DETERMINANTS OF FOOD CHOICE AND BODY MASS INDEX AMONG RURAL AND URBAN ADOLESCENTS: A CASE OF ARUSHA AND ARUMERU DISTRICTS

BY

TABUSIA GODSON MANGARE

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN HUMAN NUTRITION OF SOKOINE UNIVERSITY OF AGRICULTURE.

MOROGORO, TANZANIA.

2011

ABSTRACT

This study was conducted in Arumeru District and Arusha Municipality to represent rural and urban areas respectively. The main objective of the study was to determine factors that influence food choice and Body Mass Index among rural and urban adolescents. A cross-sectional research design was used to collect data. Respondents' selection was done using multistage, purposive and simple random sampling. Pre-tested questionnaire was used to interview sampled 278 male and female adolescents. Height and weight measurements were taken from the interviewed adolescents. Descriptive and inferential statistical analyses were carried out using the Statistical Package for Social Science (SPSS) version 12.0. WHO-AnthroPlus software was used to compute BMI-for-age (Z-score) and the mean ±SD was 0.46 ±1.20. The study revealed that education level of the mother, nutrition/healthy benefits and taste of the food were the major determinants of respondents' food choice. The statistical difference ($P < 0.001$) was found between the preferred food (from globalized/exotic food) and residence. These respondents usually consumed types of food from traditional/local food, no significant difference ($P \leq 0.05$) was found between rural and urban adolescents. However more respondents (93.2%) ate globalized/exotic foods than traditional/local foods (5%) as snacks. Factors that affect nutrition status of respondents are education level of parents/guardians, socioeconomic status, sex and residence. Prevalence of overweight/obese adolescents was higher in urban (19.0%) than rural (1.5%) adolescents and in female (15.2%) than male (5.3%) adolescents. The significant difference ($P \leq 0.05$) was found in the awareness and attitude towards globalized or exotic foods between urban and rural adolescents. It is recommended from this study that the responsible authority should emphasize on nutrition education to the public and schools so as to build a healthy nation.

DECLARATION

I, Tabusia Godson Mangare, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work and that it has neither been submitted nor being concurrently submitted for a degree award in any other institution.

T.G. Mangare 26/07/2011

Tabusia Godson Mangare — Date

(M.Sc. Human Nutrition)

The above declaration is confirmed by:

..... 26/07/2011

Prof. J. Msuya — Date

(Supervisor)

COPYRIGHT

ACKNOWLEDGEMENTS

First of all, I thank God for lightening the way and allowing me to successfully complete my studies as planned. Many people assisted me in the preparation of this dissertation. I cannot mention all of them by name although I owe them profound gratitude.

First of all I would like to thank The Belgian Technical Cooperation for their financial support during my two years stay at Sokoine University of Agriculture to pursue this course.

My profound gratitude is due to my supervisor Prof J. Msuya for his guidance, suggestions, constructive criticism, and devotion to the work through the study. His readiness to assist has been a key success of this work. Appreciation should also go to Dr. P. Mamiro and Ms. K. Kulwa from the Department of Food Science and Technology for their various contributions to this study.

Sincere appreciation should also go to the Arumeru district and Arusha Municipality District Officer, District Education Co-coordinator, heads of schools, parents and students for their contributions towards the development of this work.

Special thanks to Prof. Mellau and Mrs. Mellau, my kids Kelvin and little Glory and also to all my friends for their moral, financial and material support during the whole period of the study.

DEDICATION

I thank the Almighty father, Holy Spirit and Jesus the son for the love, grace and support during the entire time in pursuing this course. This work is dedicated to my father Mr. G. Mangare and my late mother Mrs. Martha N. Mangare (may the Good Lord rest her soul in peace), who laid the foundation of my education by sacrificing a lot. I appreciate their support, love, care and excellent parenthood throughout my entire life.

LIST OF ABBREVIATIONS AND SYMBOLS

BMI	Body Mass Index
FFQ	Food Frequency Questionnaire
GEF	Globalized/Exotic Food
NBS	National Bureau of Statistics
NCD	Non Communicable Diseases
NGO	Non Governmental Organisation
RCO	Regional Commissioner's Office
SD	Standard Deviation
TLF	Traditional/Local Food
URT	United Republic of Tanzania
WHO	World Health Organisation

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Adolescence is the transition phase from child-hood to adulthood and is accompanied by natural, biochemical and emotional changes that take place during a short period of time. World Health Organization (2004) classifies children aged 10-19 years as adolescents. At this period, physical changes affect the body's nutritional needs, while changes in one's lifestyle may affect eating habits and food choices. Adolescents' nutritional health is important for supporting the growing body and for preventing future health problems (Byrnes, 2003). During adolescence, individuals develop responsibility for health-related behaviours and attitudes that affect their future. Food-related attitudes and behaviours are particularly important during these years since eating habits developed at this time continue into adulthood. Their eating habits tend to be characterized by frequent snacking, skipping meals, junk food consumption and consistently low intake of milk, fruits and vegetables (Abudayya *et al.*, 2007).

Food choice is a complex process because it is deeply embedded in culture, is influenced by many factors internal and external to the person, and carries many different meanings. At the same time, the food choices people make have health and other consequences (Contento *et al.*, 2006). Multiple psycho-social and environmental factors influence teenagers' food choices, including hunger, mood, preferences, appeal, time demands, convenience and cost (Abudayya *et al.*, 2007). Food choices criteria are the factors that affect the foods' selection and consumption; it varies according to nation, gender and age (Livingstone and Helsper, 2004). Adolescents as a group are at risk for short term and long term nutritional problems which are directly related to their food choices.

The widespread availability of junk foods such as candy, potato chips (crisps), and soft drinks may have a negative effect on the nutritional quality of the diet. The key features of such foods are the large content of fat and/or sugar, high caloric values, and the relatively low content of vitamins, minerals and dietary fibre (Temple *et al.*, 2006). Data from a large study of American children and adolescents aged 8 to 18years associated consumption of foods of low nutrient density with increased energy intake but decreased intake of several micronutrients (Kant, 2003). In another study of subjects in this age group, Bowman (2004) associated consumption of these foods with higher energy and fat intakes but lower intakes of dietary fibre, fruit and non-starchy vegetables with the increasing consumption of sugary soft drinks, which tend to displace more nutritious beverages like fresh juices and milk; this trend has a negative effect on the overall nutritional quality of the diet of children.

Increased consumption of high-calorie diets and a more sedentary lifestyle have resulted in an increase in the incidence of overweight/obesity and of obesity-related degenerative disorders (McArthur *et al.*, 2001). The prevalence of overweight/obesity have increased rapidly throughout the world and is penetrating the poorest nations in the world starting with the urban middle-aged adults, but increasingly affecting semi-urban and rural areas, and younger age groups (Prentice, 2006). Throughout the world, excessive weight is becoming more and more noticeable among children. Obesity acquired during adolescence has been reported to persist into adulthood and is associated with risk factors for chronic diseases later into life in both developed and developing countries (Veiga *et al.*, 2004).

1.2 Problem Statement and Justification

The nutritional quality of the diets of adolescent in urban and rural Tanzania has been a matter of concern due to the consequences of globalization. There is an observation that

urbanization is influencing food habits and dietary patterns in many parts of Africa (and the world in general), especially in urban areas (Kinabo, 2005). Malnutrition in any stage of life can have serious short or long term effect for health. Nutrition during adolescence plays an important role in the life cycle (ACC/SCN, 2000). Over the world there has been a great change in the nutritional status of adolescents during the past two decades because of global economic development and urbanization (Abudayya *et al.*, 2005). Schneider (2000), Popkin (2001) and Cruz (2001) noted the decreasing trend of under nutrition in developing countries and increasing obesity among adolescents both in developed and developing countries. Increased consumption of fast foods especially among the young population is linked to increased marketing activity. Advertisements and sales promotions in urban and rural areas are playing a key role in expanding and stimulating demand among the younger generation (Kinabo, 2005).

Globally data on adolescent nutritional status and related factors are limited especially in developing countries (de Onis *et al.*, 2001). For some time now, adolescents have not been considered as a high risk group for poor health and nutrition and often receive little attention. As a result, resources have traditionally been directed to under five years of age children and pregnant women. Some studies (Shepherd, 1996; Neumark *et al.*, 1999; Roininen, 2001; Videon *et al.*, 2003; Contento *et al.*, 2006; and Funke *et al.*, 2007) have reported various factors that determine food choices of adolescents in different countries. Information of adolescents' food choices and their nutrition status is important for designing and initiating some intervention programmes. It is important to set priority actions starting by assessing the situations that face adolescents in their everyday life. There is little information on factors that determine food choices and nutrition status (BMIs) of rural and urban adolescents in Tanzania. This study was therefore intended to investigate those factors and assess nutrition status of adolescents and their nutrition

knowledge, awareness, attitude and practices concerning exotic and local foods intake by adolescents. The findings of this study will provide baseline information that can be used to initiate sustainable nutrition and health promotion programmes especially targeting for this age group that will help them to have healthy food choices and hence good nutrition status.

1.3 Study Objectives

1.3.1 General objective

To determine factors that influence food choice and Body Mass Index among rural and urban adolescents in Arusha Region.

1.3.2 Specific objectives

i. To determine the socio-economic and demographic factors that influence food choices among rural and urban adolescents with regard to globalized/exotic and traditional/local foods.

ii. To compare the awareness and attitude of rural and urban adolescents for globalized/exotic foods (such as potato chips, hamburgers, chocolates, ice creams, etc) and traditional/local foods (such as *loshoro, machalari, kiburu,* etc).

iii. To determine the relationship between Body Mass Index (es) of adolescents and their socio-demographic and environmental characteristics.

iv. To determine the association between levels of nutrition knowledge of adolescents and their socio-demographic characteristics.

1.4 Hypothesis

Given the fact that globalization has greatly penetrated even the rural areas, this study will be guided by the following hypotheses:

Ho: There is no significant difference in the awareness and attitude towards globalized or exotic foods and BMI (es) between urban and rural adolescents.

H_1: There is significant difference in the awareness and attitude towards globalized or exotic foods and BMI (es) between urban and rural adolescents.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Overview

Adolescents are a nutritionally vulnerable group for a number of specific reasons including their high requirements for growth, eating patterns and lifestyles, their risk-taking behaviours and susceptibility to environmental influences. Inadequate nutrition in adolescence can potentially retard growth and sexual maturation. It can affect adolescents' current health and put them at high risk of chronic disease as well, particularly if combined with other adverse lifestyle patterns, even if the detrimental effects may take long to show.

2.2 Nutritional Needs in Adolescents

During adolescence a number of physiological changes occur. These include a marked acceleration in growth (the pubertal growth spurt) and considerable gains in bone and muscle. These changes influence nutritional requirements and consequently demand for both nutrients and energy are high thus, makes teenagers particularly vulnerable to deficiency. The hormones which act through the pubertal growth spurt are regulated to a great extent by nutritional factors. All these changes create special nutrition needs. The requirement of some of the nutrients is as high as, or higher in adolescents than in any other age groups (WHO, 2000), and therefore many micronutrients, including vitamin A, thiamine, riboflavin, niacin, folic acid, vitamin B 12, vitamin C, and iodine, reach levels required by adults.

2.3 Eating Behaviour and Intakes of Adolescents

There are many factors that affect the eating behaviours in adolescence including peer influences, parental modelling, food availability, food preferences, cost, convenience, personal and cultural beliefs, mass media, and body image (Story *et al.*, 2002). Personal factors that influence eating behaviour include attitudes, beliefs, food preferences and also biological changes. Environmental factors include the immediate social environment such as family, friends and peer networks, and other factors such as school, fast food outlets and social and cultural norms. Other factors include food availability, food production and distribution systems, and mass media and advertising play a more distant and indirect role in determining food behaviours yet can exert a powerful influence on individual eating behaviours (Stang *et al.*, 2005) and hence nutrition status.

2.3.1 Food choices

Food choice refers to a set of conscious and unconscious decisions made by a person at the point of purchase, at the point of consumption or any point in between. The eating patterns of young children are largely determined by their family on whom they are dependent on and later by other social and cultural interactions (Veiga and Sichieri, 2006). Adolescence is a time of growing independence, including increased opportunities to make decisions about what and when to eat (Videon *et al.*, 2003). During this period of life, peers are capable of exerting a bigger influence on food intake, whereas family influences may diminish (Longbottom *et al.*, 2003). There may be major variations in determinants of food choice according to age, sex, socioeconomic status and cultural norms among adolescents as a heterogeneous group (Shepherd and Dennison, 1996). It can be said that in adolescents like in other groups, taste preferences are a major determinant of food choices.

The study done by Noble *et al.* (2003), found an inverse relationship between the perceived wholesomeness of food and adolescents' liking for the foods. Personal preferences for the taste, texture and appearance of the food had a much greater influence than the nutritional quality and that; the wholesomeness of the meals is not a very important factor in adolescents' food choice (Noble *et al.*, 2003).

2.3.2 Snacking

The consumption of snacks is a worldwide issue among adolescents regardless of where they live, whether urban or rural areas, developed or developing countries (Funke *et al.*, 2007). Snacks provide one-fourth to one-third of the daily energy intake for adolescents (Karen, 2003). It is well known that the snacking tendency decreases the amount food intake and hence nutrients intake. Jahns *et al.* (2001) noted that, food choices made by adolescents while snacking tend to be high in sugar, sodium, and fat, while relatively low in vitamins and minerals. Soft drinks are the most commonly chosen snacks for adolescent females and account for about 6% of total caloric intake (Wyshak, 2000). This high consumption of soft drinks increases the risk for bone fractures over an individual's lifetime. Snacks are usually more easily available than wholesome meals despite the nutritional implication (Noble *et al.*, 2003) therefore healthy snack choices should be emphasized.

