NUTRITIONAL STATUS, PHYSICAL EXERCISE AND ASSOCIATED FACTORS AMONG URBAN SECONDARY SCHOOL ADOLESCENT GIRLS IN ILALA MUNICIPAL

By

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A dissertation Submitted in (partial) fulfilment of the requirements for the Degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

Muhimbili University of Health and Allied Sciences
October, 2017

CERTIFICATION

The undersigned certifies that she has ready and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled:
Nutritional status , physical exercise and associated factors among urban secondary school adolescent girls in ilala municipal as partial fulfilment of the requirements for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

……..

Dr. Jane Mlimbila(PHD)
(Supervisor)

……..
Date

DECLARATION AND COPYRIGHT

I, Alice Samson Mwambambale, declare that this **dissertation** is my original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature…….. Date…….

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to those who have contributed to the success of this dissertation.

First, I do thank God for the good health, protection and guidance throughout my study, second my supervisor **Dr. Jane Mlimbila** for her enormous supervisory support, advise and encouragement, Dr. Bruno Sunguya for his technical inputs and thoughtful criticism during the research development work. I am also grateful to Mr. Hekima Mtoji of MUHAS and Mr. Luitfrid Nnally of Tanzania Food and Nutrition Centre for the statistical data base development and detailed analysis support.

I also owe my gratitude to Dar es Regional Office, the Ilala Municipal administrative office, Ilala Municipal Secondary Schools heads (Jangwani girls, Benjamin Mkapa, Mchikichini, Airwings, Tusiime and Christ the King) for their cooperation and ensuring that I got the required data.

I am indebted to all urban secondary school adolescent girls who participated in my research as correspondents, if they wouldn't respond to my questionnaires I wouldn't have information for my research. I would also like to appreciate my research assistants Mr Juma Said and Samuel Simon for helping me in data collection.

My gratitude should be extended to my MPH classmates for their valuable academic contribution and support throughout my study. Lastly I would like to give thanks to Dean, Lecturers and the School of Public Health and Social Sciences staff for their support during my study.

DEDICATION

This dissertation is dedicated to my sister Vibeck S Mwambambale for her enthusiasm of seeing me attaining high education and for the great support she has given me throughout my study life.

Abstract

Background: Poor nutrition status among adolescent girls is a global public health challenge facing the world today, especially in the developing countries. In Tanzania more than 17.5% of adolescent girls aged 15 to 19 years are considered to be thin, with 4.4% being severely thin while about 9% are overweight or obese. Adolescent girls are particularly vulnerable to poor nutrition because they are growing fast, they need more of protein, iron, and other micronutrients to support the adolescent growth development and meet the body's increased demand for iron during menstruation. Poor nutrition in adolescent girls contributes to maternal mortality/morbidity as well as to the low birth weight which in turn might contribute to increased percentage for infant mortality and nutrition-related chronic diseases.

Objective: The study aimed at assessing nutrition status, physical exercise and associated factors among urban secondary schools adolescent girls aged 13 -19 years old in Ilala municipal.

Materials and Methods: A cross-sectional descriptive study of 284 selected urban adolescent school girls aged from 14 to 19 years. Multistage, simple random sampling technique from Secondary schools in Ilala Municipal was carried out. Their nutritional status was determined using anthropometric measures (BMI for age). The socio demographic, individual and environmental variables were analysed to determine their relationship with under nutrition in adolescent girls. Data was analyzed using SPSS (version 18) and Anthroplus software package. Logistic regression analysis (bivariate) was used to examine how independent variables influenced dependent variable.

Association between independent variable and dependent variable was considered significant if p-value is less than 0.05.

Results: The study reveals prevalence of stunting in adolescent girls (31.4%) whereas 20.9% were severely stunted. wasted and overweight/obesity were 1.5% and 2.3% respectively. Study findings revealed that the only predictor variable which yielded significant result was quality of drinking water ($p< 0.098$).

Conclusion: Under nutrition especially stunting of the adolescent girls is an important public health problem in the area and it is likely to remain a problem if left unaddressed and no intervention put is in a place.

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Abbreviations

BMIA	Body mass Index for Age
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
H/A	Height for Age
HAZ	Height for Age of Z score
MUAC	Mid-upper arm circumference
MUHAS	Muhimbili University of Health and Allied Sciences
NCDs	Non Communicable Diseases
SPSS	Statistical Package for Social Sciences
TDHS	Tanzania Demographic Health Survey
TFNC	Tanzania Food and Nutrition Centre
UNICEF	United Nations Children's Emergency Fund
W/A	Weight for Age
WAZ	Weight for Age of Z score
WHO	World Health Organization

Definitions of Terms

Nutritional status is the physiological condition of an individual that results from the balance between nutrient requirements and intake and the ability of the body to use these nutrients (1).

Adolescent girls are females aged between 10 to 19 years old.

Anthropometric measurements are used to assess the size, shape and composition of the human body. OR can be defined as the use of body measurements such as weight, height and mid-upper arm circumference (MUAC), in combination with age and sex, to gauge growth or failure to grow.

BMI for Age–BMI for children used to assess nutrition status of children and teens (2-20 years old).

Under nutrition – Is a state of the body that results from insufficient intake or inadequate absorption of energy, protein or micronutrients that in turn leads to nutritional deficiency?

Over-nutrition _

Weight-for-age – Nutritional index, a measure of underweight (or wasting and stunting combined)

CHAPTER ONE

1.0 Introduction

1.1 Background

An Adolescent is defined by World health organization (WHO) as an individual between the ages of 10 and 19 years; approximately, adolescents make 20% of the world's population. Adolescence is a period of transition from childhood to adulthood and it occupies a crucial position in the life of human beings. This period is characterized by an exceptionally rapid rate of growth coupled with development of the reproductive system, sexual maturation, formation of identity, and gender roles. It is a period where 20% of final adult height, 45% of increments in bone mass and 50% of adult weights are gained. This dynamic period of growth and development forms a concrete base adult health.(2, 3,4). Adolescence increases requirements for nutrients intake to meet the increased demand for rapid growth and development (5, 4).

Nutritional status can be defined as the physiological condition of an individual that results from the balance between nutrient requirements and intake and the ability of the body to use these nutrients (1).Poor nutrition is regarded as one of risk factors in adoption of malnutrition which is referring to any type of disorders in the nutritional status of the individual. Poor nutrition in adolescent girls contributes on maternal mortality/morbidity as well as to the low birth weight which in turn might contribute to increased percentage for infant mortality, nutrition-related chronic diseases. Malnourished adolescent girls and women are more likely to give birth to low birth weight infants, who are malnourished in childhood and later life, thus transferring under nutrition from one generation to the next.(6,7)

The most prevalent nutritional disorders among adolescents are under- nutrition in terms of stunting or thinness, over-nutrition (overweight and obesity) and micro- nutrients deficiency in form of iron deficiency, iodine deficiency, dental caries, and zinc deficiency (8,9,10).

According to the study conducted in Kilosa, Tanzania, 21% of adolescent children are thin. Teenage girls were reported to be more at risk of continuing to be thin as they are concerned about their weight, they tend to eat less and changes in fatty tissue increase (11).

Prevalence of obesity is increasing faster in developing countries and female obesity is higher than male obesity which is ten-fold more in adolescent girls than boys(10). Being overweight during childhood and adolescence has been associated with increased risk for non communicable diseases (NCDs) such as cancers, diabetes, and cardiovascular diseases and increase mortality in adult (12). In the year 2008 NCDs account for 27% of all death in Tanzania (9).

Adolescent girls are particularly vulnerable to poor nutrition because they are growing fast, they need more of protein, iron, and other micronutrients to support the adolescent growth development and meet the body's increased demand for iron during menstruation (13). Adolescents' healthy eating habit is an important condition for their physical growth, psychosocial development and cognitive performance, as well as prevention of diet-related chronic diseases in adulthood (14, 13). However, dietary habits often get unhealthier when individuals enter adolescence. They increase consumption of snacks, soft drinks, fast foods and sugary foods which are contributing factors to obesity. However, the consumption of fruits and vegetables decreased among adolescents (14,15). Unhealthy eating habit is a serious health issue that needs to be addressed. Since prevention is the best long-term strategy for tackling poor nutrition in adolescence, there is a need to understand the eating pattern and habits among adolescent school girls (13).

Therefore, this study assessed nutrition status, physical exercise and associated factors to nutrition status of adolescent girls attending secondary schools in Dar es Salaam.

