PREVALENCE AND FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG PRIMARY SCHOOL CHILDREN IN KINONDONI DISTRICT, DAR-ES-SALAAM

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Prevalence and Factors Associated with Overweight and Obesity among Primary School Children in Kinondoni District, Dar-es-salaam

By

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A dissertation submitted in partial fulfilment of the requirement for the degree of Master of Science (Applied Epidemiology) of Muhimbili University of Health and Allied Sciences

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Certification

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled **Prevalence and factors associated with overweight and obesity among primary school children in Kinondoni district, Dar es Salaam** in partial fulfilment of the requirements for the degree of Master of Science in Applied Epidemiology of the Muhimbili University of Health and Allied Sciences.

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Declaration and Copyright

I, **Sijenunu Aron Mwaikambo**, declare that this dissertation is my own 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.

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Dedication

This work is dedicated to my family. My father, Mr. Aaron Mwaikambo, my late mother Mrs. Bupe Anania Mwaikambo, my sister Clara Aaron, My brothers Ndipo and Ntoli Mwaikambo and my daughter Bakhita Naomi.

Abstract

Introduction: Urban Tanzania is currently experiencing nutrition transition- a globalization-related phenomenon that entails the progressive displacement of traditional diets richer in nutrients, in favour of the consumption of unhealthy foods; heavy in added sugar, saturated fat, and sodium and an increase in sedentary life style. Despite these trends little is known about childhood obesity in Tanzania. This study intended to determine prevalence of and factors associated with overweight and obesity among primary school children in Kinondoni district in Dar es Salaam.

Methods: This was a cross sectional study of children aged 7-14 years attending primary school in Kinondoni District, Dar es Salaam. Classification of children as overweight or obese was based on the International Obesity Task Force (IOTF) BMI cut off-points for defining overweight and obesity in children between 2 and 18 years. A structured questionnaire was used to collect demographic and risk factor data. Data were analysed using Epi info version 3.5.1. The Chi-squared test was used for categorical data while Logistic regression analysis was conducted to control for confounding.

Results: A total of 1722 children aged 7-14 years were recruited. Mean age =10.9 yrs, SD 1.74, mode=12 yrs, median = 11 yrs. A total of 175 (10.2%) were overweight and 78 (4.5%) were obese. Among children who attended public primary schools 49 (4.8%) were overweight while 12 (1.2%) were obese. Among those who attended private primary schools 126 (18.2%) were overweight while 66 (9.5%) were obese. The prevalence of overweight among children attending private schools was found to be statistically significant higher than the prevalence of overweight among children in government schools (95% CI = 0.2 - 0.3, p <0.001). Similarly the prevalence of obesity among children in private schools was found to be statistically significant higher than the prevalence of obesity among children attending government schools (95% CI = 0.1 – 0.2, p<0.001). Children with more than three siblings were less likely to be overweight or obese than those with three siblings or less (OR = 0.69, 95% CI = 0.5- 1.0, p 0.02). Children who walk to and from school were less likely to be overweight or obese than those who use private cars, school transport or public transport (OR =0.46, 95% CI = 0.3-0.6, p <0.001). Among children who reported to commute to school using private cars, school buses or public

transport those who used private cars or school buses were more likely to be overweight or obese than those who used public transport (OR = 4.17, 95% CI =1.9 - 8.9, p<0.001). Television and computer use were found to be associated with increased risk of overweight and obesity (OR = 1.57, 95% CI = 1.1- 2.3, p0.03). Children who reported to use computers for six hours and less per week were less likely to be overweight or obese than those who reported to use for more than six hours per week (OR = 0.17, 95% CI = 0.1 - 0.3, p <0.001). Eating of breakfast before going to school was found to be protective against overweight and obesity (OR = 0.67, 95% CI =0.5 - 0.9, p 0.01), while children who were given lunch at school were more likely to be overweight or obese than those not given lunch at school (OR=6.36, 95% CI =4.2-9.6, p<0.001). Children who reported to do chores at school (e.g. cleaning of school grounds and classes) were less likely to be overweight or obese than those who reported to not do any chores at school (OR =0.46, 95% CI = 0.2-1.0, p 0.05).

Conclusion: This study has demonstrated that a significant proportion of primary school children in Kinondoni district are either overweight or obese. It also shows that overweight and obesity were associated with sedentary life style among children. It is therefore recommended that parents and teachers should sensitize and encourage children to be physically active while at school and at home to avert this problem. Schools / teachers can help children to be physically active by allocating time for sports in school schedules and encouraging children to actively participate.

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CHAPTER 1

Introduction

1.1 Background

Overweight and obesity can be defined as abnormal or excessive fat accumulation in the body to the extent that health might be impaired [1]. The fundamental cause of childhood overweight and obesity is an energy imbalance between calories consumed and calories expended. When a child's energy expenditure is low compared to energy consumed, excess energy is stored in the body as fat.

The world is experiencing an alarming increase in prevalence of childhood obesity [2]. This upward trend in childhood obesity is attributable to a number of factors including; a global shift in diet towards increased intake of energy-dense foods that are high in fat and sugars but low in vitamins, minerals and other healthy micronutrients [1]. Another contributing factor is a trend towards decreased physical activity levels due to the increasingly sedentary nature of many forms of recreation activities e.g. video games, changing modes of transportation, and increasing urbanization [1]. Also few cases of childhood obesity are due to genetic defects such as leptin deficiency or medical causes such as hypothyroidism, growth hormone deficiency or side effects due to drugs (e.g. – steroids) [3].

Modifiable risk factors associated with childhood obesity are mostly related to changes in the society (e.g. social and economic development) as well as children's behaviour, families' behaviour and lifestyle choices [4]. As societies become more urbanized people tend to adopt new lifestyle and become less active. For instance in most cases urbanization comes with changes in diets with people having less homemade meals for readymade canned foods, drinks and fast foods that are high in fat and sugars and low in nutrients. Also urbanization is associated with sedentary lifestyle where various rural urban cross-sectional studies demonstrate lower levels of physical activity in urban areas [5].

Thanks to rapid urbanization and industrialization, Tanzania has witnessed the so-called nutrition transition; a globalization-related phenomenon that entails the progressive

abandonment of traditional diets richer in nutrients, in favour of the consumption of unhealthy foods; heavy in added sugar, saturated fat, and sodium. As countries develop, becoming more industrialized, cities expand offering more imported food. These fast food options quickly become a popular choice among the well-off urban population, being regarded as trendy western food. Also increased urbanization results in environmental factors that may discourage participation in physical activities such as violence and high density traffic, lack of sidewalks, parks and sports facilities. Presence of play grounds and safe side walks along roads may help children to cultivate the habit of exercising compared to when there is no such facilities like the situation we have in all cities in Tanzania.

Policies in the areas of agriculture, transport, urban planning, the environment, food processing, distribution and marketing, as well as education play a pivotal role in the problem of childhood obesity [6]. In addition policies that control quality and type of foods imported into a country are necessary to limit accessibility to unhealthy foods for children and general population.

1.2 Statement of the problem

Childhood obesity / overweight is one of the most serious public health challenges affecting children Worldwide [7]. The worldwide prevalence of childhood overweight and obesity increased dramatically from 4.2% in 1990 to 6.7% in 2010, [8]. Globally a total of 42 million children under the age of five were estimated to be overweight or obese in 2010 and 92 million were at risk of overweight. A high proportion of this burden (35 million children) was borne by developing countries [8]. The estimated prevalence of childhood overweight and obesity in Africa in 2010 was 8.5% [8].

This upward trend is expected to reach 9.1% (60 million) worldwide and reach 12.7% in Africa in 2020 [8]. In Tanzania few studies have reported prevalence of obesity among children. A study conducted in 2010 to determine prevalence of overweight and obesity among children aged 6-12 years in Dodoma and Kinondoni municipalities reported prevalence of overweight among children aged 6-9 years and 10 – 12 years to be 5.8% and 4.9% respectively. Prevalence of obesity among school children aged 6 -9 yrs and 10 -12

years was reported to be 6.4% and 5.4% respectively [9].However results of an unpublished study conducted in 2006 report prevalence of overweight and obesity among school children in urban Tanzania to be 30% and on average the prevalence of overweight and obesity for both urban and rural school children to be 13.5% [10].

Obesity is a major risk factor for non communicable diseases such as diabetes, cardiovascular diseases, gallbladder disease, atherosclerosis and cancer in children and adults [11]. Childhood obesity is also associated with increased morbidity and mortality among affected children.

This study aims at establishing the prevalence of overweight and obesity among primary school children in Kinondoni District based on International Obesity Task Force (IOTF) cut off points for classifying children as overweight or obese.

1.3 Rationale

Public health specialists and policymakers in Tanzania are generally unaware of the prevalence and associated factors of overweight and obesity among children. This is due to the fact that there are not enough data to document on the extent of the problem in the country.

Determining the prevalence of overweight and obesity among children is important because it will create awareness of the problem and serve as evidence towards motivating policy makers to establish effective interventions. This study will also determine risk factors associated with overweight and obesity and hence make it possible for responsible policy makers and program managers to make evidence based public health decisions.

1.4 Research questions

- What is the prevalence of overweight among primary school children in Kinondoni district?
- What is the prevalence of obesity among primary school children in Kinondoni district?
- What are the dietary practices associated with risk of overweight or obesity among primary school children in Kinondoni district?
- What are the behaviours associated with an increased risk of overweight or obesity among primary school children in Kinondoni district?