2.3.3 Skipping meals

Meal skipping is common among adolescents, especially during middle and late adolescence. Breakfast is the most commonly skipped meal and is attributed to lack of time, desire to sleep longer in the morning, lack of appetite, and dieting to lose weight (Stang *et al.*, 2005). Gleason *et al.* (2001) noted that, skipping breakfast may affect concentration, learning, and school performance and young people who skipped breakfast

had lower total daily energy, vitamin and mineral intakes compared to those who ate breakfast. The report further explained that, lunch skipping also reduces intakes of energy, protein, and other important nutrients.

2.3.4 Parents/guardians and food choice

Many different factors influence food habits in a complex interactive way. Parents and the family environment are very important for young children to learn and develop food preferences and eating habits in a dual way (Story *et al.*, 2002). As providers of the food children eat, family members are also relevant role models and establish rules and norms related to food and eating practices. Parents provide most of the food a child consumes, and children depend on them to do so. Parents, especially mothers, rely heavily on what their paediatricians and family physicians recommend (Nelson *et al.*, 2003). Despite increasing independence in food choices as a child ages, parental influence remains high through adolescence. In the United States, a study of 282 families in the Seattle area showed that mothers significantly influenced the consumption of fruits and vegetables of their children 5-17 years of age (Hannon *et al.*, 2003).

2.4 Nutrition and Health of Adolescents

Healthy diet is not only vital for growth and development but for disease prevention both in the long- and short-term thus it is important that young people are encouraged to make healthy choices. Dietary intake during adolescence is crucial for the increased growth and development needs of adolescents who gain 20% of their adult height and 50% of their adult weight and skeletal mass in a few years, while they develop secondary sexual characteristics (Klimis-Zacas *et al.*, 2006). Inadequate dietary intake and poor food choices often lead to common nutrition related disorders and increase the risk for a wide range of diseases (Gibson, 1990).

Both sexes are particularly vulnerable to nutritional deficiencies and to unbalanced or disordered eating behaviours (Yannakoulia *et al.*, 2004, 2005), which can lead to loss of height, osteoporosis, and delayed sexual maturation. Amorim-Cruz (2000) and Rolland-Cachera *et al.* (2000) suggested that intakes of several essential nutrients, most notably iron, calcium, and zinc in United States and many Western, Northern, and Southern European countries do not meet the recommendations particularly in adolescent girls, whereas intakes of fat and added sugars exceed the recommendations (Munoz *et al.*, 2002).

2.5 Factors Influencing Adolescents' Nutritional Status

Nutritional problems of adolescents, whether under nutrition or nutrition-related chronic diseases, are mainly the result of dietary inadequacies, which may be related to a number of factors that can be grouped under physiological, socioeconomic, and psychosocial factors (Stang and Story, 2005). As growth imposes additional nutritional requirements in adolescence; such high requirements mean that adolescents are exposed to not meeting them. Brook *et al.* (1997) noted that people with similar genetic potential, who have been subjected to favourable or unfavourable environments, can reach different growth stages, revealing the importance of nutrition and of the social and economic level as well.

2.5.1 Socioeconomic factors

Socioeconomic factors have a pervasive influence on quantity and quality of diets, irrespective of lifecycle groups; adolescents are not different in this respect, perhaps with the exception of the great influence upon their eating habits by the commercial environment, particularly mass media. The constraints to improving adolescent health that these conditions impose have to be recognized (WHO, 2005). Many of these factors also

impinge on nutrition, particularly through inadequate access to food, or unhealthy dietary patterns.

2.5.2 Psychosocial factors

Psychosocial factors are probably those with particular importance during adolescence. The search for identity, the struggle for independence and acceptance, and concern about appearance, are changes that may have a great impact on lifestyle, eating patterns and intakes of adolescents (Spear, 1996). Adolescents are greatly influenced in their eating habits by peers, mass media, social and cultural norms, and lack of nutrition knowledge, while the influence of the family tends to decline (Johnston and Haddad, 1996). Adolescence is a time of high vulnerability to societal and peer pressure, often reinforced by the media, as may be evidenced by behaviours, attitudes and dietary practices (Johnston and Haddad, 1996).

2.6 Assessment of Adolescents' Nutritional Status

The overall nutritional status of adolescence is better assessed with anthropometry which is the single most inexpensive, non-invasive and universally applicable method (de Onis, 1997). Anthropometry is a measure of the variation in physical dimensions and gross motor composition of the human body at different levels and degree of nutrition (Gibson, 2005). Growth retardation is an early response to nutritional inadequacy. Anthropometry which include weight, height, skin fold thickness and arm circumferences, is measured for assessing the nutritional status and health of adolescents (Mahan, 2004; WHO, 2005 and Abudayya *et al.*, 2007). Anthropometry provides information on nutritional history and is useful to detect the nutrition status of an individual. Anthropometric variables, especially weight and height, have been used more and more often in the evaluation of the nutritional condition in clinical and population studies (Oliveira *et al.*, 2000). In adolescence, these

parameters are fundamental due to the typical physical transformations of this age group, considering that physical growth itself depends on proper nutritional conditions. WHO (2009) recommends the use of BMI-for-age (Z-score and or percentiles) for assessing nutrition status of 5-19 years old children.

2.7 Nutrition Knowledge, Attitude and Practices

The nutrition knowledge is important to adolescence because it helps them choose the right food for their health. Funke *et al.* (2003) found that, there is a positive correlation between the preference and healthiness of foods among the adolescents in a study done in Nigeria. In that study, adolescents with a fair knowledge of the nutritional contents of the foods they eat, and would rather go for healthy foods than unhealthy ones, if available. In the same study, most of the drinks perceived to be healthy were more likely to be chosen with the exception of soft and sweetened (Funke *et al.*, 2003).

A survey by Bloom (2003) at a private school in Cape Town in South Africa found that nutritional knowledge scores were high overall although students were still opting for unhealthy foods and drinks. A survey undertaken in rural black children found that foods most commonly brought to school were of healthier options (Clifford *et al.*, 2006). Despite this, the difference in nutritional value between the healthy choices and the favourite choices was not as great as many nutritionists feared. The meals chosen based on preference were, in many respects, no less healthy than those chosen on the basis of the adolescents' perceptions of the healthiness of the meals, and in some respect the preferred meals were healthier (Hackett *et al.*, 1997).

Nutrition knowledge of adolescents in general is little predictive of eating behaviours. While recognizing that adolescents often have poor food habits, American adolescents

typically cite the lack of time, discipline, and a sense of urgency as barriers to altering their dietary behaviours (Story and Resnick, 1986). The relative influence of parents and peers may vary across cultures and sub-cultures, but a general trend is for social and external factors in general, and peers in particular, to become increasingly significant with transition to adolescence (Contento *et al.*, 1988).

2.8 Globalization and Dietary Intake

Globalization, as a term, is very often used to refer to economic situation whereby there is integration of national economies into the international economy through trade, foreign direct investment, capital flows, migration, and spread of technology. Information technology offers an opportunity to disseminate information to a wide population and therefore influence people's behaviour and practices (Popkin, 2003).

Globalization has resulted in many positive and negative changes in the developing and developed worlds with its focus on freer movement of capital, technology, goods and services. It has profound effects on lifestyles that are linked with diet (Popkin, 2003). Globalization has increased free movement of processed foods and other commodities such as cooking oil, soft drinks, biscuits, cakes, sweets and chocolates and ready to eat foods. These have become readily available on the market and consumption has increased significantly in urban areas of Africa (Kinabo, 2005). The dietary intake pattern is now changing rapidly from a traditional diet of high carbohydrate, high fibre to one containing many manufactured, processed and non-traditional foods (Kinabo, 2005). This trend is accelerated by the increased rate of globalization.

2.9 Urbanization and Food Consumption

Urbanization and changing food habits and lifestyles have created an additional burden of nutrition problems in Africa (WHO, 2003). Throughout the developing world, there has been a profound increase in the penetration of modern television programming. There is a view among some researchers that the US fast food sector and soft drink industry have led to the declines of usual diets throughout the developing world (Lobstein *et al.*, 2003). Promotions increase purchase frequency by giving consumers incentives such as gift or prizes to encourage them to drink or eat more. Sales promotions drive frequent purchasing particularly among children. Instead of drinking home-made fruit juices or any other locally available natural beverages, many people have switched to drinking Coca-Cola and other such soft drinks (Kinabo, 2005).

The growth of American food companies has certainly spread across the globe. Coca-Cola is sold in more than 200 countries. The McDonald's, Pizza Huts, and Kentucky Fried Chicken restaurants are rapidly spreading across the globe. They are quickly followed, or even preceded by food chains that follow their models, even to the point of serving the same dishes and being equally efficient (Lobstein *et al.*, 2003).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Areas

The study was conducted in Arusha region whereby Arusha Municipality and Arumeru district represented urban and rural areas respectively. The information about the location and population of the above mentioned districts are provided below.

3.1.1 Arusha Municipality

Arusha Municipality which is also the business and administrative centre of the region has a land area of 82.5 square km, which is only 0.1% of the regional land area. The district comprises of 3 divisions and 17 wards consisting of 40 streets (URT, 2002 and RCO Arusha, 2007). According to the projections based on the National census of 2002, Arusha Municipality has a population size of about 281 608, whereby 270 485 are in areas considered as urban and 11 123 are in areas considered to be rural. Among this population, 62 531 are adolescents who comprise approximately 22% of the whole district population (NBS, 2002).

Socioeconomic activities in Arusha Municipality

Arusha is a local and international tourism centre. One of the major socioeconomic activities is the tourism business. Also the town is the main market for tanzanite gemstones which are mined in Mererani which is just outside the town. The economy of Arusha Municipality depends on commerce, industry, small scale agriculture and tourism (RCO Arusha, 2007).

3.1.2 Arumeru district

Arumeru district is one of the 5 districts which form Arusha region in northern Tanzania. The district lies between longitudes 36.5° to 37° east and latitudes 3.5° to 3.7° south of the equator. Arumeru district has an area of 2 896 square km which is about 3.5% of the area in Arusha region of which total area is 82 424 square km. Administratively, the district is divided into 6 divisions, 37 wards and consisting of 147 villages (RCO Arusha, 2007).

Arumeru district has a population size of 516 814, with the annual growth rate of 3.8% and the population density of 137 individuals per square km. Among that population, approximately 123 802 are adolescents which comprise about 24% of the whole district population (NBS, 2002).

Socioeconomic activities in Arumeru district

In Arumeru, people do petty businesses in their famous markets namely Usa-river, Tengeru and Kikatiti in the eastern part and Ngaramtoni ya juu, Oldonyosambu and Kissongo in the western part. The market places are situated near the main roads where transport accessibility is good. Other activities are livestock keeping (cow, goats, donkey and sheep), agriculture (maize, beans, pigeon peas, Irish potatoes, vegetables); bee keeping and other people are employed in government, NGOs, tourism, mining and flower industry.

3.1.3 Traditional/local foods in Arusha and Arumeru

The traditional foods in Arusha and Arumeru include *kitaloolo* – made by two methods, either from green vegetables, meat/beans and potatoes or from sweat corn, green vegetables, green bananas and milk. The ingredients are grounded together. *Loshoro* is another popular traditional food. It is made from de-hulled maize grains, green banana and

fermented milk. *Matendera* (*machalari/kiburu*) is made by either using green banana with meat/ beans whereby the food is taken by all age groups. *Engideri/kitawa* is made from green banana with either fresh or fermented milk, which is normally the food for sick people and lactating mothers. *Mangolo/olkitao* (*makande*) is made from de-hulled maize with meat/beans, and is the food for all people. *Mtori* which is a thin soup made by green banana with meat is a food for sick and breastfeeding mothers. Others are *Ngararumu* which is maize grains with beans, and *Kibwee* (*kisusio*) - made by fresh blood, fat meat and soup. Local alcoholic drinks are also available such as *wari/endapa* (*mbege*) - made by fermented banana and finger millet, and *maritina* made from fermented roots and honey.

3.1.4 Ethnic groups

The two districts are composed of three major ethnic groups which are Wameru, Waarusha and the pastoralists Maasai. Others who have migrated in are Warangi, Wambulu, Wairaqw, Wachagga and Wapare (RCO Arusha, 2007).

3.1.5 Social services

Social services available in the study area are health services, water supply, social welfare, market, education, agriculture and live-stock extension services, microenterprises and informal sector development. Others include economic empowerment by provision of soft loans and natural resource management (mining, forest keeping and environmental conservation).

3.2 The Research Design

Cross-sectional research design was used whereby the information was collected at one point in time. This design provides useful information for statistical description and

interpretation and allows for determination of relationship between variables that are focused in the study (Bernard, 1996).

3.2.1 Sampling

3.2.1.1 Study population

Both male and female adolescents were the subjects of this study. Included adolescents were those in school and those who have been out of school for the past one year. Adolescents in boarding schools were not included in the study because they mainly eat the already predetermined school meals. Also adolescents who have special diets because of certain disease conditions were excluded from this study.

3.2.1.2 Sample size

The sample size of 299 was obtained using the Fischer *et al.* (1991) formula. The expected prevalence of adolescents (22% and 24%) for Arusha and Arumeru districts respectively were used for the calculation. Accordingly:

$$N = t^2 \frac{[p \times q]}{d^2}$$

Where N = sample size, t = 1.96 (the risk of error), p = 22% and 24%, q = 78% and 76% (expected non-prevalence) and d = 0.05 (level of precision).

