MAGNITUDE AND RISK FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG SECONDARY SCHOOL ADOLESCENTS IN KINONDONI MUNICIPAL, DAR ES SALAAM

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BY

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CERTIFICATION

The undersigned certify that they have read and at this moment recommends for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled: ***"Magnitude and risk factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal, Dar es Salaam",*** in fulfillment of the requirements for the degree of Masters of Public Health of Muhimbili University of Health and Allied Sciences.

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DECLARATION AND COPYRIGHT

I, **Frediana Edimundi Kimario** declare that this **dissertation** is my own original work and that it has not been presented to any other University for a similar or any other degree award.

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Foremost,I would like to thank God for giving me life and blessings along the way.My heartfelt appreciation goes to Dr.Rehema Chande Mallya and Ms. Rebecca Rabach for their mentorship and supervision, making time out of their busy schedules to mentor and supervise me during my research studies, and for being a strong pillar of support for me throughout my studies at MUHAS.To all my family and my friends, they have been very supportive and their encouragement and support have urged me to finish this work. My sincere gratitude also goes to all the head teachers and students in the various secondary schools where I collected the data.To Regional Administrative Secretary and Education Officer Kinondoni Municipal, thank you, and may the good Lord bless you for your continuous support. You have been a blessing in my life my mother, my brothers, my lovely sister Benedicta Peter Temu, and Elisante Ismail Maruchu and I will forever be grateful to you.

DEDICATION

This work is dedicated to my beloved parents and relatives**.**

ABSTRACT

Background: Overweight and obesity is a global public health issue that is becoming more prevalent in the younger generation. Globally prevalence of overweight and obesity among children and adolescents aged 5-19 has increased from 4% in 1975 to over 18% in 2016.

Broad objective: To determine the magnitude and risk factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal.

Methodology: A cross-sectional study was conducted among 4 secondary schools in Kinondoni Municipal from June to July 2024. The study involved a total of 400 secondary school adolescents in Kinondoni Municipal which was selected through a two-stage stratified sampling method. A structured questionnaire was used to collect information on socioeconomic factors, dietary habits, and physical activity factors. Also, anthropometric measurements were taken by using WHO standard procedures and BMI was calculated. Descriptive analysis was used to summarize data and regression models were estimated to determine factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal.

Results: The overall prevalence of overweight and obesity among secondary school adolescents in Kinondoni Municipal was 18.3% and 3.2% respectively . The majority (n=229; 57.3%) of the participants were female, while only (n=171; 42.8%) were male aged (15-19) years. Factors such as school type (p=<0.001), amount of money provided to the adolescents(p=0.043), type of sport engaged (p=0.027), frequency of watching television (p=0.047), Type of food purchased away from home(p=0.012) and consumption of soft drink (p= 0.021) were significantly associated with overweight/obesity among secondary school adolescents in Kinondoni Municipal.

Conclusions: The magnitude of overweight/obesity among secondary school adolescents is high which leads to public health concerns. Interventions aimed at promoting healthier food choices, reducing the availability of unhealthy food options outside the home environment, and educating adolescents about balanced nutrition can help to reduce the prevalence of overweight/obesity among adolescents.

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention (CDC)
FAO	Food and Agriculture Organization
SPSS	Statistical Package for Social Science
SD	Standard Deviation
SES	Socio Economic Status
TDHS	Tanzania Demographic and Health Survey
UNICEF	United Nations Children Emergency Fund
WHO	World Health Organization
MUHAS	Muhimbili University of Health and Allied Sciences

DEFINITION OF KEY TERMS

Adolescents	Transitional phase of growth and development between childhood and adulthood. WHO defines an adolescent as any person between ages 10 and 19 years.This study defined as a transition period aged between 15-19 years.
Anthropometric measurement	Are noninvasive quantitative measurements of the body .CDC define as body measurements such as height and weight in combination with age used to identify the nutrition status of adolescents.
Body Mass Index	is a medical screening tool that measures the ratio of height to weight to estimate the amount of body fat of a person. BMI is calculated by using weight in kilograms (kg) divided by the square of height in meters (m2).
Dietary habits	Refers to the habitual decisions of individuals or a group of people regarding what foods they eat.
Overweight and obesity	Defined as abnormal or excessive fat accumulation that presents a risk to health. A body mass index (BMI) over 25 is considered overweight, and over 30 is obese.

CHAPTER ONE:

1.0 INTRODUCTION

1.1 Background

The prevalence of overweight and obesity has raised significant concerns about public health(1). Overweight and obesity impacts people of all ages, genders, races, socioeconomic classes, and ethnicities. Adolescents overweight and obesity has grown to epidemic proportions with over 4 million people dying each year as a result of being overweight or obese(2). The rise of overweight and obesity is characterized by excessive body fat resulting from genetic factors, environmental factors, and lifestyle factors such as sedentary behaviors, unhealthy dietary habits, and lack of physical activity which can contribute significantly to the rise of overweight and obesity among secondary school adolescents (3). The consequences of adolescents being overweight and obese extend beyond physical health, impacting psychological well-being and increasing the risk of chronic diseases such as type 2 diabetes, hypertension, cancer, and cardiovascular diseases later in life (4).

Tanzania is one among the African countries currently experiencing rapid economic growth, urbanization, and nutrition transition which increase the prevalence of overweight and obesity among secondary school adolescents(5). According to Tanzania Demographic and Health Survey, the report shows that the prevalence of overweight and obesity among adolescents aged between 15-19 years is higher in urban areas than in rural(6). It is known that overweight and obesity are common in high-income countries but these conditions are now on the rise in low and middle-income countries, particularly in urban settings (7). Even though overweight and obesity were first more common in adults, over the past few decades, there has been a significant global increase in the prevalence of overweight and obesity among adolescents. This emerging issue is particularly impactful on the public health of adolescents in low and middle-income countries(8).

The study conducted in semi-rural Babati shows that the prevalence of overweight and obesity among adolescents is 9.2% (9). Additionally, a study conducted in Mwanza shows

that the prevalence of overweight and obesity among high school adolescents is 14.0% (10). Also, the study conducted among primary school children aged 7-17 years in urban, Tanzania reported that the prevalence of overweight and obesity was about 18%(11). Thus this health problem is distributed to different age groups especially both age groups living in urban areas so this study helped to determine factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal, Dar es Salaam.

1.2 Problem Statement

Being overweight and obese has continued to be a societal problem which represents a rapidly growing risk to the health of people in several countries(12). Globally prevalence of overweight and obesity among adolescents aged between 5-19 has increased from 4% in 1975 to over 18% in 2016. The rise of overweight and obesity among adolescents occurs equally in both boys (19%) and girls (18%)(13).

In Tanzania, the prevalence of overweight and obesity among adolescents aged between15-19 years is higher in urban areas compared to rural areas. It was reported that the prevalence of overweight and obesity among adolescents is 18% in urban and 9.2% in rural areas(11). The issue of adolescent overweight and obesity in developing countries was less acknowledged due to less availability of information about adolescent overweight and obesity(8). The consequences of adolescent overweight and obesity extend beyond physical health, impacting psychological well-being and increasing the risk of chronic diseases such as type 2 diabetes, hypertension, cancer, and cardiovascular diseases later in life (4).

Studies (8,9) done in Tanzania determine various factors contributing to overweight obesity among secondary school adolescents in urban and rural areas. The documented factors include socio-demographic factors, unhealthy dietary habits, and a decline in physical activity. Therefore, further information is needed to know the current trends of overweight and obesity among secondary school adolescents aged between 15-19 years since the last study was done five years ago this study helped to determine the magnitude and risk factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal, Dar es Salaam.

1.3 Conceptual Framework

In Figure 1, the conceptual framework shows the dependent and independent variables where by dependent variable involves overweight and obesity, and the independent variables involve factors associated with overweight and obesity which will be socioeconomic factors such as family income, parental education, parental occupation, dietary habits and level of physical activity.