1.5 Objectives

1.5.1 Overall objective

To determine the prevalence and factors associated with overweight and obesity among primary school children in Kinondoni district, Dar es Salaam

1.5.2 Specific objectives

- Determine the prevalence of overweight among primary school children in Kinondoni district, Dar es Salaam
- Determine the prevalence of obesity among primary school children in Kinondoni district, Dar es Salaam
- To identify dietary practices associated with an increased risk of overweight or obesity among primary school children in Kinondoni district, Dar es Salaam
- To identify behaviours associated with an increased risk of overweight or obesity among primary school children in Kinondoni district, Dar es Salaam

1.6 Literature Review

1.6.1 Prevalence of childhood overweight and obesity

Childhood overweight and obesity affect children worldwide, however many studies report prevalence of overweight and obesity in developed countries, such as United States of America, Canada and United Kingdom. This is because the problem of overweight and obesity was in the past perceived to be a problem of developed countries. In developing countries where under nutrition, poverty and infections such as Acquired Immunodeficiency Syndrome (AIDS), Malaria and Tuberculosis are realities the problem of overweight and obesity was regarded as less pressing [4].

Results of few studies conducted in developing countries such as South Africa, and Tanzania show that obesity is not only a problem of developed countries but is becoming an increasing problem in many developing counties undergoing nutrition transition, particularly in urban areas. For instance a youth risk behaviour survey (n=9054) conducted in South Africa in 2002 found that 17% of the adolescents were overweight and 4.2% were obese [17]. Another study conducted using IOTF cut off points among South Africa primary school children aged 6 – 13 years found prevalence of overweight and obesity to be 16% [18].

Tanzania, like many other developing countries is currently experiencing a nutrition transition: the displacement of traditional diets with foods high in saturated fat, sodium, and cholesterol and an increase in sedentary lifestyles. Nutrition transition and its effects is mostly experienced in urban cities as opposed to rural areas. Despite these trends our understanding of childhood obesity in Tanzania is limited. One of the two studies on prevalence of childhood obesity in Tanzania has not been published and has used Body Mass Index (BMI) cut off points for adults to classify overweight and obesity in children [10]. This study reported the prevalence of childhood overweight to be as high as 30% [10]. The other study which reported much lower prevalence of overweight and obesity, categorized children as overweight or obese based on WHO, BMI for age percentile and body fat mass measurements [9]. However expected prevalence used in sample size

calculations for this study was based on prevalence of obesity among women of reproductive age making precision of the sample size estimate questionable.

1.6.2 Factors associated with and effects of childhood overweight or obesity

Physical inactivity and poor diet have been shown to be associated with increased risk of childhood overweight or obesity. Many families especially in urban have replaced traditional diets high in fibre and minerals with diets high in saturated fats, sugars and refined starch. This coupled with sedentary lifestyle has greatly contributed to the increasing problem of overweight and obesity among children and adults.

Studies conducted in many parts of the world have shown physical inactivity including lack of participation in sports activities at school or at home, and less active mode of transport to and from school to be associated with increased risk of overweight and obesity among children [19,20,21].

Furthermore the growing tendency of parents to use television as baby sitters, the growing tendency of children to play electronic games such as video games instead of participating in sports like football, running etc partially contribute to the increasing rates of obesity among children. Several studies have found a positive association between television use, computer use and use of electronic games and overweight or obesity in children [22, 23, 24, 25, 26, 27, and 28].

Childhood overweight and obesity can also be attributed to genetic factors, certain medical conditions, environmental factors and policies. Interplay of genetics and the environment is central to the regulation of energy balance, and thus body weight. Although the genetic influences on body weight have received considerable attention in recent years, the marked increase in the prevalence of obesity over the past 20 years, a relatively short period of time, is most likely due to recent environmental changes. The environment offers abundance of convenient, palatable, energy-dense foods, less of traditional high nutrient diets and increasingly fewer demands for physical activity in usual lifestyles, lack of conducive environment for physical activity the contemporary environment enables the energy balance to be tipped in favour of weight gain. Thus, a gene-environment interaction is likely in which individuals, particularly those who are genetically susceptible, are at risk

for developing obesity in an environment that facilitates high energy intake and low energy expenditure. Although specific medical conditions can cause child obesity, these are very rare. They include hormone or other chemical imbalances and inherited disorders of metabolism. Furthermore certain medications can cause weight gain by altering how the body processes food or stores fat.

Various studies report that obese children experience breathing difficulties, increased risk of fractures, early markers of cardio vascular disease, hypertension and psychological effects [12, 13]. Obese children are also affected by cardiovascular and endocrine dysregulation with onset of insulin resistance and metabolic syndrome even in absence of significant evidence of hypertension and type 2 diabetes mellitus [14].

Furthermore excessive weight in childhood is associated with greater adult morbidity and mortality because obese children are more likely to grow into obese adults and develop non communicable diseases at a younger age [15]. World Health Organization (WHO) reports show that 44% of the diabetes burden, 23% of the ischaemic heart disease burden and between 7% and 41% of certain cancer burdens among adults are attributable to overweight and obesity. Also at least 2.8 million adults die each year as a result of being overweight or obese making it the fifth leading risk for global death [16].

Research shows that prevention could be the key strategy in controlling current problem of childhood obesity [29, 30, and 31]. Prevention may include primary prevention of overweight or obesity, secondary prevention or prevention of weight regains following weight loss, and avoidance of more weight increase in obese persons unable to lose weight.

Promotion of healthy diets and physical activity in schools is essential to fight childhood obesity [32]. Children and adolescents spend a significant part of their young lives in school, thus the school environment is an ideal setting to acquire knowledge and skills about healthy choices and to increase physical activity levels. Also primary and childhood schools play an important role in primary socialization, which is extremely important to structure the basic personality of an individual.

1.6.3 Assessment of childhood obesity

There are internationally agreed thresholds of BMI for defining under-weight, normal weight, overweight, and obesity in adults, but classification of obesity in children has proved to be complicated. This complication is caused by the fact that in children height is increasing and body mass is continually changing, consequently BMI changes substantially with age. Furthermore there are substantial international differences in the age of onset of puberty and in the differential inter individual rates of fat accumulation [33]. Consequently to date there has not been the same level of agreement on the classification of obesity for children and adolescents as there is for adults. There has been confusion both in terms of globally applicable reference population and of the selection of appropriate cut of points for designating a child as obese.

Various organizations such as United States National Centre for Health Statistics [34] and national authorities in the United Kingdom [35] and France [36] have developed BMI for age reference charts that suit their situation. These country specific developed BMI for age reference charts differ by country and cannot be used for global comparisons of obesity. Confusion over the use of different reference curves led to the establishment of expert panel convened by International Obesity Task Force (IOTF) which proposed a set of BMI cut off points for children based on pooled data collected by surveys of children in Brazil, Britain, Hong Kong, Singapore, Netherlands and the United States of America [37].
Subsequently IOTF published BMI cut-points for defining overweight and obesity in children between 2 and 18 years in 2000. The cut off points can be extrapolated to the widely accepted definitions for adult overweight and obesity; a BMI $\geq$ 25 and a BMI $\geq$ 30 respectively and enables comparison globally [37]. The IOTF BMI classification has been shown to have excellent specificity and sensitivity for overweight cut off points but lower sensitivity for obesity cut off points when compared to United Kingdom data and body impedance measure of total fat [38]. In addition this method was developed using International data, thus allows international comparisons of overweight and obesity in children.

CHAPTER 2

Materials and Methods

2.1 Study design

This was a cross sectional study of children aged 7-14 years attending primary schools in Kinondoni District Council, Dar es Salaam.

2.2 Study area

The study was conducted in Kinondoni municipality, which is among the three municipalities of Dar es Salaam city. It is located in the northern part of the city. It borders the Indian Ocean to the east, Ilala municipal to the south and Coast region to the west. Administratively, the municipality is divided into four divisions namely Kinondoni, Kawe, Magomeni and Kibamba. Kinondoni district was selected because it is part of Dar es Salaam City which is the biggest industrial and commercial centre in the country.

Kinondoni has an area of 531 sq. km with a population of 1,324,826 with a growth rate of 4.1% per annum. The estimated population density is 1,179 people per square km. The original occupants of Kinondoni municipal are Zaramo and Ndengereko, but due to urbanization, many people of different ethnicity have migrated to live in the municipality.

Climatic Condition:
Kinondoni municipality lies in the tropical coastal belt of Tanzania. Therefore, it experiences high temperature throughout the year ranging from 25° C in June – August to 35° C in January – March, with rainfall of 131.5mm per year.

Social-economic activities:
Being part of Dar es Salaam city that is the biggest industrial and commercial center in the country, the municipality has 37 industries, which offer significant job opportunities. However, the majority of the people in the urban part of the municipality engage in self-employment activities such as trading, fishing and small-scale manufacturing in the informal sector.

The municipality has a total of 227 primary schools of which 137 are public and 90 private.

2.3 Study population

Study population was a sample of children aged 7-14 years who attend public and private primary schools in Kinondoni, Dar es Salaam. This age group was selected because majority of the children who are in primary schools in Tanzania fall within this age range. Furthermore children aged 7 years and above are more likely to understand and respond accurately to questions than younger children.

2.4 Sample size

The calculated sample size was 1793 children. It was calculated using a cluster sampling formula [39]: Cluster sampling formula and a design effect of 2 was used because sampling procedure involved sampling of school and class clusters to get participants. An expected prevalence of overweight and obesity used in calculating the minimum sample size required has been reported by a study on Prevalence of overweight and obesity among primary school children in Tanzania: Experiences from Kinondoni and Njombe [10].

$$\mathbf{n = g^* \frac{z^2 * p * q}{\varepsilon^2}}$$

z: alpha risk expressed in z-score

p: expected prevalence

q: 1-p

g: design effect

ε: absolute precision

$$n = \frac{2*1.96^2*0.3*0.7}{0.03^2}$$

n = 1793

2.5 Sampling technique

A total of ten primary schools were selected where by six schools were public and four schools were private. We decided to have ten schools for convenience due to limited time and budget that was available for data collection. Participating number of public and private schools was decided based on proportionate sampling of available public and private schools. There are 227 primary schools in total of which 137 are public and 90 are private. These schools were selected using systematic random sampling.