Since the prevalence and expected prevalence of adolescents for both districts were almost the same, the average was used to calculate the sample size where,

$$N = 1.96^2 \times \frac{[0.23 \times 0.77]}{0.05^2}$$

$$N = 3.8416 \times \frac{0.1771}{0.0025}$$

$$N = 272.1$$

The attrition rate of 10% was allowed for this study and used to obtain the sample size of interviewed adolescents.

$$N = 272.1 + [10\% \text{ of } 272.1]$$
$$N = 272.1 + 27$$
$$N = 299$$

3.2.1.3 Sampling procedure and technique

Multistage, simple random and purposive sampling techniques were used. Divisions and wards were selected randomly from each district. Then schools were selected randomly from each selected ward. Twenty to thirty in-school adolescents from 10 primary and secondary schools were obtained randomly from different classes basing on the criteria of age (11-19years which is the adolescents' age) for both sexes (male and female). For out of school subjects, purposive sampling was used. The village and ten cell leaders from the villages and urban street of the selected schools above gave the name and physical address for the parents/guardians of adolescents who completed school. Thereafter interviewed was done to those adolescents in both rural and urban areas respectively.

3.2.2 Types of data collected

Three types of primary data were collected from the respondents. First was the background information, which was collected by face to face interviews from individual subjects whereby structured questionnaires (Appendix 2) containing both open and close-ended questions was used. The questions sought to obtain socio-economic information and demographic characteristics of the adolescents and their parents/guardians. The other types of data included food choice, nutrition knowledge and nutrition status of respondents. These are described below.

3.2.2.1 Food choice and nutrition knowledge data

Information about the respondent's food choice, awareness, attitude and practices on traditional/local and globalized/exotic foods was obtained using the prepared questionnaire. Nutrition knowledge scores were obtained using a specially designed nutrition test (Appendix 1), comprising of twenty questions. The categories of knowledge scores performance were: well (if respondents scored 12 and above), fair (from 11 to 8) and bad (below 8).

3.2.2.2 Nutritional status data

Respondent's anthropometric measurements (weight and height) were taken. Individuals were weighed with minimum clothes and without shoes using a Seca electronic balance (SECA Vogel and Hakel, Hamburg Germany) to the nearest 0.1 kg. Height board was used to measure height and recorded to the nearest 0.1 cm. The weight and height measurements were used to calculate BMI-for-age in order to determine the nutrition status of individual respondents.

3.2.3 Data collection tools and materials

Structured questionnaire (Appendix 2) was administered and filled by respondents. Materials and equipment for data collection included a list of selected students and their addresses, stationeries (pencils, sharpener, pens, clipboards, eraser, files) for filling out questionnaires and recording weights and heights, weighing scales and height boards for measuring weight and height respectively, also reference tables for Body Mass Index.

3.2.4 Preliminary survey

Prior to the actual survey, the questionnaire was pre-tested in Moshi Municipality, which is a neighbouring town to Arumeru and Arusha Municipality. The information obtained

was not included in this report but it helped for necessary modifications before the actual data collection.

3.2.5 Ethical consideration

Sampled respondents were asked for verbal consent and permission to take part in the study. The respondents were also assured that the information collected was to be used only for the purpose of the study and not otherwise.

3.2.6 Data processing and analysis

Data from filled in questionnaires was coded, entered, cleaned and analyzed by using the Statistical Package for Social Sciences for Windows version 12.0 (Norusis/SPSS Inc, 2003). Descriptive and inferential statistics including mean, standard deviation and frequencies were calculated. Chi-square test was used for comparison of different variables (i.e. sex, age, residence, education level and nutrition knowledge) with the consumption, preferences, awareness and attitude of two food groups (traditional/local and globalized/exotic). T-test was used for testing the association between Z-scores and the different variables named above. P-value of 0.05 was used as the maximum criterion for statistical significance level. Anthropometric data was processed using WHO-AnthroPlus (WHO, 2009) to obtain the nutritional indicator (BMI-for-age) computed in z-scores and determined according to the WHO cut off points (WHO, 2009). Types of foods categorized as globalized/exotic (GEF) were: hamburger, sausage, *samosa*, chips, pizza, chocolate, ice-cream, soda, cake, egg chop, fried chicken, crisps and kebab. On the other hand, traditional/local foods (TLF) were *kitawa/engideri, machalari, kiburu, loshoro, kitalolo* and *Mangolo/olkitao (makande)*, as described in section 3.1.3 above.

CHAPTER FOUR

4.0 RESULTS

4.1Overview

This chapter presents the results of the study on the factors that affect the food choice and Body Mass Index of rural and urban adolescents in Arusha and Arumeru districts. The chapter is organized into several sub-sections. The sub-sections include general characteristics of the study respondents, socio-economic categories of parents/guardians, adolescents' food choices, respondent's awareness and attitude towards globalized/exotic and traditional/local foods, nutritional status (BMI-for-age) and the level of nutrition knowledge of adolescents.

4.2 General Characteristics of the Study Population

A total of 278 adolescents in Arusha and Arumeru districts were interviewed during the study period. The characteristics of the respondents considered here include sex, age, education level, family members and family socio-economic category. Also a total number of years a respondent has lived in urban, peri-urban or rural areas were recorded. The general characteristics of the respondents helped to provide variables for assessing associations with other variables of interest.

4.2.1 Age and sex

The distribution of age is presented in Table 1. The age of the respondents varied between 10 and 19 years, which concur with the definition of adolescents by WHO (2004). There were more female respondents (52.2%) than males (47.8%). The distribution of age showed that those aged between 14 – 16 years were the largest group (36.6%) followed by 17 – 19 years group (33.4%). The smallest group was those aged between 11 – 13 years

(30.0%). The mean population age was 15.27 years. There was no significant difference (at $P \leq 0.05$) in age distribution between female and male respondents.

4.2.2 Education level and residence

Table 1 summarizes the results. Most of the sampled respondents were still in school (93.8%) as compared to those who had completed school (6.1%). The majority of those in school were in secondary school (65.1%) while 28.7% were in primary school. Those who had completed secondary school were 3.9% and primary schools were 2.1%. The distribution by residence showed that 46.8% were currently living in rural areas while 43.9% had lived in rural areas for more than five years. On the other hand, 30.2% were currently living in urban areas, whereas 32.7% had lived there for more than five years. Other respondents were in peri-urban areas (23%) and 21.9% had lived in peri-urban areas for more than five years.

4.2.3 Socio-economic and demographic

According to the teachers/community leaders' perception, majority of the respondents' families (93.2%) were regarded as normal families. On the other hand, 4.3% were considered to be moderately rich and 2.5% were categorized as relatively poor families. Results are summarized in Table 1. The socioeconomic categories were according to community leaders and teachers.

Majority of the respondents lived with both parents (68%) while 18.3% lived with single parents and the rest lived with guardian(s) (13.7%). Many families in this study were observed to have 6 – 9 members (52.9%) followed by those with less than six members (37%) and 10.1% had more than 9 members.

Table 1: General characteristics of the respondents

Characteristics	Female (N=145)		Male (N=133)		Total (N=278)	
	n	%	n	%	n	%
Age of respondents (years)						
11-13	45	31.0	38	28.6	83	30.0
14-16	61	42.1	41	30.8	102	36.6
17-19	39	26.9	54	40.6	93	33.4
Type of respondent						
In school	138	95.1	123	92.5	261	93.8
Completed school	7	4.8	10	7.5	17	6.1
Education level						
Competed primary school	3	2.0	3	2.2	6	2.1
Primary school	44	30.3	36	27.0	80	28.7
Secondary school	94	64.8	87	65.4	181	65.1
Completed secondary school	4	2.7	7	5.2	11	3.9
Residence						
Urban	44	30.3	40	30.1	84	30.2
Peri-urban	33	22.8	31	23.3	64	23.0
Rural	68	46.9	62	46.6	130	46.8
Years lived in rural areas						
> 5 years	64	44.1	58	43.6	122	43.9
5 years or less	81	55.9	75	56.4	156	56.1
Years lived in peri-urban areas						
> 5years	34	23.4	27	20.3	61	21.9
5 years or less	111	76.6	106	79.7	217	78.1
Years lived in urban areas						
> 5years	48	33.1	43	32.3	91	32.7
5 years or less	97	66.9	90	67.7	187	67.3
Dependants						
Have both parents	90	62.1	99	74.4	189	68.0
Have a single parent	33	22.8	18	15.5	51	18.3
Depends on guardian/guardians	22	15.2	16	12	38	13.7
Socio-economic family category *						
Normal family (average)	135	93.1	124	93.2	259	93.2
Moderately rich family	6	4.1	6	4.5	12	4.3
Relatively poor family	4	2.8	3	2.3	7	2.5
Number of family members living together						
Less than 6 members	55	37.9	48	37.9	103	37.0
6-9 members	72	49.7	75	49.7	147	52.9
More than 9 members	18	12.4	10	12.4	28	10.1

* This is according to the teachers and community leaders

4.2.4 Education level of parents/guardians

Table 2 summarizes the results of education level of the parents/guardians which include 3 categories of: (i) none or primary school, (ii) secondary school and certificate, and (iii) diploma and degrees. Most of the mothers had either not attended school or had only primary school education (52.8%) between female and male adolescents. Those who had secondary school education were 31.1% and few had attained diploma and degrees (16.1%). The education level of fathers showed significant difference at P = 0.017. Those who did not attend school or had primary school education were 35.1% while those with secondary school education and certificate were 35.6%. The rest had either diploma or degrees (29.2%).

Table 2: Education level of parents/guardians of interviewed adolescents

Characteristics	Female		Male		Total	
	n	%	n	%	n	%
Education level of the father (n=202)						
None or Primary school	26	26.5	45	43.3	71	35.1
Secondary school and certificate	39	39.8	33	31.7	72	35.6
Diploma and degrees	33	33.7	26	25.0	59	29.2
Education level of the mother (n=235)						
None or Primary school	56	47.8	68	57.6	124	52.8
Secondary school and certificate	37	31.6	36	30.5	73	31.1
Diploma and degrees	24	20.5	14	11.9	38	16.1
Education level of the guardians (n=38)						
None or Primary school	12	52.2	3	20.0	15	39.5
Secondary school and certificate	4	17.4	6	40.0	10	26.3
Diploma and degrees	7	30.4	6	40.0	13	34.2

4.3 Eating Habits

4.3.1 Breakfast

Table 3 shows that 76.4% of the female respondents usually take traditional/local food (TLF) for breakfast while 23.6% take globalized/exotic food (GEF). Majority of male respondents (79.5%) usually had traditional/local food for breakfast and the remaining 20.5% take globalized/exotic food. Majority of respondent groups i.e. the youngest (11-13years); middle (14-16years) and oldest (17-19years) were taking traditional/local food for breakfast (79.3%, 77.6% and 77.2% respectively). The chi-square statistics testing indicate that there were no significant differences between females and males and between the included age-groups at $P \leq 0.05$.

Table 3: Main type of food consumed for breakfast by respondents

Variable	Traditional / local food %	Globalized/ exotic food %	Total	Chi-square value	P – value and significance levels
Sex					
Female (n=145)	76.4	23.6	100	0.38	0.53NS
Male (n=133)	79.5	20.5	100		
Age group in years					
11-13 (n=83)	79.3	20.7	100	0.12	0.94NS
14-16 (n=102)	77.6	22.4	100		
17-19 (n=93)	77.2	22.8	100		
Residence					
Urban (n=84)	87.8	12.2	100	15.75	0.000***
Peri-urban (n=64)	86.9	13.1	100		
Rural (n=130)	67.4	32.6	100		

NS = Not Significant at $P \leq 0.05$, *** = Significant at $P \leq 0.001$

According to the residence (i.e. urban, peri-urban and rural). 87.8% of the urban, 86.9% of the peri-urban and 67.4% of the rural respondents were taking traditional/local food for breakfast. Unlike age-groups of respondents which were found to have no significant differences, more respondents from the rural area were taking globalized foods for breakfast (32.6%) than those in either peri-urban (13.1%) or urban (12.2%) at $P<0.001$. Reverse was true for the traditional local foods.

4.3.2 Lunch

It was observed, as shown in Table 4, that majority of female (95.6%) and male (94.6%) respondents usually take TLF for lunch. The same pattern appears on the age groups where majority of adolescents within the age groups take traditional/local food for lunch. Similarly basing on their residence, majority of adolescents who live in peri-urban (96.6%), urban (94.8%) and rural areas (94.6%), take TLF for lunch. The differences were not statistically significant. Furthermore, 7.1% of adolescents from urban and 7.8% in peri-urban areas reported to eat nothing for lunch (data not shown).

Table 4: Main type of food consumed for lunch by respondents

Variable	Traditional/local food		Globalized/exotic food		Chi-square value	P-value &significance levels
	n	%	n	%		
Sex						
Female (n=137)	131	95.6	6	4.4	0.145	0.70NS
Male (n=130)	123	94.6	7	5.4		
Age group						
11-13 (n=83)	79	95.2	4	4.8	0.059	0.97NS
14-16 (n=95)	90	94.7	5	5.3		
17-19 (n=89)	85	95.5	4	4.7		
Residence						
Urban (n=78)	74	94.8	4	5.1	0.365	0.83NS
Peri-urban (n=59)	57	96.6	2	3.4		
Rural (n=130)	123	94.6	7	5.4		

NS = Not Significant at $P \leq 0.05$

4.3.3 Dinner

The results for evening meal (dinner) are almost the same where majority of respondents had TLF compared to those who had GEF. There was no significant difference for sex, age group or residence. This is shown in Table 5.