1.2 Problem statement

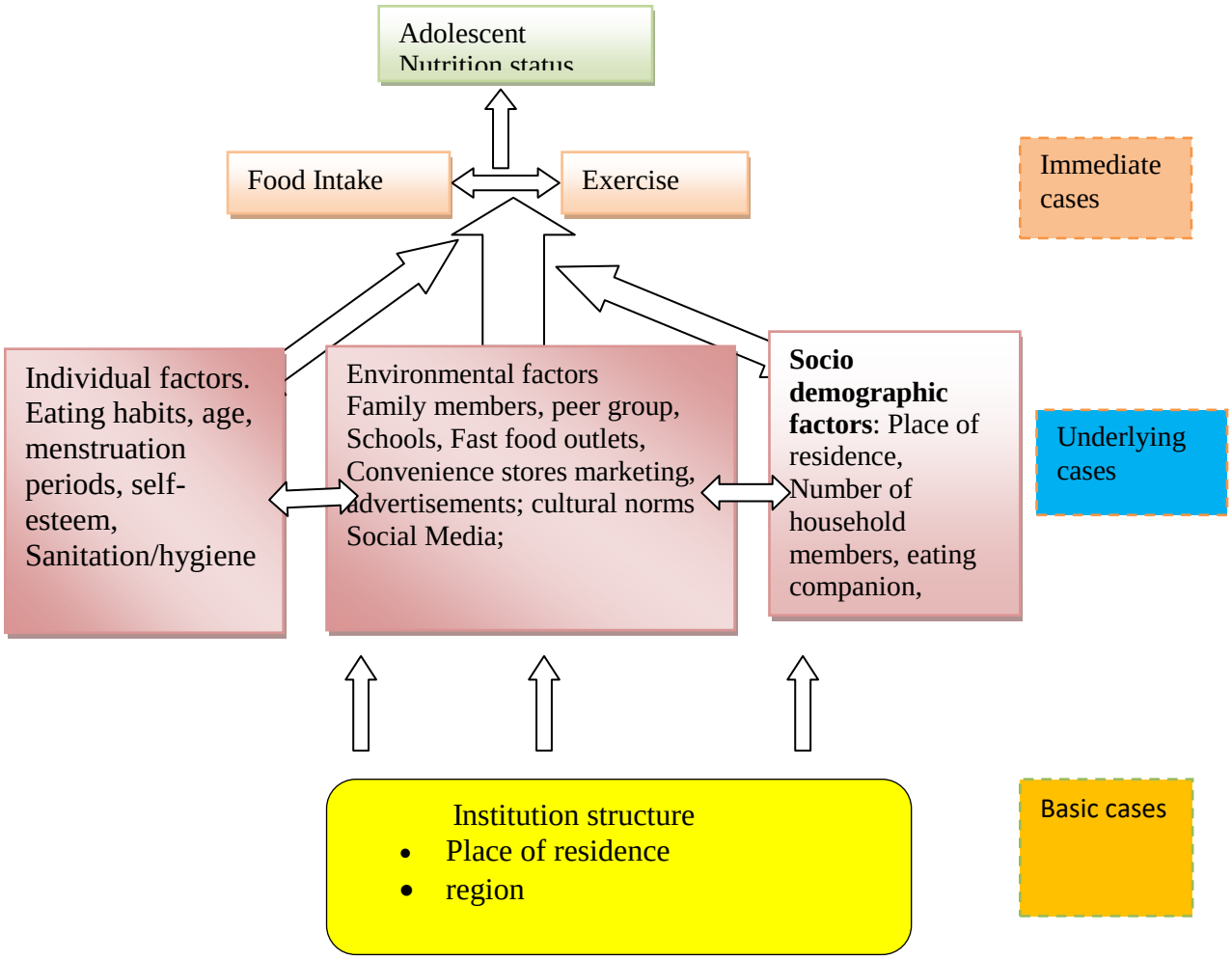
Poor nutrition status in adolescent girls is a global public health challenge facing the world today, especially in the developing countries. In Tanzania, more than 17.5% of adolescent girls aged 15 to 19 years are considered to be thin, with 4.4%being severely thin while about 9% are overweight or obese (16). According to National Nutrition Survey 2014,10.2% of adolescent girls aged 15 – 19 years old were thin while 20% considered to be overweight and 9.7% obese (17)

Reports from other countries revealed that, adolescent nutrition can be affected by factors like, economic condition, resource constrain, limited access to and availability of healthy foods and health care services, which puts them at a very high risk to be malnourished (16,18). Other factors being, food intake, eating behaviour and eating disorders (Anorexia and Bulimia Nervosa) social and environmental issues, household food insecurity, poor dietary diversification (minimal consumption of animal foods and fruits and vegetables and insufficient energy intake and consumption of high calorie foods) and lack of sanitation and clean water. Gender inequality and women status which place girls on less access to information and health services poor mental health and lower self esteem contribute to girls owns nutrition status .(16,18)

Also Nutrition in adolescent can be affected by which is increasing with younger ages,

There is a scarcity of research on adolescent nutrition in developing countries and especially in Tanzania no report was found regarding nutrition status and factors associated among adolescent girls. Most studies of malnutrition in developing countries have concentrated on young children or on the pregnancy period (19,14).However little have been done on eating habits and nutrition status of adolescent girls in urban areas. Therefore this study was carried out to Nutritional status, physical exercise and associated factors among urban adolescent girls attending day secondary Schools.

1.3 Conceptual Framework



Source: Adapted and reconstructed from UNICEF (1998)
Figure 1 Conceptual Framework illustrating factors influencing nutrition status of adolescent girls.

Several factors seem to influence eating habits and engagement on physical exercise activities of urban adolescent girls which determine their nutrition status .The framework generally classifies the causes of poor nutrition structure into immediate underlying and basic factors immediate level refers to food intake and infectious diseases which are caused underlying factors Individual factors.(Eating habits, age, menstruation periods, self-esteem, Sanitation/hygiene) Environmental factors (Family members, peer group, Schools, Fast food outlets, Convenience stores marketing, advertisements; cultural norms Social Media;) Socio demographic factors: Place of residence, Number of household members, eating companion etc. The basic factors includes Institution structure (Place of residence,Region).

1.4 Rationale

Since nutrition in adolescent is associated with a number of health implications, it is very important to understand factors influencing nutritional status of adolescent girls. Therefore, findings from this study will provide necessary information that will help various stakeholders to develop effective nutrition interventions that promote healthy eating and lifestyles among adolescent girls. In particularly through the urban school system, to stop the rapid progression of poor nutrition status and other nutrition related chronic disease risks later in their adulthood.

1.5 Main Research question

What is the Nutritional status , physical exercise and associated factors among urban secondary schools adolescent girls aged 13 -19 years old in Ilala Municipal?

1.5.1 Sub Research questions

1. What is the prevalence of malnutrition (low Body Mass Index for Age – BMI for age) among urban secondary schools adolescent girls aged 13 -19 years old in Ilala Municipal?

2. What are factors associated with malnutrition among urban secondary schools adolescent girls 13 -19 years old in Ilala municipal.
3. What is the proportion of urban secondary schools adolescent girls 13 -19 years old who have adopted physical exercise practices in Ilala Municipal?
4. What are the factors associated with adoption of physical exercise practices among urban secondary schools adolescent girls aged 13 -19 years old in Ilala Municipal.

1.6 Objectives

1.6.1 Main objective.

To assess nutrition status, physical exercise and associated factors among urban secondary schools adolescent girls aged 13 -19 years old in Ilala municipal.

1.6.2 Specific objectives:

1. To assess prevalence of under nutrition among urban secondary schools adolescent girls aged 13 -19 years old in Ilala municipal.
2. To assess factors associated with under-nutrition among urban secondary schools adolescent girls 13 -19 years old in Ilala municipal.
3. To determine proportion of urban secondary schools adolescent girls 13 -19 years old who have adopted physical exercise practices in Ilala Municipal.
4. To assess factors associated with adoption of physical exercise practices among urban secondary schools adolescent girls aged 13 -19 years old in Ilala Municipal.

CHAPTER TWO

2.0 Literature Review

2.1 Overview

The burden of nutrition related diseases is increasing and expected to rise by 2030 especially in low and middle income countries (20). Adolescent girls are backbone of health and progressive family, they therefore need good nutrition and active life style to support their health, optimal growth, mental development, educational performance and prevention of obesity and other nutrition related chronic diseases in later life associated with poor eating habits in earlier life. (3,11, 21,22,23).

A range of methods have been produced in order to quantify body fat and obesity during childhood and adolescence. Body mass index (BMI) is the preferred method of stating body fat percentile in groups (24). Three major reference charts have been employed. These are the Center for Diseases Control (CDC) growth charts. The WHO 2007 references (25) and the International Obesity Task Force (IOTF) reference (26,27).

2.2 Magnitude of poor nutrition in urban school adolescent girls

WHO considers a child aged between 5 – 19 years to be an overweight when BMI-for-age greater than +2 to +3 standard deviation (SD) and an obese when BMIA is greater than + 3 SD above the WHO population. Moderate under nutrition (thinness) is defined as BMIA less – 2 to -3 SD and severe under-nutrition is when BMIA is less than -3 SD as compared to the WHO reference population (28).

Both under-nutrition and over nutrition are indicators used to define poor nutrition which is linked to more deaths worldwide. In developing countries it has been a normal to encounter the coexistence of under-nutrition and over-nutrition. The double burden of over and under nutrition occurring more among adolescents girls (29).

Under nutrition among adolescent girls is a problem affecting girls in many developing countries. Under- nutrition (thinness) has been a leading risk factor for low income

regions.10% of the total disease burden is under nutrition.(30). Several studies have been conducted in different regions and support the higher prevalence of under nutrition among adolescent in respective countries. The study conducted by Sarkar , 2015 in west Bengel shows prevalence of underweight and stunting were high among adolescent girls with 16% underweight, stunting 20.7% and overweight or obesity was 11.4% (31). In Ethiopia, prevalence of thinness were reported to be 55%, wasting 44% and stunting 25.5% (32).

In India, the problem of under nutrition among adolescent girls is very high as shown in the recent study that more than half of adolescent girls were thin (53.8%), while 3.6% were overweight and 42% found to be normal (6). According to recent study conducted in Belagave, the prevalence of thinness among girls is 62% while overweight is 2% (33). Tanzania like many other developing countries is currently experiencing under nutrition problem. According to TDHS report of 2010, stunting was 42% among children aged below 5 years and 16% were underweight, which reflects both chronic and acute under nutrition. Despite of all these studies focusing more on under five years children little is mentioned about nutritional information in adolescent who are at risk of experiencing nutrition problems. A recent study conducted among adolescent school children in Kilosa, Tanzania which revealed under nutrition prevalence rate of 21% (11).