Separate lists for public and private schools were obtained from the Kinondoni municipal education officer. Schools were arranged alphabetically in ascending order for both the list for public and list for private schools. For public schools simple random sampling was used to select the first school then every 23rd school was picked to get the remaining five schools. The sampling interval used was obtained by dividing the total number of public schools by six. For private schools the first school was selected using simple random sampling and each 23rd school was chosen to make four schools. The sampling interval used was obtained by dividing the total number of private schools by 4.

A total of 180 children were selected from each of the sampled schools to make a total of 1800 children. In each school that participated in the study we used a list of classes and streams of a particular school (e.g. 1a, 1b, 2a, 2b) to randomly select streams that make up a total number of students required per school. Number of streams to be sampled depended on the average number of students per stream in a school. The average number of pupils per stream in public schools was around 50, and the average number per stream in private schools was 30. Thus on average 4 streams were sampled in public schools to make 180 children. A total of 6 streams were sampled in private schools. In both public and private schools one stream per class was sampled from primary 2 to primary 7. Primary one classes were not included in the sampling list for all schools. This is because during the time of data collection primary one pupils had just joined school, and we were advised by teachers not to include them in the study. Systematic random sampling was employed to select streams in a school. Sampling interval was different for each of the schools and was based on number of students per stream in a school.

2.6 Definition of terms

Participants were classified as overweight or obese based on IOTF BMI cut off-points for defining overweight and obesity in children between 2 and 18 years depicted in Appendix 1. Children who had BMI equal to or above cut off points corresponding to BMI 25kg/m^2 were classified as overweight. Those who had BMI equal to or above cut off points corresponding to BMI 30kg/m^2 were classified as obese. This definition of overweight and obesity was adopted by this study because it is less arbitrary, easily applicable and more international than others. In addition, it permits direct comparison of trends in childhood obesity worldwide.

2.7 Data collection procedure and study variables

2.7.1 Data collection procedure

Before commencement of data collection permission to conduct the study in the District was sought from the District Executive Director (DED) for Kinondoni Municipality. A letter introducing the investigator, the research and requesting permission to undertake the study in Kinondoni with a copy of ethical clearance letter attached was sent to the DED for Kinondoni.

After permission to do the study was given, the investigator obtained the list of primary schools present in Kinondoni to be used for sampling from the District Education Officer (DEO). Logistics information such as availability of children, the best time to interview children, contacts of head teachers of schools that were selected were discussed and arranged with the District education officer.

Thereafter the investigator visited all sampled schools for data collection accompanied by a representative from the District education office. This was necessary for easy identification of sampled schools. In each school introduction of the study and visiting team was made to the head teacher. After head teacher's approval to undertake the study in a school was given, selection of class streams to be part of the study was done. Then informed consent leaflets to be taken to parents / guardians were given to all children in classes that were sampled.

Demographic, anthropometric and risk factors information were obtained for all children whose parents gave consent for them to participate in the study. Data pertaining to demographic and risk factors were collected via a structured questionnaire that was administered by research assistants. Age was collected in years and months and rounded to the nearest half year. Age was also verified against school records, where applicable.

For each child weight and height measurements were taken. Direct measures of weight (kg) were collected using a digital weighing scale that was calibrated to a hospital digital scale. Weight measurements were rounded to one decimal place. A Shorr height board was used to measure heights. Two measurements were taken and the average was recorded. Children were asked to take off their shoes for the height measure and to take off their shoes and any over clothing for the weight measure.

BMI (kg/m^2) was calculated for each child by dividing the weight (kg) by squired height (m^2). Each child was classified as overweight or obese according to cut off points for defining child overweight and obesity published by IOTF in 2000.

Research assistants were trained on the questionnaire and how to take anthropometric measures prior to commencement of the study. The questionnaire was piloted to a group of primary school children from a school that was not included in the study before the commencement of actual data collection.

2.7.2 Study variables

1. Dependent variables:

i. Overweight and obesity

2. Explanatory variables:

The following explanatory variables were assessed:

i. Behaviours associated with increased or reduced risk of overweight and obesity including mode of transport to school, participation in sports, children's involvement in doing different household chores, television watching, use of electronic games and computer use.

ii. Dietary practices such as breakfast consumption, type of food purchased at school, consumption of soft drinks, starch foods, fried foods, fruits, and vegetables. Also time for main meal of the day, time for dinner and sleeping time.

2.8 Data Management

2.8.1 Data quality

All information was collected by trained research assistants. Height and weight measurements were taken by the investigator for all participants. Every day after data collection, all collected information was cross-checked looking for omission and inappropriate entries. Problems were corrected on the same day to ensure good data quality.

2.8.2 Data entry

Make view was prepared and then all the collected information was entered in Epi Info software version 3.5.1. Frequencies and cross tabulations were run to detect errors in data entry.

2.8.3 Data analysis

Quantitative data from the questionnaires were analysed using Epi Info software version 3.5.1. Continuous variables were reported using means and standard deviations. Categorical data were reported as whole numbers and percentages. Odds ratio was calculated to ascertain association between dependent variables (overweight, obesity and other weights) and key explanatory variables such as television and computer use, mode of transport to and from school. Statistical tests were conducted using chi-squared analysis for categorical data. Logistic regression analysis was used to control for confounding.

2.8.4 Calculations of statistical associations.

Statistical associations were calculated using Epi info software. For those variables with participants:-

- More than 10 in all cells, uncorrected tests for association (Chi square and p-values) were used.
- 10 or less in any of the cells, Yates corrected measures of association (Chi square and p-values) were used.
- 5 or less, Fisher exact (odds ratio and confidence limits) was considered.
- Odds ratio 'Taylor series' was considered as crude odds ratio.

2.9 Ethical Considerations

1. Ethical clearance

Ethical clearance to conduct the study was sought and granted by the Muhimbili University of Health and Allied Sciences (MUHAS), Research and Publication Ethical Committee.

2. Consent

Written consent to take measurements and interview children was sought from school authority and parents. Informed consent forms were given to school head teachers and parents.

3. Confidentiality

Identity of children involved in the study was anonymous. Children were not required to give their names during interviews. This anonymity was explained to teachers and parents in the informed consent leaflet provided to them.

CHAPTER 3

Results

3.1 Demographic characteristics of study participants

A total of 1722 children from ten primary schools in Kinondoni district participated in the study, making a 96% response rate. Table 1 shows that majority of the children 1,030 (59.8%) were from public schools while 692 (40.2%) were from private schools. Most of the children 1684 (97.8%) were residents of Kinondoni district while only 2.2% were residents of Ilala and Temeke districts. Participants were aged 7 – 14 years, with a mean of 10.9 years (standard deviation = 1.74), mode age of 12 years and median age of 11 years.

Table 1: Demographic characteristics of study participants

Variable	Description	Frequency	Percentage (%)
Sex	**Total**	**1722**	**100.0**
	Female	943	54.8
	Male	779	45.2
Age group	7-10 years	639	37.1
	11-14 years	1083	62.9
Area of residence	Kinondoni	1684	97.8
	Ilala	23	1.3
	Temeke	15	0.9
Type of school	Government	1030	59.8
	Private	692	40.2
Name of school	Bahari	152	8.8
	Grace	169	9.8
	Kibamba	175	10.2
	Makabe Primary	148	8.6
	Mapambano	176	10.2
	Mbezi Ndumbwi	176	10.2
	Mikocheni	175	10.2
	St. Columbus	180	10.5
	Sunrise	191	11.1
	Ukwamani	180	10.5

Table 2 shows the parent's level of education and occupation. A significant number of respondents could not tell their parents' level of education and occupation. A total of 547 (31.8%) and 488 (28.3%) of the respondents didn't know their fathers' level of education,

and their mothers' level of education respectively. Similarly 405 (23.6%) didn't know their fathers' occupation and 220 (12.8%) didn't know their mothers' occupation.

Table 2: Parents level of education and occupation

Variable	Description	Frequency	Percentage (%)
	Total	**1722**	**100.0**
Father's level of education	Post secondary	537	31.2
	Secondary	359	20.8
	Primary	271	15.7
	No formal education	8	0.5
	Don't know	547	31.8
Mother's level of education	Post secondary	443	25.8
	Secondary	378	22.0
	Primary	395	22.9
	No formal education	18	1.0
	Don't know	488	28.3
Father's occupation	Government employee	387	22.5
	Private sector employee	516	30.0
	Business	414	24.0
	Don't know	405	23.6
Mother's occupation	Government employee	229	13.3
	Private sector employee	280	16.3
	Business	640	37.2
	House wife	353	20.5
	Don't know	220	12.8

3.2 Prevalence of overweight and obesity

Of the 1722 school children interviewed, 253 (14.7%) were either overweight or obese. Of these children, 175 (10.2%) were overweight and 78 (4.5%) were obese. Table 3 shows that 98 (10.4%) of the girls were overweight and 39 (4.1%) were obese while 77 (9.9%) of the boys were overweight and 39 (5%) were obese. The prevalence of overweight among girls was not found to be statistically significant different from the prevalence of overweight in boys (95% CI = 0.8-1.5, p 0.73). Likewise the prevalence of obesity for girls was not found to be statistically significant different from the prevalence in boys (95% CI =0.5-1.3, p 0.39).