Table 5: Main type of food consumed for dinner by respondents

Variable	Traditional/ local food		Globalized/exotic food		df	Chi-square value	P – value & significance levels
	n	(%)	n	(%)			
Sex					1	0.01	0.889 NS
Female	140	96.6	5	3.4			
Male	128	96.2	5	3.8			
					2	5.20	0.074 NS
Age group							
11-13	77	92.8	6	7.2			
14-16	101	99.0	1	1.0			
17-19	90	96.8	3	3.2			
					2	13.40	NS
Residence							
Urban	76	90.5	8	9.5			
Peri-urban	62	96.9	2	3.1			
Rural	130	100.0	0	0			

NS = Not Significant (P>0.05), df = degree of freedom

4.4 Food Preference

4.4.1 Preferred food for breakfast

Respondents were asked to indicate the type of food (tradition/local food or globalized/exotic foods) they preferred to eat for breakfast. The results are shown in Table 6. Significant difference was not found in the food preferred for breakfast between males and females, and among different age groups of the adolescents in this study (at $P \leq 0.05$).

When considering the residential areas, 81.5% of respondents who live in rural area preferred breakfast from GEF, the remaining percentage preferred to have breakfast from TLF. Unlike those in rural areas, results show that more than half of the respondents (56.3%) who live in peri-urban and 52.4% of those in urban area preferred to have breakfast from traditional/local food (TLF). The differences are significant at $P < 0.001$.

Table 6: Main type of food preferred for breakfast by respondents

Variable	Traditional/local food		Globalized/ exotic Food		df	Chi-square value	P – value & significance levels
	n	%	n	%			
Sex							
Female (n=145)	50	34.5	95	65.5	1	1.10	0.29 NS
Male (n=133)	54	40.6	79	59.4			
Age group							
11-13 (n=83)	31	37.3	52	62.7	2	0.69	0.70 NS
14-16 (n=102)	41	40.2	61	59.8			
17-19 (n=93)	32	34.4	61	65.6			
Residence							
Urban (n=84)	44	52.4	40	47.6	2	37.67	0.000***
Peri-urban (n=64)	36	56.3	28	43.8			
Rural (n=130)	24	18.5	106	81.5			

NS = Not Significant at $P \leq 0.05$, *** = Significant at $P < 0.001$, df = degree of freedom

4.4.2 Preferred foods for lunch

Table 7 shows the results. It appears that there was no significant difference in the foods preferred for lunch between males and females as well as among the different age groups of the surveyed adolescents (at $P \leq 0.05$).

However, highly statistical significant difference ($P < 0.001$) was found between residence of respondents and the type of food they preferred to take for lunch. More adolescents (65.5%) who live in urban areas preferred to take globalized/exotic foods than tradition/local foods (34.5%) for lunch. Almost similar results were observed for respondents who live in rural and peri-urban areas (66.2% and 56.2% respectively) who preferred to have lunch from GEF group of foods.

Table 7: Main type of food preferred for lunch by respondents

Variable	Traditional/ local food		Globalized/exotic Food		df	Chi-square value	P-value and significance
	n	%	n	%			
Sex							
Female (n=145)	63	43.4	82	56.6	1	3.17	0.075NS
Male (n=133)	72	54.1	61	45.9			
Age group							
11-13 (n=83)	34	41.0	49	59.0	2	3.94	0.139NS
14-16 (n=102)	49	48.0	53	52.0			
17-19 (n=93)	52	55.9	41	44.1			
Residence							
Urban (n=84)	29	34.5	55	65.5	2	22.40	0.000***
Peri-urban (n=64)	28	43.8	36	56.2			
Rural (n=130)	44	33.8	86	66.2			

NS = Not Significant at $P \leq 0.05$, *** = Significant at $P < 0.001$, df = degree of freedom

4.4.3 Preferred foods for dinner

Table 8 summarizes the results of the foods reported to be preferred for dinner. Just like the case of preferred foods for lunch, there was no significant difference in preference by either sex or age group of respondent (at $P \leq 0.05$).

For the residential areas, majority of adolescents (80.8%) who live in rural area preferred to take dinner from GEF, compared to only 52.4% and 48.4% of the adolescents in urban and peri-urban areas respectively. The differences were significant at $P < 0.001$ using chi-square statistics.

Table 8: Main type of food preferred for dinner by respondents

Variable	Traditional/ local food		Globalized /exotic Food		Df	Chi-square value	P – value and significance levels
	n	%	n	%			
Sex							
Female (n=145)	44	30.3	101	69.7	1	3.19	0.074NS
Male (n=133)	54	40.6	79	59.4			
Age group							
11-13 (n=83)	28	33.7	55	66.3	2	0.13	0.936NS
14-16 (n=102)	37	36.3	65	63.7			
17-19 (n=93)	33	35.5	60	64.5			
Residence							
Urban (n=84)	40	47.6	44	52.4	2	27.70	0.000***
Peri-urban (n=64)	33	51.6	31	48.4			
Rural (n=130)	25	19.2	105	80.8			

NS = Not Significant P >0.05, *** = Significant at P< 0.001, df = degree of freedom

4.4.4 Reasons for choosing to eat the food preferred

Table 9 shows different reasons the adolescents had on choosing to eat the food which they preferred the most. The biggest proportions indicated that good taste (39.2%) and nutrition/health benefits of the food (40.3%) were the main reasons that made them to

choose the foods. Other reasons were low cost (7.2%), advised by parents/guardians (6.8%), attractive advertisement they saw about the food (3.2%), and less preparation time of the food (2.2%). Very few (1.1%) chose foods because they were advised by their friends or their friends liked to eat that food.

Table 9: Main reasons given by the surveyed adolescents to choose the preferred foods

Reason	Frequency	Percent
Low cost	20	7.2
Good advertisement	9	3.2
Good taste	109	39.2
Short preparation time	6	2.2
Advised by friends/Friend likes	3	1.1
Advised by parents/guardians	19	6.8
Healthy/nutrition benefits	112	40.3
Total	**278**	**100**

4.5 Meals and Snacks Eaten by Adolescents

Majority of adolescents (95%) eat TLF as their usual full meals and very few (5%) eat GEF as their usual full meals. Results are shown in Table 10. On the other hand, majority of respondents (93.2%) eat globalized/exotic foods as snacks, and only 5% eat traditional/local foods as snacks. About 1.8% indicated that they don't eat snacks at all.

Table 10: Usual full meals and snacks of adolescents

Usual food	Frequency	Percent
Full meals		
Globalized/exotic food	14	5
Traditional/local food	264	95
Snacks		
None	5	1.8
Traditional/local foods	14	5
Globalized/exotic foods	259	93.2

4.6 Awareness of Respondents about Different Food Types

4.6.1 Awareness about globalized/exotic foods

Respondents were asked if they had ever heard or seen various foods of globalized/exotic type. Table 11 summarizes the results. The results show that all adolescents who live in urban areas (100%) were aware of chips, chocolate, soda and *samosa*. However, majority of adolescents in this area were also aware of other types of GEF such as ice creams (97.6%), cakes (98.8%), fried chicken (97.6%), crisps and sausages (85.7%). All the respondents who live in peri-urban areas (100%) were aware of cakes and soda. Others from the same area were aware of chips and chocolate (98.4% each), *samosa* (96.9%) and ice creams (95.3%). For fried chicken and sausages were 90.6% and 81.3% respectively.

All the respondents from rural areas (100%) were aware of only chips. Others in the rural areas were aware of soda and cake (99.2% each), *samosa* (96.9%), fried chicken (95.4%), chocolate (92.3%), ice-creams (85.4%) and sausages (68.7%). Other awareness results for the GEF foods include kebab, hamburger, pizza and egg chops as shown in Table 11.

Table 11: Distribution of respondents who are aware of various globalized/exotic foods according to their areas of residence

	Urban (N=84)		Peri-urban(N=64)		Rural (N=130)	
Globalized/ exotic food	n	%	n	%	n	%
Hamburger	57	67.9	42	65.6	2	1.5
Sausage	72	85.7	52	81.3	67	68.7
Samosa	84	100	62	96.9	126	96.9
Chips	84	100	63	98.4	130	100
Pizza	52	61.9	47	73.4	9	6.9
Chocolate	84	100	63	98.4	120	92.3
Ice-cream	82	97.6	61	95.3	111	85.4
Soda	84	100	64	100	129	99.2
Cake	83	98.8	64	100	129	99.2
Egg chop	63	75	45	70.3	39	30
Fried chicken	82	97.6	58	90.6	124	95.4
Crisps	76	90.5	54	84.4	33	25.4
Kebab	74	88.1	51	79.7	42	32.3

4.6.2 Awareness about traditional/local foods

Respondents were also asked if they had ever heard or seen various foods of traditional/local type. The results are presented in Table 12. It appears that most adolescents were aware of the traditional/local foods despite of their residence bias. Generally, *Mangolo/olkitao (makande)* and *machalari* were very common in all the three categories of residence. Other traditional/local foods showed varied results. For example, *loshoro* was common among the rural respondents (96.2%) but less common among the urban (56%) or peri-urban (63.5%). Similarly, *kitaloolo* was common in rural (79.2%) and not in urban (33.3%) or peri-urban (32.8%). Other traditional/local foods with variations included *kitawa/engideri* and *kiburu.*

Table 12: Distribution of respondents who are aware of various traditional/local foods according to their areas of residence

Traditional/local food	Urban (N=84)		Peri-urban(N=64)		Rural (N=130)	
	n	%	n	%	n	%
Kitawa/engideri	30	35.7	32	50.0	95	73.1
Machalari	74	88.1	58	90.6	112	86.2
Kiburu	51	60.7	45	70.3	92	70.8
Loshoro	47	56.0	40	62.5	125	96.2
Kitaloolo	28	33.3	21	32.8	103	79.2
Mangolo/olkitao (Makande)	83	98.8	63	98.4	130	100

4.7 Attitudes of Adolescents on Globalized/Exotic Foods and Traditional/Local Foods

4.7.1 Attitude towards taste

Respondents who had ever eaten the GEF and TLF were asked to indicate their attitude about taste on a three point scale of good/satisfactory, fair or bad/unsatisfactory. The results for comparison of taste attitude of GEF and TLF are in Appendix 3 and Appendix 4. The summary is shown in Table 13 which compares the results for the three residential areas (urban, peri-urban and rural). The majority of respondents reported the attitude

towards taste of the four GEF (chips, *samosa*, kebab and crisps) to be good. Significant differences were found among the varying types of residence at ($P < 0.05$). For all six traditional/local foods assessed, only one food appeared to have significant difference in attitude towards taste according to residence at $P < 0.01$.

Table 13: Summary results of respondents who reported to have good taste attitude for Globalizes/Exotic Foods and Traditional/Local Foods

Variable	Urban (N=84) %	Peri-urban (N=64) %	Rural (N=130) %	Chi-square value	P-value and significance levels
Globalized/exotic food					
Chips	92.1	85.3	79.3	8.282	0.01*
Samosa	86.1	89.2	68.9	15.533	0.004
Kebab	85.9	73.1	67.6	9.564	0.048*
Crisps	90.1	70.2	66.7	15.545	0.004**
Traditional/local food					
Kitaloolo	48.2	50.0	67.2	14.875	0.005**

* = Significant at $P \leq 0.05$, ** = Significant at $P < 0.01$
Source: Extracted from Appendices 3 and 4

4.7.2 Acceptability

Table 14 shows that among globalized/exotic foods, acceptability of adolescents on fried chicken, chocolate, crisps and ice cream were found to be the highest in urban and peri-urban areas compared to the rural. The differences were significant at $P \leq 0.05$. The detailed results are presented in Appendix 5.

Table 14: Acceptability of respondents for Globalized/Exotic Foods

Type of food	Urban (n=84) %	Peri-urban (n=64) %	Rural (n=130) %	Chi-square	P-value & significance levels
Chocolate					
Acceptable	74.3	68.7	55.2	9.757	0.045*
Not sure	18.8	23.9	36.2		
Not acceptable	6.9	7.5	8.6		
Ice cream					
Acceptable	79.6	67.7	59.4	9.696	0.046*
Not sure	16.3	26.2	33		
Not acceptable	4.1	6.2	7.5		
Fried chicken					
Acceptable	89.1	85.3	65.6	24.677	0.000***
Not sure	8.9	14.7	34.4		
Not acceptable	2	0.0	0.0		
Crisps					
Acceptable	78	59.6	50.0	13.74	0.008**
Not sure	18.7	38.6	50.0		
Not acceptable	3.3	1.8	0.0		

*= Significant at $P \leq 0.05$, **= Significant at $P < 0.01$. ***= Significant at $P < 0.001$
Source: Extracted from Appendices 5 and 6

In traditional/local foods, *Mangolo/olkitao (makande)* is the only food reported to have significant difference in acceptability by residence of the respondents living in urban (64.5% and 79.6%) compared with those living in rural (59.5% and 63.1%) and peri-urban (48.5% and 57.2%) areas respectively at $P \leq 0.05$. Results are shown in Table 15.