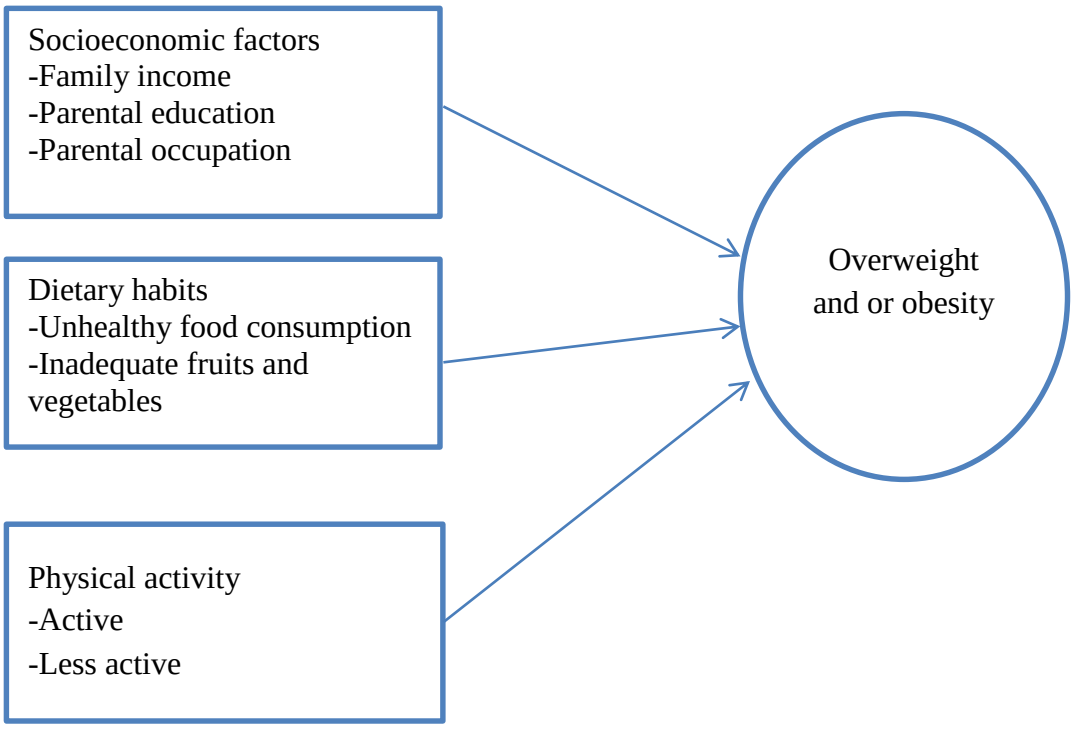


Figure 1: Conceptual Framework Adapted from Urie Bronfenbrenner(2020)

1.4 Rationale of the Study

In our communities, secondary school adolescents are among the age group where nutrition education is very important because they are the future generation, the findings of this study are expected to be relevant to the development of useful interventions intended to address the problem of overweight and obesity among secondary school adolescents hence they will be the role model to passing nutritional education to other age group so that we can have healthy generation in the future. The study will benefit secondary school adolescents, government, and nutrition stakeholders in developing policies and interventions to address the problem of overweight and obesity among secondary school adolescents

1.5 RESEARCH QUESTIONS

1.5.1 Main Question

What are the magnitude and risk factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal?

1.5.2 Specific Questions

1. What is the prevalence of overweight and obesity among secondary school adolescents in Kinondoni Municipal?
2. What are the socioeconomic factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal?
3. What are the dietary habits associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal?
4. What is the level of physical activity among secondary school adolescents in Kinondoni Municipal?

1.6 OBJECTIVES

1.6.1 Broad Objective

To determine the magnitude and risk factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal.

1.6.2 Specific Objectives

1. To detesrmine the prevalence of overweight and obesity among secondary school adolescents in Kinondoni Municipal.
2. To determine socioeconomic factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal.
3. To determine dietary habits associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal.
4. To determine the level of physical activity associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal.

CHAPTER TWO:

2.0 LITERATURE REVIEW

2.1 Prevalence of Overweight and Obesity Among Secondary School Adolescents

According to the World Health Organization reports indicate that a child aged between 5-19 years is considered to be overweight when their BMI for age is greater than +1 standard deviation (SD) equivalent to a BMI of 25kg/m^2 at 19 years and an obese when the BMI for age is greater than+2 standard deviation (SD) equivalent to BMI greater than 30kg/m^2 at 19 years above the WHO (13). Overnutrition is a major global health concern that affects children as well as adolescents. It is shown in the studies that the prevalence of obesity and overweight among adolescents has risen dramatically whereas the trends from 1975 to 2016 show the prevalence of overweight and obesity rising from 1% to 5% for girls and 8% for boys respectively(13).

WHO reported that in 2016 over 340 million children and adolescents aged between 5-19 years were obese(2). It is considered that overweight and obesity are only for developed countries but now even low and middle-income countries are also experiencing the rise of overweight and obesity among adolescents both boys and girls. According to a study conducted in Nigeria shows that the prevalence of overweight and obesity among adolescents was 1.4% and 6.6% (14). A similar study conducted in India reported that the prevalence of overweight and obesity among adolescents was 6.8% and 17.1%(15).

In Tanzania according to TDHS shows that the prevalence of overweight and obesity is higher in urban settings compared to rural settings about 18% and 9.2% respectively. A similar study conducted in Mwanza shows that the prevalence of overweight and obesity among high school adolescents was 14.0%(8). Additionally, a study conducted in Morogoro reported that the prevalence of overweight and obesity among school-age children was 18.3%(16)

2.2 Socioeconomic Factors Associated with Overweight and Obesity Among Secondary School Adolescents

2.2.1 Family Income

Socioeconomic status is often measured by looking at income, education, and the place where people live. Studies done in Morogoro indicate that in developed countries higher socio-economic status is linked to a lower rate of overweight and obesity, while in developing countries it's the opposite, with overweight and obesity more common among higher socio-economic status individuals (17).In traditional societies, being slim may be seen as a sign of being poor, while being overweight and obese can be associated with affluence. As income increases in these societies, diets often shift towards more high-fat and less healthy options.

In lower-income groups, diets tend to be more energy-dense with higher fat intake, as healthier foods are more expensive (18).Studies suggest that families from the lower SES groups engage in much more activity than those in professional groups. Further studies indicate that change in income has little effect on dietary structure in countries where income levels are already quite high for basic food needs. Income increases are spent on more elaborate packaging and processing of higher-quality foods rather than quantity of food.

In low-income groups, food demand is much more price and income-sensitive. Their diets have a propensity to be energy-dense with high fat intake a prominent feature is the more expensive vegetables, fruits, and whole grains cereals are eaten more in small amount(19). One's financial situation determines how much money they have to spend, which leads to eat too much foods high in fat and carbohydrates. These give off a lot of energy that is not used up, making the person more likely to become obese. Overweight and obesity are more common in lower socioeconomic groups in Britain. This is caused by a variety of factors, such as the availability and choice of food, and lifestyle factors like activity level and weight loss motivation (20).

2.2.2 Parental Education and Occupation

Adolescents' overweight and obesity are more likely linked to the education and occupation of parents. A study conducted in Nigeria reported that parents with formal education had a higher risk of their adolescents being overweight or obese compared to those without formal education. This increased risk is associated with higher incomes, which make it easier for them to access energy-dense foods and electronic devices promoting sedentary behavior, thereby increasing the likelihood of adolescents being overweight and obese (21)

2.3 Dietary Habits Associated with Overweight and Obesity Among Adolescents

Adolescence is the time when new dietary habits are acquired. Eating behaviors that are established during this time may persevere through adulthood(22). Their meals diet is often characterized by several specific behaviors such as eating away from home, high intake of fast foods, snacking, unhealthy diet, and skipping meals. These behaviors may induce adverse nutrition conditions including overweight and obesity. In various global regions, a noticeable transformation in eating patterns has emerged, driven by shifts in lifestyle influenced by urbanization, socio-economic development, and alterations in the food environment. This transition is marked by a rise in fast food consumption, eating out, increased snacking, and heightened intake of sweetened beverages(23).

An increase in snacking has been associated with skipping breakfast. Change in dietary intake patterns is characterized by shifting consumption to more energy-dense food instead of traditionally plant-based food. A research study conducted in Eastern Uganda indicates that the nutrition status of adolescents is linked to their dietary diversity. Additionally, the insufficient consumption of fruits and vegetables is a prevalent practice among adolescents, as observed in various countries due to nutrition transition, there is a need for information in this domain to uncover the dietary practices among adolescents (24).

2.4 Physical Activity Associated with Overweight and Obesity Among Adolescents

Physical activity is directly related to healthy weight status through increased energy expenditure. On the other hand, evidence suggests that overweight and obese adolescents are less active**.** An increase in urbanization and modernization are associated with the prevalence

of overweight and obesity among secondary school adolescents due to lifestyle changes, adolescents start living sedentary lives, especially in urban areas hence reducing the level of physical activity. Adolescents with less physical activity are more likely to become overweight or obese compared to those with active physical activity (21.6% and 10.9%) respectively(25)

CHAPTER THREE:

3.0 METHODOLOGY

3.1 Study Design

A quantitative cross-sectional study design was carried out because it is appropriate to measure the relationship between the prevalence of overweight and obesity and its associated factors at the same time(26).

3.2 Study Area

The study was conducted in Kinondoni Municipal in Dar es Salaam region . Dar es Salaam is located $6^{o}48'$ south, 39^{o} 17' East in Tanzania and covers approximately 1,590 square kilometers. It is surrounded by coastal regions in the Northern, Western, and southern parts and bordered by the Indian Ocean in the East. Kinondoni Municipal is among the three municipalities in the city with 143 secondary schools situated at the center admitting both private and government schools. The reason to conduct this study in Kinondoni Municipal is that according to a study conducted by Mwaikambo, the prevalence of overweight and obesity is higher among school-age children aged between 7-14 years in Kinondoni Municipal (27), this shows that there was a need to conduct a study in the area of adolescent age between 15-19 years who were attending day schools to determine risk factors associated with overweight and obesity among secondary school adolescents.

