA AFYA NA SAYANSI ZA JAMII**

**DODOSO LA UTAFITI WA UZITO MKUBWA KUPITA KIASI NA UHUSIANO NA  
VYAKULA KATI YA WANAFUNZI WA SHULE ZA MSINGI ZA HALMASHAURI YA  
WILAYA YA ILALA WENYE UMRI KATI YA MIAKA 10-13.**

Habari. Ningependa unisaidie katika kujibu maswali yaliyo katika dodoso hili. Huu ni utafiti, sio mtihani. Majibu yako yatasaidia kutambua tatizo la uzito mkubwa kupita kiasi na vyakula vinavyosababisha tatizo hilo miongoni mwa wanafunzi wa shule za msingi wa umri wa miaka 10-13. Katika Wilaya ya Ilala, Dar es salaam. Matokeo yatasaidia katika kuboresha hali ya lische miongoni mwa watoto wa shule wa umri kama wako Tanzania. Ushiriki ni kwa hiari na majibu yako yatabaki kuwa siri.

Asante sana kwa muda wako.

Dodoso namba \_\_\_\_\_

Jina la shule \_\_\_\_\_

**SEHEMU YA I: TAARIFA ZA AWALI: (tafadhali weka tick pale inapofaa)**

1. Jinsia
  - a) Me ( )
  - b) ke ( )

2. Una miaka mingapi ?

a) 10 ( )

b) 11 ( )

c) 12 ( )

d) 13 ( )

3. Aina ya shule unayosoma

a) Shule binafsi ( )

b) Shule ya Serikali ( )

### **SEHEMU YA II: MASWALI YANAYOHUSIANA NA LISHE**

4. Je, huwa unapewa fedha ya kununua chakula au vinywaji wakati ukiwa shuleni ?

a) Ndiyo ( )

b) Hapana ( )

5. Ikiwa ndiyo, kwa wastani ni kiasi gani cha fedha unachopewa kwa siku?

a) 100-500

b) 500-1000

c) > 1000

6. Ni mara ngapi kwa wiki unanunua vyakula/ vinywaji vinavyouzwa shuleni au mbali na nyumbani?

a) Mara moja kwa wiki ( )

b) Mara 2-4 kwa wiki ( )

c) Mara 5-7 kwa wiki ( )

7. Ni vyakula gani unavyonunua ukiwa shuleni au mbali na nyumbani? \_\_\_\_\_

8. Je, huwa mnapatiwa chakula cha mchana shuleni?

a) Ndiyo ( )

b) Hapana ( )

9. Ikiwa ndiyo, ni chakula gani huwa mnakula shuleni? \_\_\_\_\_

10. Je, huwa una beba chakula kutoka nyumbani kwa ajili ya kula ukiwa shuleni?

a) Ndiyo ( )

b) Hapana ( )

11. Ikiwa ndiyo, ni chakula gani huwa unabeba kwa ajili ya kula ukiwa shuleni?

\_\_\_\_\_

12. Unakula milo mingapi kwa siku?

a) Mlo mmoja ( )

b) Milo miwili ( )

c) Milo mitatu ( )

e) Milo 5-7 ( )

13. Je, huwa unapata kifungua kinywa kabla ya kwenda shule?

a) Ndio ( )

b) Hapana ( )

14. Kama Ndio, mara ngapi kwa wiki huwa unapata kifungua kinywa kabla ya kwenda shuleni?

a) Mara 1 kwa wiki

b) Mara 3 kwa wiki

c) Mara 5 kwa wiki

15. Muda gani asubuhi huwa unapata kifungua kinywa?

a) saa 12 asubuhi

b) saa 1 asubuhi

c) saa 2 asubuhi

d) saa 4 asubuhi

16. Ni vyakula gani unapenda kutumia kama kifungua kinywa? \_\_\_\_\_

SEHEMU YA III: Dodoso ya kutathmini aina za vya kula vilivyoliwa ndani ya siku saba (7) zilizopita.