Table 15: Acceptability of respondents for Traditional/Local Food

Type of food	Urban (N=84) %	Peri-urban (N=64) %	Rural (N=130) %	Chi-square	P-value & significance levels
Mangolo/olkitao (Makande)					
Acceptable	79.6	57.2	63.1	11.821	0.019*
Not sure	19.4	41.8	35.4		
Not acceptable	1.0	0.0	1.5		

*= Significant at $P \leq 0.05$

4.7.3 Perception on health/nutrition benefits of Globalized and Traditional foods

Table 16 summarizes the results of the perceptions as compared in the three study areas. Significant differences at $P \leq 0.05$ were noted for sausage and ice cream, $P \leq 0.01$ for chocolate and crisps and at $P \leq 0.001$ for soda among the globalized foods. More results are shown in Appendix 7.

Table 16: Perception on health/nutrition benefits of Globalized/exotic foods

Type of food	Urban (N=84) %	Peri-urban (N=64) %	Rural (N=130) %	Chi-square	P-value & significance levels
Sausage					
Much health/nutrition benefits	54.9	38	63.5	10.951	0.027*
Little heath/nutrition benefits	40.2	60	28.8		
No health/nutrition benefits	4.9	2.0	7.7		
Chocolate					
Much health/nutrition benefits	26.7	29.9	44	1.314	0.012**
Little heath/nutrition benefits	45.5	43.3	45.7		
No health/nutrition benefits	26.7	26.9	10.3		
Ice cream					
Much health/nutrition benefits	26.5	21.5	37.7	9.814	0.044*
Little heath/nutrition benefits	44.9	47.7	47.2		
No health/nutrition benefits	28.6	30.8	25.1		
Soda					
Much health/nutrition benefits	40.6	23.5	58	27.262	0.000***
Little heath/nutrition benefits	46.5	59.4	38.2		
No health/nutrition benefits	12.9	19.1	3.8		
Crisps					
Much health/nutrition benefits	46.2	35.1	35.3	12.782	0.012**
Little heath/nutrition benefits	45.1	43.9	66.7		
No health/nutrition benefits	8.8	21.1	0		

* = Significant at $P \leq 0.05$, ** = Significant at $P \leq 0.01$, *** = Significant at $P < 0.001$.

For traditional/local foods, more adolescents (73.4%) from urban reported *machalari* to have health/nutrition benefits than those from peri-urban (72.6%) and rural areas (63.6%). *Kiburu* also showed significant difference at $P < 0.01$. Results are shown in Table 17. Appendix 8 presents more results.

Table 17: Perception on health/nutrition benefits of the Traditional/local foods

Type of food	Urban (N=84)	Peri-urban (N=64)	Rural (N=130)	Chi-square	P-value & significance levels
Machalari					
Much health/nutrition benefits	73.4	72.9	63.6	11.878	0.018*
Little heath/nutrition benefits	20.3	27.1	35.5		
No health/nutrition benefits	6.3	0.0	0.9		
Kiburu					
Much health/nutrition benefits	72.0	60.0	50	14.129	0.007**
Little heath/nutrition benefits	14.0	37.5	42.5		
No health/nutrition benefits	14.0	2.5	7.5		

*= Significant at $P \leq 0.05$, **= Significant at $P < 0.01$

4.8 Nutrition Status of Respondents

Four major parameters of anthropometry as used in nutrition assessment namely age, sex, height and weight. From the measurements of respondents' height and weight, Z-scores were calculated as follows:

$$\text{Z-score} = \frac{\text{BMI (calculated)} - \text{BMI(median)}}{\pm 1\text{SD BMI}}$$

BMI-for-age cut off points were used to determine the nutrition status (WHO, 2009) as shown in Table 18.

Table 18: Cut-off points for BMI-for-age Z-score for adolescents

Description	BMI-for-age (Z score)
Severe thinness	<-3SD
Thinness	<-2SD
Normal	-1.99SD to +2SD
Overweight	>+1SD (equivalent to BMI 25 kg/m^2 at 19 years)
Obesity	>+2SD (equivalent to BMI 30 kg/m^2 at 19 years)

Source: WHO growth references 5-19years (2009)

Table 19 summarizes the results of BMI-for-age as assessed using Z-scores of the respondents. The mean Z-score for all respondents was 0.46 ±1.20 SD (data not shown). Accordingly, the majority of respondents (79.9%) have normal nutrition status while 10.5% are over-nourished (overweight or obese) and 9.7% are under-nourished (thin and severely thin).

Table 19: Nutrition status of respondents using BMI-for-age Z-score

Nutrition status category	Frequency	Percent
Severely thin	9	3.2
Thin	18	6.5
Normal	222	79.9
Overweight	23	8.3
Obese	6	2.2
Total	**278**	**100**

4.9 Relationship of Nutrition Status and Variables of Interest

4.9.1 Analysis using chi-square statistics

The respondents' nutrition status was related with different independent variables of interest (Table 20). More male respondents (18.0%) than female (2.1%) were undernourished (thinness or severe thinness). Also more female (15.2%) were found to be in over nutrition category than male respondents (5.3%). The differences were significant at $P < 0.001$. Comparison of the nutrition status of respondents with their area of residence indicated that more respondents who live in urban areas (19.0%) were

overweight/obese compared to those who live in rural areas (1.5%). The differences were significant at $P < 0.001$. There was no significant difference in nutrition status in the various age groups of respondents. Therefore nutrition status of adolescents was significantly different for sex and area of residence ($P < 0.001$) but not with age group.

Table 20: Relationship of respondents' nutrition status and selected independent variables

Variable	Nutrition status category (%)			Chi-square value	P-value & significance levels
	Under-nutrition	Normal	Over-nutrition		
Sex				25.08	0.000***
Female	2.1	82.8	15.2		
Male	18.0	76.7	5.3		
Residence				21.56	0.000***
Urban	7.1	73.8	19.0		
Peri-urban	7.8	75.0	17.2		
Rural	12.3	86.2	1.5		
Age				2.73	NS
11-13	9.6	79.5	10.8		
14-16	11.8	75.5	12.7		
17-19	7.5	84.9	7.5		

NS = Not significant at $P \leq 0.05$, *** significant at $P < 0.001$

4.9.2 Analysis using t-test statistics

Nutrition status of respondents in terms of BMI-for-age Z-scores was compared (using t-test) in different residential areas. Results are summarized in Table 21. BMI-for-age Z-scores of respondents living in rural areas were significantly lower than either urban or peri-urban at $P \leq 0.001$. But there was no statistical significant difference at $P \leq 0.05$ in Z-scores for respondents who live in urban and peri-urban areas. This may be because the two areas are near each other therefore lifestyle and the type of food eaten are almost the same.

Table 21: T-test results for comparison of respondents' BMI-for-age z-scores and area of residence

Compared residence	Mean value	Standard deviation	t - value	df	P - value & significance levels
Urban	2.11	0.50	3.86	212	0.000***
Rural	1.89	0.35			
Urban	2.11	0.50	0.30	146	NS
Peri-urban	2.09	0.49			
Peri-urban	2.09	0.49	3.23	192	0.001**
Rural	1.89	0.35			

NS = No significance at P ≤ 0.05, ** Significance at P = 0.001,
*** Significance at P < 0.001, df = degree of freedom

Further analyses were conducted whereby respondents' BMI-for-age z-scores were related with the number of years lived in each residential area under study. Results are presented in Table 22. Respondents who had lived for more than 5 years in urban or peri-urban areas were having significantly higher z-scores than those who had lived for less years. On the other hand, those who had lived longer in rural areas were having lower z-scores than those who had lived for shorter period (P<0.001). It appears that longer stays in urban or peri-urban are associated with higher z-scores while for the rural area is the vice versa.

Table 22: T - test results for comparison of respondents' BMI-for-age z-scores and years resided in three different areas

Residence	Compared period in years	Mean BMI (Z-score)	Std deviation	t - value	df	P - value
Urban	>5 years	2.09	0.49	2.39	276	0.017**
	5 years or less	1.96	0.41			
Rural	>5 years	1.90	0.37	-3.53	276	0.000***
	5 years or less	2.08	0.48			
Peri-urban	>5 years	2.13	0.46	2.45	276	0.015**
	5 years or less	1.97	0.44			

** = Significance at P ≤ 0.01, *** = Significance at P < 0.001, df = degree of freedom

4.10 Nutrition Knowledge of Adolescents

Respondents were given a nutrition knowledge test and their scores were categorized into well, fair and bad/fail performance. The results are presented in Table 23. Majority of respondents (47.1%) performed fairly, while 29.9% performed well and those who performed badly were 23%.

Table 23: Nutrition knowledge scores of respondents

Knowledge test performance	Frequency	Percent
Well performed	83	29.9
Fair	131	47.1
Bad/fail	64	23.0
Total	**278**	**100**

Table 24 summarizes the results of testing for relationship of the respondents' nutrition knowledge with different variables of interest. Majority of respondents who were in secondary school (61.6%) performed well compared to only 28.9% who were in primary school. The difference was statistically significant at $P < 0.01$.

The table also shows that respondents of varying age groups and education levels of the mother were also statistically significant different in their nutrition knowledge at $P < 0.05$. However, differences in respondents' sex, area of residence and education level of the father were found to have no significant difference with the nutrition knowledge scores at $P \leq 0.05$.

Table 24: Comparison of respondents' nutrition knowledge with different variables

Variable	Nutrition knowledge categories			df	Chi-square value	P-value and significance
	Well performed (N=83) (%)	Fair (N=131) (%)	Bad/fail (N=64) (%)			
Education level of respondents						
In primary school	28.9	16.7	54.5	1	3.817	0.009**
In secondary school	61.6	14.6	23.7			
Sex						
Female	29.0	46.9	24.1	1	0.481	0.883^{NS}
Male	30.8	47.4	21.8			
Residence						
Urban	26.2	57.1	16.7	2	10.87	0.096^{NS}
Peri-urban	34.4	46.9	18.8			
Rural	30.0	40.8	29.2			
Age						
11-13	24.1	62.7	13.3	2	11.984	0.010*
14-16	34.3	37.3	28.4			
17-19	30.1	44.1	25.8			
Education level of the mother						
Primary only or None	38.6	41.2	59.4	3	14.56	0.004*
Secondary and Certificate	37.3	20.6	23.4			
Diploma and Degrees	8.4	19.8	7.8			
Education level of the father						
Primary Only or None	19.3	22.9	39.1	3	18.83	0.063^{NS}
Secondary and Certificate	32.5	22.1	25.0			
Diploma and Degrees	19.3	25.2	15.6			

NS = Not significant at P ≤ 0.05, * = significant at P < 0.05, ** = Significant at P≤ 0.01

CHAPTER FIVE

5.0 DISCUSSION

5.1Overview

The main objective of the study was to determine factors that influence food choice and Body Mass Index among rural and urban adolescents in Arusha Region. The specific objectives were to determine the socio-economic and demographic factors that influence food choices among rural and urban adolescents with regard to globalized/exotic and traditional/local foods; to compare the awareness and attitude of rural and urban adolescents for globalized/exotic foods and traditional/local foods; to determine the relationship between Body Mass Index (es) of adolescents and their socio-demographic and environmental characteristics and to determine the association between levels of nutrition knowledge of adolescents and their socio-demographic characteristics.

5.2 Determinants of Adolescents' Food Choices

5.2.1 Socio-economic and demographic factors

The possibility of having access to a certain type of food can be determined by the socioeconomic status of the parents/guardian(s). For example, Neumark *et al.* (2003) reported that frequency of family meals was positively associated with socioeconomic status. Parents are the ones who provide food and initiate early feeding practices to their children. The level of education of the parents/guardians (Temple *et al.*, 2005) helps in understanding and may have influence on guiding their children on choosing what to eat. However, the higher the education level, the higher the income and wage potential.

In this study it was observed that, majority of respondents usually eat more of TLF (Table 6, 7 & 8) than types of food from GEF. Since all respondents in this study live with their

parents/guardians of whom they depend on, it could have been difficult for them to usually eat what they preferred instead of what is being offered. Longbottom *et al.* (2002) reported that parental control on adolescents' food choice can be manifested in many ways, one of them as food providers which is dictated partly by income and social class. Bassett *et al.* (2007) reported on the parents and especially mothers' control over adolescents eating by controlling household food supplies. But sometimes parents do respond to their teenagers' likes and dislikes, and can purchase and serve food they know their children will eat more often than refuse.

5.2.2 Nutrition/health benefits

Adolescents in this study have two major reasons for choosing to eat the most preferred foods; these are nutrition/health benefit (40.9%) and taste of the food (39.2%). The assumption could be that, adolescents believe their food choices are the healthier options. For those who have knowledge on nutrition they try to practice by preferring healthier foods. This finding differs from what have been reported by French *et al.* (2001) that health concerns are overall not an important motivator of food choices among adolescents, but also food choices are healthier among those adolescents who are motivated by concern about their health.

5.2.3 Taste of the food

Taste of the food is another factor for adolescents in this study to choose the food they preferred most. The reason for taste has also been reported by Noble *et al.* (2000) that, although dietary trends are affected by behavioural, socio-cultural, and economic variables, diet choices are most often guided by how food tastes, and agreed that taste preference is the main influence of food selection among adolescents. Taste of food has

also been reported to influence food choice of adolescents in other studies (French *et al.*, 1999; Neumark-Sztainer, 1999; Norton *et al.*, 2000).

Respondents in this study had mentioned other factors which influence their food choice as; low cost of the food, parents/guardians advice, attractive advertisements of the food, less preparation time and advice by friends or peer pressure (Table 9). Parental/guardian advices had been reported by Bassett *et al.* (2007) that, adolescents hear what their mothers (primarily) tell them about healthy eating and even change their food choices. Adults have more exposure to different foods and healthy eating through various ways of communications than adolescents. It is therefore, easier for them to advise their children on healthier options. Attractive advertisement is another influencing factor mentioned by 3.2% of respondents. Advertisements are believed by manufacturers and marketers to be highly effective in selling particular products and have an influence on food choices of children and adolescents. This has also been noted by Shepherd (1996). Very few respondents (2.2%) reported time and convenience to have influence on their food choices. This is far different from the observations by French *et al.* (2001). This study found 1.1% of the adolescents to have been influenced by friends. This finding however differs from a study by Contento *et al.* (2006) where many adolescents admitted that it is easier to be influenced by their friends when they eat with them, and were afraid to be laughed at when they chose a healthier option.