2.3 Factors affecting nutritional status

2.3.1 Intrapersonal factors

These factors include psychosocial factors, such as attitudes, beliefs, knowledge, self-efficacy, taste, and food preferences-as well as biological factors such as hunger. Behavioral factors such as meal and snack patterns and lifestyle factors such as perceived barriers for instance, cost, time demands, and convenience (34). With regard to gender, it appears that adolescent girls do experience more stress than their male counterparts due to the physical and physiological changes and are at a greater risk of developing unhealthy eating habits (35,34).

2.3.2 Socio-demographic factors

Socio demographic factors like religion, place of residence, number of household members, eating companion, sanitation and hygiene are said to have an effect on nutrition status of adolescents. A study done in India in 2012 shows that religion has a significant influence on nutritional status of adolescent girls. Hindu girls were more vulnerable to under nutrition 27.7% compared to Muslim girls 14.8%.This indicates the variability in food accessibility and dietary intake in religion wise. (36).

According to FANTA, Adolescent girls are more likely to have poor nutrition status in comparison to other members in the family because of the gender inequality which destroy the household distribution of foods with poor distribution in adolescent girls(37).Adolescent girls who are frequently eat alone are at risk of having poor nutrition status as they always tend to skip meals more than adolescent girls who either eat with family members or with peers.(13).

2.3.3 Environmental factors

Environmental factors like Family members, peer group, Schools, Fast food outlets, Convenience stores marketing, advertisements; cultural norms Social Media are found to be influential on adolescent eating habits and life style which in turn determine their nutritional status(38, 39). According to Dymytrenko on her study 2009,females are influenced by social environment to a greater extent than males, it is reported that bigger percentage of women(34%) than men (13%) indicated that 1 of the 2 primary reasons for choosing to eat at fast-food restaurants was to eat with friends and family (34).

2.3.4 Eating Habits and physical exercise

Eating habit can be defined as the way individual or group of individuals eats kind of food they eat, how they eat and when, it comprises meal frequency, diet composition and

food choices. Eating habit of an individual results from interaction of various factors and develops over time (40). Eating habits and physical exercise are the immediately factors for nutrition status. Individual who are frequently involving themselves in physical exercises eats healthier than those who do not and individuals who skip meals especially breakfast are less physically active than those who eat regularly. Poor nutrition status in children and adolescents are generally caused by poor eating habits and physical inactivity or a combination of the two (4).

Despite the necessity of healthy eating and physical exercises in adolescent period, research has shown that as the individual enters adolescence, the dietary habits often get unhealthier (15, 41). Healthy lifestyle in adolescence involves health eating habit Adolescent girls are characterized by poor eating habits and poor engagement on physical exercises. They are skipping meals mostly breakfast, eating fast foods and unhealthy snacks.

CHAPTER THREE

3.0 Research Methodology

3.1 Study Design

This Quantitative study employed cross-sectional descriptive study design and was implemented from November 2016 to August 2017

3.2 Study area

Ilala municipal council is one of the four municipalities of Dar es Salaam city; other municipal councils include Temeke, Kinondoni and Dar es Salaam city council. According to the recent census of 2012 the total population of the district is 1,195,936 people while male are 581, 184 and female 614, 752 (NBS, 2015). The municipal is divided into 26 wards. Ilala municipality has an area of 210 km^2.

On its Southern part it borders Temeke and Kigamboni municipality, while in western it borders Kisarawe district and in northern part it border Ubungo and Kinondoni Municipality. Ilala municipal council was selected as a study area because of its strategic location and it is highly populated area. It is the residence of most Government Ministries and institutions, National referral hospital (Muhimbili), Dar es Salaam international airport, High court of Tanzania and some universities campuses. Furthermore it is the city centre which comprises business centers of the country such as Kariakoo, Kivukoni, Mchafukoge, Buguruni, Upanga, and Vingunguti**.**
How about the distribution of secondary schools in Dare s salaam

3.3 Study Population and Target Group

The study involved adolescent girls' age (13 -19 years) attending secondary schools in Ilala Municipal.

3.3.1 Inclusion Criteria

Urban secondary schools adolescent girls (13 -19 years old) present at school during an interview day.

3.3.2 Exclusion Criteria

Urban Secondary schools adolescent girls (13 -19 years old) with disabilities.

3.4 Sample size determination

The total numbers of adolescent in secondary schools involved in this study, basing on the assumption of the proportion of poor nutrition to be 21.2% of women aged 15 -49 years old (42) confidence interval of 95% with a desired precision of 5% and marginal error of 5. The sample size of the study is calculated using the following formula (51).

$$n = z^2 p (1-p) / \varepsilon^2 \quad \ldots\ldots (1)$$

Whereby:

N	Calculated sample size
Z	point on standard distribution = 1.96
P	Proportion malnourished adolescent girls = 21.2% (50)
ε	Margin of error on estimate = 5% or 0.05

The calculated sample size basing on this formula was:

n= 256

In order to account for non-response, the sample size was inflated by using the following formula.

N= 1/Rxn

Whereby:

N	Final sample size
R	Response rate (estimated to be 90%)
N	Calculated sample size (256)

The final sample was 284 adolescent girl students.

3.5 Sampling technique and process

The study used Multi-stage sampling method. First stage was random selection of two wards from each of three divisions. The second stage involved selection of one school from each of the selected wards by using simple random sampling approach. This entails that six (6) schools were selected from the Municipal. The plan was to enrol equal number of students to participate in the study from each school. Basing on the calculated sample size of 284 students, this meant that in each school, a total of 48 students were needed to be enrolled.

The third stage of sampling involved simple random selection of three classes in the selected school so as to obtain study participants. The fourth and last stage involved a simple random selection of adolescent girl 48 students from the selected 3 classes in each school who participated in the study.

3.6 Data collection tools

The main tool for data collection was a structured questionnaire with closed structured questions. The questionnaire was adopted from Tanzania Demographic, Health and Malaria Indicator Survey 2015/16. The questionnaire content included the information on the following aspects:-

Adolescent girl students (age, food intake habits, self-esteem)

Basic socio-demographic information (diseases, number of household members, eating companion, place of residence, sanitation/hygiene, source of water , hand washing , water purification)

Environmental information (family members, peer group at school, fast foods outlet, mass media, sport infrastructure)

Physical exercises information (jogging, walking, rope jumping, playing)

Anthropometric measurements (weight and height)

3.7 Variables

3.7.1 Dependent variable

Nutritional status

- Under nutrition

3.7.2 Independent variables

3.7.2.1 Demographic factors

Diseases

Fever, cough or diarrheal in the month preceding the survey.

Number of household members:

Small size (Below 5 members), medium size (between 5 and 7 members); large size (above 7 members).

Eating companion

Alone, family members, friends and peer.

Place of residence: Squatter (unplanned suburb); planned suburb.

Sanitation and hygiene.

Source of water

Tape water; bore hole, dams, open shallow well, others.

Hand washing

Before eating

After coming from toilet

Water purification

Use purified water (bottled, boiled, water guard) or otherwise

3.7.2.2 Individual factors

Age

Early adolescents (13 -14 years old); middle adolescents (15 to 16 years old); and late adolescents (17 to 19 years).

Food intake:

Feeding frequency – Number of meals usually consumed per day: 1 meal; 2 meals; 3 meals; More than 3 meals

Number of food groups consumed in the day preceding the survey (Individual Dietary Diversity Score): 24 hours dietary recall. .

Menstruation periods: Normally experiences loss of appetite or nausea when ammenorhoic.

Self-esteem:

What is the student feeling about her body weight: Too thin; Normal; overweight; Obese

3.7.2.3 **Environmental factors**

Family members

Family members: Family members support and encouragement about an adolescent's body weight, eating behavior, and the way she does physical exercises

Peer group at school**:** Friends support and encouragement about adolescent's body weight, eating behavior, and the way she does physical exercises.

Fast foods Outlet: adolescent's preference to eat in fast food outlets than home or school meals.

Mass media: Newspapers, Radio and Television programs and adverts do not adequately cover issues of healthy eating and physical exercise.

Sport infrastructure: There are no adequate infrastructure for sports, recreation and body exercise in the neighbourhood

3.7.2.4 Physical activities - Involvement in physical activities scores

3- 4 = Highly involvement

2 = Moderately involvement

0 = Inactively involvement

3.7.2.5 Factors affecting adoption of physical activities

Presence of sport ground in school

Presence of sport ground in neighbourhood

Encouragement from peers

Encouragement from family members

3.7.2.6 Anthropometric measurements

Date of birth

Sex

Age

Weight in Kilogram

Height in Centimeters

3.8 Recruitment and training of research assistance

Based on experience on related research and social science knowledge, 2 research assistants were selected and have one day training by researcher on the use of research instrument and how to obtain primary data from respondents.

3.9 Pre testing of questionnaire

Pretesting helped to observe if the questionnaire is clearly understood by respondents or not. It helped on doing required amendments and refining of the data collection tool. In this study, the pre-testing was done by using a Kiswahili version questionnaire. The research assistants under the supervision of the researcher conducted the pretesting exercise to get more acquainted with the process, methodology and techniques for obtaining quality data. The pretesting exercise was conducted in an urban secondary in Ilala Municipal which was not selected to participate in the actual survey.

3.10 Validity and reliability

To assess the validity and reliability of the research tool, a pre-test was conducted among 20 students. Content and construct validity used to determine the relevance and representativeness of the tools. The questions that weren't clear or seemed to be inappropriate or irrelevant were modified, or omitted so as to enhance consistency before commencement of the study.

3.11 Data collection procedures

The data was collected by using a self-administered questionnaire therefore the interviewees filled the questionnaire to obtain quantitative information on socio demographic factors, individual factors, and environmental factors of urban secondary schools adolescent girls. Also, standard stadiometer and weighing scales were used to measure students' height and weights respectively. The weight and heights of students were recorded into questionnaires. Data were collected during working days in an identified comfortable room with high privacy. School management from selected schools helped on identification of good environment areas for data collection.