Table 3: Prevalence of overweight and obesity by sex

Sex	Overweight n (%)	Obese n (%)	Others n (%)	Total n (%)
Girls	98 (10.4%)	39 (4.1%)	806 (85.5%)	943
Boys	77 (9.9%)	39 (5.0%)	663 (85.1%)	779
Total	175(10.2%)	78 (4.5%)	1469 (85.3%)	1722

Table 4 shows that a total of 69 (10.8%) children in age range 7-10 years were overweight while 34 (5.3%) were obese. A total of 106 (9.8%) children in age range 11 – 14 years were overweight while 44 (4.1%) were obese. Prevalence of overweight for children in age range 7 – 10 years was not found to be statistically significant different from the prevalence of overweight in children aged 11 -14 years (95% CI = 0.8 – 1.5, p 0.50). Similarly the prevalence of obesity among children in age groups 7 – 10 years and 11 – 14 years were not found to be statistically significant different from each other (95% CI = 0.8-2.1, p 0.23)

Table 4: Prevalence of overweight and obesity by age group

Age group (Yrs)	Overweight n (%)	Obese n (%)	Others n (%)	Total n (%)
7-10	69 (10.8%)	34 (5.3%)	536 (83.9%)	639
11-14	106 (9.8%)	44 (4.1%)	933 (86.1%)	1083
Total	175(10.2%)	78 (4.5%)	1469 (85.3%)	1722

Table 5 shows that among children who attended public primary schools 49 (4.8%) were overweight while 12(1.2%) were obese. Among those who attended private primary schools 126 (18.2%) were overweight while 66 (9.5%) were obese. The prevalence of overweight among children attending private schools was found to be statistically

significant higher than the prevalence of overweight among children in public primary schools (95% CI = 0.2 - 0.3, p<0.001). Similarly the prevalence of obesity among children in private schools was found to be statistically significant higher than the prevalence of obesity among children attending public schools (95% CI = 0.1 – 0.2, p<0.001).

Table 5: Prevalence of overweight and obesity by school type

School Type	Overweight n (%)	Obese n (%)	Others n (%)	Total n (%)
Public	49 (4.8%)	12 (1.2%)	969(94.1%)	1030
Private	126(18.2%)	66 (9.5%)	500(72.3%)	692
Total	175(10.2%)	78(4.5%)	1469 (85.3%)	1722

3.3 Dietary practices and behaviours associated with overweight and obesity

Table 6 shows that children who reported to be living with three siblings or less were more likely to be overweight or obese than children living with more number of siblings. This association was found to be statistically significant (OR=1.62, 95% CI = 1.2 - 2.2, p 0.001). Those children who reported to be living with six or less people in a household were less likely to be overweight or obese than children who reported to be living with seven or more. This association was not found to be statistically significant. Children living with two parents were less likely to be overweight or obese than children with a single or no parent; however this association was not found to be statistically significant (OR=0.90, 95% CI = 0.6 - 1.3, p 0.26).

Table 6: Behaviour practices associated with child overweight or obesity

Number of individuals in a household		**Total studied**	**Overweight and obese respondents**		**P-value**	**Crude OR**	**95%CI**
			No	**%**			
Number of siblings	1-3	1073	181	16.9	**0.001**	**1.62**	**1.2-2.2**
	4 and more	648	72	11.1			
Number of people living in a household	Six or less	892	119	13.3	0.10	0.79	0.6-1.1
	7 or more	830	134	16.1			
Number of parents	Two parents	1500	218	14.5	0.26	0.90	0.6-1.3
	Single or no parent	221	35	15.8			

Table 7 shows that children whose fathers had secondary and post secondary education were more likely to be overweight or obese than children whose fathers had no formal education or had primary education (OR = 2.81, 95% CI = 1.8 - 4.5, p< 0.001). Similarly children whose mothers had post secondary or secondary education were more likely to be overweight or obese than children whose mothers had no formal education or had primary school education (OR = 3.61, 95% CI = 2.4 - 5.6, p<0. 001).

Table 7: Association between overweight or obesity and parents' level of education

Level of education		**Total studied**	**Overweight and obese respondents**		**p-value**	**Crude OR**	**95%CI**
			No	**%**			
Father's level of education	Secondary or post secondary	879	157	17.9	**<0.001**	**2.81**	**1.8-4.5**
	Primary or no formal education	279	20	7.2			
Mother's level of education	Secondary or post secondary	813	164	20.2	**<0. 001**	**3.61**	**2.4-5.6**
	Primary or no formal education	413	27	6.5			

Table 8 shows that children who reported going to and from school mostly on foot were less likely to be either overweight or obese than those who reported using other means (OR = 0.31, 95% CI = 0.2 - 0.4, p< 0. 001). Children who reported going to school mostly by riding a bicycle were less likely to be overweight or obese than those who reported using other means. However the association was not found to be statistically significant (OR = 0.26, 95% CI = 0.0 – 1.9, p 0.25). Children who reported going to school mostly by school bus or private cars were 4.2 times more likely to be overweight or obese than those who reported to use public transport (OR =4.17, 95% CI = 1.9 - 8.9, p < 0.001).

Table 8: Association between mode of transport used and obesity or overweight

Mode of transport to and from school		Total studied	Overweight and obese respondents		p value	Crude OR	95%CI
			No	%			
Walking	Yes	1112	103	9.3	**<0. 001**	**0.31**	**0.2-0.4**
	No	610	150	24.6			
Riding a bicycle	Yes	23	1	4.3	0.25	0.26	0.0-1.9
	No	1699	252	14.8			
Other modes of transport	Private car or school bus	493	138	27.9	**<0.001**	**4.17**	**1.9-8.9**
	Public transport	94	8	8.5			

Table 9 shows that respondents who reported to actively participate in sports activities were 0.68 times less likely to be overweight or obese than those who reported to not actively participate in sports activities. Those who reported to actively participate in sports activities were asked about amount of time they spend on sports per week. Those who reported to spend less than 300 minutes per week in sports were more likely to be overweight or obese than those who reported to spend more than 300 minutes per week. However these associations were not found to be statistically significant.

Table 9: Association between participation in sports and overweight or obesity

Participation in sports activities		Total studied	Overweight and obese respondents		P value	Crude OR	95%CI
			No	%			
Active participation in sports activities	Yes	1692	247	14.6	0.54	0.68	0.3-1.7
	No	30	6	20.0			
Time spent participating in sports per week	<=300min per week	1295	135	10.4	0.39	1.25	0.8-2.1
	>300 minutes per week	211	18	8.5			

Table 10 shows that children who reported to normally watch television were 1.9 times more likely to be overweight or obese than those who reported to not normally watch television. Those who reported to normally watch television were asked about approximate time spent watching television per week. Those who reported to watch television for 42 hours and less per week were less likely to be overweight or obese than those who reported to watch television for more than 42 hours per week (OR=0.20, 95% CI = 0.1-0.7, p 0.01).

Similarly children who reported to usually use computers were 2.72 times more likely to be overweight or obese than children who reported to not usually use computers. Among those who reported to usually use computers, those who spent six or less hours per week using computers were less likely to be overweight or obese than those who reported to use more time (OR = 0.17, 95% CI =0.1-0.3, p <0. 001). Respondents who reported to normally play video /computer games were more likely to be overweight or obese than children who reported to not normally play video games (OR = 2.33, 95% CI = 1.8 – 3.1, p <0.001).

Table 10: Association between television, computer, videogame use and overweight or obesity

Television, computer and video games use		Total studied	Overweight and obese respondents		P-value	Crude OR	95%CI
			No	%			
Usually watch television	Yes	1449	228	15.7	**0.005**	**1.85**	**1.2-2.9**
	No	273	25	9.2			
Time used to watch television per week	42 hrs and less	1438	215	14.9	**0.014**	**0.20**	**0.1-0.7**
	Above 42 hrs	11	5	45.5			
Usually use computers	Yes	576	136	23.6	**<0.001**	**2.72**	**2.1-3.6**
	No	1146	117	10.2			
Time used on computers per week	6 hrs or less	504	40	7.9	**<0.001**	**0.17**	**0.1-0.3**
	>6hrs	72	24	33.3			
Usually play video games	Yes	600	132	22.0	**<0.001**	**2.33**	**1.8-3.1**
	No	1122	121	10.8			

Table 11 shows that respondents who reported to usually do some kind of house chores e.g. house cleaning, laundry were less likely to be overweight or obese than those who reported to not do those chores (OR = 0.73, 95% CI = 0.5-0.9, p 0.04). Respondents who reported to not do any kind of household chores were more likely to be overweight or obese than those who reported to do some kind of household chores (OR =1.84, 95% CI = 1.1 - 3.2, p 0.03). Similarly children who reported to usually clean school grounds were less likely to be overweight or obese than those who reported to not do any cleaning activities at school (OR =0.39, 95% CI = 0.3-0.6, p< 0.001).

Table 11 also shows that among those who reported to usually do some kind of household chores, those who reported to do household chores 1-3 times per week were more likely to be overweight or obese than those who reported to do so 4-7 times per week. Among those who reported to clean school grounds and classes, those who reported to do so for 1-3 days

per week were more likely to be overweight or obese than those who reported to clean school grounds for 3-6 days per week (OR = 2.12, 95%CI = 1.5-2.9, p< 0.001).

Table 11: Association between doing chores at home and school with overweight or obesity

Household and school chores		**Total studied**	**Overweight and obese respondents**		**P-value**	**Crude OR**	**95%CI**
			No.	**%**			
Not doing any household chores	Yes	98	17	17.3	**0.03**	**1.84**	**1.1-3.2**
	No	1546	158	10.2			
Doing household chores like cleaning, laundry	Yes	878	81	9.2	**0.04**	**0.73**	**0.5-0.9**
	No	766	94	12.3			
Times per week house chores are done	1-3 times per week	598	79	13.2	**<0.001**	**1.77**	**1.3-2.5**
	4-7 times per week	895	71	7.9			
Cleaning at school	Yes	1342	116	8.6	**<0.001**	**0.39**	**0.3-0.6**
	No	302	59	19.5			
Cleaning at school times per week	1-3	444	77	17.3	**<0.001**	**2.12**	**1.5-2.9**
	3-6	978	88	8.9			

Table 12 shows that children who were given money to buy food and drinks at school were less likely to be overweight or obese than those not usually given money. (OR = 0.47, 95% CI= 0.4 – 0.6, p< 0.001). However among those given money, children who reported to be given 1,000 T.shs and less per day were less likely to be overweight or obese than those given more than 1,000 T.shs per day (OR = 0.49, 95% CI = 0.3 - 0.9, p 0.01).