5.3 Awareness about Globalized/Exotic (GEF) and Traditional/Local Foods (TLF)

5.3.1 Awareness of globalized/exotic foods

Adolescents in urban area are more aware of most types of GEF compared to those who live in rural areas (Table 11). This is not surprising because, GEF are commonly available in urban than in rural areas. Another reason could be that, adolescents who live in urban

areas have more access to different media which expose them to some commercial adverts concerning various types of foods. Methods of preparation and fast food chains (common in urban areas) could be other reasons for other types of GEF not to be known in the rural areas. For example the owners of western food chains/outlets have control of the menu and mode of preparing these foods such as pizzas and hamburgers.

5.3.2 Awareness of traditional/local foods

Traditional/local foods are the type of foods widely consumed by many families in the study area regardless of where they live, it be urban or rural areas. The main ingredients are readily available and many of them are being produced locally. Therefore it's not surprising that almost all adolescents in urban and rural areas (Table 12) were aware of TLF because they are the kinds of food usually prepared for the family meals.

5.4 Attitudes towards Globalized/Exotic Foods (GEF) and Traditional/Local Foods (TLF)

5.4.1 Taste of GEF and TLF

In this study taste of the food appeared to be an important factor towards food consumption for adolescents living in Arusha and Arumeru districts (Table 9). Grimm *et al.* (2004) and Norton *et al.* (2000) had similar results in their studies. The taste of *kitawa/engideri, machalari, loshoro, kitaloolo* was reported to be favoured more by rural than peri-urban and urban respondents (Appendix 4). The reason could be that, rural respondents eat more frequently those types of food compared to those in urban areas ($P<0.001$ for *loshoro* and *kitaloolo*). GEF used in this study have high content of sugar, salt and/or fat. Majority of respondents (Table 13 and Appendix 3) reported the taste of almost all GEF to be good/satisfactory/enjoyable despite of whether they live in urban, peri-urban or rural areas. This can be explained that, the kinds of food with those

ingredients are the ones with taste that pleases most adolescents. Tuorila and Pangborn (1988) reported enjoyment as the predominant predictor towards different fat containing foods.

5.4.2 Nutrition/health benefits

Adolescents from urban and peri-urban areas reported that, many types of GEF have no health/nutrition benefits but those from rural areas reported the opposite (Table 16). Roininen (2001) and Rappaport *et al.* (1992) reported the reasons for person to eat a healthy diet may be different among individuals due to different reasons. Those reasons can be for prevention of chronic diseases, to reduce weight or for ideological reasons. Adolescents from urban and peri-urban areas have more exposure to radio and TV from which their use have increased recently due to the results of urbanization in Tanzania (Kinabo, 2005) than rural ones. The radio and TV stations in Tanzania broadcast various nutrition and healthy eating programmes. But it is also true that, there are some difficulties on the responsible authorities to distribute enough information (including health and nutrition) to the remote areas due to bad infrastructure in most remote areas of Tanzania.

Most respondents in both areas agreed that all foods from TLF have high healthy/nutrition benefits (Table 17). The reason could be the methods of preparations of most TLF which is moist methods. Stewing, steaming and boiling are good for nutrients preservation (although there is exception on cooking time especially for boiling) (Kinton *et al.*, 2007) compared to the one used in preparing most of the GEF (frying and the use of high fat).

5.5 Factors that Affect Nutrition Status of Adolescents

Nutrition can be defined as the process of nourishing or being nourished, especially the process by which a living organism assimilates food nutrients and uses it for growth and

for replacement of tissues (by online medical dictionary). The increase/decrease in the amount of or change in the type of food consumed puts adolescents at a greater risk of becoming either overweight or underweight. Malnutrition in adolescence includes under nutrition as well as over nutrition. In this study under nutrition (thinness and severe thinness) is defined as respondents having less than -2 BMI-for-age Z-score while, over nutrition (overweight and obese) as a respondent having more than +1 BMI-for-age Z-score (WHO, 2009).

5.5.1 Parents/guardians education level

In this study education level of the mothers is shown to have a significant influence ($P < 0.05$) on nutritional status of adolescents. However the education level of the fathers did not. Mothers with only primary school education and those without formal education had more undernourished adolescents. Veiga *et al.* (2006) reported that low education level among mothers was associated with increased nutritional risk of adolescents. Abudayya *et al.* (2007) noted that girls of mothers with low education had a significantly higher prevalence of overweight than girls of mothers with higher education. The education level of the mother sometimes can be chosen as an indicator for nutrition knowledge level. This is because a positive relationship exists between education level of the mother and the child's nutritional status as demonstrated by Serra-Majerm, in 2002. Nutrition knowledge regarding individual dietary needs and appropriate food are things that need to be learned. Nutrition knowledge has always acted as a pathway through which education level of mother influences children's diets. Tanzania NBS (2000) has shown education attainment among other issues to have strong effect on health and nutrition.

5.5.2 Socioeconomic level of the parents/guardians

In this study, no over nourished (overweight and obese) adolescents were found in the category of poor family. However, there were more adolescents who are undernourished in this socioeconomic category. This could be explained by the fact that, adolescents with low socioeconomic status do not always have access to food (especially of the right kind) because the family lacks access to or don't have enough food. It was observed by Longbottom *et al.* (2002) in South Africa that underweight rates were 8 times higher among children from the poorest households compared with those from the richest households. In India the prevalence of underweight adolescents was greatest among lower than higher economic status groups (Patterson *et al.*, 1998). Similar observation was reported in Mexico by Monge-Rojas *et al.* in 2002.

5.5.3 Sex

In this study, more females (15.2%) were found to be over nourished than male adolescents (5.3%. Dapi *et al.* (2007) it is reported that girls are in favour to be fat or a little bit fat due to cultural perception of woman beauty. A similar finding was reported by a study in Mexico of children aged 10 to 17 years (Fernald *et al.*, 2007) and from the survey in North Gaza Strip by Abudayya *et al.* (2007). The other reason for female to have higher BMI-for-age than male adolescents could be the more access to food females have during food preparations. Also girls in our African community help in light household chores while boys are trained to do the heavy work. The increasing trend of overweight and obesity for the younger generations in the world is a threat for their health during adulthood as obesity has been shown to be associated with increased risks of cardiovascular diseases and diabetes if found in such ages.

5.5.4 Residence of adolescents

The nutrition status of an individual can be affected by various factors, among which are environmental factors. In this study residence (rural and urban) was found to have significant influence on nutrition status. More respondents (19%) from urban areas were found to be over nourished compared to those in peri-urban (17.2%) and rural (1.5%) areas. This could be explained by more physical activities (walking long distances, manual work like fetching water, fire woods, field work, etc) done by respondents in rural than in urban areas, followed by intake of food which does not meet their energy expenditure. In addition, respondents in urban area are used to riding in vehicles most often and are more exposed to sedentary lifestyle, increased television viewing and the use of more labour saving equipments, which tend to favours overweight. Van de Poel *et al.* (2008) noted that the differences between nutritional status of urban and rural populations in developing countries relate primarily to improved socioeconomic status.

The quality of the food intake can also contribute to under nutrition observed in rural areas and over nutrition in urban areas. Johnson *et al.* (1994) suggested that urbanization is one of the most pertinent factors associated with the quality of dietary intake. Similar results have been reported by Clifford *et al.* (2006) in a survey conducted in South Africa. In another study in United State, rural adolescents had poorer quality of dietary intake than urban and suburban adolescents (Goodwin *et al.*, 2005). One possible explanation for the lower quality of dietary intake of rural adolescents may be related to the issue of food availability. In urban areas there are more varieties of food in the markets from various sources and also industrial processed ones (containing added nutrients) whereas, in rural areas adolescents consume natural foods which contain less calories.

5.6 Relationship between Nutrition Knowledge and Demographic Characteristics

5.6.1 Education level of respondent

In this study a significant difference ($P < 0.01$) was found between nutrition knowledge and education level of adolescents. More adolescents (61.6%) in secondary schools performed well compared with those in primary school (28.9%). This can be explained by the assumption that, more years of school had more exposure to different levels of knowledge with no exception for nutrition. Beavers *et al.* (2009) noted that education level was the predominant variable influencing nutrition knowledge.

5.6.2 Education level of the mother

In this study, the education level of the mother was found to have influence on nutrition knowledge of the adolescents. More adolescents (59.4%) of mothers with primary or no formal education had poor performance compare to those of mothers who had attained diplomas and degrees (7.8%). This can be explained by the fact that, the knowledge that the mother possesses is the one that she can easily pass to her children. Higher education levels are also thought to be related to increased awareness and practices of healthy behaviours (Caballero, 2001; Goodwin *et al.*, 2006).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Based on the findings of this study, the following conclusions can be made:

i) The determinants of food choices both in rural and in urban setting include the nutrition and/or healthy benefits, the others include taste, advices by parents/guardians, cost and food advertisement.

ii) With regard to BMI, the adolescents in rural areas were found to have a lower BMI-for-age compared with those who live in urban and peri-urban areas. In addition, sex was found to have significant influence on the nutrition status.

iii) The socioeconomic status of the family and education level of the mother was found also to have influence on the nutrition status of adolescents.

iv) More adolescents in urban areas are aware and have positive attitude and practice towards globalized/exotic food than traditional foods. The rural respondents are more aware and have more positive attitude and practice towards traditional local foods than respondents in urban areas.

6.2 Recommendations

In view of the findings of this study, the following recommendations are made:

i) To provide adolescents with relevant nutrition education through different means of communication to reduce the observed levels of malnutrition.

ii) To emphasize the provision of nutrition education in schools to be one among the mandatory subject and not an option/elective subject because many people are not aware of the importance of healthy eating in their daily life

iii) To observe regulations that guides the advertisement of foods which may have adverse effects.

iv) To establish a mechanism to monitor and implement of regulations for marketing of foods and beverages directed at children and adolescents in order to provide them with accurate and clear information that will enable them make healthier food choices.

REFERENCE

Abudayya, A., Thoresen, M., Abed, Y. and Holmboe-Ottesen, G. (2007). Overweight, stunting, and anemia are public health problems among low socioeconomic groups in school adolescents (12-15 years) in the North Gaza Strip. *Nutrition Research* 27:762-71.

Administrative Committee on Coordination /Subcommittee on Nutrition (2000). *World Nutrition Situation Report*. United Nations, Geneva. 15pp.

Amorim-Cruz, J. A. (2000). Dietary habits and nutritional status in adolescents over Europe: Southern Europe. *European Journal of Clinical Nutrition* 54:29-35.

Aranceta, J., Pérez-Rodrigo, C., Ribas, L. and Serra-Majem, L. (2003). Sociodemographic and lifestyle determinants of food patterns in Spanish children and adolescents. *European Journal of Clinical Nutrition* 57 (1): 40–44.

Bassett, R., Chapman G. E, Brenda L. and Beagan B. L. (2007). Autonomy and control: The co-construction of adolescent food choice. University of British Columbia.

Beavers, I., Kelley, M. and Flenner, J. (1982). Nutrition Knowledge, Attitudes, and Food Purchasing Practices of Parents. *Journal of Family and Consumer Sciences Research* 11: 134–142.

Bloom, D. (2003). Adolescent obesity and factors such as nutrition knowledge and practices influencing the development thereof (unpublished thesis). University of Cape, Town Cape Town

Bowman, S. A. (2002). Beverage choices of young females: changes and impact on nutrient intakes. *Journal of American Dietetic Association* 102:1234 - 9.

Byrnes, J. P. (2003). Cognitive development during adolescence. *In Blackwell Handbook of Adolescence (Edited by Adams, G.R. and Berzonsky, M. D.)*, Blackwell, Oxford. pp. 227–246.

Caballero B. (2001). Early nutrition and risk of disease in the adult, *Public Health Nutrition* 4:1335– 6.

Clifford, S., Glenda, D., Barnett, J., Orla, T. and Karen, T. (2006). Adolescents' views of food and eating: Identifying barriers to healthy eating. *Journal of Adolescent* 30:417–434

Contento, I. R., Williams, S. S., Michela, J. L., and Franklin, A. B. (2006). Understanding the food choice process of adolescents in the context of family and friends. *Journal of Adolescent Health* 38: 575–582.

de Onis, M., Dasgupta, P., Saha, S., Sengupta, D. and Blossner, M. (2001). The National Center for Health Statistics reference and the growth of Indian adolescent boys. *American Journal of Clinical Nutrition* 74:248-53.

Fernald, L. C. and Neufeld, L. M. (2007). Overweight with concurrent stunting in very young children from rural Mexico: prevalence and associated factors. *European Journal Clinical Nutrition* 61:623-32.

Fisher, A., Liang, J. E. and Townsond, J. W. (Eds.) (1991). *Handbook for Family Operations Research and Design.* Population Council, USA. Chapter 8 pp 43-46

French, S. A., Story, M., Neumark-Sztainer, D., Fulkerson, J. A. and Hannan, P. (2001). Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioural and psychosocial variables. *International Journal of Obesity* 25. 1823–1833 ftp://ftp.fao.org/es/esn/nutrition/urban/esaesn conf. pdf.Accessed 18th April 2008.