3.11.1 Assessment of nutritional status

To ensure accuracy, instrument variation was avoided; anthropometrics measurements such as height and weight were measured following standard procedures using standard equipments namely UNICEF/WHO approved electronic weighing scale and stadiometer (height board) for measuring adults' height. (WHO, 2010, UNICEF *et al.,* 2012).

3.11.2 Assessment of factors influencing eating habits

Urban secondary school adolescent girls were interviewed of their individual factors, socio demographic factors and environmental factors.

3.11.3 Assessment of factors influencing physical exercises

Urban secondary school adolescent girls were interviewed of their individual factors, socio demographic factors of adolescent girls and environmental factors.

3.12 Data Management and Analysis

3.12.1 Data entry and quality control

After an interview, the filled questionnaires were checked out to see whether they were completely and accurately filled to ensure data quality. Thereafter, data were entered into SPSS version 18 computer software for data analysis. Data quality checks were done, and data cleaning followed to identify any extreme values, missing data and any other problem associated with data. Anthropometric data were entered into Microsoft Excel computer software and thereafter were transferred into WHO Anthro-plus computer software for further analysis of nutrition indices. In addition, some data were transferred to R software to analyse and visualization of figures depicting differences of some indices among girls from different schools.

3.12.2 Data analysis

SPSS (Version 18), Microsoft Excel and WHO Anthro-plus computer software used to analyze data. WHO, 2006 references used to define adolescent girls' nutritional indices. Z-scores of Body Mass Index for Age (BMIA) were used to define nutrition status of girls. The categories of nutrition status basing on this indicator is as follows: Girls with BMIA Z-score > 2 were categorised as overweight; those with BMIA Z-score ≤2 to -2 were categorised as normal nutritional status; girls with BMIA Z-score ≤ -2 to -3 were categorised as moderately thin or moderate wasting; and other girls with BMIA Z-score < -3 were categorised as severely thin or severe wasting. BMIA is also known as height adjusted weight, and is an indication of acute or recent situation that affected nutrition status of an individual.

Similary, the indicator of linear growth namely Height-for-Age (or age adjusted height) was also computed for all girls. Height-for-Age (or age adjusted height) and is an indication of chronic or long term situation that affected nutrition status of an individual. Individuals 0 – 19 years old with low age adjusted height are also termed as "stunted" meaning that they are too short for their age, or they failed to reach the potential height

for their age and sex. The categories of nutrition status basing on this indicator is that girls with HAZ-score ≤2 to -2 were categorised as normal nutritional status; those with HAZ-score ≤ -2 to -3 were categorised as moderate stunted; and others with HAZ-score < -3 were categorised as severely stunted.

The quantitative data were generated and presented using description, tables and figures. Frequencies and percentages of different expression on nutritional status and other independent variables reported in tables.

Logistic regression analysis was employed to examine the association between socio demographic, individual, environmental variables and nutritional status. In the research question for this study, the prevalence of poor nutrition among students treated as dependent binary variables (y). The logistic regression model used to explore the log likelihood of respondents to be thin or overweight/obese against some selected socio-demographic, environmental and individual independent variables of interest (x). Odds Ratio with 95% CI calculated to determine the association of independent variable to the dependent variables (under nutrition) and significant level was set at 0.05.Therefore, a calculated , *p*-value less than 0.05shows there is significant association between dependent and independent variable.

Logistic regression to find out the significant factors associated with under nutrition among urban secondary schools adolescent girls 13 -19 years old that was estimated is presented herein below:

$$Logit(y) = \ln(\varphi \div 1 - \varphi) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \ldots\ldots\ldots + \beta_{10} x_{10} + \mu \ldots\ldots\ldots\ldots\ldots (3)$$

Whereby:

y = Dichotomous variable (The student was undernourished – BMIA < -2) = 1, or otherwise = 0

Φ = Probability y =outcome of interest: $x_1 = x_1$, $x_2 = x_2$, $x_3 = x_3$, $x_4 = x_4$, ……., $x_{10} = x_{10}$

α = Constant parameter

β_s = Regression coefficients for individual predictor variables.

x_1 = Hand washing Before eating

x_2 = Any disease in a previous one month

x_3 = Water purification

x_4 = Number of meals per day

x_5 = Dietary Diversity Scores (DDS), Number of food groups consumed in previous 24hours.

x_6 = Nausea or loss of appetite during Menstruation

x_7 = Self esteem

x_8 = Age

x_9 = Any physical activity

x_{10} = Encouragement from peers to do physical activities

μ = Stochastic disturbance (error term)

Table 1. Summary of data analysis techniques

Research Objectives	Data Analysis Technique
Objective 1: To assess prevalence of under nutrition among urban secondary schools adolescent girls aged 13 -19 years old in Ilala municipal.	Descriptive analysis - Frequency distribution
Objective 2: To assess factors associated with under-nutrition among urban secondary schools adolescent girls 13 -19 years old in Ilala municipal.	Inferential–Binary logistic regression
Objective3: To determine proportion of urban secondary schools adolescent girls 13 -19 years old who have adopted physical exercise practices in Ilala Municipal.	Descriptive analysis - Frequency distribution
Objectives 4: To assess factors associated with adoption of physical exercise practices among urban secondary schools adolescent girls aged 13 -19 years old in Ilala Municipal.	Descriptive analysis - Frequency distribution

3.13 Ethical considerations

Ethical clearance was obtained from Muhimbili University of Health and Allied Sciences (MUHAS) Research and Publications Committee. Permission to conduct the study was requested from all relevant government authorities from the Municipal to Ward levels. Three days prior to the study, urban secondary schools adolescent girls were informed on the essence of the study and given a letter of request for consent from their parents for the purposes of understanding and providing voluntary consent to participate in the study. Then, on the day of the interview, these adolescent girls were asked to sign the consent form to participate in the study, after accordance with the Child Acts 20 of 2009 which gives freedom of self-expression to adolescent girls. The information that was collected during the study were handled and treated confidentially.

3.14 Limitation and mitigation of the study

Efforts were made to minimise most limitation of the study. One form of limitation was recall bias since the collection of quality primary data largely depended on the respondent's ability to recall and respond on past events. It was expected some girls might have failed to give some responses due to failure to recall in this case, therefore they were guided on short recall period, available records used and teacher(s) were also consulted for clarity whenever necessary.

CHAPTER FOUR

4.0. RESULTS

The findings of this study are presented in this chapter. These results are organized according to the specific objectives of the study. Socio-Demographics and characteristics of the respondents, Prevalence of Nutritional Status, Factors associated with under nutrition, Practice of physical exercises in urban secondary schools adolescent girls, Factors associated with adoption of physical exercise practices.

4.1. Socio-Demographics and characteristics of the respondents

A total number of 284 adolescent girls from six secondary schools (Jangwani girls, Benjamini Mkapa, Tusiime, Mchikichini, Christ the King and Airwing) participated in the study. Their ages ranged from 13 years to 19 years. The highest proportional of girls (39%) was in the age group of 15 – 17 years old and least (25.7%) was in the age group of 18 - 19years old. Repondents came from all the 3 division and 6 wards in Ilala Municipal. The respondents were from all class levels from form 1- 2 (47.9%) form 3 - 4(37%), form 5 - 6(15.1%).The places of residence for the respondents are both squatter (15.5%) and planned (84.5%) areas.

Table 2: Socio- Demographic characteristics among urban Secondary school adolescent girls

Division	Frequency (N=284)	Percent (%)
Gerezani	188	35.6
Ilala	87	30.6
Tabata	45	16.9
Ukonga	45	16.9
Ward		
Gerezani	53	18.7
Kipawa	39	13.7
Mchikichi	48	16.9
Segerea	96	33.8
Upanga M	48	17
School		
Airwing	39	13.7
Ben.Mkap	53	18.7
Christ K	48	16.9
Jangwani	48	16.9
Mchikich	48	16.9
Tusiime	48	16.9
Education level		
Form 1 – 2	136	47.9
Form 3 – 4	105	37
Form 5 – 6	43	15.1
Age		
13 - 14years	99	34.9
15 - 17 years	112	39
18 - 19years	73	25.7
Place of residence		
Squatter	44	15.5
Planned	240	84.5

Figure 2 below shows normal distribution of Height for Age Z score (HAZ) of adolescent school girls in Ilala Municipal. The Figure shows that the distribution of the assessed girls curve is skewed to the left of the WHO reference population. This implies that the adolescent girls in Ilala municipal were shorter as compared with the reference population.

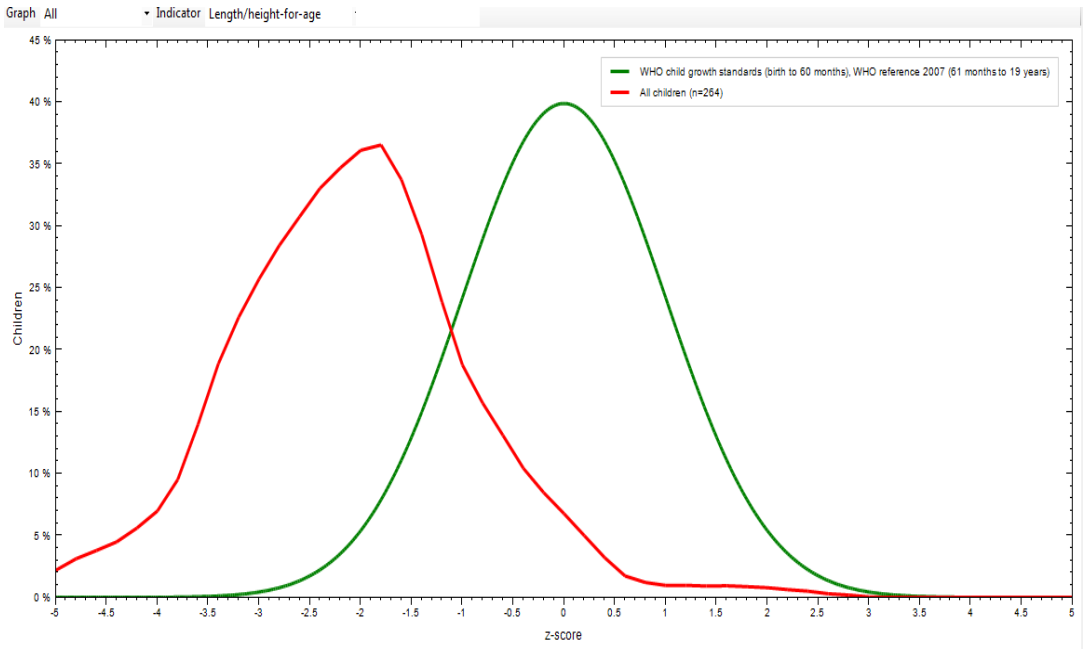


Figure 2: Gaussian Curve showing normal distribution of HAZ in urban secondary adolescent girls.