Children who were usually given money to buy food and drinks while at school were asked for number of times they usually buy food and drinks per week. Those who reported to buy food 1-2 times per week were more likely to be overweight or obese than those who reported to buy food 3-5 times per week (OR = 2.30, 95% CI = 1.4 - 3.8, p< 0.001).

Children who were usually given food to take to school were more likely to be overweight or obese than those who were not usually given food to take to school (OR = 1.54, 95% CI = 1.1 – 2.2, p 0.02). Majority of the children who reported to be given food to take to school reported to be given chips, burgers and doughnuts. Similarly children who were given lunch at school were more likely to be overweight or obese than those not given lunch at school (OR = 6.10, 95% CI = 4.5 -8.3, p< 0.001). All four private schools that participated in the study provide lunch to their students while public schools do not provide lunch. Food provided to students is mostly starch (Rice, Chips) and protein (Beef, beans) in all the four private schools.

Table 12: Association between dietary practices at school and overweight or obesity

Dietary practices at school		**Total studied**	**Overweight and obese respondents**		**P-value**	**Crude OR**	**95%CI**
			No	**%**			
Given money to buy food at school	Yes	1232	145	11.8	**<0.001**	**0.47**	**0.4-0.6**
	No	489	108	22.1			
Amount of money given	<=1000	1178	134	11.4	**0.01**	**0.49**	**0.3-0.9**
	>1000	88	18	20.5			
Buying food at school times per week	1-2 times	160	24	15.0	**<0.001**	**2.30**	**1.4-3.8**
	3-5 times	1050	74	7.0			
Given food to take to school	Yes	242	48	19.8	**0.02**	**1.54**	**1.1-2.2**
	No	1479	205	13.9			
Given food at school	Yes	692	192	27.7	**<0.001**	**6.10**	**4.5-8.3**
	No	1030	61	5.9			

Table 13 shows that children who reported to usually drink light sugar soft drinks were more likely to be overweight or obese than those who reported to not usually drink light sugar soft drinks. Children who reported to eat dinner before 7:00 PM were less likely to be overweight or obese than those who reported to eat dinner after 7:00 PM. These associations were found to be statistically significant.

Children who reported to usually eat breakfast before going to school, those who reported to usually drink full sugar soft drinks and those who reported to usually eat vegetables had equal chances of being overweight or obese to those who reported to not usually eat breakfast, drink full sugar soft drinks and eat vegetables. However these associations were not found to be statistically significant.

Table 13 also shows that children who reported to usually drink fruit juice and those who reported to usually eat fruits were more likely to be overweight or obese than those who reported to not usually drink fruit juice and those who reported to not usually eat fruits. These associations were not found to be statistically significant.

Respondents who reported to usually eat fried food and those who reported to usually eat starch foods were less likely to be overweight or obese than those who reported to not usually eat fried food and those who reported to not usually eat starch foods respectively. However these associations were not found to be statistically significant.

Table 13: Dietary practices associated with overweight and obesity

Dietary practices		Total studied	Overweight and obese respondents		P-value	Crude OR	95%CI
			No	%			
Drink light sugar soft drinks	Yes	829	146	17.6	**0.001**	**1.57**	**1.2-2.1**
	No	892	107	11.9			
Dinner time	<=7:00PM	1519	205	13.5	**0.01**	**0.61**	**0.4-0.9**
	>7:00PM	168	34	20.2			
Usually eat breakfast before going to school	Yes	1198	175	14.6	0.87	0.98	0.7-1.3
	No	523	78	14.9			
Drink full sugar soft drinks	Yes	1355	199	14.7	0.97	0.99	0.7-1.4
	No	366	54	14.7			
Usually eat vegetables	Yes	1675	246	14.7	0.92	0.96	0.4-2.2
	No	46	7	15.2			
Usually drink fruit juice	Yes	1611	244	15.1	0.05	2.0	0.9-4.0
	No	110	9	8.2			
Usually eat fruits	Yes	1692	250	14.8	0.72	1.50	0.5-5.0
	No	29	3	10.3			
Usually eat fried food	Yes	1622	234	14.4	0.19	0.71	0.4-1.2
	No	99	19	19.2			
Usually eat starch foods	Yes	1646	240	14.6	0.51	0.81	0.4-1.5
	No	75	13	17.3			

Further analysis with Logistic regression was done. Table 14 shows that walking to and from school, eating of breakfast before going to school, children being given money to buy food and drinks sold at school and children performing physical duties at school e.g. cleaning of school grounds, classes were found to be statistically significant protective against overweight or obesity. Also living with more than 3 siblings was found to be

protective against overweight or obesity. Computer use, children not doing any household chores and provision of lunch to children at school were found to be statistically significant risk factors for overweight or obesity.

Variables that were adjusted for include sex, type of school, watching television, given food to take to school, amount of money given for buying food and drinks at school. Other factors include number of times per week children do household chores and number of times per week children clean school grounds or classes.

Table 14: Factors that were found to have statistically significant association with overweight or obesity after Logistic regression analysis

Variable	**Adjusted Odds Ratio**	**p value**	**95% CI**
Walking to and from school	0.46	<0.001	0.3-0.6
Using computers	1.57	0.03	1.1-2.3
Given money to buy food at school	0.69	0.02	0.5-0.9
Eating breakfast	0.67	0.01	0.5-0.9
More than three siblings	0.69	0.02	0.5-1.0
Cleaning of school grounds or classes	0.46	0.05	0.2-1.0
Not doing any household chores	6.96	0.01	1.6-31.2
Given lunch at school	6.36	<0.001	4.2-9.6

CHAPTER 4

Discussion

This study was able to determine the prevalence and factors associated with overweight and obesity among primary school children in Kinondoni district, Dar es Salaam. The study found that a significant proportion of primary school children in Kinondoni district are either overweight or obese. The risk of being overweight or obese increased in children who used less active mode of transport to and from school, usually use computers, children who are given lunch at school, given food to take to school and those with fewer siblings.

The rising prevalence of childhood overweight and obesity is a serious public health problem given its established link to chronic health problems during childhood and adulthood [11, 12, 13, 44, and 15]. Findings of this study revealed that 14.7% of primary school children in Kinondoni district are either overweight or obese. These results are comparable to the prevalence of overweight and obesity in some developing and developed countries such as South Africa (16% of children aged 6-13 years)[18], Norway (13.8% of children aged 2 -19 years)[40] and France (15.2 % of children aged 3-14 yrs) [41].

Our findings on prevalence of overweight (excluding obesity) also concur with findings from a study conducted in 2010 to determine the prevalence of overweight and obesity among children aged 6-12 years in Dodoma and Kinondoni municipalities which reported prevalence of overweight among children in Kinondoni municipality to be 10.7%. However this study reported the prevalence of obesity for children in Kinondoni municipality to be 11.8%. [18].

However the prevalence of overweight and obesity in this study was much lower compared to that in North American countries. For instance recent USA data analysed using IOTF definitions show that 36% of school age children were overweight (including obesity). Obesity alone was affecting 13% of school children [42]. Also a survey of Mexican children in age range 10 -17 in 2000 found 26% of the children to be overweight including 7% obese [43]. This observed difference could be attributed to lifestyle differences for children in North America and Tanzania.

The prevalence of overweight and obesity was found to be higher in children who attend private schools than those who attend public schools. This observation could be attributed to the fact that children who attend private schools come from families with higher social economic status than those who go to public schools. Wealthier families can afford to take their children to school using private cars or school buses. They can also afford electronic recreational games such as computer and video games. This has an impact children's level of physical activity.

Our study identified several factors related to dietary and behaviour practices to be associated with overweight or obesity. Participants with three or less siblings were at a greater risk of being overweight or obese than those with a higher number of siblings. This association has been demonstrated by another study conducted by Juliusson P.B. et al in Norway [40]

Children who walked or used public transport to and from school were less likely to be overweight or obese than those who were driven to school by private cars or school buses. Walking or using public transport to and from school is factor of being physically active. This is could be because children who use public transport normally walk to and from bus stops, which are sometimes far from their homes or schools. Children who are driven to school by private cars or schools buses are driven from their homes or collected at school bus stops very close to their homes. In addition children who walked or used public transport most probably are coming from families with low social economic status. Other studies [19, 20, 21] conducted in Europe and South America have shown that active form of transport to and from school is associated with decreased risk of overweight and obesity.

Detection of positive association between television use, computer use and video gaming and the likelihood of overweight or obesity was noted. Computer usage in particular showed to be a risk factor for overweight and obesity after controlling for other factors. It was also noted that the likelihood of overweight or obesity were higher among respondents who used more time on television, computer and video games than those who used less time. Previous studies on sedentary habits in children have focused primarily on television watching with several studies showing strong association between television watching and obesity [21, 23, and 24]. Though a number of studies have found no evidence of a

relationship between computer usage and obesity [23, 25, 26, 27], other studies found that obesity was related with computer time and not television time in Portuguese and Brazilian youth [28, 21]. Our results suggest that not all sedentary screen based activities have equivalent association with child obesity.

Children who were given money to buy food or drinks at school were less likely to be overweight than those not given money. This could be explained by the fact that most of those who were given money were given enough to buy only snacks. They were also mostly from public schools and our results show that most of the children who use a more active mode of transport are those who attend public schools. Thus it is possible that the effect of whatever food or drinks bought at school is counteracted by the effect of children being physically active. Those given higher amount of money (> 1000 Tshs) were more likely to be obese and were mostly from private schools. It was also noted that children who were given lunch at school were more likely to be overweight or obese. This association could be due to the fact that food given to children was mostly refined starch with little or no fruits and vegetables as well as nuts and whole grains. Type of lunch provided coupled with sedentary lifestyle which was noted to be practiced with most private school children could be a reason for the higher prevalence of overweight and obesity among private school pupils.