Funke, O. M. and Ajayi, O. A. (2007). Determinants of Food Choices of Adolescents in South-Western Nigeria. *African Journal of Food, Agriculture, Nutrition and Development* 7(6): 1684-5374.

Gibson, E. L., Wardle, J. and Watts, C. J. (1998). Fruit and vegetables consumption, nutritional knowledge and beliefs in mothers and children. *Appetite* 31:205- 28.

Gleason, P. Suitor C. (January 2001). Children's diets in the mid-1990s: dietary intake and its relationship with school meal participation. [http://www.fns.usda.gov/oane] site visited on 20/9/ 2007.

Goodwin, D. K., Knol L. K., Eddy J. M., Fitzhugh E. C., Kendrick, O. and Donohue, R. E. (2006). Sociodemographic correlates of overall quality of dietary intake of US adolescents. *Nutrition Research* 26:105-10.

Grimm, G., Harnack L., Story, M. (2004). Factors associated with soft drink consumption in school-aged children. *Journal American Diet Association* 104:1244-1249.

Hackett, A. F., Kirby, S. and Howie, M. A. (1997). National Survey of the diet of Children. Living in Urban area of the United Kingdom. *Journal of Human Nutrition and Dietetics* 10: 37-51

Hannon, P. A., Bowen, D. J., Moinpour, C. M. and McLerran, D. F. (2003). Correlations in perceived food use between the family food preparer and their spouses and children. *Appetite* 40:77-83.

Jahns, L., Siega-Riz, A. M and Popkin, B. M. (2001). The increasing prevalence of snacking among US children from 1977 to 1996. *Journal of Paediatric* 138(4):493-498.

Johnston, P. K. and Haddad, E. H. (1996). Vegetarian and other dietary practices. Adolescent Nutrition– Assessment and management. New York: Chapman & Hall Inc. 57-88.

Kant, A. K. (2003). Reported consumption of low-nutrient density foods by American children and Adolescents, Nutritional and health correlates, NHANES III, 1988 to 1994. Archive of Paediatric and Adolescence Medicine 57:789–96

Kavishe, F. P. (1993). Nutrition Relevant Actions in Tanxania. Tanzania Food and Nutrition Centre, 20th Annivesary 1973 – 1993.

Kinabo, J. (2005). Impact of globalization on food consumption, health and nutrition in urban areas: a case study of Dar es Salaam, United Republic of Tanzania.

Kinton, R. and Ceseran, V. (2007). *The Theory of Catering.* British Library, London. 543pp.

Klimis-Zacas, D. J., Kalea, A. Z., Yannakoulia, M., Matalas, A., Vassilakou T., Papoutsakis-Tsarouhas, C., Yiannakouris, N., Polychronopoulos E. and Passos M. (2007). Dietary intakes of Greek urban adolescents do not meet the recommendations. *Nutrition Research* 27:18–26.

Lake, A. A., Rugg-Gunn., A. J., Hyland, R. M., Wood, C. E., Mathers, J. C. and Adamson, A. J. (2004). Longitudinal dietary change from adolescence to adulthood: perceptions, attributions and evidence. *Appetite.42: 255- 63.*

Livingstone, S. and Helsper, E. (2004). Advertising Foods to Children: Understanding Promotion in the Context of Children's Daily Lives: A Review of the Literature Prepared for the Research Department of the Office of Communications. London.

Lobstein, T. J., James, W. P. and Cole, T. J. (2003). Increasing levels of excess weight among children in England. *International Journal of Obesity Related Metabolic Disorders* 27:1136-1138.

Longbottom, P. J., Wrieden, W. L. and Pinet, C. M. (2002), Is there a relationship between the food intakes of Scottish 5 - 8 year-olds and those of their mothers? *Journal of Human Nutrition and Dietetics* 15:271- 9.

Mahan, L. K., Escott-Stump, S. and Krause, M. V. (Eds.) (2004). Krause's food, nutrition & diet therapy. Philadelphia: Saunders World Bank.

McArthur. L., Pen M. and Holbert, D. (2001). Effects of socioeconomic status on the obesity knowledge of adolescents from six Latin American cities. *International Journal of Obesity* 25: 1262 – 1268.

Munoz, K. A., Krebs-Smith, S. M., Ballard-Barbash, R. and Cleveland, L. E. (1997). Food intakes of US children compared with recommendations. *Paediatrics* 3:323 - 9.

Nelson, C. S., Wissow, L. S. and Cheng, T. L. (2003). Effectiveness of anticipatory guidance. *Paediatrics* 15:630-635.

Neumark-Sztainer, D., Mstat, P. J., Story, M., Croll, J. and Perry C. (2003). Family meal patterns: associations with socio demographic characteristics and improved dietary intake among adolescents. *Journal of American Dietetic Association* 103:317- 22.

Neumark-Sztainer, D., Story, M., Perry, C and Casey, M. A. (1999). Factors influencing food choices of adolescents. *Journal of American Diet Association* 99(8): 929-37.

Neumark-Sztainer, D., Wall, M., Story, M. and Perry, C. (2003). Correlates of unhealthy weight control behaviours among adolescents: Implications for prevention programs. *Health Psychology* 22:88-98.

Noble, C., Corney, M., Eves, A., Kipp, M. and Lumbers, M. (2003). Food Choices and Secondary School Meals: the nutritional implications of choices based on preference rather than perceived healthiness. *International Journal of Hospital Management* 22:197-215.

Oliveira, M. N., Almada C., Eduardo, H. and Eliane de Abreu. (2000). Comparison of the anthropometric assessment of adolescents of privileged and unprivileged social and economic levels. *Nutrition Research* 20: 10:1423-1436.

Patterson, T. L., Rupp, J. W., Sallies, J. F., Atkins, C. J. and Nader, R. R. (1988). Aggregation of dietary calories, fats, and sodium in Mexican-American and Anglo families. *American Journal of Preventive Medicine* 4:75 - 82.

Popkin, B. M. (2001). Nutrition in transition: thc changing global nutrition challenge. *Asia Pacific Journal of Clinical Nutrition.* 10:13-8.

Prentice, A. M. (2006). The emerging epidemic of obesity in developing countries. *International Journal of Epidemiology* 35:93–99.

Rappaport. L., Peters, G., Huff-Corzine, L. and Downey, R. (1992). Reasons for eating: an exploratory cognitive analysis. *Ecological food Nutrition.* 28: 171–189.

Rhonda, S., Sebastian, M. A., Linda, E., Cleveland, M. S. and Goldman, M. A. (2008). Effect of Snacking Frequency on Adolescents' Dietary Intakes and Meeting National Recommendations. *Journal of Adolescent Health* 42: 503–511.

Roininen, K. (2001). Evaluation of food choice behaviour: Development and validation of Health and taste Attitude Scales. Dissertation for Award of MSc Degree at University of Helsinki, Helsinki, Finland, 55pp.

Rolland-Cachera, M., Belliste, F., Deheeger, M. (2000). Nutritional status and food intake in adolescents living in Western Europe. *European Journal of Clinical Nutrition* 54:S41-6.

Schneider, D. (2000). International trends in adolescent nutrition. *Society of Scientific Medicine* 51:955-67.

Serra-Majerm, L., Ribas, L., Pe'rez-Rodrigo, C., Garcia-Closa,s R., Pen˜a- Quintana L. and Aranceta, J. (2002). Determinants of nutrient intake among children and adolescents: results from the Enkid Study. *Nutrition Metabolism* 46:31 - 8.

Shepherd, R., and Dennison, C. M. (1996). Influences on adolescent food choice

Stang, J. and Story, M. (2005). Guidelines for Adolescent Nutrition Services. [http://www.epi.umn.edu/let/pubs/adol_book.htm] site visited on 16/8/2008

Story, M., Nuemark, D. and French S. (2002). Individual and environmental influences on adolescent eating behaviors. *Journal of American Dietetic Association* 102(3): 40-51.

Story, M. and Resnick, M. (1986). Adolescent's views on food and nutrition. *Journal of Nutrition Education* 18:188-92.

Temple, N. J., Steyn, N. P., Myburgh, N. G., Johanna, H. and Nel, J. H. (2006). Food items consumed by students attending schools in different socioeconomic areas in Cape Town, South Africa. *Nutrition Bulletin* 22; 252–258.

Tuorila, H. and Pangborn, R. M. (1988). Prediction of reported consumption of selected fat-containing foods. *Appetite 11: 81–95.*

United Republic of Tanzania (2002). Population and Housing Census. Accessed April 24th, 2008.

Veiga, G., Simone, A. and Sichieri, R. (2004). Trends in Overweight Among Adolescents Living in the Poorest and Richest Regions of Brazil. *American Journal of Public Health*: 94, No. 9.

Veiga, G. V. and Sichieri, R. (2006). Correlation in food intake between parents and adolescents depends on socioeconomic level. *Nutrition Research* 26: 517– 523.

Videon, T. M. and Manning, C. K. (2003). Influences on adolescent eating: their importance of family meals. *Journal of Adolescents Health*;32:365- 73.

WHO growth references 5-19 years 2009.

WHO. (2005). Nutrition in adolescence—issues and challenges for the health sector [whqlibdoc.who.int/publication/2005/ 9241593660-eng.pdf] site visited 15/1/2010.

Wyshak, G. (2000). Teenage girls, carbonated beverage consumption, and bone fractures. *Archive of Pediatric Adolescents Medicine* 154(6):610-613.

Yannakoulia, M., Karayiannis, D., Terzidou, M., Kokkevi, A. and Sidossis, L. S. (2004). Nutrition related habits of Greek adolescents. *European Journal of Clinical Nutrition* 58:580 - 6.

Yannakoulia, M., Matalas, A. L., Yiannakouris, N., Papoutsakis, C., Passos, M. and Klimis-Zacas, D. (2005). Disordered eating attitudes: an emerging health problem among Mediterranean adolescents. *Eating and Weight Disorders* 9:126 - 33.

APPENDICES

Appendix 1: Nutrition knowledge test

I) Indicate whether True/False **(1 mark each)**

a) One of the major determinants of a person nutrition status is socioeconomic status T/F

b) Different methods of cooking has no effects on the nutritional content of food T/F

c) A person's body weight and height cannot be used to determine his/ her nutrition status T/F

d) The good nutrition status of an individual can predispose him/her to diseases T/F

e) Vitamins and minerals elements are sometimes known as protective nutrient T/F

f) One function of protein in our bodies is to repair worn out cells and tissues T/F

g) Adolescence period is the time when individual nutrients requirements increases to support the rapid growth T/F

h) Foods rich in fats, salt and sugar are very good for the health of an individual T/F

i) It is advised to eat varieties of food from different sources of food T/F

j) A person who has more weight than the one recommended for his/her age is considered to have a good health T/F

II) Among the following, tick only the mineral elements which are most important in our bodies **(1 mark for each correct tick)**

- Phosphorous
- Vitamins
- Iron

- Calcium
- Carbohydrates
- Iodine
- Enzyme
- Hormone

III) What is the good dietary source of the following nutrients (name only two sources):

- Protein
- Iron
- Vitamin A

Appendix 2: Questionnaire

SOKOINE UNIVERSITY OF AGRICULTURE

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

Good morning/afternoon

My name is ..... from Sokoine University of Agriculture Morogoro, I am doing a research on the Factors that determine Food Choices of rural and urban Adolescents in Arusha and Arumeru districts.

You have been selected randomly among others from which data will be collected. I assure you that the information provided during the interview will be used for the purpose of this study only.

I kindly ask you to cooperate answering the questions below.

1. SOCIO-ECONOMIC AND DEMOGRAPHIC INFORMATION

i) Full name: ..... Qnr no:.....

Sex: 1. □ Female 2. □ Male

ii) Date of birth (dd/mm/yy): .....

iii) Type of respondent: (put a tick)

□ In School

Name of school.....

□ Completed school

iv) Level of education

1. Completed primary/secondary school
2. Still in school (Class...../ Form.....)

v) Residence: Ward.....

Area: 1. □ Urban 2. □Peri-urban 3. □Rural

vi) For the past 10 years, how many years did u live in the following areas?

Urban..... Peri-urban..... Rural.....

vii) With whom do you live with now?

1. □ Both parents
2. □ Single parent
3. □ Guardian(s)

viii) Level of education of:

Father ..... Mother..... Guardian(s).....

ix) How many members of your family eat together (share the same pot)? .....

x) Economic level of the family (From teachers and urban street/village leaders):

1. □ Well-to-do family (rich family)
2. □ Moderately rich family
3. □ Normal family
4. □ Poor family

2. FOOD RELATED BEHAVIOUR INFORMATION

i) What do you usually eat for:

a. Breakfast .....
b. Lunch .....
c. Dinner .....

If not give reason.....

ii) What would you prefer/like to eat for:-

a. Breakfast .....
b. Lunch .....
c. Dinner .....

If not, give reasons.....

iii) What are the reasons for you to choose to eat the type of food you prefer?(rank from the mostly preferred)

- □ Low cost
- □ Attractive advertisement
- □ Enjoy the taste
- □ Serves time of preparation
- □ My friends also likes to eat/advice from friends
- □ Parents/Guardians advice
- □ Health/ nutrition benefits
- □ Other.....

iv) What foods do you eat as:

a) **Full meals:** .....

How do you obtain them? (sources)

1. □ Home made
2. □ Bought from eating places/shops

b) **Snacks:** .....