Tafadhali onyesha kama ulikula chakula cha aina yoyote kati ya vifuatavyo katika wiki moja iliyopita na mara ngapi na ikiwa chakula ulichokula hakipo kwenye orodha, unaweza kuongeza



S/NO	Alama	Chakula	Ulaji wa chakula kwa wiki					
17			Zaidi ya mara 5 kwa wiki	Mara 4 kwa wiki	Mara 3 kwa wiki	Mara 2 kwa wiki	Mara 1 kwa wiki	Haki kuli wa kabisa
18	SF	Mkate						
19	HF	<b>Vitafunwa vya kukaangwa:</b> chapatti, vitumbua, sambusa, maandazi, Kebab/sambusa/						
20	SF	Viazi/mihogo/magimbi ya kuchemsha						
21	SF	Makande						
22	SF	Uji wa ulezi/ mahindi						
23	SF	Wali na maharage						
24	HF	<b>vipakio:</b> mayonnaise, siagi ya mafuta, siagi ya karanga, siagi ya chokleti (nutela), jamu						
25	HF	<b>Snacks (confectionaries):</b> keki, biskuti, chokleti, chama, pipi, biskuti za maziwa, bigii,cripsi, chauro,						

26	SF	Pilau						
27	SF	Wali mweupe						
28	SF	Ndizi						
29	HF	Nyama (ng'ome, mbuzi,)						
30	HF	Samaki						
31	HF	Kuku						
32	HF	Mayai(ya kukaanga/kuchemsha)						
33	HF	Maziwa mtindi yenye ladha						
34	NF	<b>matunda</b> :nanasi,tikitimaji, apple, chungwa, embe, ndizi parachichi, Papai n.k						
35	SSB	<b>Vinywaji vyenye sukari</b> :(coca cola, fursana, apple punch, fanta etc), chai, kahawa						
36	NF	Maziwa freshi						
37	NF	Maziwa mtindi						
38	HF	Viazi vya kukaanga/chips, mihogo, Baga,						
39	HF	Kuku wa kukaanga/mishikaki						
40	HF	Ice-cream za maziwa/za maji						
41	SF	njegere, maharage, choroko, kunde, karanga,						

42	SSB	<b>Vinywaji vya kuongeza nguvu:</b> (Mo enery, redbull, azam energy etc.)						
43	SF	Ugali						
44	NF	<b>Juisi za matunda asili:</b> juisi ya rosella, juisi ya embe, juisi ya nanasi, juisi ya matunda mchanganyiko, n.k.						
45	HF	Juisi za box/ zinazotengenezwa viwandani						
46	NF	<b>Mboga za majani:</b> mchicha, spinach, chinisi, tembele, majani ya maboga,kabichi n.k.						

#### SEHEMU YA IV: VIPIMO

47. Uzito.....Kg. (kupimwa na mtafiti)

48. Urefu.....Cm. (kupimwa na mtafiti)

BMI.....

**Appendix III: Consent form**  
**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 Pamela Silas Kipande a MPH student at Muhimbili University of Health and Allied Sciences (MUHAS) in the School of Public Health and Social sciences. I am doing research on the magnitude of overweight and associated eating patterns among school children aged 10-13 year in Dar-es-salaam city,Tanzania.

**The aim of the Study**

This study aims to determine the magnitude of overweight and associated factors among primary school children aged 10-13years in Dar es salaam city. Findings from this study will be helpful in planning appropriate nutritional interventions for this age group and in developing curriculum that will incorporate nutritional education in primary schools, helping children make informed decision on Food choices and promote healthy eating behaviors.

**Procedure**

I would like your child to participate in this study, because he/she is among the age group that is mainly affected by overweight hence his/her participation is important. If you allow him/her to participate he/she will be interviewed for about 10 minutes so as to provide information required and measurement of height and weight will be taken for BMI calculation. **Confidentiality**

Child's particulars will not be disclosed to anyone, the information collected will only be used to for this study. There will be no need for personal identity such as names, so as to protect your confidentiality.

#### **Right to refuse or withdraw**

It is your choice to allow/deny your child's participation in this study and you are free to withdraw him/her at any time. However, I encourage you to consent for his/her participation because the information she/he will provide is very important in this study.