Of the nine dietary variables assessed (consumption of light sugar soft drinks, full sugar soft drinks, fruit juice, fried food, starch foods, fruits, vegetables, breakfast consumption and dinner time), only breakfast consumption followed expected trends after logistic regression analysis. Children who mostly eat breakfast before going to school were less likely to be overweight or obese. This finding agrees with findings of other studies conducted in developing and developed countries. Skipping breakfast has been shown to be associated with obesity among children living in developed [44, 45] and developing [46, 47] countries. Furthermore literature shows that skipping breakfast may lead to an up – regulation of appetite and poorer diet quality ultimately resulting in weight gain over time.

Surprisingly eating of fried and starch foods were found to be associated with decreased risk of obesity. These findings were unanticipated given that such dietary practices are expected to increase the risk of childhood obesity in developed countries [44]. It is

possible that children who are obese reduce their intake of unhealthy foods to cut down weight. It is also possible that respondents were affected by response bias, providing answers that they perceived to be representative of a healthy diet.

There are a number of limitations of this study that need to be pointed out. An obvious limitation is its cross – sectional nature which precludes statements of cause and effect. This becomes especially limiting when interpreting associations that could have two legitimate pathways such as reverse association between obesity and walking to school. Walking to school may have a protective effect on development of obesity or it may simply be that obese children prefer to be driven to school. Also as I pointed out earlier some dietary practices did not give anticipated results. This could be due to the fact that overweight and obese children might be cutting down on unhealthy foods and eating more of health foods to lose weight. Thus findings need to be treated with caution.

Another limitation is that puberty, ethnicity and genetic factors that could have an effect on obesity were not assessed. Given the wide range of our sample it is likely that puberty and other mentioned factors had a role to play in the onset of overweight and obesity.

There is also a potential limitation related to the fact that self reported questions pertaining to dietary and level of physical activity were not validated. In addition, though questions were designed to be age appropriate we cannot rule out the possibility of recall bias and difficulty in comprehending questions in younger children. To overcome this limitation some of the information provided by much younger children was validated against school records where applicable. Furthermore **s**ome younger children failed to answer some of the questions a fact that can have an effect on the measure of association calculated.

Another potential limitation is that information on the amount of food usually consumed was not collected. Given that staple food for most families in Tanzania is starch (rice, ugali, bananas etc) this information would have been instrumental in assessing the effect of type of food taken on obesity.

CHAPTER FIVE

Conclusion and Recommendations

5.1 Conclusion

In conclusion this study has demonstrated that a significant proportion of primary school children in Kinondoni district are either overweight or obese. Furthermore results indicate that prevalence of overweight and obesity is higher among children who attend private schools than among children who attend public schools.

We have identified factors related to childhood overweight or obesity that may be considered for future intervention in school children. Less active mode of transport to and from school, smaller number of siblings, provision and type of lunch provided to children at schools, unhealthy dietary practices at home and at school, computer use and children not doing any chores were found to be associated with increased risk of overweight and obesity.

Buying of food sold within school premises and children being given small amount of money to buy food or drinks sold in school premises were not found to be associated with increased risk of overweight or obesity in children.

5.2 Recommendations

1. School children should be encouraged to actively participate in daily moderate physical activity (e.g. sports and chores) at home and at school. At school teachers can ensure students participation in sports by allocating time for sports in the school schedule and having programs that will increase children's awareness on the health benefits of being physically active
2. Parents need to be advised or sensitized to set aside time for healthy meals, physical activity and limit television viewing, computer use and electronic games for their children.
3. More research on this subject matter to further explore other factors for obesity that were not explored by this study.

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Appendices

Appendix 1: IOTF – recommended cut off points for overweight and obesity by gender and by age from 2 to 18 years

	Overweight cut off points		Obesity cut off points	
Age (years)	Males	Females	Males	Females
2	18.4	18.0	20.1	20.1
2.5	18.1	17.8	19.8	19.5
3	17.9	17.6	19.6	19.4
3.5	17.7	17.4	19.4	19.2
4	17.6	17.3	19.3	19.1
4.5	17.5	17.2	19.3	19.1
5	17.4	17.1	19.3	19.2
5.5	17.5	17.2	19.5	19.3
6	17.6	17.3	19.8	19.7
6.5	17.7	17.5	20.2	20.1
7	17.9	17.8	20.6	20.5
7.5	18.2	18.0	21.1	21.0
8	18.4	18.3	21.6	21.6
8.5	18.8	18.7	22.2	22.2
9	19.1	19.1	22.8	22.8
9.5	19.5	19.5	23.4	23.5
10	19.8	19.9	24.0	24.1
10.5	20.2	20.3	24.6	24.8
11	20.6	20.7	25.1	25.4
11.5	20.9	21.2	25.6	26.1
12	21.2	21.7	26.0	26.7
12.5	21.6	22.1	26.4	27.2
13	21.9	22.6	26.8	27.8
13.5	22.3	23.0	27.2	28.2
14	22.6	23.3	27.6	28.6
14.5	23.0	23.7	28.0	28.9
15	23.3	23.9	28.3	29.1
15.5	23.6	24.2	28.6	29.3
16	23.9	24.4	28.9	29.4
16.5	24.2	24.5	29.1	29.6

17	24.5	24.7	29.4	29.7
17.5	24.7	24.8	29.7	29.8
18	25	25	30	30

Source: Cole et al, 2000 (37)

Appendix 2: Information leaflet and Informed consent Form

SURVEY ON PREVALENCE AND FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG PRIMARY SCHOOL CHILDREN IN KINONDONI DISTRICT, DAR ES SALAAM

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

INVITATION:

Dear Head teacher

Your school is invited to participate in the above mentioned study. The leaflet you are reading is to provide information about this proposed study on Prevalence and factors associated with overweight and obesity among primary school children in Kinondoni District, Dar es Salaam. Together with this leaflet is the Informed Consent Form. Please read carefully the information in the leaflet, and in case you agree for your school to participate please put your signature, a cross or tick at the designated area in the Informed consent form. In case you need additional information or clarification you are welcome to ask for more explanation.

I am an employee of the Ministry of Health and Social welfare, currently pursuing studies in Msc. Applied Epidemiology at Muhimbili University of Health and Allied Sciences.

PURPOSE AND DISCRIPTION OF THE STUDY

The study is a survey on Prevalence and factors associated with overweight and obesity among primary school children in Kinondoni District, Dar es Salaam. It aims to determine the prevalence of overweight and obesity and identify factors associated with increased

risk of overweight and obesity among school children in Kinondoni District. Results obtained from this study will be used to propose school based intervention methods for prevention of overweight and obesity among primary school children. You will be informed of the results at the planned means of research results dissemination. The study results will be disseminated through a publication and in a thesis for academic purpose.

STUDY PROCEDURE

Children will be interviewed on questions related to potential risk factors for development of overweight and obesity, such as dietary habits, physical activity etc. Also Height and weight measurements using weighting scale and wall height charts respectively will be taken in order to classify children as normal weight, obese or overweight.

VOLUNTARY PARTICIPATION

Please note that your school's participation in this study is voluntary and you have a right to refuse to consent. If you consent for your school to participate you have the right to withdraw your school from the study at any time if you wish to do so.

BENEFITS

There are no direct benefits for participating in the study. But since the study will be getting information of risk factors for overweight and obesity, the benefits will accrue later. The study will recommend preventive measures that can be adopted by schools or parents to prevent children from becoming overweight or obese.

ALTERNATIVES

The alternative of participating in the study is to decline for your school to take part.

RISKS AND DISCOMFORT

There are no risks or discomforts involved in this study. Participants will be asked questions and their height; weight measurements will be taken using non invasive techniques.

COMPENSATION FOR TIME

Your school's participation in the study will hopefully help control the problem of overweight and obesity their consequent health complications among children.

CONFIDENTIALITY

Names of interviewed children will not appear on the questionnaire and no record of their participation as individuals will be kept.

REVIEW AND APPROVAL

The review and approval of the study has been done by the Ethical committee of Muhimbili University of Health and Allied Sciences (MUHAS).

RESULTS

The results of the study will be made available to you through a planned means of research results dissemination. Results of this study will also be compiled in a research paper for publication and as part of a partial fulfilment of a master's degree.

CONTACTS FOR FURTHER INFORMATION

In case you have any questions concerning the nature of this study, please contact:

Director of Research and Publication
Muhimbili University of Health and Allied Sciences
P.O. BOX 65001
Dar es Salaam
Office Tel: 022 2150302-6

If you agree for your school to participate please keep this leaflet for more information during the study.

CONSENT FORM

I confirm that I have read carefully and I have understood the information provided in the leaflet and consent for my school to participate in the study. I am aware that I can freely withdraw my school from this study any time I wish to do so.

Signature: _____

Date: _____

Appendix 3: Information leaflet and Informed consent Form for parents

SURVEY ON PREVALENCE AND FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG PRIMARY SCHOOL CHILDREN IN KINONDONI DISTRICT, DAR ES SALAAM

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

INVITATION:

Dear parent

Your child is invited to participate in the above mentioned study. The leaflet you are reading is to provide information about this proposed study on Prevalence and factors associated with overweight and obesity among primary school children in Kinondoni District, Dar es Salaam. Together with this leaflet is the Informed Consent Form. Please read carefully the information in the leaflet, and in case you agree for your child to participate please put your signature, a cross or tick at the designated area in the Informed consent form. In case you need additional information or clarification you are welcome to ask for more explanation.

I am an employee of the Ministry of Health and Social welfare, currently pursuing studies in Msc. Applied Epidemiology at Muhimbili University of Health and Allied Sciences.

PURPOSE AND DISCRIPTION OF THE STUDY

The study is a survey on Prevalence and factors associated with overweight and obesity among primary school children in Kinondoni District, Dar es Salaam. It aims to determine the prevalence of overweight and obesity and identify factors associated with increased risk of overweight and obesity among school children in Kinondoni District. Results

obtained from this study will be used to propose school based intervention methods for prevention of overweight and obesity among primary school children. You will be informed of the results at the planned means of research results dissemination. The study results will be disseminated through a publication and in a thesis for academic purpose.