Figure 3 below shows normal distribution of BMI for Age Z score (BMIZ) of adolescent school girls in Ilala Municipal. The figure shows that the distribution of the assessed girls curve is skewed to the right of the WHO reference population. This implies that the adolescent girls in Ilala municipal had higher Height Adjusted Weight as compared with the reference population. This results have been contributed by the fact that majority of the girls were short for their age, hence they appear to be heavier than their shorter stature.

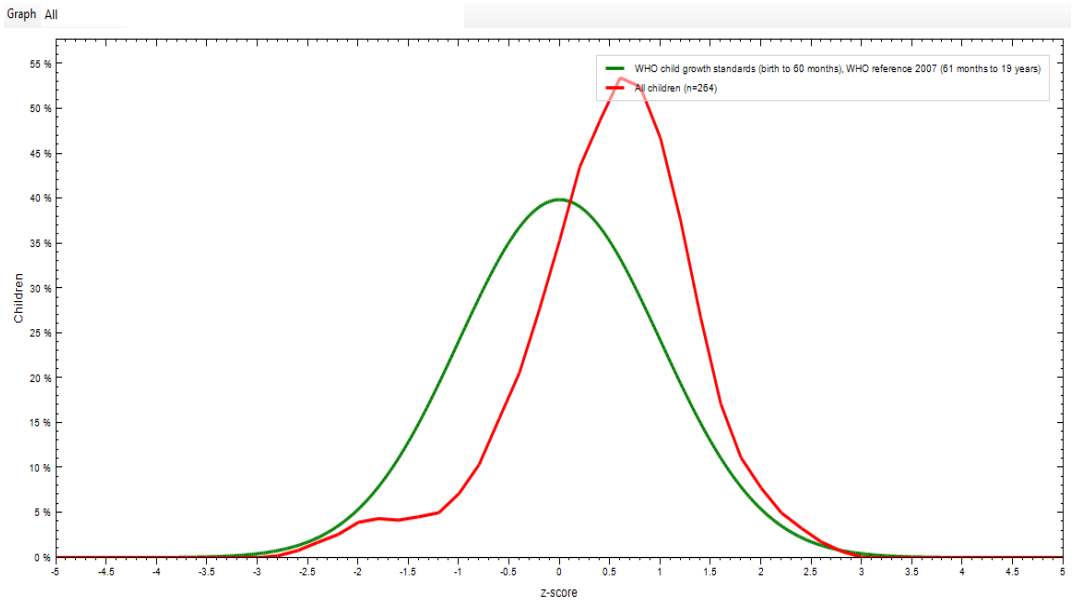


Figure 3: Gaussian Curve showing normal distribution of BMIZ in adolescent school girls

4.2 Prevalence of Nutritional Status

The finding revealed that non-attainment of desirable height-for-age among adolescent school girls in the surveyed area is a major nutrition problem. In total 52.3% of sampled girls were stunted 1.5% Wasting and (2.3%) overweight/obesity.

Table 3: Nutritional Status of secondary school adolescent girls basing on HAZ

Nutrition status	Frequency	Percent
Stunting level (HAZ)		
Normal height	126	47.7
Moderate stunting	83	31.4
Severe stunting	55	20.9
Total	264	100

4.3 Factors associated with under nutrition

Results of the logistic regression fitted to evaluate the significant factors associated with under nutrition among urban secondary schools adolescent girls 13 -19 years old are shown in Table 4 below. Original model consisted of 10 predictor variables which were hypothesized to be associated with wasting (low BMI for Age) among the subjects.

However, after evaluating the model, only eight variables were found to contribute to the model. Hence, the final model evaluated had eight predictor variables namely disease during the previous month, quality of drinking water, loss of appetite during menstruation, self esteem with regards to one's body weight, level of physical activity, peer encouragement on doing physical exercise; age and number of meals eaten per day.

The results shows that seven out of all eight predictor variables analysed, yielded insignificant results ($p > 0.1$). The only predictor variable which yielded significant result was quality of drinking water ($p < 0.1$). The regression coefficient (β) for this predictor variable was negative. This implies that girls who drank purified water were less likely to have below normal BMI for age as compared to those who drank non purified water. The odd ratio of a girl who drinks purified water to be wasted was 0.001 lower as compared to that of a girl who drank purified water, all other factors remaining the same. In fact, at *ceteris peribus*, basing on 95% confidence interval, the population based odd ratio for a student girl to be wasted in Ilala Municipal was lying between 0.000 - 13.5, lower than that of their counterparts who drank non-purified water. These results were statistically significant ($p < 0.1$) at 95% confidence level (Table 4).

Table 4: Factors associated with low BMI for Age in urban School adolescent Girls of Ilala Municipal

		β	Sig.	Odd ratio	95.0% C.I.for EXP(B)	
	N=284		p	e^{β}	Lower	Upper
Illness			0.575			
Diarrhoea	21	-34.8	0.989	0.0	0.0	.
Cough	32	-21.8	0.998	0.0	0.0	.
Fever	53	0.5	0.821	1.7	0.0	21.9^{E1}
Typhoid	59	-6.1	0.136	0.0	0.0	6.9
Purified drinking water	216	-14.1	0.098^{*}	0.001	0.0	13.5
Number of meals	284	18.9	0.110	16.9^{E9}	0.0	20.8^{E17}
Loss appetite	188	-20.8	0.136	0.0	0.0	69.6^{E1}
Self-esteem			1.000		0.0	
Too light	2	-11.3	1.000	0.0	0.0	.
Light	16	15.4	1.000	52.3^{E5}	0.0	.
Normal	245	-16.1	1.000	0.0	0.0	.
Jogging	156	-4.5	0.142	0.0	0.0	4.6
Age	284	-0.5	0.108	0.5	0.3	1.1
Peer encouragement	154	-3.9	0.261	0.0	0.0	18.6
Constant		57.9	0.999	15.1^{E20}		

Reference variable: Disease = Not applicable; Drinking water = Non purified water; Appetite when ammenorhoic = Normal appetite; Self-esteem basing on one's body weight = Heavy; Physical activity = No jogging; Friends encouraging physical activity = No encouragement; * = statistically significant at 95% level of confidence ($p < 0.1$

The logistic regression model estimated was evaluated by using the standard tools namely the Hosmer- Lemeshow goodness-of-the fit test (Hosmer; Lemeshow, 2000) and pseudo R^2 developed by Cox and Snell and Nagelkerke (Table 5). The results yielded the Hosmer-Lemeshow Chi-square of 5.51 (p = 0.702). This implies that the data was best fitted to the model, meaning a high quality of the results. If the model and data were not well fitted, the yieled p-value for H-L statistic could be < 0.05 cut off point which is not the case for this result. Other supplementary model evaluation (pseudo R squares) were evaluated. However, these R square are not as robust as those of linear regression model because in logistic regression model the dependent variable is categorical. The r-squared statistic, which measures the variability in the dependent variable that is explained by a linear regression model, cannot be computed for logistic regression models. The pseudo r-squared statistics are designed to have similar properties to the true r-squared statistic.

Table 5: Overall Model Evaluation

Statistic	Chi-square	Df	Sig.
Hosmer and Lemeshow Test	5.510	8	0.702
Cox & Snell R Square	0.133		
Nagelkerke R Square	0.177		

4.4 Practice of physical exercises in urban secondary schools adolescent girls

The results in table 6 below show the frequency distribution of adoption of physical activities of the urban secondary schools adolescent girls. 71.5 % of girls were moderately involved in physical activities while 17.6% of girls were highly involved and 10.9% were inactively involved in physical exercises.

Table 6: Level of physical exercises adoption in urban secondary schools adolescent girls

Physical exercise (PE)	Frequency (N=284)	Percent
Highly involved	50	17.6
Moderately involved	203	71.5
Inactively involved	31	10.9

4.5 Factors associated with adoption of physical exercise practices

Data presented in Figure 6 below indicates that only 30% and 25% of girls reported to have infrastructure to play games in their homes and schools respectively.