#### **Benefits**

Participating in this study will benefit your child by knowing your nutritional status and all children who will be overweight will be given nutritional counselling and diet recommendation to help them manage their weight.

#### **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 my supervisor, Dr. Jane Mlimbila from MUHAS, P. O. BOX 65001, Dar es Salaam, mobile number +255713210174. 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 your child to participate? Put a tick in appropriate box

Agreed

NOT agreed

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

Signature of parent.....Date.....

Signature of researcher ..... Date.....

**Appendix IV: Informed Consent form (Swahili version)**

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI

NAMBA YA UTAMBULISHO

FOMU YA IDHINI YA KUSHIRIKI KATIKA UTAFITI

Naitwa Pamela Silas Kipande mwanafunzi wa MPH katika Chuo Kikuu cha Afya na Sayansi ya shirikishi Muhimbili (MUHAS) katika Shule ya Afya ya Umma na Sayansi ya Jamii. Ninafanya utafiti juu ya tatizo la uzito mkubwa kupita kiasi na jinsi linavyohusiana na mifumo wa kula miongoni mwa wanafunzi wa shule za msingi wa umri wa miaka 10-13.”katika Wilaya ya Ilala, iliyopo Jijini Dar es salaam.

DHUMUNI LA UTAFITI

Utafiti huu unalenga kubaini ukubwa wa tatizo la uzito kupita kiasi na namna unavyohusiana na ulaji wa vyakula miongoni mwa wanafunzi wa shule za msingi wa umri wa kati ya miaka 10-13.”katika Wilaya ya Ilala, Dar es salaam. Matokeo ya utafiti huu yatasaidia katika kupanga mikakati ya lishe kwa kundi hili na kutengeneza mtaala utakaojumuisha elimu ya lishe katika shule za msingi na kuwasaidia watoto kufanya

uamuzi sahihi juu ya uchaguzi wa chakula na kukuza tabia za kula vyakula vinavyo boresha afya.

#### UTARATIBU

Ningependa mtoto wako ashiriki katika utafiti huu, kwa sababu yeye ni miongoni mwa kundi la watoto umri kati ya miaka 10-13, ambalo linaathiriwa sana na uzito kupita kiasi hivyo ushiriki wake ni muhimu. Ukimruhusu kushiriki, atahojiwa kwa takribani dakika 10 ili kutoa taarifa zinazohitajika na vipimo vya urefu na uzito vitachukuliwa kwa ili kubaini uzito wake. Majibu ya mtoto hayatawekwa wazi kwa mtu yeyote, taarifa zilizokusanywa zitatumika tu kwa utafiti huu. Hakutakuwa na haja ya utambulisho wa kibinafsi kama vile majina, ili kulinda usiri wake.

#### HAKI YA KUKATAA AU KUJITOA

Ni uamuzi wako kuruhusu / kukataa ushiriki wa mtoto wako katika utafiti huu na uko huru kumwondoa wakati wowote. Hata hivyo, ninakuhimiza kukubali ushiriki wake kwa sababu habari anayotoa ni muhimu sana katika utafiti huu.

#### FAIDA

Kushiriki katika utafiti huu kutamnufaisha mtoto wako kwa kujua uzito wake kama unaendana na umri na jinsia yake kama ilivyo katika muongozo wa Shirika la Afya Duniani wote watakozidi uzito watapewa ushauri wa lishe na mapendekezo ya lishe ili kuwasaidia kudhibiti uzito wao.

#### HATARI

Hakutakuwa na madhara yoyote kwa motto wako kutokana na ushiriki katika utafiti huu

#### NANI WA KUWASILIANA NAYE

Kama una maswali yoyote unaweza kumuuliza mtafiti mkuu Pamela Silas Kipande, namba ya simu 0621 916694 au msimamizi wa utafiti Dr. Jane Mlimbila, Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, S.L.P 65001 Dar es salaam, simu +255713210174. Ikiwa



utakuwa na maswali juu ya haki za mtoto wako kama mshiriki unaweza kumpigia Dr. Bruno Sunguya mwenyekiti wa kamati ya chuo ya utafiti na uchapishaji, S.L.P 65001, Dar es salaam, simu +2552150302-6.