STUDY PROCEDURE

Children will be interviewed on questions related to potential risk factors for development of overweight and obesity, such as dietary habits, physical activity etc. Also Height and weight measurements using weighting scale and wall height charts respectively will be taken in order to classify children as normal weight, obese or overweight.

VOLUNTARY PARTICIPATION

Please note that your child's participation in this study is voluntary and you have a right to refuse to consent. If you consent for your child to participate you have the right to withdraw your child from the study at any time if you wish to do so.

BENEFITS

There are no direct benefits for participating in the study. But since the study will be getting information of risk factors for overweight and obesity, the benefits will accrue later. The study will recommend preventive measures that can be adopted by schools or parents to prevent children from becoming overweight or obese.

ALTERNATIVES

The alternative of participating in the study is to decline for your child to take part.

RISKS AND DISCOMFORT

There are no risks or discomforts involved in this study. Participants will be asked questions and their height; weight measurements will be taken using non invasive techniques.

COMPENSATION FOR TIME

Your child's participation in the study will hopefully help control the problem of overweight and obesity and their consequent health complications among children.

CONFIDENTIALITY

Names of interviewed children will not appear on the questionnaire and no record of their participation as individuals will be kept.

REVIEW AND APPROVAL

The review and approval of the study has been done by the Ethical committee of Muhimbili University of Health and Allied Sciences (MUHAS).

RESULTS

The results of the study will be made available to you through a planned means of research results dissemination. Results of this study will also be compiled in a research paper for publication and as part of a partial fulfilment of a master's degree.

CONTACTS FOR FURTHER INFORMATION

In case you have any questions concerning the nature of this study, please contact:

Director of Research and Publication
Muhimbili University of Health and Allied Sciences
P.O. BOX 65001
Dar es Salaam
Office Tel: 022 2150302-6

If you agree for your school to participate please keep this leaflet for more information during the study.

CONSENT FORM

I confirm that I have read carefully and I have understood the information provided in the leaflet and consent for my child to participate in the study. I am aware that I can freely withdraw my child from this study any time I wish to do so.

Signature: _____

Date: _____

Appendix 4: Questionnaire

SURVEY ON PREVALENCE AND FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY AMONG PRIMARY SCHOOL CHILDREN IN KINONDONI DISTRICT, DAR ES SALAAM

Questionnaire number: .....

Name of school: .....

Type of School: .....

Child number: .....

Date of interview: .....

A: Demographic characteristics

1. Age in years: .....

2. Sex: ..... (male, female)

3. Area of residence: Street.....
   District.....

4. Father's education
   a) No formal education
   b) Primary education
   c) Secondary education
   d) Post secondary education / college
   e) Don't know

5. Mother's education
   a) No formal education
   b) Primary education
   c) Secondary education
   d) Post secondary education/ college
   e) Don't know

6. Father's occupation
   a) Government employee
   b) Private sector employee
   c) Petty business
   d) Other.....
   e) Don't know

7. Mother's occupation
   a) Government employee
   b) Private sector employee
   c) Petty business
   d) House wife
   e) Other.....
   f) Don't know

8. What is the total number of individuals living in your household including parents? .....

   How many parents:.....

   How many siblings (include yourself): .....

   Other relatives:..... .....

B: Anthropometric measurements

9. Height in m: .....

10. Weight in Kg: .....

11. BMI Weight in Kg/ Height in m^2: .....

12. Overweight or obesity categorization (Use table below with BMI cut off points for childhood overweight and obesity to determine whether child is overweight or obese). .....

Table 1: IOTF – recommended cut off points for overweight and obesity by gender and by age from 2 to 18 years

	Overweight cut off points		Obesity cut off points	
Age (years)	Males	Females	Males	Females
2	18.4	18.0	20.1	20.1
2.5	18.1	17.8	19.8	19.5
3	17.9	17.6	19.6	19.4
3.5	17.7	17.4	19.4	19.2
4	17.6	17.3	19.3	19.1
4.5	17.5	17.2	19.3	19.1
5	17.4	17.1	19.3	19.2
5.5	17.5	17.2	19.5	19.3
6	17.6	17.3	19.8	19.7
6.5	17.7	17.5	20.2	20.1
7	17.9	17.8	20.6	20.5
7.5	18.2	18.0	21.1	21.0
8	18.4	18.3	21.6	21.6
8.5	18.8	18.7	22.2	22.2
9	19.1	19.1	22.8	22.8
9.5	19.5	19.5	23.4	23.5
10	19.8	19.9	24.0	24.1
10.5	20.2	20.3	24.6	24.8
11	20.6	20.7	25.1	25.4
11.5	20.9	21.2	25.6	26.1
12	21.2	21.7	26.0	26.7
12.5	21.6	22.1	26.4	27.2
13	21.9	22.6	26.8	27.8
13.5	22.3	23.0	27.2	28.2
14	22.6	23.3	27.6	28.6
14.5	23.0	23.7	28.0	28.9
15	23.3	23.9	28.3	29.1
15.5	23.6	24.2	28.6	29.3
16	23.9	24.4	28.9	29.4
16.5	24.2	24.5	29.1	29.6
17	24.5	24.7	29.4	29.7
17.5	24.7	24.8	29.7	29.8
18	25	25	30	30

C: RISK FACTORS INFORMATION

13. Do you usually walk to school and back?
    a) Yes
    b) No

14. If yes, what is the distance covered per day in minutes of walking? .....

15. Do you usually go to school and back on a bike?
    a) Yes
    b) No

16. If yes, what is the distance covered per day in time (minutes)?
    .....

17. If you don't usually walk or use a bicycle to and from school, how do you usually commute to and from school?
    a) Car
    b) Public transport
    c) School bus
    d) Others (specify).....

18. Do you usually participate in sports activities (by playing)?
    a) Yes
    b) No

19. If yes, what types of sports do you usually play?
    a) Football
    b) Cycling
    c) Running
    d) Swimming
    e) Others (specify).....

20. If yes, on average how many times per week do you participate in sports activities?
    .....days per week

21. How long do you participate in sports activities per day? .....(minutes)

22. Do you usually watch television?
    a) Yes
    b) No

23. If yes, on average how many times per week do you watch television?
    .....days per week

24. If yes, on average how many hours per day do you watch television?
    ..... hours per day

25. Do you usually use computers?
    a) Yes
    b) No

26. If yes, on average how many times per week do you use computers?
    .....days per week

27. If yes, on average how many hours per day do you use computers?
    .....hours per day

28. Do you usually play video games?
    a) Yes
    b) No

29. If yes, on average how many times per week do you play video games?
    .....days per week

30. If yes, on average how many hours per day do you play video games?
    ..... hours per day

31. What other activities (house chores), do you usually perform while at home?
    a) House cleaning
    b) Laundry
    c) Taking care of siblings
    d) I don't do anything
    e) Others (specify).....

32. On average how many times per week do you perform house chores? .....days per week

33. Extracurricular activities (none sports) performed at school
    a) Cleaning
    b) Farm work
    c) Gardening
    d) I don't do anything
    e) Others (specify).....

34. On average how many times per week do you do extracurricular activities at school? .....days per week

35. Are you given any money for buying food or drinks while at school?
    a) Yes
    b) No

36. If yes, on average how much money are you given per day? .....

37. On average how many times per week do you buy foods sold in school?
    .....days per week

38. What type of food do you usually buy at school? .....

39. Are you given lunch at school?
    a) Yes
    b) No

40. If yes, what type of lunch are you usually given at school? .....

41. Are you given any food at home to take to school?
    a) Yes
    b) No

42. If yes, what type of food do you usually take to school? .....

43. Do you usually eat breakfast before going to school?
    a) Yes
    b) No

44. If yes, on average how many times per week do you take breakfast?
    .....days per week

45. What do you usually eat for breakfast? .....

46. Do you usually drink full sugar soft drinks?
    a) Yes
    b) No

47. If yes, on average how many times per week do you consume full sugar soft drinks?.....days per week

48. Do you usually drink light (diet) soft drinks?
    a) Yes
    b) No

49. If yes, on average how many times per week do you drink light soft drinks? .....days per week

50. Do you usually drink fruit juice?
    a) Yes
    b) No

51. If yes, on average how many times per week do you drink fruit juice?
    ..... days per week

52. Do you usually eat fried foods?
    a) Yes
    b) No

53. If yes, on average how many times per week do you eat fried foods?
    ..... days per week

54. Do you usually eat starch foods?
    a) Yes
    b) No

55. If yes, how many times per week do you eat starch foods?
    ..... days per week

56. What type of starch do you usually eat? .....

57. Do you usually eat fruits?
    a) Yes
    b) No

58. If yes on average how many times per weeks do you eat fruits? .....days per week

59. Do you usually eat vegetables?
    a) Yes
    b) No

60. If yes, on average how many times per week do you eat vegetables?
    .....days per week

61. Heaviest meal of the day taken at what time? .....

62. At what time do usually eat dinner? .....

63. At what time do you usually sleep at night? .....

Interviewer observation.....

Appendix 5: Questionnaire – Kiswahili version

DODOSO LA KUTATHIMINI UKUBWA WA TATIZO LA UZITO WA KUPINDUKIA NA SABABU ZINAZOSABABISHA TATIZO HILO KWA WATOTO WA WANAOSOMA SHULE ZA MSINGI KATIKA MANISPAA YA KINONDONI, DAR ES SALAAM

Namba ya dodoso: .....

Jina la shule: .....

Umiliki wa shule: .....

Namba ya mtoto: .....

Tarehe ya usaili: .....