How do you obtain them? (sources)

1. □ Home made
2. □ Bought from eating places/shops

3. (a) AWARENESS AND ATTITUDE INFORMATION

(i) **Answer the following questions in each food listed: (Put a tick and use the key below the table)**

	Group/type of food	Ever heard or see?		Ever eat or taste?		Taste	Acceptability	Nutrition/health benefits
	Globalized/exotic food	**Yes**	**No**	**Yes**	**No**			
1.	Hamburger							
2.	Sausage							
3.	Chips							
4.	Pizza							
5.	Chocolate							
6.	Ice cream							
7.	Soda(s)							
8.	Samosa							
9.	Egg chop							
10.	Cake							
11.	Nuts							
12.	Fried chicken							
13.	Kebab							
14.	Crisps							
	Traditional/Local food							
15.	*Kitawa/Engideri*							
16.	*Machalari*							
17.	*Kiburu*							
18.	*Loshoro*							
19.	*Kitaloolo*							
20.	*Makande*							

Key:

1. **Taste:**
   a) Good/enjoyable/pleasant
   b) Somehow good
   c) Bad/unpleasant/not enjoyable

2. **Acceptability:**
   a) Strongly acceptable
   b) Not sure
   c) Not acceptable

3. **Nutrition/Health benefits**
   a) Very beneficial
   b) Little beneficial
   c) Not at all beneficial

4. ANTHROPOMETRIC MEASUREMENT

Name	Sex	Height(cm)	Weight(kg)

Appendix 3: Results of attitude towards taste of the globalized/exotic foods according to residence of respondent

Type of food	Urban (%)	Peri-urban (%)	Rural (%)	Chi-square	P-value
Hamburger					
Good/satisfactory/enjoyable	80.0	61.9	100	4	
Fairly good	20.0	33.3	0	4.21	0.378
Bad/not enjoyable/unsatisfactory	0	4.8	0		
Sausage					
Good/satisfactory/enjoyable	72	75	75		
Fairly good	26.8	20	25	1.719	0.787
Bad/not enjoyable/unsatisfactory	1.2	2.0	0		
Chips					
Good/satisfactory/enjoyable	92.1	85.3	79.3		
Fairly good	7.9	14.7	21.7	8.282	0.01
Pizza					
Good/satisfactory/enjoyable	72.7	56.5	100		
Fairly good	22.7	30.4	0	3.416	0.491
Bad/not enjoyable/unsatisfactory	4.5	13	0		
Chocolate					
Good/satisfactory/enjoyable	84.2	74.6	72.4	7.65	0.105
Fairly good	15.8	23.9	27.6		
Bad/not enjoyable/unsatisfactory	0	1.5	0		
Ice cream					
Good/satisfactory/enjoyable	86.7	81.5	73.6		
Fairly good	13.3	16.9	25.6	6.640	0.156
Bad/not enjoyable/unsatisfactory	0	1.5	0.9		
Soda					
Good/satisfactory/enjoyable	85.1	86.1	87.0		
Fairly good	14.9	11.8	12.2	1.784	0.758
Bad/not enjoyable/unsatisfactory	0	1.5	0.8		
Samosa				15.533	0.004
Good/satisfactory/enjoyable	86.1	89.2	68.9		
Fairly good	13.9	10.8	30.3		
Bad/not enjoyable/unsatisfactory	0	0	0.8		

Type of food	Urban (%)	Peri-urban (%)	Rural (%)	Chi-square	P-value
Cake					
Good/satisfactory/enjoyable	89.1	86.8	86.3		
Fairly good	9.9	13.2	13.7	2.766	0.598
Bad/not enjoyable/unsatisfactory	1	0	0		
Egg chop					
Good/satisfactory/enjoyable	84.1	83.3	75.9		
Fairly good	11.6	16.7	24.2	5.197	0.268
Bad/not enjoyable/unsatisfactory	4.3	0	0		
Fried chicken					
Good/satisfactory/enjoyable	92.9	95.2	92.4		
Fairly good	7.1	4.8	7.2	0.413	0.814
Kebab					
Good/satisfactory/enjoyable	85.9	73.1	67.6	9.564	0.048
Fairly good	11.8	21.2	32.4		
Bad/not enjoyable/unsatisfactory	2.4	5.8	0		
Crisps				15.545	0.004
Good/satisfactory/enjoyable	90.1	70.2	66.7	15.545	0.004
Fairly good	9.9	26.3	33.3		
Bad/not enjoyable/unsatisfactory	0	3.5	0		

Appendix 4: Results of attitude towards taste of the traditional/local foods according to residence of respondent

Type of food	Urban	Peri-urban	Rural	Chi-square	P-value
Kitawa/kideri					
Good/satisfactory/enjoyable	59.6	70.8	72.4		
Fairly good	27.6	25	37.1	3.007	0.557
Bad/not enjoyable/unsatisfactory	0	4.2	3.4		
Machalari					
Good/satisfactory/enjoyable	67.1	76.3	77.6		
Fairly good	31.6	20.3	22.4	6.506	0.164
Bad/not enjoyable/unsatisfactory	1.3	3.4	0		
Kiburu					
Good/satisfactory/enjoyable	70	70	57.5		
Fairly good	20	25	38.8	7.186	0.126
Bad/not enjoyable/unsatisfactory	10	5	3.8		
Loshoro					
Good/satisfactory/enjoyable	57	57.6	58.1		
Fairly good	35.5	36.4	37.2	0.046	1.000
Bad/not enjoyable/unsatisfactory	6.5	6.1	5.8		
Kitaloolo					
Good/satisfactory/enjoyable	48.2	50	67.2		
Fairly good	30.8	31.3	50.6	14.875	0.005
Bad/not enjoyable/unsatisfactory	0	18.8	1.2		
Makande					
Good/satisfactory/enjoyable	77.6	61.2	73.3		
Fairly good	21.4	38.3	27.7	7.806	0.99
Bad/not enjoyable/unsatisfactory	1	0	0		

Appendix 5: Results of attitude towards acceptability of globalized/exotic food according to residence of respondent

Type of food	Urban	Peri-urban	Rural	Chi-square	P-value
Hamburger					
Acceptable	77.8	71.4	100	0.636	0.728
Not sure	22.2	28.6	0		
Sausage					
Acceptable	72	71.4	63.5		
Not sure	25.6	36	34.6	3.021	0.554
Not acceptable	2.4	0	1.9		
Chips					
Acceptable	87.1	82.4	77.5		
Not sure	10.9	17.6	21.7	6.231	0.183
Not acceptable	2	0	0.8		
Pizza					
Acceptable	72.7	56.5	50		
Not sure	27.3	43.5	50	2.042	0.360
Chocolate					
Acceptable	74.3	68.7	55.2		
Not sure	18.8	23.9	36.2	9.757	0.045
Not acceptable	6.9	7.5	8.6		
Ice cream					
Acceptable	79.6	67.7	59.4		
Not sure	16.3	26.2	33	9.696	0.046
Not acceptable	4.1	6.2	7.5		
Soda					
Acceptable	85.1	77.9	77.9		
Not sure	14.9	22.1	19.1	6.823	0.146
Not acceptable	0	0	3.1		
Samosa					
Acceptable	79.2	83.1	68.9	7.103	0.131
Not sure	18.8	16.9	27		
Not acceptable	2	0	4.1		
Cake				7.37	0.117

Type of food	Urban	Peri-urban	Rural	Chi-square	P-value
Acceptable	87.1	80.9	74		
Not sure	11.9	19.1	23.7		
Not acceptable	1	0	2.3		
Egg chop				2.832	0.586
Acceptable	66.7	60	75.8		
Not sure	29	36.7	24.2		
Not acceptable	4.3	3.3	0		
Fried chicken				24.677	0.000
Acceptable	89.1	85.3	65.6		
Not sure	8.9	14.7	34.4		
Not acceptable	2	0	0		
Kebab					
Acceptable	74.1	57.7	61.8		
Not sure	24.7	36.5	38.2	7.536	0.110
Not acceptable	1.2	5.8	0		
Crisps				13.74	0.008
Acceptable	78	59.6	50		
Not sure	18.7	38.6	50		
Not acceptable	3.3	1.8	0		

Appendix 6: Results of attitude towards acceptability of the traditional/local food according to residence of respondent

Type of food	Urban	Peri-urban	Rural	Chi-square	P-value
Kitawa/kideri				6.816	0.146
Acceptable	72.4	87.5	63.2		
Not sure	27.6	12.5	28.1		
Not acceptable	0	0	6.7		
Machalari				0.761	0.944
Acceptable	62.0	62.7	59.9		
Not sure	36.7	35.6	41.1		
Not acceptable	1.3	1.7	0.9		
Kiburu				2.105	0.716
Acceptable	66	55	55		
Not sure	32	40	40		
Not acceptable	2	5	5		
Loshoro				8.737	0.068
Acceptable	64.5	48.5	59.5		
Not sure	35.5	51.5	32.2		
Not acceptable	0	0	8.3		
Kitaloolo				6.034	0.197
Acceptable	69.2	56.3	48.2		
Not sure	30.8	25	44.6		
Not acceptable	0	18.8	7.2		
Makande				11.821	0.019
Acceptable	79.6	57.2	63.1		
Not sure	19.4	41.8	35.4		
Not acceptable	1	0	1.5		

Appendix 7: Results of attitude towards health/nutrition benefits of globalized/exotic food according to residence of respondent

Type of food	Urban	Peri-urban	Rural	Chi-square	P-value
Hamburger				2.901	0.574
Much health/nutrition benefits	42.2	28.6	100		
Little heath/nutrition benefits	55.6	66.7	0		
No health/nutrition benefits	2.2	4.8	0		
Sausage				10.951	0.027
Much health/nutrition benefits	54.9	38	63.5		
Little heath/nutrition benefits	40.2	60	28.8		
No health/nutrition benefits	4.9	2.0	7.7		
Chips				4.618	0.329
Much health/nutrition benefits	56.4	47.1	61.2		
Little heath/nutrition benefits	38.6	47.1	36.4		
No health/nutrition benefits	5	5.9	2.3		
Pizza				1.009	0.908
Much health/nutrition benefits	43.2	43.5	50		
Little heath/nutrition benefits	50	43.5	50		
No health/nutrition benefits	6.8	13	0		
Chocolate				1.314	0.012
Much health/nutrition benefits	26.7	29.9	44		
Little heath/nutrition benefits	45.5	43.3	45.7		
No health/nutrition benefits	26.7	26.9	10.3		
Ice cream				9.814	0.044
Much health/nutrition benefits	26.5	21.5	37.7		
Little heath/nutrition benefits	44.9	47.7	47.2		
No health/nutrition benefits	28.6	30.8	25.1		
Soda				27.262	0.000
Much health/nutrition benefits	40.6	23.5	58		

Type of food	Urban	Peri-urban	Rural	Chi-square	P-value
Little heath/nutrition benefits	46.5	59.4	38.2		
No health/nutrition benefits	12.9	19.1	3.8		
Samosa				6.733	0.151
Much health/nutrition benefits	62.4	62.7	49.2		
Little heath/nutrition benefits	31.7	49.2	45.1		
No health/nutrition benefits	5.9	3.1	5.9		
Cake				9.036	0.06
Much health/nutrition benefits	55.4	34.3	55.7		
Little heath/nutrition benefits	40.6	58.8	38.9		
No health/nutrition benefits	4	5.9	5.3		
Egg chop				4.557	0.336
Much health/nutrition benefits	68.1	63.3	69.7		
Little heath/nutrition benefits	26.1	36.7	30.3		
No health/nutrition benefits	5.8	0	0		
Fried chicken				3.081	0.544
Much health/nutrition benefits	70.7	69.4	70.3		
Little heath/nutrition benefits	26.3	30.6	28.8		
No health/nutrition benefits	3.0	0	0.9		
Kebab				9.244	0.055
Much health/nutrition benefits	58.8	34.6	52.9		
Little heath/nutrition benefits	33.3	50	41.2		
No health/nutrition benefits	5.9	15.4	5.9		
Crisps				12.782	0.012
Much health/nutrition benefits	46.2	35.1	35.3		
Little heath/nutrition benefits	45.1	43.9	66.7		
No health/nutrition benefits	8.8	21.1	0		

Appendix 8: Results of attitude towards health/nutrition benefits of traditional/local foods according to residence of respondent

Type of food	Urban (n=84)	Peri-urban (n=64)	Rural (n=130)	Chi-square value	P-value
Kitawa/kideri				4.442	0.35
Much health/nutrition benefits	75.9	58.3	59.6		
Little heath/nutrition benefits	20.7	41.7	34.8		
No health/nutrition benefits	3.4	0	3.6		
Machalari				11.878	0.018
Much health/nutrition benefits	73.4	72.9	63.6		
Little heath/nutrition benefits	20.3	27.1	35.5		
No health/nutrition benefits	6.3	0	0.9		
Kiburu				14.129	0.007
Much health/nutrition benefits	72	60	50		
Little heath/nutrition benefits	14	37.5	42.5		
No health/nutrition benefits	14	2.5	7.5		
Loshoro				3.977	0.409
Much health/nutrition benefits	64.5	51.5	51.2		
Little heath/nutrition benefits	29	45.5	38.0		
No health/nutrition benefits	6.5	3	10.7		
Kitaloolo				4.905	0.297
Much health/nutrition benefits	61.5	37.5	38.6		
Little heath/nutrition benefits	30.8	43.8	54.2		
No health/nutrition benefits	7.7	18.8	7.5		
Makande				7.767	0.101
Much health/nutrition benefits	71.4	61.2	59.9		
Little heath/nutrition benefits	26.5	37.3	39.9		
No health/nutrition benefits	2.0	1.5	6.2		