Nimesoma hii fomu na kuielewa. Nakubali mtoto wangu kushiriki katika utafiti huu.

Jina la Mzazi.....Sahihi ya Mzazi.....Date.....

Sahihi ya mtafiti ..... Date.....

## **Appendix V: Learners information and Assent letter**



Dear learner,

### **ABOUT THE STUDY**

Your school is one of the schools selected to participate in a study determining the magnitude of overweight and associated eating patterns among school children aged 10-13 years in Ilala district council. The Municipal Department of Education, the school head teacher and parents committee have given permission for the study to take place.

### **WHAT WILL HAPPEN?**

If you decide to take part in this study, you will be engaged in the following activities;

You will be asked to complete a Food Frequent Questionnaire that consists of three sections, the first section consists of demographic characteristics, that are your age, gender and type of school attended. The second section that requires you to recall the food and drinks (meals) consumed for the past seven days and the third section requires to take measurements of height (M) and weight (Kg) for BMI calculation that will be used to assess the nutritional status.

### **ARE THERE ANY RISK?**

There will be no any risk associated with this study.

### **IS IT A MUST TO PARTICIPATE?**

NO, taking part in this study is completely voluntary. If you choose not to participate in the study there will be no negative consequences. However your participation is important in order to obtain data and gain a better understanding on how school children of your age are affected by the issue addressed and plan for appropriate intervention.

**WHAT ABOUT THE RESULTS OF THE STUDY?**

We will not use your name on the questionnaire, parents, teachers and other school staff will NOT know how you responded to the questions and the anthropometrics measures taken. No information will be given to anyone about any individual learner’s involvement with any activities. The results will be used to plan for the appropriate nutritional intervention.

**WHOM TO CONTACT**

In case of any inquiry please contact the Principal Investigator Miss Pamela Silas Kipande, mobile number 0621 916694 or my supervisor, Dr. Jane Mlimbila from MUHAS, P. O. BOX 65001, Dar es Salaam, mobile number +255713210174. 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)

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 VI: Learners information and Assent letter (Swahili version)**



### **KUHUSU UTAFITI**

Shule yako ni moja ya shule za msingi za wilaya ya Ilala zilizochaguliwa kushiriki katika utafiti juu ya “ukubwa wa uzito kupita kiasi na namna inayohusiana ulaji wa vyakula miongoni mwa wanafunzi wa shule za msingi wa umri wa miaka 10-13.” Ofisi ya manispaa ya Ilala na Mwalimu mkuu wametupatia ruhusa ya kufanya utafiti huu, ambao unafanyika katika shule za manispaa hii, na shule unayosoma ni miongoni mwa shule iliyo chaguliwa. Hivyo Unaombwa kushiriki katika utafiti huu.

### **JE, NINI KITATOKEA?**

Ikiwa mzazi/mlezi wako amepokea taarifa zilizoko kwenye fomu inayokuruhusu wewe kushiriki katika utafiti na kukubali ushiriki. Utaombwa kujibu maswali yaliyo kwa mfumo wa dodoso pamoja na kupima urefu na uzito itavyoweza kujua kiwango cha uzito wako. Wataalamu wa lishe watakusadia katika kujaza fomu hiyo kwa kukuuliza maswali yaliyopo katika dodoso na kujibu maswali yoyote utakayo kuwa nayo juu ya huu utafiti.

### **JE, KUNA HATARI ZOZOTE?**

HAPANA, hakutakuwa na hatari yoyote itayosababishwa na utafiti huu.

### **JE, NI LAZIMA KUSHIRIKI?**

HAPANA, kushiriki katika utafiti huu ni kwa ridhaa kabisa. Ikiwa utaamua kutokushiriki katika utafiti, hakutakuwa na madhara yoyote. Pia unaweza kutoshiriki kabisa ikiwa hutapenda. Lakini ushiriki wako ni wa muhimu sana ili kuweza kufahamu zaidi vyakula na ulaji unaopelekea uzito mkubwa kupita kiasi miongoni mwa wanafunzi.