A: Taarifa binafsi

1. Umri katika miaka: .....

2. Jinsia: .....

3. Makazi: Mtaa / kitongoji.....
   Wilaya.....

4. Kiwango cha elimu cha baba
   a) Hajasoma
   b) Elimu ya Msingi
   c) Elimu ya sekondari
   d) Elimu baada ya masomo ya sekondari
   e) Sijui

5. Kiwango cha elimu cha mama
   a) Hajasoma
   b) Elimu ya Msingi
   c) Elimu ya sekondari
   d) Elimu baada ya masomo ya sekondari
   e) Sijui

6. Kazi ya baba
   a) Ameajiriwa serikaliki
   b) Ameajiriwa katika makampuni binafsi
   c) Anafanya biashara ndogo ngodo
   d) Nyinginezo (taja).....
   e) Sijui

7. Kazi ya mama
   a) Ameajiriwa serikaliki
   b) Ameajiriwa katika makampuni binafsi
   c) Anafanya biashara ndogo ngodo
   d) Nyinginezo (taja).....
   e) Sijui

8. Nyumbani kwenu kunaishi watu wangapi, (pamoja na wazazi)? .....

   Wazazi wangapi.....

   Watoto wangapi (pamoja na wewe).....

   Ndugu wangapi.....

   Watu wengine wangapi? .....

B: Vipimo vya kutathimini Ukuaji

9. Urefu katika m: .....

10. Uzito katika Kg: .....

11. BMI Uzito katika Kg/ Urefu katika m^2: .....

12. Gawa watoto katika makundi ya Uzito uliozidi na uzito wa kupindukia kwa kutumia jedwali lililopo hapo chini.

Table 1: IOTF – recommended cut off points for overweight and obesity by gender and by age from 2 to 18 years

	Overweight cut off points		Obesity cut off points	
Age (years)	Males	Females	Males	Females
2	18.4	18.0	20.1	20.1
2.5	18.1	17.8	19.8	19.5
3	17.9	17.6	19.6	19.4
3.5	17.7	17.4	19.4	19.2
4	17.6	17.3	19.3	19.1
4.5	17.5	17.2	19.3	19.1
5	17.4	17.1	19.3	19.2
5.5	17.5	17.2	19.5	19.3
6	17.6	17.3	19.8	19.7
6.5	17.7	17.5	20.2	20.1
7	17.9	17.8	20.6	20.5
7.5	18.2	18.0	21.1	21.0
8	18.4	18.3	21.6	21.6
8.5	18.8	18.7	22.2	22.2
9	19.1	19.1	22.8	22.8
9.5	19.5	19.5	23.4	23.5
10	19.8	19.9	24.0	24.1
10.5	20.2	20.3	24.6	24.8
11	20.6	20.7	25.1	25.4
11.5	20.9	21.2	25.6	26.1
12	21.2	21.7	26.0	26.7
12.5	21.6	22.1	26.4	27.2
13	21.9	22.6	26.8	27.8
13.5	22.3	23.0	27.2	28.2
14	22.6	23.3	27.6	28.6
14.5	23.0	23.7	28.0	28.9
15	23.3	23.9	28.3	29.1
15.5	23.6	24.2	28.6	29.3
16	23.9	24.4	28.9	29.4
16.5	24.2	24.5	29.1	29.6
17	24.5	24.7	29.4	29.7
17.5	24.7	24.8	29.7	29.8
18	25	25	30	30

C: UTATHIMINI WA SABABU ZINAZOPELEKEA UZITO WA KUPINDUKIA

13. Je huwa kwa kawaida unatembea kwa mguu kwenda shuleni na kuridi nyumbani?
    a) Ndio
    b) Hapana

14. Kama ndio, huwa unatembea umbali gani kwa siku (dakika anazotumia kwenda shule na kurudi nyumbani)? Dakika.....

15. Je huwa kwa kawaida unaendesha baiskeli kwenda shulena kurudi nyumbani?
    a) Ndio
    b) Hapana

16. Kama ndio huwa unatumia dakika ngapi kuendesha baiskeli kwenda shule na kurudi nyumbani? Dakika.....

17. Kama kwa kawaida hutembei kwa mguu na hutumii baiskeli, je huwa kwa kawaida unatumia njia gani kwenda shule na kurudi nyumbani?
    a) Gari binafsi
    b) Dala dala
    c) Basi la shule
    d) Nyingine (Taja).....

18. Je huwa kwa kawaida unacheza michezo?
    a) Ndio
    b) Hapana

19. Kama ndio, unacheza michezo gani?
    a) Mpira wa miguu
    b) Baiskeli
    c) Kukimbia
    d) Kuogelea
    e) Nyingine (Taja).....

20. Kama ndio, kwa wastani unashiriki katika michezo mara ngapi kwa wiki?
    Siku .....kwa wiki

21. Kama ndio, kwa siku unashiriki katika michezo kwa muda gani?
    Dakika .....kwa siku

22. Je huwa kwa kawaida unaangalia luninga?
    a) Ndio
    b) Hapana

23. Kama ndio, kwa wastani unaangalia luninga mara ngapi katika wiki?
    Siku.....katika wiki

24. Kwa kawaida huwa unaangalia luninga kwa masaa mangapi kwa siku?
    Dakika.....kwa siku

25. Je huwa kwa kawaida unatumia komputa?
    a) Ndio
    b) Hapana

26. Kama ndio, kwa wastani unatumia komputa mara ngapi kwa wiki?
    Siku ..... katika wiki

27. Je huwa kwa kawaida unatumia masaa mangapi kwa siku ukitumia komputa?
    Dakika.....kwa siku

28. Je huwa kwa kawaida unacheza michezo ya komputa au video?
    a) Ndio
    b) Hapana

29. Je huwa kwa kawaida unacheza michezo ya komputa/video mara ngapi kwa wiki?
    Siku .....kwa wiki

30. Kama ndio, kwa wastani unatumia masaa mangapi kwa siku kucheza michezo ya komputa au video? Dakika.....kwa siku

31. Je huwa kwa kawaida unafanya kazi gani ukiwa nyumbani?
    a) Kusafisha nyumba
    b) Kufua
    c) Kuangalia wadogo zangu
    d) Sifanyi kazi yoyote
    e) Nyingine (Taja).....

32. Kama unafanya kazi za nyumbani, ni mara ngapi kwa wiki unafanya kazi za nyumbani? Siku.....kwa wiki

33. Je huwa unafanya kazi gani ukiwa shule?
    a)Usafi
    b) Kazi za shamba
    c) Bustani
    d) Sifanyi kazi yoyote
    d)nyingine (Taja).....

34. Je ni mara ngapi kwa wiki unafanya kazi ukiwa shule? Siku .....kwa wiki

35. Je huwa unapewa pesa kwa ajili ya kununua chakula na vinywaji uwapo shuleni?
    a) Ndio
    b) Hapana

36. Kama ndio, kwa kawaida huwa unapewa shilingi ngapi kwa siku?.....

37. Kwa wastani mara ngapi kwa wiki unanunua chakula na vinywaji vinavyouzwa shuleni? Siku .....kwa wiki

38. Kwa kawaida huwa unanunua vyakula vya aina gani?
    .....
    .....

39. Je huwa kwa kawaida unapewa chakula cha mchana uwapo shule?
    a) Ndio
    b) Hapana

40. Kama ndio, kwa kawaida unapewa chakula cha aina gani?.....

41. Je huwa unapewa chakula cha kwenda nacho shule?
    a) Ndio
    b) Hapana

42. Kama ndio, kwa kawaida ni vyakula vya aina gani huwa unaenda navyo shule?
    .....

43. Je huwa kwa kawaida unapata kifungua kinywa kabla ya kwenda shule?
    a) Ndio
    b) Hapana

44. Kama ndio, kwa wastani unapata kifungua kinywa mara ngapi kwa wiki?
    Mara.....kwa wiki

45. Kama ndio kwa kawaida huwa unakula nini wakati wa kufungua kinywa?
    .....
    .....

46. Je huwa kwa kawaida unakunywa vinywaji baridi vyenye sukari (Full sugar soft drinks)?
    a) Ndio
    b) Hapana

47. Je kwa wastani unakunywa vinywaji baridi vyenye sukari mara ngapi kwa wiki? Mara .....kwa wiki

48. Je huwa kwa kawaida unakunywa vinywaji baridi vilivyopunguzwa sukari (light soft drinks)?
    a) Ndio
    b) Hapana

49. Kama ndio kwa wastani mara ngapi kwa wiki unakunywa vinywaji baridi vilivyopunguzwa sukari? Siku..... .kwa wiki

50. Je huwa kwa kawaida una kunywa juice za matunda?
    a) Ndio
    b) Hapana

51. Kama ndio, kwa wastani unakunywa juice za matunda mara ngapi katika wiki? Siku.....katika wiki

52. Je huwa kwa kawaida unakula vyakula vilivyo kaangwa?
    a) Ndio
    b) Hapana

53. Kama ndio, kwa wastani unakula vyakula vilivyo kaangwa mara ngapi katika wiki? Siku.....katika wiki

54. Je huwa kwa kawaida unakula vyakula vya wanga?
    a) Ndio
    b) Hapana

55. Kama ndio, kwa wastani unakula vyakula vya wanga mara ngapi katika wiki? Siku.....kwa wiki

56. Kama ndio nitajie aina za vyakula vya wanga unavyokula kwa kawaida: .....

57. Je huwa kwa kawaida unakula matunda?
    a) Ndio
    b) Hapana

58. Kama ndio, mara ngapi kwa wiki unakula matunda?
    Siku.....katika wiki

59. Je huwa kwa kawaida unakula mboga za majani?
    a) Ndio
    b) Hapana

60. Kama ndio, kwa wastani mara ngapi kwa wiki unakula mboga za majani?
    Siku.....katika wiki

61. Mlo mkubwa wa siku (main meal of the day) huwa unakula saa ngapi? .....

62. Je kwa kawaida huwa unakula chakula cha jioni/usiku saa ngapi?
    .....

63. Kwa kawaida huwa unalala saa ngapi usiku? .....

Maoni ya msaili.....