3.3 Study Population

The target population of this study was secondary school adolescents of both private and government schools aged between 15-19 years.

3.3.1 Inclusion and Exclusion Criteria

All secondary school adolescents aged between 15-19 years in Kinondoni Municipal were included in the study. Where by all secondary school adolescents who were severely ill and those who were absent during data collection, also adolescents who did not agree to participate in the study were excluded.

3.4 Sample Size and Selection

The sample size was calculated by using the Kish and Leslie population proportion formula

$$n = \frac{z^2 p(100-p)}{e^2}$$

n estimated sample size

z= percentage point of the normal distribution corresponding to the level of significance <5%,

z= 1.96

e= margin of error

p=Prevalence of overweight and obesity 40%(28)

$$n = \frac{(1.96)2 \times P \times (100-P)}{5^2}$$

$$n = \frac{(1.96)2 \times 40 \times (100-40)}{5^2}$$

$$n = 384$$

To account for non-response (10%) sample size was 400.

3.5 Sampling Techniques and Sampling Process

A two-stage stratified sampling method was used to select schools and students. In the first stage, A total number of 143 Secondary schools in Kinondoni Municipal were listed then followed by a random selection of 4 representative schools Kisauke, Maendeleo, Mbezi Beach, and Mtakuja Beach Secondary School. Then the selected school was divided into 4 strata which were form I, II, III, IV. The second stage was a random selection of students in each stratum within each school where in each stratum a random selection of 25 students was chosen to make a total of 100 students per school.

3.6 Variables

3.6.1 Dependent Variable

The dependent variable was overweight and obesity

3.6.2 Independent Variables

The independent variables were socioeconomic factors, dietary habits, and physical activity factors.

Table 1: Variables Involved in the Study and Their Measurement

Objective	Variables	Type	How to measure
To determine the prevalence of overweight and obesity among secondary school adolescents	Overweight and obesity	Dependent variables	BMI for age cut-off point A.Greater than +1(SD)=Overweight and obesity B.Less than one <1 (SD)=Others
To determine socioeconomic factors associated with overweight and obesity	Family income	Independent variables	A. High economic status B. Middle economic status C. Low economic status
	Parent occupation	Independent variables	A: Employed B: Unemployed C: Farmer D: Others
	Parent education	Independent variables	A: No education B: Primary education C: Secondary education D: High-level education
To determine dietary habits associated with overweight and obesity	Dietary habit	Independent variables	A: Healthy diet B: Unhealthy diet
To determine the level of physical activity associated with overweight and obesity	Physical activity	Independent variables	A: Active B: Less active

3.7 Data Collection Methods

Data was collected by using a questionnaire with structured questions on adolescent's socioeconomic factors, dietary habits, and physical activity factors. Participants were given to fill out the questionnaire on their own. Anthropometric measurements were collected using a stadiometer weighing scale and height scale. Data collection was conducted during school days in a comfortable environment.

3.7.1 Anthropometric Measurements

Anthropometric measurements were taken following the standard procedures using standard equipment namely UNICEF/WHO-approved weighing scale and height board. Measurements of weight were taken while participants were barefoot and with less and light clothes and the measurements and recorded to the nearest 0.1kg. Height was measured by using a Harpenden stadiometer (Holtain ltd-UK) which was placed against the wall firmly participants were required to remove their shoes and the result was recorded to the nearest 0.1cm.

3.7.2 Assessment of Adolescent Dietary Habits

Dietary habits were measured by using a food frequency questionnaire adopted from FAO 2013 which contains 5 food groups where participants were asked to recall the frequency of consumption of each food item every week.

3.7.3 Assessment of Adolescent's Physical Activity

The International Physical Activity Questionnaire (IPAQ,2002) was adopted where work-related physical activity questions were omitted and responses were grouped into active and less active physical activity.

3.8 Data Collection Tools

A questionnaire with structured questions was used to obtain the information from the participants. The tool had several sections including collecting respondent's sociodemographic and economic characteristics, dietary habits, physical activity, and anthropometric measurements results.

3.8.1 Validity and Reliability

To achieve validity and reliability, questions were designed in such a way that they captured relevant information for the research objectives. A pre-testing questionnaire was conducted on 4 secondary school adolescents to modify and remove the questions that seemed to be unclear or irrelevant(29).

3.9 Data Management and Analysis

The collected questionnaires were manually checked for accuracy and completeness before entering data into the computer. The data was carefully entered into the computer for cleaning and analysis by using Stata version 17. Analysis of data was done by using Stata version 17, Microsoft Excel, and WHO Anthro-plus to yield descriptive statistics on overweight and obesity, socioeconomic, dietary habits, and physical activity. Frequencies were produced for categorical variables and differences between proportions were examined using the chi-square test. Regression models were run and presented as adjusted odd ratios with their 95% confidence interval, and a p-value of <5% was used as a cut-off point for statistical significance.

Table 2: Summary of Data Analysis

No	Objectives	Data analysis technique
1	To determine the prevalence of overweight/Obesity among secondary school adolescents in Kinondoni Municipal.	Descriptive statistics (Frequencies and percentages)
2	To determine sociodemographic and economic factors associated with overweight and obesity among adolescents in Kinondoni municipal.	Bivariate analysis Multivariate analysis
3	To determine dietary habits associated with overweight and obesity among adolescents in Kinondoni Municipal.	Bivariate analysis Multivariate analysis
4	To determine the level of physical activity associated with overweight and obesity among adolescents in Kinondoni Municipal.	Bivariate analysis Multivariate analysis

3.10 Ethical Consideration

Before conducting research ethical clearance was requested from Muhimbili Univesity of Health and Allied Science (MUHAS)-IRB. Permission to conduct the study was requested from all relevant government authorities. Informed consent was obtained from parents/guardians and assent was given by the adolescents as required. Before data collection, adolescents were informed of the importance of the study and were requested to inform their parents. This was to encourage parents to sign the consent form. Anthropometric measurements were taken while ensuring privacy. Confidentiality of collected information was ensured by giving the participants numbers instead of writing their names and each participant was informed of his /her nutrition status.

CHAPTER FOUR

4.0 RESULTS

4.1 Socio-Demographic Characteristics

A total of 400 adolescents aged between 15 to 19 years were included in the study. The majority (n=229; 57.3%) of the participants were female, while only (n=171; 42.8%) were male. Most adolescents were enrolled in government schools (n=300; 75%). Each class level was equally represented in the study, with (n=100; 25%) of respondents from each class. Living arrangements showed that a majority, (n=220; 55%), lived with both parents. In terms of parental education, (n=131; 32.8%) of the fathers had secondary education, and (n=42; 10.5%) had no education. Similarly, (n=128; 32.0%) of mothers had secondary education, and (n=49; 12.3%) had no education. Regarding occupation, (n=127; 31.8%) and (n=139; 34.8%) of fathers and mothers were employed respectively. As shown in Table 3

Table 3: Socio-Demographic Characteristics (n=400)

Variables	n=400	%
Sex		
Male	171	42.8
Female	229	57.3
School Type		
Government	300	75
Private	100	25
School of respondent		
Mbezi Beach High School	100	25
Maendeleo Secondary	100	25
Mtakuja Beach Secondary	100	25
Kisauke Secondary School	100	25
Who do you live with		
Mother	68	17
Father	33	8.3
Both parent	220	55
Grandparent	39	9.8
Other relations	40	10
Father Education		
Primary education	112	28
Secondary education	131	32.8
University	69	17.3
No education	42	10.5
I don’t know	46	11.5
Mother's education		
Primary education	113	28.2
Secondary education	128	32.0
University	57	14.2
No education	49	12.3
I don’t know	53	13.3
Father's occupation		
Employed	127	31.8
Unemployed	65	16.3
Self employed	179	44.8
Others	29	7.2
Mother Occupation		
Employed	139	34.8
Unemployed	109	27.3
Self employed	131	32.8
Others	21	5.3

Source:Field Data (2024)

4.2 Prevalence of Overweight or Obese among Secondary School Adolescent

The assessment of nutritional status was based on the WHO Body Mass Index (BMI) cutoff point. Where, among the 400 adolescents surveyed, 18.3% were overweight, 3.2% of the participants were obese, while 63.5% had a normal nutrition status and 14.5% were underweight.