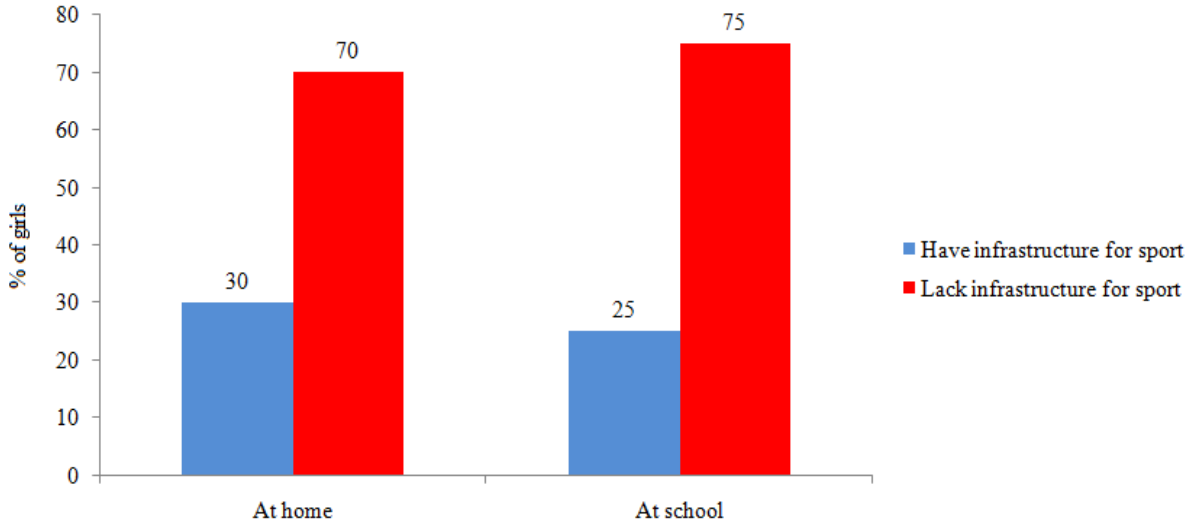


Figure 4: Availability of infrastructure for physical exercises in schools and homes

Table 7, present data on perception of girls regarding receiving family members encouragement to do physical exercise. The results show that 7% strongly disagree that they are encouraged to do physical exercise whereas 13.4% strongly agree y.

Table 7: Encouragement to do physical exercise from family members

Response	Frequency	Percent
Strong disagree	20	7.0
Disagree	65	22.9
Agree	161	56.7
Strong agree	38	13.4
Total	284	100.0

Results presented in Table 8 below shows data on perception of girls who receive encouragement to do physical exercise from their peers in school. The table show that 9.2% strongly disagree that they are encouraged to do physical exercise whereas 33.8% just disagree. In addition, those who agree and strongly agree were 46.8% and 10.2% respectively.

Table 8: Encouragement to do physical exercise from friends in school

Response	Frequency	Percent
Strong disagree	26	9.2
Disagree	96	33.8
Agree	133	46.8
Strong agree	29	10.2
Total	284	100.0

Table 9, shows a summary on factors associated with adoption of physical activities. The results show that 12%) of respondents who were categorised as of normal nutritional status were lowly involved in physical exercises 100% of overweight girls were moderately involved in physical exercises. However, the observed results show that there was no statistically significant association between nutritional status of the respondents and adoption of physical exercise (p = 1.000). Furthermore, results in table 10 shows majority of girls were moderately involved in physical activity 76% of form 1 – 2 67% of form 3 – 4 and 67% from form 5 – 6. These results indicate a statistically significant association between the class at which the respondent belongs and adoption of physical exercises (p =0.000).

Similarly majority of girls living in moderately planned areas (70%) were moderately engaged in physical exercises. Similarly, 80% of those living in squatter moderately doing physical exercises, and the result indicates a statistically significant association between the place of residence and adoption of physical exercises (p = 0.000).

Moreover, moderate physical activity was reported to be adopted by girls in all age groups (75of adolescent girls aged 13 – 14 years old) (70% of 15 – 17years olds) (69% and of respondents aged 17 – 19years old). The association between the age of respondent and adoption of physical activity was statistically significant (p = 0.000). 23(14%), 116(73%) and 21(130%) of respondents who have sports infrastructures at school were highly moderately and lowly engaged in physical exercises respectively while 27(22%), 87(70%) and 10(8%) of respondents who do not have sports infrastructures at school were highly moderately and lowly engaged in physical exercises respectively and the result indicates that there is no statistically significant association between sports infrastructures at school and adoption of physical activity (p = 0.304).However 23(17%), 92(69%) and 19(14%) of respondents who have sports infrastructures at home were highly moderately and lowly engaged in physical exercises respectively while 27(18%), 111(74%) and 12(8%) of respondents who do not have sports infrastructures at home were highly moderately and lowly engaged in physical exercises respectively and the result indicates that there is a statistically significant association between sports infrastructures at home and adoption of physical activity (p = 0.033).

Furthermore 10(8%), 99(76%) and 21(16%) of respondents who do not received peer support to exercise were highly moderately and lowly engaged in physical exercises respectively while 40(26%), 104(68%) and 10(6%) of respondents who received peer support to exercise were highly moderately and lowly engaged in physical exercises respectively and result indicates that there is no statistically significant association between peer support to exercise and adoption of physical exercises (p = 0.154).However 5(5%), 75(74%) and 22(22%) of respondents who do not received family member support to exercise were highly moderately and lowly engaged in physical exercises respectively while 45(25%), 128(70%) and 9(5%) of respondents who received family member support to exercise were highly moderately and lowly engaged in physical exercises respectively. The results shows that there is a statistically significant association between family member support to exercise and adoption of physical exercises (p = 0.000).

Furthermore all respondents who were feeling to be extremely underweight were inactively engaged in physical exercises 2(100%) while 2(13%), 11(69%) and 3(19%) of respondents who were feeling to be underweight were highly moderately and lowly engaged in physical exercises respectively, However 45(18%), 178(73%) and 22(9%) of respondents who were feeling to have normal weight were highly moderately and lowly engaged in physical exercises respectively. 3(16%), 13(68%) and 3(16%) of respondents who were feeling to be overweight were highly moderately and lowly engaged in physical exercises respectively, while 1(50% and 1(50%) of respondents who were feeling to be obese were moderately and lowly engaged in physical exercises respectively. The results shows that there is a statistically significant association between feeling about the body weight and adoption of physical exercises ($p = 0.000$).

Table 9: Association of level of adoption of physical exercises according to and socio-demographic characteristics

Variable	Observation	Levels of physical activity involvement				
		High n (%)	Moderate n (%)	Low n (%)	χ^2	p
BMI for Age	Normal	46 (18)	178 (70)	30 (12)	76.561	1.000^{NS}
	Moderate wasting	1 (25)	3 (75)	0 (0)		
	Overweight	0 (0)	6 (100)	0 (0)		
Level of education	Form 1 - 2	23 (17)	104 (76)	9 (7)	57.789	0.000^{s}
	Form 3 - 4	21 (20)	70 (67)	14 (13)		
	Form 5 - 6	6 (14)	29 (67)	8 (19)		
Place of living	Planned	46 (19)	168 (70)	26 (11)	135.26	0.000^{s}
	Squatter	4 (9)	35 (80)	5 (11)		
Age	13 - 14 years	14 (18)	57 (75)	5 (7)	72.64	0.000^{s}
	15 - 17 years	24 (17)	99 (70)	18 (13)		
	18 - 19 years	10 (18)	38 (69)	55 (13)		
Sport infrastructure at school	Present	23 (14)	116 (73)	21 (130	0.901	0.304
	Not present	27 (22)	87 (70)	10 (8)		
Sport infrastructure at home	Present	23 (17)	92 (69)	19 (14)	4.563	0.033^{S}
	Not present	27 (18)	111 (74)	12 (8)		
Peer support to exercise	Not received	10 (8)	99 (76)	21 (16)	2.028	0.154^{NS}
	Received	40 (26)	104 (68)	10 (6)		
Family member support to exercise	Not received	5 (5)	75 (74)	22 (22)	22.535	0.000^{S}
	Received	45 (25)	128 (70)	9 (5)		
Feeling about body weight	Extremely under weight	0 (0)	0 (0)	2 (100)	783.7	0.000^{s}
	Under weight	2 (13)	11 (69)	3 (19)		
	Normal	45 (18)	178 (73)	22 (9)		
	Over weight	3 (16)	13 (68)	3 (16)		
	Obese	0 (0)	1 (50)	1 (50)		

Note: NS = statistically not significant association at 90% level of confidence; **s** = statistically significant association at 90% alpha level of confidence

CHAPTER FIVE

5.0 DISCUSSION

This chapter presents a discussion of the main findings with respect to the specific objectives and various literature reviews. The overall prevalence of stunting, wasting and overweight is 52.3%, 1.5%, 2.3% respectively.

5.1 Nutrition status of adolescent girls

5.1.1 Stunting

The finding revealed that non-attainment of desirable height-for-age among adolescent school girls in the surveyed area is major nutrition problem. In total 52.3% of sampled girls were stunted meaning that they were too short for their age. This study is similar to the study done among adolescents in Magu district in Tanzania which shows the prevalence of stunting was, 52.5 %.(54). However the results of this study are higher than the study conducted in Ethiopia, which shows the prevalence of stunting among adolescents was 28.5 % (53). According to global standards given by WHO (52), the level of stunting in adolescent girls in secondary schools is above 42%, a threshold categorised as a very high public health problem. Stunting, a sign of long term malnutrition usually begins during embryonic stage when pregnancy is conceived, and progress as the child grow, all the way to 19 years of age when linear growth comes to an end. However, the negative effects of stunting are irreversible when it occurs during pregnancy all the way until a person reaches two years of age.

5.1.2 Wasting Underweight, overweight, and obesity

Underweight is not to a major nutritional problems affecting adolescent secondary school girls in the surveyed area. This is because underweight was seen only in 1.5% of the studied school girls. This finding is lower compared to prevalence of underweight reported in Benin (14%). Djibout (20.1%), Egypty (9.9%), Ghana (18%), Malawi (12%)(43**).** According to global standards defining public health significance of

nutritional problem, WHO (52) uses a cut-off point of ≤ 5% prevalence of wasting to define that problem does not pose significance public health concern in the community.