**JE, MTU YEYOTE ATAFAHAMU MAJIBU YAKO?**

HAPANA, Hutatakiwa kuweka jina lako katika karatasi ya maswali. Wazazi, walimu, wafanyakazi na wanafunzi wengine hawatafahamu majibu uliyotoa.

**JE, NITAWEZA KUMUULIZA NANI KAMA NINA MASWALI KUHUSU UTAFITI?**

Kama una maswali yoyote unaweza kumuuliza mtafiti mkuu Pamela Silas Kipande, namba ya simu 0621 916694 au msimamizi Dr. Jane Mlimbila, Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili, S.L.P 65001 Dar es salaam, simu +255713210174. Ikiwa utakuwa na maswali juu ya haki zako kama mshiriki unaweza kumpigia Dr. Bruno Sunguya mwenyekiti wa kamati ya chuo ya utafiti na uchapishaji, S.L.P 65001, Dar es salaam, simu +2552150302-6.

Nimesoma hii fomu na kuielewa. Nakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki.....Date.....

Sahihi ya mtafiti ..... Date.....

## Appendix VII: Ethical letter



Ref. No.DA.282/298/01.C/789

Date: 30/07/2021

**MUHAS-REC-07-2021-789**

Pamela Silas Kipande,  
MPH -School of Public Health and Social Sciences  
**MUHAS**

**RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED:  
MAGNITUDE OF OVERWEIGHT AND ASSOCIATED EATING PATTERNS  
AMONG SCHOOL CHILDREN AGED 10-13 YEARS IN ILALA DISTRICT, DAR  
ES SALAAM-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: 30/07/2021

EXPIRATION DATE OF APPROVAL: 29/07/2022

**STUDY DESCRIPTION:**

**Purpose:**

The purpose of this analytical cross-sectional study is to determine the magnitude of overweight and associated eating patterns among school children aged 10-13 years in Ilala District Dar es salaam-Tanzania 2021.

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-%20852.pdf> and in the MUHAS archives.

## Appendix VIII: Permission Letter

**HALMASHAURI YA JIJILI DAR ES SALAAM**

DARUA ZOTE ZIPELEKWE KWA MKURUGENZI WA JIJILI

S.L.P. Na. 20950  
 Simu Na. 2128800  
 2128805  
 Fax Na. 2121486



OFISI YA MKURUGENZI  
 IMTAA WA MISSION  
 S.L.P. 20950  
 11883 – DAR ES

Kumb.Na. IMC/CP.24/VOL.II

09/08/2021

Mwalimu Mkuu,  
 Tusiime S/Msingi,  
 Muhimbili S/Msingi  
 St. Joseph S/Msingi,  
 Alala Boma S/Msingi  
 S.L.P 20950  
**DAR ES SALAAM.**

**YAH: KIBALI CHA KUFANYA UTAFTI MWANACHUO PAMELA SILAS  
 KIPANDE KUTOKA CHUO KIKUU CHA SAYANSI NA TIBA MUHIMBILI**

Husika na kichwa cha habari hapo juu

2. Mtajwa hapo juu ni Mwanachuo kutoka Chuo Kikuu cha Sayansi na Tiba Muhimbili anayetarajiwa kufanya utafiti kuhusu "uzito mkubwa kupitiliza kwa watoto wa miaka 10 -13.
3. Kibali kimetolewa kumrusu **Pamela S. Kipande** kufanya utafiti huo kuanzia tarehe 09/08/2021 hadi 30/09/2021.
4. Mpokee na kumpa ushirikiano ili aweze kukamilisha utafiti wake kwa ufanisi.
5. Nawatakia kazi njema

*Dorothy Mnyone*  
**K.n.y: AFISA ELIMU MSINGI**

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 IMTAA WA MISSION  
 S.L.P. 20950  
 11883 - DAR ES SALAAM