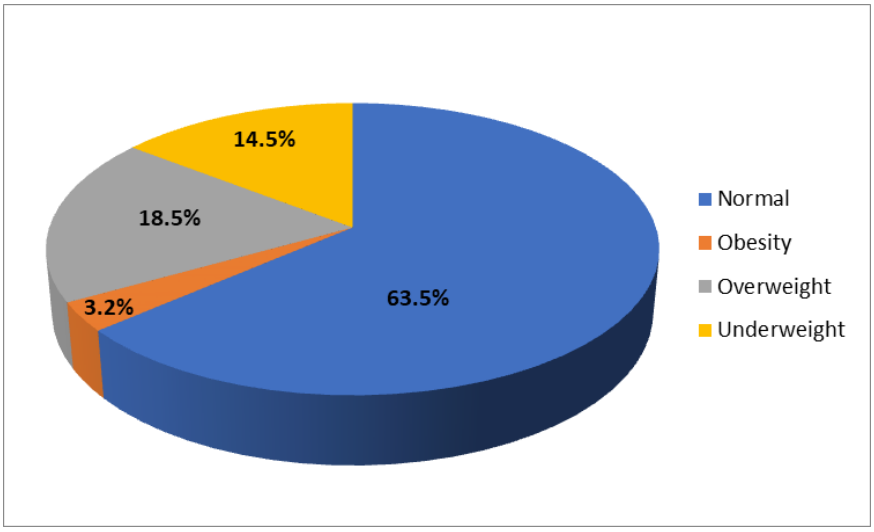


Figure 2: Prevalence of Overweight/Obese Among Secondary School Adolescent

4.3 Socio-Demographic and Economic Factors Associated with Overweight or Obese Among Secondary School Adolescent

Several socio-economic characteristics of the participants were explored to understand the most relevant factors that influenced overweight or obesity among adolescents. Whereas, in the bivariate analysis, only the type of school and amount of money provided to the child showed a significant association with a prevalence of overweight/obesity. Specifically, among the 100 adolescents in private schools, (n=37; 37%) were overweight or obese, compared to (n=51; 17%) of the 300 students in government schools p-value <0.001, and adolescents who received 3,050-4,000 Tanzanian Shillings per day had a higher prevalence of overweight/obesity (43.3%, n=13) compared to those who received 500-1,000 Tsh (n=34; 21.1%), p-value=0.011.

For the multivariable analysis, those factors that showed statistical significance (p-value<0.05) and those that had (p-value<0.2), were included to assess for independent association and adjust for potential confounding. In the analysis, both the type of school and the amount of money provided to the child retained their significance. With, students in

private schools and adolescents who received 3,050-4,000 Tsh. had 2.46 and 1.65 higher odds of being overweight or obese compared to their counterparts in government schools (Adjusted OR=2.46, 95% CI: [1.34 - 4.51]), p-value=0.004 and those receiving 500-1,000 Tsh (Adjusted OR=1.65, 95% CI: [1.56 - 4.14]), p-value= 0.043 respectively. As shown in Table 4

Table 4: Socio-Demographic and Economic Factors Associated with Overweight or Obese among adolescent (n=400)

Variables	n=400	Overweight /Obese n=88	p-value	Multivariate analysis	
				Adjusted OR, 95% CI	p-value
Sex					
Male	171	29 (17.0)	0.352		
Female	229	59 (25.8)			
School Type					
Private	100	37 (37.0)	**< 0.001***	2.46 (1.34 - 4.51)	**0.004***
Government	300	51 (17.0)		Reference	
Father Education					
Primary education	112	26 (23.2)			
Secondary education	131	30 (22.9)			
University	69	17 (24.6)	0.757		
No education	42	8 (19.0)			
I don't know	46	7 (15.2)			
Mother's education					
Primary education	113	23 (20.4)		1.96 (0.68 - 5.72)	0.213
Secondary education	128	27 (21.1)		1.61 (0.56 - 4.69)	0.378
University	57	19 (33.3)	0.059	2.91 (0.92 - 9.29)	0.07
I don't know	53	14 (26.4)		2.75 (0.88 - 8.62)	0.082
No education	49	5 (10.2)		Reference	
Father's occupation					
Employed	127	34 (26.8)		1.25 (0.54 - 2.89)	0.599
Self employed	179	34 (19.0)		1.01 (0.45 - 2.27)	0.975
Others	29	10 (34.5)	0.075	2.69 (.94 - 7.72)	0.064
Unemployed	65	10 (15.4)		Reference	
Mother Occupation					
Employed	139	32 (23.0)			
Unemployed	109	25 (22.9)	0.279		
Self-employed	131	30 (22.9)			
Others	21	1 (4.8)			
Amount of money per day (Tsh)/Pocket money					
3050-4000	30	13(43.3)		1.65 (1.56 - 4.14)	**0.043***
2050-3000	69	18 (26.1)		1.08 (0.54 - 2.18)	0.823
1050-2000	140	23 (16.4)	**0.011***	0.62 (0.33 - 1.16)	0.136
500-1000	161	34 (21.1)		Reference	

Source:Field Data(2024)

4.4 Dietary Habits Associated with Obesity Among Secondary School Adolescent

In the assessment of dietary habits, several factors were explored including, the number of meals per day, type of food consumed, frequency of consumption of certain foods, and type of foods purchased when not home. In the bivariate analysis, these factors were explored individual in relation to outcome of interest (overweight or obese). Where the frequency of purchasing food or drinks away from home (p-value=0.031**)**, type of food purchased (p-value=0.042**)**, frequency of consuming fruit **(**p-value=0.041**)**, vegetables **(**p-value=0.049**)**, and soft drinks (soda) (p-value=0.002**)**, showed to have statistical significance with overweight/obesity.

Further in the multivariable analysis, similar conditions were used as an analysis of the socio-demographic and economic factors. In this analysis frequency of purchasing food or drinks away from home and, the frequency of consuming fruit and soft drinks (soda) retained an independent association. Specifically, adolescents who bought food or drink away from home 4-7 times per week were 68% likelier to be overweight or obese compared to those who purchased once (Adjusted OR=1.68; 95% CI [1.25 - 3.75], p-value=0.012. Where, adolescents who never consumed fruits had a higher prevalence of overweight/obesity at (n=31; 25.4%) and were 1.41 more likely to be overweight or obese compared to those who consumed every day (Adjusted OR=1.41, 95% CI [1.26 - 3.52], p-value=0.045. Additionally, adolescents consuming soft drinks (soda) every day and those consuming it 4-6 days per week were 3.79 and 3.46 times more likely to be overweight or obese compared to those who never drunk soft drinks respectively. As shown in Table 5

Table 5: Dietary Habits Associated with Obesity Among Secondary School Adolescent (n=400)

Variables	n=400 (%)	Overweight /Obese n=88	p-value	Multivariate analysis	
				Adjusted OR, 95% CI	p-value
Purchase food/drink away from home					
4-7 times	194	44 (22.7)		1.68 (1.25 - 3.75)	**0.012***
2-3 times	142	35 (24.6)	**0.031***	1.83 (1.79 - 4.20)	**0.004***
Once	64	9 (14.3)		Reference	
Type of food purchased away from home					
Fried food	243	59 (24.3)		1.69 (0.76 - 3.78)	0.194
Soda	100	19 (19.0)	**0.042***	1.27 (0.52 - 3.14)	0.593
Fruits and Vegetables	57	9 (15.8)		Reference	
Fruit Consumption/Week					
Never	122	31 (25.4)		1.41 (1.26 - 3.52)	**0.045***
1-3 days	161	37 (23.0)	**0.041***	1.26 (0.51 - 3.13)	0.616
4-6 days	79	12 (15.2)		0.70 (0.25 - 1.99)	0.505
Every day	38	8 (21.1)		Reference	
Vegetable Consumption/Week					
Never	29	8 (27.6)		1.31 (0.45 - 3.82)	0.615
1-3 days	189	36 (19.0)	**0.049***	0.69 (0.35 - 1.38)	0.300
4-6 days	120	28 (23.3)		0.93 (0.45 - 1.92)	0.842
Every day	62	16 (25.8)		Reference	
Fried Food Consumption/Week					
Every day	164	33 (20.1)			
4-6 days	126	27 (21.4)	0.194	0.7 (0.37 - 1.32)	0.278
1-3 days	110	28 (25.9)		0.7 (0.39 - 1.27)	0.247
Soft drink Consumption (Soda)/ week					
Every day	154	39 (25.3)		3.79 (1.45 - 11.95)	**0.021***
4-6 days	140	32 (22.9)	**0.002***	3.46 (1.41 - 19.19)	**0.024***
1-3 days	93	16 (17.2)		2.09 (0.24 - 18.36)	0.505
Never	12	1 (8.3)		Reference	

Source: Field Data (2024)