Also, Overweight and obesity (2.3%) appeared to be within the levels that do not pose a significant public health concern. This finding is higher compared to prevalence of overweight among adolescent girls reported in Malawi (1.1%) and Ghana (1.5%). However, the result is lower than that reported in Djibout (9.4%, Egypt (7.6%) and Mouritania (5.1%) (43).

Overweight and obesity at adolescence increases risk of non communicable diseases such as diabetes and cardiovascular diseaseslife.

Adolescent girls in Ilala municipal had higher Height Adjusted Weight as compared with the reference population. Any comparison ffrom other literatures?

This results may have been due to the fact that majority of the girls were short for their age, hence they appear to be heavier than their shorter statures.

5.2 Factors associated with under nutrition

The results show that drinking of purified water was lower among the respondents. (P =0.098) The use of non-purified water increases the odd of wasting in adolescent secondary school girls surveyed. (OR= 0.001). Non-purified water increases the risk of infections with waterborne pathogens which compete for nutrients with the body in the gut. In doing so, the microbes affect nutrient utilization in the body by causing low absorption of vitamins, minerals and macronutrients. (43) Adolescents who take impure water in drinking, cooking and other works results to repeated attack of diarrhoea hence lose strength and weight.(45)

However other predictors (namely disease during the previous month, loss of appetite during menstruation, self esteem with regards to one's body weight, level of physical activity, and peer encouragement on doing physical activity; age and number of meals eaten per day) were not statistically significant contributing to low BMI for age among the research subjects. Probably there are other exogenous factors which were not

included in this study, which if they could have been included, those predictor variables could have yielded significant results.

5.2 The adoption of physical exercises practices.

Finding of this study suggests that 17.6% of adolescent girls in the surveyed area were highly involved in physical exercises. This low prevalence on adoption of all physical exercises might be due to lack of infrastructures at both schools and home neighbourhood as only 30% and 25% of girls reported to have infrastructure to play games in their homes and schools respectively. Globally, 81% of adolescents aged 11-17 years were insufficiently physically active in 2010. Adolescent girls were less active than adolescent boys, with 84% vs. 78% not meeting WHO recommendations (46)

5.3 Factors influencing adoption of physical exercise practices

level (P=0.001) (49). The higher the level of education the higher is the performance in physical exercises.

Performance of physical exercise was positively correlated with the age of respondents.(p = 0.000). These results are similar to the information given by ..... which reveals that participation in physical exercises decreases with age, and the decline is greater in girls than boys (50).This implies that the early adolescent age girls are more actively involved on physical exercises compared to late adolescent girls.

The study also shows that there is a statistically significant association between family member support to exercise and adoption of physical exercises (p = 0.000). This finding is similar to the study done in UCLA which shows 31.7% of students reported high family support for Physical exercise(44).

Performance of physical exercise is positively correlated with individual feeling about the body weight (P = 0.000).Similar results with another study done in UK, where by physical exercise was closely associated with feeling of the body weight (β =0.42, P<0.001) (51). This means that adoption of physical exercises is increasing as the feelings of increased body weight.

CHAPTER SIX

6.0. **Conclusion and recommendations**

6.1. **Conclusion**

The study has revealed that under nutrition especially stunting of the adolescent girls is a serious public health problem in the area and it is likely to remain a problem if left unaddressed and no intervention put in a place.

Wasting, overweight, and obesity appeared to be minor nutritional problems affecting adolescent secondary school girls in the surveyed area. Despite being problems which don't pose a serious public health concern, acute malnutrition and overweight/obesity are problems which need attention even at an individual level. This is because, if individuals who are suffering from these problems take no action to tackle them, they are likely to succumb to serious health problems.

This study indicates that among all predictor variables for wasting only the use of non-purified water increases the odd of wasting in adolescent secondary school girls surveyed.

The absence of infrastructure for physical activity around home/schools and lack of encouragements decrease the level of involvement in physical activities among adolescent girls in Ilala.

6.2**. Recommendation**

- Therefore community development workers should emphasize more on creation of awareness on child nutrition and public health.
- Family members should encourage adolescent girls to do physical activity l.
- Government and community members provide play grounds around homes and schools for physical exercises to be adopted by adolescent girls in Ilala.
- More research should be done on adolescent girls' nutrition status. These researches should include other factors which are not included in this study to yield significant results.

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APPENDICES

Appendix 1A: Consent Form English Version

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)
DIRECTORATE OF RESEARCH AND PUBLICATIONS

ID-NO……

Consent to participate in an INTERVIEW

Introduction

Greetings! My name is Alice Mwambambale a student of Master of Public Health at Muhimbili University. I am conducting a research as part of my studies with the main objective of "**Nutritional status , physical exercise and associated factors among urban secondary school adolescent girls in ilala municipal**"

About the study:

A total of 284 adolescent girls will be interviewed in this study. Hence, including you in the study will also mean that I will ask you few questions regarding your socio demographic, environmental and individual characteristics. Also I will take your height and weight measurements during this study. This would take approximately 20 minutes of your valuable time.

What Participation Involve

If you agree to participate in this study, you will be required to sign this consent form and answer the question that you will be asked by the interviewer.

Benefits

You will not get direct benefits from the study. But, the information provided by you will help us to understand your nutritional status and some direct associated factors. Findings from this study will inform the school administration and other stakeholders on consolidating future nutrition programs aiming at reducing malnutrition problem among school children.

Risks

This study involves no invasive procedures so we expect that no harm will be done to any participant.

Confidentiality

I wish to assure you that, this information will be treated in confidentiality between you and the researcher. All the information collected in the questionnaire forms will be entered in the computer with only the study identification number.

Voluntary participation

Taking part in this study is totally voluntary, that is, you can decide to participate or not. You can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Who to contact if you have any question about this study

You can contact the researcher, Alice Mwambambale of Muhimbili University of Health and Allied Sciences, P. O. Box 65001, Dar es Salaam, or you may call Prof. M Moshi**,** Chairman of the Research and Publication Committee. P. O. Box 65001, Dar es Salaam **Tel No: 2150302-6)**

Do you agree? Yes…….. No……

Participant agrees ……..... Participants does not Agree. ……...…

I, …… Have read the contents of this consent form and my questions have been adequately answered. I therefore agree to participate in this study.

Signature of the participant ……Date ……

Signature of the interviewer …….. Date ……

Appendix 1B: Consent Form Swahili Version

CHUO CHA SAYANSI ZA TIBA MUHIMBILI - KURUGENZI YA UTAFITI NA MACHAPISHO

FOMU YA RIDHAA

Nambayautambulisho……..

Utambulisho

Habari! Jina langu ni Alice Mwambambale mwanafunzi wa shahada ya uzamili katika fani ya afya ya jamiikatikachuokikuu cha sayansi za afya na tiba Muhimbili. Ninafanya utafiti huu kama sehemu ya masomo yangu, ambao lengo kuuni "**kufanya Utafiti wa Hali ya Lishe ya Wanafunzi wa kike wa Shule za sekondari za mjini na Sababu Zinazochangia Hali ya Lishe manispaa ya Ilala**"

Dhumuni la utafiti huu:

Jumla ya wanafunzi wa kike 284 wa shule za sekondari watashiriki katika utafiti huu. Kwa hiyo nitachukua muda watakribani dakika 20 kukuhoji maswali kuhusu taarifa zako binafsi kwenu. Sambamba na maswali haya nitachukua vipimo vyako vya uzito na urefu.

Ushiriki

Kama utakubali kushiriki katika utafiti huu itabidi usaini fomu hii ya makubaliano pia ujibu maswali utakayoulizwa na mtafiti.

Faida

Hamna faida ya moja kwa moja kwa wewe kushiriki katika utafiti huu Lakini taarifa utakazotoa zitasaidia kutambua hali yako ya lishe. Matokeo ya utafiti huu yatahabarisha uongozi wa shule, wadau na program za lishe zijazo kwa ajili ya kuboresha mikakati ya kupunguza tatizo la utapiamlo kwa wanafunzi.

Hatarishi

Utafiti huu hausishi vitendo vyovyote vyakudhuru mwili wako kwa hiyo hatutegemei mshiriki yoyote kupata madhara.

Usiri: Taarifa zote zitakazokusanywa zitashughulikiwa kwa usiri wa hali ya juu kati yako na mtafiti. taarifa hizi zitaingizwa kwenye mfumo wa komputa kwa namba na sio kwa majina yenu.

Ushiriki wa hiyari

Kushiriki kwako katika utafiti huu ni wa hiyari. Unaweza kujitoa katika utafiti muda wowote hatakama ulikubali kujiunga hapo mwanzo. Kukataa kushiriki au Kujitoa katika utafiti hakutakuwa na adhabu yoyote wala hupotezi haki zako za hapo awali.

Mawasiliano

Tafadhali, kama utakuwa na maswali yoyote kuhusu utafiti huu wa siliana na mtafiti mkuu: Alice Mwambambalewa of S.L.P. 65001,chuo cha sayansi za tiba Muhimbili Dar es Salaam,au Mwenyekiti wa kamati ya utafiti na uchapishaji **Prof. M. Moshi**, S.L.P 65001, Dar es Salaam ,simu 2150302-6.

Je unakubali kushiriki katika utafiti huu? Ndiyo…….. Hapana……

Mimi …….....……..., …… nimesoma /nimeelezwa yaliyomo yote katika fomu hii na maswali yangu yote yamejibiwa. Nakubali kushirikika tika utafiti huu.