4.5 Physical Activity Associated with Obesity Among Secondary School Adolescent

The study also examined the association between physical activity and overweight or obesity among adolescents. Where the only factors that showed significance were the type of sport an adolescent engaged in and the frequency of watching television (TV). Adolescents who played football had a lower prevalence of overweight/obesity at (n=29; 16.7%) in comparison to those who didn't engage in sport (n=36; 25.2%), p-value=0.017. Those who watched TV every day (n=44; 26.1%) had a high prevalence of overweight or obese in comparison to those who never watch TV (n=4; 15.8). These association retain their significance in the multivariate analysis. Adolescents who played football had 39% lesser odds of being overweight or obese compared to those who didn't participate in any sports activity (Adjusted OR=0.61, 95% CI; [0.13 - 0.91]), p-value=0.027. As shown in Table 6

Table 6: Adolescent Physical Activity Associated with Overweight and Obesity (n=400)

Variables	n=400 (%)	Overweight /Obese n=88	p-value	Multivariate analysis	
				Adjusted OR, 95% CI	p-value
Walk at least 30 min/day					
No	16	6 (37.5)	0.127	2.25 (0.79 - 6.46)	0.13
Yes	384	82 (21.4)		Reference	
Type of Sport engaged					
Football	174	29 (16.7)		0.61 (0.13 - 0.91)	**0.027***
Netball	61	13 (21.3)	**0.017***	0.83 (0.41 - 1.72)	0.625
Others	21	10 (47.6)		2.89 (0.36 - 7.07)	0.088
Don't play at all	143	36 (25.2)		Reference	
Watching Television/week					
Everyday	171	44 (26.1)		1.61 (1.13 - 4.93)	**0.047***
2-3 days	79	20 (25.7)		1.83 (0.53 - 9.72)	0.125
4 - 5 days	95	19 (20.3)	**0.041***	1.23 (0.27 - 6.07)	0.072
Once	32	7 (21.9)		1.67 (0.36 - 15.07)	0.158
Never	23	4 (15.8)		Reference	

Source:Field Data (2024)

CHAPTER FIVE:

5.0 DISCUSSION

5.1.1 Magnitude of Overweight/ Obesity Among Secondary School Adolescents in Kinondoni Municipal.

Findings revealed that about 18.3% and 3.2% among Secondary school adolescents in Kinondoni Municipal were overweight and obese. This is a concern as overweight and obesity in adolescence are likely to continue into adulthood, hence increasing the risk of noncommunicable diseases such as type 2 diabetes, hypertension, cancer, and cardiovascular diseases(4). This coincides with what has been reported from other studies such as studies done in Mwanza found that the prevalence of overweight and obesity among adolescents is 14.0% (8). A similar study conducted in India reported that the prevalence of overweight and obesity among adolescents was 17.1% and 6.8%(15). Additionally, a similar study conducted in Morogoro reported that the prevalence of overweight and obesity among school-age children was 18.3%(17). Moreover study conducted in Moshi Municipal reported that the prevalence of overweight and obesity was 23% higher compared to these findings because the study was conducted only in girls but these findings were conducted in both boys and girls(30). These findings are higher than what has been reported in a study conducted in urban Arusha reported prevalence was 17.7%(11). Being a male or female, type of school, amount of money provided to the child, frequency of watching television (TV), Type of food purchased away from home, consumption of soda, adolescents who had never consumed fruits and vegetables were found to be significant factors associated with overweight and obesity among secondary school adolescents.

5.1.2 Socioeconomic Factors Associated with Overweight/Obesity Among Secondary School Adolescents in Kinondoni Municipal.

The findings revealed that adolescents in private schools were more likely to be overweight or obese compared to those in government schools ($p=<0.001$ and $p=0.004$) respectively. This difference suggests that the resources and environments in private schools, which may include access to more processed foods and fewer physical activity opportunities, contribute to higher rates of overweight and obesity among secondary school adolescents in Kinondoni

Municipality. A similar study conducted by previous researchers in Dodoma and Kinondoni shows that there is an association between private schools and overweight/obesity among adolescents(10). Similar studies done in Saudi Arabia show that adolescents in private schools have higher odds of being overweight or obese compared to public schools, this is because adolescents from private schools come from families with high economic status(31).

Study findings have also revealed that adolescents who were receiving higher daily allowances (between 3050-4000 Tsh) were more likely to be overweight or obese than those receiving lower amounts (500-1000 Tsh). This shows that economic resources affect dietary choices, with higher allowances possibly leading to the purchase of more calorie-dense but less nutritious foods. Similar studies done in Dodoma show that there is an association between the amount of money they were given to buy food and overweight /obesity among adolescents(10,31).s

Moreover study revealed that Parental education which includes both the mother's and father's education was found to have no association with overweight and or obesity among secondary school adolescents in Kinondoni Municipal. These findings are similar to studies done in Arusha on determinants of overweight and or obesity among school children(32). This was unlike what has been shown in other studies done in Nigeria which reported that parents with formal education had a higher risk of their adolescents being overweight or obese compared to those without formal education. This increased risk is associated with higher incomes, which make it easier for them to access energy-dense foods and electronic devices promoting sedentary behavior, thereby increasing the likelihood of adolescents being overweight and obese (21)

While fathers' occupations did not show clear associations with overweight or obesity, adolescents whose mothers were employed tended to have higher rates of overweight or obesity. This suggests that parental employment status may impact family dynamics and dietary habits. Similar studies were reported in Kenya among school children which show the mother's occupation is associated with overweight /obesity(33).

5.1.3 Dietary Habits Associated with Overweight/ Obesity Among Adolescents

The findings revealed that adolescents who purchased food or drinks away from home 2-3 times per week or 4-7 times per week had significantly higher odds of being overweight or obese compared to those who did so less frequently or not at all ($p = 0.031$, $p = 0.012$). This showed that frequent consumption of meals outside the home, potentially with less control over ingredients and portions, contributes to higher obesity risk among adolescents. This is in contrast to the previous studies that indicated a positive association between eating away from home in a restaurant and dietary diversity(24). Similar study done in United state have reported that adolescents who had purchased food away from home were associated with overweight and obesity compared to adolescents who did not purchase food away from home (17).

In addition, the study has also shown that consuming soda (soft drinks) outside the home was significantly associated with higher odds of being overweight or obese, whereas purchasing fruits and vegetables showed no significant association ($p = 0.042$). Similar findings conducted in Mwanza and Dodoma reported that consuming soft drinks had a significant association with overweight/obesity among adolescents(8,10). This study was in line with studies conducted in the United States which reported that children who consume soda frequently were almost four times more likely to be overweight/obese compared with those who did not consume soft drinks(16,23). This shows the role of beverage choices in contributing to excess calorie intake and weight gain among secondary school adolescents.

5.1.4 Physical Activity Among Secondary School Adolescents

The study found that adolescents who walked at least 30 minutes per day had lower odds of being overweight or obese compared to those who did not engage in daily walking, although this association was not statistically significant ($p = 0.127$). These findings suggest that while regular walking are beneficial for overall health, their direct impact on weight status may vary among adolescents in this context. Similar studies conducted in Morogoro and Urban Ghana showed that there is no relationship between walking to school and Overweight/obesity(16,34).

Also, the findings revealed that engaging in specific types of sports also showed varying associations with overweight and obesity. Adolescents who participated in football had significantly lower odds of being overweight or obese compared to those who did not engage in any sports ($p = 0.027$). However, participation in netball or other sports did not show significant associations with weight status among adolescents. This study was in line with the studies conducted by previous researchers which reported that adolescents with less physical activity are more likely to become overweight or obese compared to those with active physical activity (21.6% and 10.9%) respectively(26).

Moreover, the findings revealed that frequent television watching was significantly associated with higher odds of overweight or obesity, particularly among adolescents who watched television daily or 4-5 days per week ($p = 0.047$, $p = 0.041$). These findings show the impact of sedentary behaviors on weight status among adolescents in Kinondoni Municipal. This study was in contrast with studies done in the United States which have reported that there is an interaction effect between screen viewing time and physical activity that may influence the associations between obesity and sedentary behaviors(17).

5.2 Limitations of the Study

The study survey was cross-sectional and therefore no causal inferences can be made. The cut-offs used with self-reported BMI may lead to underestimation of overweight and obesity (35). Recall bias since it was difficult for respondents to remember the type and frequency of food taken during the past few weeks depending on the ability of the participant to recall and respond to past events. The mitigation of recall bias was to reduce the time interval which was between the events of the study and the assessment (9).Measurement error also affected the study result, this includes standard measurements used to measure weight and height.The mitigation of measurement error one measurement was taken twice to avoid measurement error (30).

CHAPTER SIX:

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The magnitude of overweight and or obesity among secondary school adolescents in Kinondoni Municipal is high posing a public health concern. Dietary habits such as frequent consumption of meals away from home, particularly those high in sugar like sodas, are strongly associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal. Interventions aimed at promoting healthier food choices, reducing the availability of unhealthy food options outside the home environment, and educating adolescents about balanced nutrition can help to reduce the prevalence of overweight/obesity among adolescents.

6.2 Recomendations

1. Based on the findings, it is recommended that adolescents be encouraged to eat healthy and engage in physical activity so that the problem of overweight and/or obesity among this age group can be reduced.
2. Policy makers and nutrition stakeholders should plan and implement evidence based interventions that will help alleviate the problem of overweight and/or obesity among secondary school adolescents. These interventions should mostly include interventions that will increase healthy dietary habits among this age group.
3. There should be a qualitative study to gain deeper understanding to the economic factors associated with adolescents overweight and or obesity among secondary school adolescents in Tanzania.

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8.0 APPENDICES

8.1 Appendix I: Questionnaire (English Version)

MAGNITUDE AND RISK FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG SECONDARY SCHOOL ADOLESCENTS IN KINONDONI MUNICIPAL.

SECTION I: DEMOGRAPHIC INFORMATION (Please tick (√) where applicable)

1. Questionnaire number…….

2. Name of the school ……

3. Type of school

a) Government ( )

b) Private ( )

4. Gender ……

a) Male ( )

b) Female ( )

5. Age? ……

6. How many years are you studying?

a) Form I ( )

b) Form II ( )

c) Form III ( )

d) Form IV ( )

7. Who do you live with?

a) Mother ( )

b) Father ( )

c) Both parents ( )

d) Grandma and Grandpa ( )

e) other relationships (Aunt, Uncle and Brother) ( )

f) others …….

SECTION II: ECONOMIC INFORMATION (Please tick (√) where appropriate)

8. What is the education of your father/guardian?

a) University ( )

b) Secondary education ( )

c) Primary education ( )

d) He has no education ( )

e) I don't know ( )

9. What is the education of your mother/guardian?

a) University ( )

b) Secondary education ( )

c) Primary education ( )

d) He has no education ( )

e) I don't know ( )

10. What is the occupation of your father/guardian?

a) Employed ( )

b) Unemployed ( )

c) Self employed ( )

d) Other……

11. What is the job of your mother/guardian?

a) Employed ( )

b) Unemployed( )

c) Self Employed ( )

d)Other……..

12. Are you given money to buy food or drinks while at school or outside the home?

a) Yes ( )

b) No ( )

13. If yes, on average how many shillings are you given per day? ……..

PART III: QUESTIONS RELATED TO DIETARY HABITS

16. In the past week, did you eat the following food group? (Please tick (√) where appropriate)

	How many times in the past week			
Food Group	7 or more	4-6	1-3	Never
a)Fruits				
b)Vegetables				
c)French fries				
d)Fried meat				
e)soda				

17. How many times a week do you buy food/drink at school or away from home?

a) Immediately ( )

b) 2-4 times ( )

c) 5-7 times ( )

d) Never ( )

18. What food or drink do you usually buy at school or away from home?

a) Fried food ( )

b) Fruits and vegetables ( )

c) Soda ( )

d) Fried meat ( )

19. Are you given lunch at school?

a) Yes ( )

b) No ( )

20. If yes, what food is served at school? ……

21. How many times a day do you eat?

a) Immediately ( )

b) 2 times ( )

c) 3 times ( )

d) 4-8 times ( )

22. What is your favorite mealtime?

a) Breakfast ( )

b) Lunch ( )

c) Dinner ( )

d) Snacks ( )

e) other (specify) …….

23. Which of the following meals do you usually skip during the day?

a) Breakfast ( )

b) Lunch ( )

c) Dinner ( )

d) Snacks ( )

e) None ( )

f) other (specify) …… …

24. Why do you skip the above meal?

a) Not being hungry ( )

b) Lack of time ( )

c) Not liking the food served ( )

e) you don't have money ( )

f) other (specify) ……

PART IV: QUESTIONS RELATED TO PHYSICAL EXERCISE

25. Do you exercise regularly?

a) Yes ( )

b) No ( )

26. Which of the following games do you usually play?

a) Football ( )

b) Netball ( )

c) You don't play at all ( )

d) Name another game…….

27. Do you walk at least 30 minutes a day?

a) Yes ( )

b) No ( )

28. Is there a playground at school?

a) Yes ( )

b) No ( )

29. What do you usually do in your spare time?

a) Sit down (talking, reading, doing school work)( )

b) Standing or walking ( )

c) Running or playing a little ( )

d) Running and playing hard ( )

30. How many days a week do you watch TV?

a) I never watch TV ( )

b) 1 day a week ( )

c) 2 days a week( )

d) 3 days a week ( )

e) 4 days per week ( )

f) 5 days per week ( )

g) 6 days a week ( )

h) Every day ( )

PART V: ANTHROPOMETRIC MEASUREMENTS

Weight ……kg

Height ……..cm

BMI ……

8.2 Appendix II: Questionnaire (Kiswahili Version)

DODOSO LA KUTATHMINI TATIZO LA UZITO WA KUPINDUKIA NA HATARI ZINAZOHUSIANA NA UZITO MKUBWA NA UNENE WA KUPINDUKIA MIONGONI MWA VIJANA WA SHULE ZA SEKONDARI KATIKA MANISPAA YA KINONDONI.

SEHEMU YA I: TAARIFA ZA KIDEMOGRAFIA (Tafadhali weka tiki(√) inapofaa)

1.Namba ya dodoso…….

2. Jina la shule ……

3. Aina ya shule

a) Serikali ( )

b) Binafsi ( )

4. Jinsia ……

a) Mwanaume ( )

b)Mwanamke ( )

5. Umri ? ……

6. Unasoma kidato cha ngap?

a) Kidato cha I ( )

b) Kidato cha II ( )

c) Kidato cha III ( )

d) Kidato cha IV ( )

7. Unaishi na nani?

a)Mama ( )

b) Baba ( )

c) Wazazi wote wawili ( )

d)Bibi na babu( )

e)mahusiano mengine(Shangazi, Mjomba na Ndugu) ( )

f)wengine …….

SEHEMU YA II: TAARIFA ZA KIUCHUMI (Tafadhali weka tiki (√) inapofaaa)

8.Elimu ya baba/mlezi wako ni ipi?

a) Chuo kikuu ( )

b) Elimu ya sekondari ( )

c) Elimu ya msingi ( )

d) Hana elimu ( )

e) sijui ( )

9.Elimu ya mama/mlezi wako ni ipi?

a) Chuo Kikuu ( )

b) Elimu ya sekondari ( )

c) Elimu ya msingi ( )

d) Hana elim ( )

e) sijui ( )

10.Kaz ya baba/mlezi wako ni ipi?

a) Ana kazi ( )

b) Hana kazi ( )

c) Kajiajiri ( )

e) Nyinginezo……

11.Kazi ya mama/mlezi wako ni ipi?

a)Ana kazi ( )

b) hana kazi ( )

c)Kajiajiri ( )

12.Je, unapewa hela kwa ajili ya kununua chakula au vinywaji ukiwa shuleni au nje ya nyumbani?

a) Ndio ( )

b) Hapana ( )

13.Ikiwa ndio, kwa wastani unapewa shilingi ngapi kwa siku? ……..

SEHEMU YA III: MASWALI YANAYOHUSIANA NA TABIA YA MLO

16.Je, katika wiki iliyopita ulikula kundi la vyakula lifuatalo?(Tafadhali weka tiki (√) inapofaa)

	Umekula mara ngapi vyakula vifuatavyo wiki ilopita			
Kundi la chakula	**1-3**	**4-6**	**7 au zaidi**	**Sijala kabisa**
a)Matunda				
b)Mboga mboga				
c)Chakula cha kukaanga mfano chipsi				
d)Nyama ya kukaanga				
e)Soda				

17. Je, unanunua chakula/kinywaji mara ngapi kwa wiki shuleni au mbali na nyumbani?

a) Mara moja ( )

b) mara 2-4 ( )

c) Mara 5-7 ( )

d) Kamwe ( )

18. Ni chakula gani au kinywaji gani huwa unanunua shuleni au mbali na nyumbani?

a) Chakula cha kukaanga ( )

b) Matunda na mboga ( )

c) Soda ( )

d) Nyama ya kukaanga ( )

19. Je, unapewa chakula cha mchana shuleni?

a) Ndio ( )

b) Hapana ( )

20.Ikiwa ndiyo, ni chakula gani kinachotolewa shuleni? ……

21. Je, unakula mara ngapi kwa siku?

a) Mara moja ( )

b) mara 2 ( )

c) mara 3 ( )

d) mara 4-8 ( )

22. Ni wakati gani wa chakula unaopenda zaidi?

a)Kiamsha kinywa ( )

b)Chakula cha mchana ( )

c)Chakula cha jioni ( )

d)Vitafunwa ( )

e)vingine (taja) …….