Sahihi ya mshiriki …… …….Tarehe ……

Sahihi ya mtafiti msaidizi …… ……Tarehe ……

Appendix 2: Public Health Significance of Nutritional Status Indicators

Public health significance	Per cent of victims below -2 z scores		
	Stunting (Low height for age)	Wasting (Low weight for height)	Underweight (Low weight for age)
Low	< 20	< 5	< 10
Medium	20 – 29	5 – 9	10 – 19
High	30 – 39	10 – 14	20 – 29
Very high	≥ 40	≥ 15	≥ 30

Source: WHO (http//www.who.int/en)

Appendix 3: Questionnaire (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES (MUHAS)

DIRECTORATE OF RESEARCH AND PUBLICATIONS

NUTRITIONAL STATUS , PHYSICAL EXERCISE AND ASSOCIATED FACTORS AMONG URBAN SECONDARY SCHOOL ADOLESCENT GIRLS IN ILALA MUNICIPAL

Questionnaire no……..

Date of interview……

Division

Ward…….

Name of school…….

Class……

INDIVIDUAL CHARACTERISTICS

Date of birth ……. /……../……

How do you rate availability of food at your home/school?

Inadequate

Adequate

More than adequate

How many meals you usually consume per day?

1 meal ( )

2meals ( )

3meals

More than 3 meals

Yesterday during the day and night did you eat any of the following ? Tick to the food you have taken(Individual Dietary Diversity Score):

Cereals- porridge, ugali, bread, rice, potatoes, yams, cassava, millet, sorghum, makande, bananas

Protein(legumes and dairy product)- milk, eggs, meat, fish, sardines, insects,cheese, beans,peas, lentils,peanut,soya,sesame, groundnuts

Vegetables-pumpkin, carrots, okra, green vegetables

Fruits – mangoes, papayas, ripe bananas, watermelon, wild fruits, cucumber, avocado, oranges

Cooking oil: 1. Yes 2. No

Do you normally experience loss of appetite or nausea during your menstruation periods?

Yes

No

What do you fee; about your body weight

Too thin

Thin

Normal

Overweight

Obese

SOCIAL DEMOGRAPHIC CHARACTERISTICS

Have you experienced one or more of the following diseases in the previous month preceding the survey?

Fever,

Cough

Diarrhea

None.

Not applicable

How many people are in your household?.....

Who do you normally take food with

Alone

Family members

Friends /peers

Peer &Alone

Family and alone

How do you consider the place you are living to be?

1. Squatter (unplanned)

2. Planned suburb

What are the source of water at you home/school

Tape water,

Bore hole,

Dams,

Open shallow well,

Other mention

Do you wash your hands before eating

Yes

No

Do you wash your hands after coming from toilet

Yes

No

Do you normally drink purified water (bottled, boiled, water guard).

Yes

No

Do you have toilets at home/school?

Yes

No

ENVIRONMENTAL CHARACTERISTICS

Do your family members give you adequate support and encouragement about your body weight?

Strongly disagree

Disagree

Agree

Strongly agree

Do your friends at school give you adequate support and encouragement about your body weight?

Strongly disagree

Disagree

Agree

Strongly agree

Do you prefer to eat in fast food outlets than home or school meals?

Strongly disagree

Disagree

Agree

Strongly agree

Newspapers, Radio and Television programs and adverts do not adequately cover issues of healthy eating and physical exercise.

Strongly disagree

Disagree

Agree

Strongly agree

There are no adequate infrastructure for sports, recreation and body exercise in the neighbourhood.

Strongly disagree

Disagree

Agree

Strongly agree

D. PHYSICAL ACTIVITIES CHARACTERISTICS

Do you normally do jogging?

Yes

No

Do you normally play net ball

Yes

No

Do you normally play basket ball

Yes

No

Do you normally play volley ball

1. Yes

2. No

Do you walk at least 30 minutes per day?

Yes

No

Is there a sport ground in school

Yes

No

Is there a sport ground in neighbor hood

Yes

No

Do you receive any support /Encouragementto do physical exercises from peers

Yes

No

Do you receive any support /Encouragement to do physical exercises from family members

Yes

No

ANTHROPOMETRIC MEASUREMENTS

Date of birth dd…./mm……../yy……..

Weight in Kilogram ……..

Height in Centimeters……

Appendix 4: Questionnaire (Swahili version)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI

DODOSO – KUFANYA UTAFITI WA HALI YA LISHE YA WANAFUNZI WA KIKE WA SHULE ZA SEKONDARI ZA MJINI NA SABABU ZINAZOCHANGIA HALI YA LISHE MANISPAA YA ILALA

Namba ya dodoso…….

Tarehe ya usahili……

Tarafa…….

Jina la kata…….

Jina la shule……

Kidato.....

TAARIFA BINAFSI

Tarehe ya kuzaliwa……. /……../……

Hali ya upatikanaji wa chakula kwenye kaya/familia yenu upoje?

Hairidhishi

Inaridhisha

Inaridhishasana

Unakula milo mingapikwasiku?

Mlo 1

Milo 2

Milo 3

Milo zaidiya 3

Umekula aina gani ya vyakula kwenye mlo waja na mchana na usiku kati ya hivi vifuatavyo;-?(mdodose kwa umakini)

Wanga- uji, ugali, mkate, wali, viazi, magimbi, mihogo, mtama,uwele, makande, ndizi

Protini-

maziwa.mayai,nyama,samaki,dagaa,wadudu,siagi,samli,maharage,kunde,njegere. mbaazi,soya,ufuta,karanga

Mboga mboga- boga, karoti, bamia. Mboga mboga zote za kijani, nyanya,

Matunda- maembe, papai, ndizi mbivu, tikiti maji, matunda pori, tango, parachichi

Mnatumia mafuta yoyote wakati wa kupika? 1. Ndiyo 2. Hapana

Je, huwana kukosa hamu ya kula na kunapata kichefu chefu mara kwa mara unapokuwa kweny hedhi?

Ndiyo

Hapana

Unajisikiaje kuhusu uzito wa mwili wako?

Mwepesi kupitiliza

Mwepesi

Kawaida

Mzito

Mzito kupitiliza

TATHMINI BINAFSI NA KIJAMII

Je ndani ya kipindi cha mwezi kilichopita umeugua ugonjwa wowote kati ya yafuatayo? Au tofauti na haya?

Kuharisha

Kukohoa

Homa

Kuumwa tumbo

Haihusiki

Katika nyumba unayoishi kuna idadi ngapi ya watu wanaoishi hapo?.....

Je mara nyingi wakati wakula huwa unakula nanani?

Peke yako

wanafamilia

marafiki

peke yako /pamoja na marafiki

wanafamilia na mwenyewe

17. Unaichukuliaje hali ya mahali unapoishi

1. Hapajapangiliwa

2. Pamepangiliwa

Mnachota wapi maji ya kutumia nyumbani (chanzo cha maji)?

Maji ya bomba

Maji ya visima

Maji ya bwawani

Visima vifupi vilivyowazi

Njia nyingine, itaje

Je huwa unakunywa maji (yaliyochemshwa au yaliyowekw ashabu au unanunua yaliyotengenezwa kiwandani)

Ndiyo

Hapana

Je nyumbani/ shuleni kwenu kunachoo?

Ndiyo

Hapana

Je, Huwa unanawa mikono kabla ya kula

Ndiyo

Hapana

Je, huwa unanawa mikono baada ya kutoka msalani

Ndiyo

Hapana

UTATHMINI WA HALI YA KIMAZINGIRA

Je wanafamilia wako wanakushauri na kukupa matumaini kuhusiana na uzito w amwili wako, ulaji wako na kuhusu ufanyaji wa mazoezi ya mwili?

Sikubaliani kabisa

Sikubaliani

Nakubaliana

Nakubaliana sana

Je marafiki zako wanakushauri na kukupa matumaini kuhusiana na uzito wa mwili wako, ulaji wako na kuhusu ufanyaji wa mazoezi ya mwili?

Sikubaliani kabisa

Sikubaliani

Nakubaliana

Nakubaliana sana

Je unapendelea zaidi kula vyakula vinavyouzwa kwenye vioski kuliko chakula cha nymbani?

Sikubaliani kabisa

Sikubaliani

Nakubaliana

Nakubaliana sana

Magazeti, vipindi vya redio na luninga na matangazo haya elezei kwa utoshelevu ulaji bora na ufanyaji wa mazoezi.

Sikubaliani kabisa

Sikubaliani

Nakubaliana

Nakubaliana sana

Hakuna miundo mbinu yakutosha kwa ajili ya michezo na mazoezi ya viungo shuleni kwenu.

Sikubaliani

Nakubaliana

Nakubaliana sana

Hakuna miundo mbinu yakutosha kwa ajili ya michezo na mazoezi ya viungo karibu na mahali unapoishi?

Sikubaliani kabisa

Sikubaliani

Nakubaliana

Nakubaliana sana

D. TATHMINI YA USHIRIKI WA MAZOEZI YA MWILI

Je huwa unakimbia taratibu mara nyingi

Ndiyo

Hapana

Je huwa unacheza mchezo wa netiboli?

Ndiyo

Hapana

Je huwa unacheza mchezo wa kikapu?

Ndiyo

Hapana

Je huwa unatembea hata kwa dakika 30 kila siku?

Ndiyo

Hapana

Je marafiki zako wanakushauri na kukupa matumaini kuhusiana na ufanyaji wa mazoezi ya mwili.

Ndiyo

Hapana

Je wanafamilia wanakushauri na kukupa matumaini kuhusiana na ufanyaji wa mazoezi ya mwili.

Ndiyo

Hapana

VIPIMO VYA KUTATHMINI UKUAJI

Tarehe ya ukusanywaji taarifa dd……/mm……/yy…..

Tarehe ya kuzali wadd…./mm……../yy……..

Uzito (Kg) …… Urefu (Cm) ……

Uzito kwa umri..... 1. Hali nzuri 2. Uzito pungufu (<-2 Z score)