23. Ni milo ipi kati ya ifuatayo kwa kawaida huwa huruka kula kwa siku?

a)Kifungua kinywa ( )

b)Chakula cha mchana ( )

c)Chakula cha jioni ( )

d)Vitafunwa ( )

e) Hakuna ( )

f) vingine (taja) …… …

24. Kwa nini unaruka mlo hapo juu?

a) Kutokuwa na njaa ( )

b) Ukosefu wa muda ( )

c)Kutopenda vyakula vinavyotolewa ( )

e)hauna hela ( )

f) vingine (taja) ……

SEHEMU YA IV: MASWALI YANAYOHUSIANA NA MAZOEZI YA MWILI

25. Je, wewe hufanya mazoezi ya kukimbia kwa kawaida?

a) Ndio ( )

b) Hapana ( )

26. Je, huwa unacheza mchezo gani kati ya ifuatayo?

a)Mpira wa miguu ( )

b)Netiboli ( )

c) Hauchezi kabisa ( )

d)Taja mchezo mwingine…….

27. Je, unatembea kwa angalau dakika 30 kwa siku?

a) Ndio ( )

b) Hapana ( )

28. Je, kuna uwanja wa michezo shuleni?

a) Ndio ( )

b) Hapana ( )

29. Je,huwa unafanya nini mara nyingi wakati wa mapumziko?

a) Keti chini (kuzungumza, kusoma, kufanya kazi za shule)( )

b)Kusimama au kutembea ( )

c) Kukimbia au kucheza kidogo ( )

d) Kukimbia na kucheza kwa bidii ( )

30. Je, unatazama TV kwa siku ngapi kwa wiki?

a) Sijawahi kutazama TV ( )

b) siku 1 kwa wiki( )

c) siku 2 kwa wiki( )

d)siku 3 kwa wiki wiki ( )

e) siku 4 kwa wiki ( ) f) siku 5 kwa ( )

g) siku 6 kwa wiki ( )

h) Kila siku ( )

SEHEMU YA V: VIPIMO VYA ANTHROPOMETRIC

Uzito ……kg

Urefu ……..cm

BMI ……

8.3 Appendix III: English Consent Form

CONSENT TO PARTICIPATE IN THE STUDY OF FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG SECONDARY SCHOOL ADOLESCENTS KINONDONI MUNICIPAL, DAR ES SALAAM.

Dear Sir/Madam,

My name is Frediana Edimundi Kimario, pursuing a Master of Science in Public Health at Muhimbili University of Health and Allied Sciences (MUHAS). I am researching the prevalence and factors associated with overweight and obesity among secondary school adolescents in Kinondoni Municipal, Dar es Salaam.

This research is a partial fulfilment of the requirements for the degree of Master of Public Health.

Purpose of the study:

This study aims to determine factors associated with overweight and overweight and obesity among secondary school adolescents in Kinondoni Municipal, Dar es Salaam.

How to participate:

Participants who are willing to participate in this study will have to sign a consent form.

Measurement of anthropometrics (weight and height) will be done, followed by a short interview.

Confidentiality:

The information from the study will be kept confidential and kept in a safe place with access to authorized personnel and will be used for research purposes only. No names will be used instead identification numbers will be used to maintain the anonymity of participants.

Voluntary participation and the right to withdraw from the study:

Your participation is voluntary, and you have the right to withdraw from participating in this study at any time. Whatever your decision may be, it will have no effect in any way on your rights to care and treatment.

Risks:

For this study, we do not expect any risk prior, during and/or after participating in this study.

Right to withdraw and alternatives

It is voluntary to participate in this study. You have the right to refuse to participate or to withdraw from the study even if you have already given your consent. You will not be penalized or lose any benefits by refusing or withdrawing from this study.

Benefits:

I hope that the information from this research will be useful in contributing to improve

Compensation:

There will be no compensation of any kind for participating in this study.

I request your informed consent to participate in this study.

INVESTIGATOR'S STATEMENT

I the investigator have educated the research participant on the purpose and applications of this study.

Signed…… Date…….

PARTICIPANT'S STATEMENT (CONSENT/ASSENT)

I willingly agree to take part in this study on factors associated with overweight and overweight and obesity among secondary school adolescents in Kinondoni Municipal, Dar es Salaam. I do this with full understanding of the purposes of the study and the procedures involved which include filling out a study questionnaire and having some measurements, all of which have been explained to me by Frediana Edimundi Kimario.

No ----------

Age ----------

Signature of participant ----------

Date----------

If the participant is under the age of 18 years, the parent or guardian shall sign below to give consent on behalf of the participant.

No ----------

Age ----------

Signature of participant ---------- Date----------

If you have questions during the study, you may contact the following:

Principal Investigator
Muhimbili University of Health and Allied Sciences (MUHAS)
School of Public Health
P.O. Box 65001 Dar es Salaam.
Mobile phone: 0713250074

In case of any complains about your rights as a participant in this study please contact:

The Chairperson of the Research and Publication Committee
Muhimbili University of Health and Allied Sciences (MUHAS)
P.O. Box 65001 Dar es Salaam
Tel: 0713250074

8.4 Appendix IV: Kiswahili Consent Form

RIDHAA YA KUSHIRIKI KATIKA UTAFITI KUHUSU KUTATHIMINI TATIZO LA UZITO WA KUPINDUKIA NA SABABU ZINAZOSABABISHA TATIZO HILO KWA VIJANA UMRI WA BALEHE WANAOSOMA SHULE ZA SEKONDARI, MANISIPAA YA KINONDONI, DAR ES SALAAM.

Kwa Bibi/Bwana,

Jina langu ni Frediana Edimundi Kimario, mwanafunzi wa shahada ya uzamili katika Chuo cha Afya na Sayansi shirikishi cha Muhimbili, nafanya utafiti kuhusu kutathimini sababu zinazosababisha tatizo la uzito wa kupindukia kwa vijana umri wa balehe wanaosoma shule za sekondari, manisipaa ya Kinondoni, Dar es salaam.

Nia ya utafiti:

Utafiti huu unalenga kutathimini sababu zinazosababisha tatizo la uzito wa kupindukia kwa vijana umri wa balehe wanaosoma shule za sekondari, wilaya ya manisipaa ya Kinondoni , Dar es salaam.

Jinsi ya kushiriki:

Unaweza kushiriki katika utafiti huu kwa kujaza kwa hiyari yako fomu ya kuridhia kushiriki. Utafiti huu utakuwa na mahojiano kwa kutumia dodoso na vipimo vya uzito na urefu.

Utunzaji wa siri:

Majibu yote yatakusanywa kutoka katika eneo la utafiti na yatahifadhiwa sehemu maalum ambapo wahusika tu ndio wataruhusiwa kuzipata taarifa hizo na zitatumika kwaajiri ya utafiti tu. Pia majina hayatatumika badala yake tutatumia namba ya utambulisho tu.

Hiyari ya kushiriki na kujitoa katika utafiti huu

Ushiriki katika utafiti huu ni wa hiyari na pia ni haki yako kujitoa katika utafiti huu muda wowote unapohisi kufanya hivyo. Maamuzi yako ya kuamua kutoshiriki au kujitoa katika utafiti huu hayataathiri haki yako ya kupata huduma na matibabu.

Madhara ya Kushiriki Utafiti:

Hatutegemei madhara yeyote kukutokea ukiwa na/ama baada ya kushiriki katika utafiti huu.

Haki ya kujiondoa na njia mbadala

Ni hiari kushiriki katika utafiti huu. Una haki ya kukataa kushiriki au kujiondoa kwenye utafiti hata kama tayari umetoa idhini yako. Hutaadhibiwa au kupoteza faida yoyote kwa kukataa au kujiondoa kwenye utafiti huu.

Manufaa ya kushiriki utafiti huu:

Ni matumaini yangu matokeo ya utafiti huu yatasaidia kutambua sababu zinazosababisha tatizo la uzito wa kupindukia kwa vijana umri wa balehe wanaosoma shule za sekondari, manisipaa ya Kinondoni, Dar es salaam.

Nitashukuru sana kama kwa hiyari yako utaamua kushiriki katika utafiti huu.

KAULI YA MTAFITI

Mimi mtafiti, nakiri nimemueleweshа mshiriki wa utafiti huu kuhusu huu utafiti.

Sahihi…… Tarehe…….

KAULI YA MSHIRIKI

Natoa idhini mwenyewe bila aina yoyote ya kushurutishwa au kulazimishwa kushiriki katika utafiti uliotajwa hapa kuhusu “**Kutathimini sababu zinazosababisha tatizo la uzito wa kupindukia kwa vijana umri wa balehe wanaosoma shule za sekondari, wilaya ya Ilala, Dar es Salaam.”**

Nafanya hivi baada ya kuelewa taarifa zote nilizoelezwa na mtafiti, Frediana Edimundi, na pia amenijibu na kunielewesha zaidi maswali niliyomuuliza.

Nimeelezewa kikamilifu kuhusu madhumuni na hali yake na naelewa kuwa nitaulizwa maswali kadhaa na kufanyiwa baadhi ya vipimo.

Pia naelewa kuwa naweza kujiondoa wakati wowote iwapo nitabadilisha mawazo.

Namba_____ Umri_____

Sahihi ya Mshiriki……

Tarehe …….

Mawasiliano kwa wahusika:

Kwa maswali au maoni kuhusiana na utafiti huu tafadhali wasiliana na wafuatao:

Mtafiti mkuu

Chuo kikuu cha afya na tiba shirikishi Muhimbili

S.L.P 65001 Dar es Salaam

Nambari ya simu: : 0788602078

Kwa mawasiliano zaidi kuhusiana na haki zako kwenye utafiti huu kama mshiriki, tafadhali wasiliana na:

Mwenyekiti wa tume ya tafiti na uchapishaji wa tafiti.

Chuo kikuu cha afya na tiba shirikishi Muhimbili

S.L.P 65001 Dar es Salaam

Nambari ya simu: : 0713250074

8.5 Appendix V: Ethical Clearance Letter

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATIONS

Ref. No.DA.282/298/01.C/2291 Date: 31/05/2024

MUHAS-REC-05-2024-2291
FREDIANA EDIMUNDI KIMARIO
SHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: MAGNITUDE AND RISK FACTORS ASSOCIATED WITH OBESITY AMONG SECONDARY SCHOOL ADOLESCENTS IN KINONDONI MUNICIPAL, DAR ES SALAAM.

Reference is made to the above heading,

I am pleased to inform you that the Chairperson 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: 31/05/2024
EXPIRATION DATE OF APPROVAL: 31/05/2025

STUDY DESCRIPTION:
Purpose:
The purpose of this observational cross-sectional study is to determine the magnitude and risk factors associated with obesity among secondary school adolescents in Kinondoni Municipal.

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-%2015701.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. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. 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)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. 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 Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

8.6 Appenidx VI: Introduction Letter –Regional Administrative Secretary

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.630/2023

03rd June, 2024

The Regional Administrative Secretary,
P.O. Box 5429,
DAR ES SALAAM

Re: INTRODUCTION LETTER FREDIANA EDIMUNDI KIMARIO

We would like to inform you that the bearer of this letter is **Frediana Edimundi Kimario** with Reg. No. **HD/MUH/T.630/2023** is a student at Muhimbili University of Health and Allied Sciences (MUHAS) "pursuing **MPH-Regular Track.**

As part of her studies, she will be doing an elective research titled: "**Magnitude and Risk Factors Associated with Obesity Among Secondary School dolescents in Kinondoni Municipal, Dar es Salaam."**

The research has been approved by the Chairman of University Senate.

Kindly provide her the necessary assistance to facilitate the conduct of her research.

We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

c.c **Frediana Edimundi Kimario**

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

8.7 Appenidx VII: Permission letter –Kinondoni Municapal

JAMHURI YA MUUNGANO WA TANZANIA
Ofisi ya Rais
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

MKOA WA DAR ES SALAAM
Anwani ya Simu:
Simu: 2203156/58
Fa: +25522203213
Tovuti: www.dsm.go.tz
Barua Pepe: ras@dsm.go.tz
Unapojibu Tafadhali taja:

OFISI YA MKUU WA MKOA
3 Barabara ya Rashidi
Kawawa,
S. L. P. 5429,
12880 - DAR ES SALAAM.

10 Juni, 2024

Kumb. Na. EA.260/307/01B/142

Mkurugenzi wa Manispaa,
Manispaa ya Kinondoni,
DAR ES SALAAM.

YAH: UTAMBULISHO WA UTAFITI

Tafadhali husika na kichwa cha habari hapo juu.

2. Ofisi ya Mkuu wa Mkoa wa Dar es Salaam inautambulisha utafiti ujulikanao ***"Magnitude and Risk Factors Associated with Obesity among Secondary School Adolescent in Kinondoni Municipal, Dar es Salaam"*** ikiwa ni sehemu ya kukamilisha mafunzo ya Shahada ya Uzamili ya Frediana Edimundi Kimario ambaye ni Mwanafunzi katika Chuo Kikuu cha Sayansi na Afya Shirikishi Muhimbili.

3. Kibali cha kufanya utafuti huu kimetolewa na Chuo Kikuu cha Muhimbili (MUHAS-REC-05-2024-2274) ambacho kinaanzia tarehe 31/05/2024 hadi 31/05/2025. Utafiti huu umepangwa kufanyika katika Manispaa ya Kinondoni ndani ya Mkoa wa Dar es Salaam.

5. Kwa barua hii, namtambulisha kwako **Frediana Edimundi Kimario** ambaye ndio msimamizi mkuu wa utafiti huo ili aweze kufanya utafiti huu muhimu.

Nashukuru kwa ushirikiano.

Dkt. Mohamedi Mang'una
Kny; KATIBU TAWALA MKOA
DAR ES SALAAM

Nakala: Katibu Tawala Mkoa,
DAR ES SALAAM. – Aione katika jalada

8.8 Appendix VIII: Permission letter –Educational Officer

JAMHURI YA MUUNGANO WA TANZANIA

OFISI YA RAIS,
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

HALMASHAURI YA MANISPAA YA KINONDONI

Unapojibu tafadhali taja:

Kumb. Na. HB.345/520 **Tarehe:** 13 **Juni**, 2024

Mkuu wa Divishen ya Elimu ya Sekondari,
Manispaa ya Kinondoni,
S.L.P 31902,
DAR ES SALAAM.

YAH: KIBALI CHA KUFANYA UTAFITI NA KUMTAMBULISHA FREDIANA EDIMUNDI KIMARIO

Kichwa cha habari hapo juu cha husika.

2. Ofisi ya Mkurugenzi imepokea barua yenye Kumb.Na. EA.260/307/04E/142 ya tarehe **10 Juni, 2024** toka Chuo Kikuu cha Sayansi na Afya Shirikishi Muhimbili ikimtambulisha mtajwa hapo juu kwa ajili ya kufanya utafiti.

3. Kwa barua hii **Kibali kimetolewa** na Mwajiri kwa ajili ya kufanya utafiti katika **Divisheni ya Afya Ustawi wa Jamii na Lishe** kuhusu "***Magnitude and Risk Factors associated with obesity among Secondary School Adolescent in Kinondoni Municipal, Dar es Salaam'.*** Kuanzia tarehe **31 Mei**, 2024 hadi **31 Mei**, 2025.

4. Tafadhali mpokee na kumpa ushirikiano.

.....
Maria Masimbusi
Kny: **MKURUGENZI WA MANISPAA**

MKURUGENZI WA MANISPAA
MANISPAA YA KINONDONI
DAR-ES-SALAAM

Nakala

Frediana Edimund Kimario - kwa taarifa

Barua zote zitumwe kwa Mkurugenzi wa Manispaa Manispaa ya Kinondoni, S.L.P. 31902, 2 Barabara ya Morogoro, 14883 Dar es Salaam, Unaweza pia kuwasiliana asi kwa Simu: +255 2170173 Nukushi: 2172606, Barua pepe – info@kinondonimc.

8.9 Appendix IX: Permission letter –Head of Schools

JAMHURI YA MUUNGANO WA TANZANIA

OFISI YA RAIS,
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

HALMASHAURI YA MANISPAA YA KINONDONI

Unapojibu tafadhali taja:

Kumb. EC.270/541/545 **20/06/2024**

Wakuu wa Shule,
Shule za Sekondari,
Mbezi beach High, Maendeleo, Mtakuja beach na **Kisauke**.
MANISPAA YA KINONDONI.

Yah: KIBALI CHA KUFANYA UTAFITI NA KUMTAMBULISHA FREDIANA EDIMUNDI KIMARIO KWENYE SHULE ZA SEKONDARI

Tafadhali husika na mada tajwa hapo juu

2. Ofisi ya Mkurugenzi wa Manispaa imekiri kupokea barua yenye **Kumb.Na.EA.260/307/04E/142** ya tarehe 10 Juni, 2024 kutoka Chuo Kikuu cha Dar es Salaam ikimtambulisha mtajwa hapo juu kwa ajili ya kufanya utafiti.

3. Kwa barua hii napenda kuwajulisha kuwa, kibali kimetolewa kwa "**Frediana Edimundi Kimario**" kufanya tafiti kuhusu **"Magnitude and Risk Factors associated with Obesity among Secondary Adolescent in Kinondoni Municipal, Dar es salaam"** kwa Sekondari tajwa hapo juu katika Manispaa ya Kinondoni kuanzia tarehe ya barua hii hadi tarehe 31/05/2025.

4. Aidha, Kibali hiki kisiathiri ratiba ya ufundishaji na ujifunzaji shuleni na hakihusiki kuchangisha mchango wowote kutoka kwa wazazi/walezi wa wanafunzi.

5. Nakutakia utekelezaji mwema.

Mwl: Mtundi A. Nyamhanga.
KNY: MKURUGENZI WA MANISPAA

Nakala: Mkurugenzi wa Manispaa - Aione kwenye jalada
- Frediana E. Kimario - Kwa taarifa
- Maafisa Elimu Kata - Kwa taarifa