EATING HABITS AND THEIR ASSOCIATION WITH NUTRITIONAL STATUS OF SCHOOL GOING ADOLESCENT GIRLS IN KISUMU CITY, KENYA

BY

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DECLARATION

I certify that this thesis has not been previously presented for a degree in Maseno University or any other University. The work reported herein is my original work and all sources of information have been supported by relevant references

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DEDICATION

This Thesis is dedicated to my son Brandon Swahili and my parents Gideon and Esther Swahili.

ABSTRACT

Adolescents form 20% of the world's population, with 85% living in developing countries. In Kenya, they comprise 23.8% of the population. Nutritional status of adolescent girls has been reported to influence future maternal and infant health. Most studies in developing countries have focused on nutritional status and food security among children under 5 years as well as breastfeeding and pregnant mothers; while little attention has been given to nutrition in adolescents. Globalization, rapid urbanization and economic growth have led to changed trends in lifestyles and eating habits particularly among adolescents in developing countries that are likely to affect their nutrition status. However it is not clear whether eating habits reported in the West also exist in developing country contexts, or whether, as in the West, they may influence nutritional status of adolescent girls. This study aimed to assess the relationship between eating habits and nutritional status among school going adolescent girls in Kisumu, the third largest City in Kenya, open to Western influence on eating habits. Specific objectives were to: identify eating habits practiced by adolescent girls in Kisumu City; establish factors determining their eating habits; and assess the relationship between eating habits and their nutritional status. Anthropometric measurements were taken to determine nutritional status, and data on household and cultural factors, eating habits, and psychosocial factors measured on a 10-item Rosenberg scale and adapted Eating Attitude Test-26, was collected using a structured questionnaire; in a cross-sectional survey conducted among 235 randomly selected school-going adolescent girls aged 14 to 19 years, from 3 randomly selected mixed schools in Kisumu City. Logistic and linear regressions were used to assess relationships between eating habits; and between eating habits and nutritional status. Prevalence of overweight, obesity and underweight were 29.2%, 4.9% and 4.4%, respectively. Skipping meals, snacking, binge eating –all negative eating habits; and vegetable and fruit consumption-positive habits, were practised by the adolescent girls. Skipping meals, especially breakfast was the most common eating habit (62.8 %), while fruit consumption was the least common (41.2%). Vegetable consumption was associated with a 0.19 (95% CI: 0.02, 2.46; p=0.005) increase in BMI. The prevalence of overweight and obesity is high in school-going adolescents in Kisumu; and although eating habits identified in the West exist in this group, they are compensatory mechanisms to cater for missed meals or limited time to prepare and consume breakfast, rather than a conscious decision to reduce food intake as seen in developed countries. Ministry of health and school administrations should enhance healthy eating habits through nutrition education, and sensitise parents on the importance of breakfast for the girls; and influence the food options sold in *kiosks* around schools in joint efforts with County government authorities.

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LIST OF ABBREVIATIONS

BMI:	Body Mass Index
CDC:	Centres for Disease Control
DSM-IV:	Diagnostic Statistical Manual- IV
FANTA:	Food and Nutrition Technical Assistance
FBP:	Food by Prescription
FGD:	Focused group Discussions
AIDS :	Acquired Immuno Deficiency Syndrome
IFIC:	International Food Information Council
KDHS:	Kenya Demographic and Health Survey
KEMRI:	Kenya Medical Research Institute
KI:	Key Informant
MOH:	Ministry of Health
MOE:	Ministry Of Education
MUAC:	Mid-Upper arm circumference
NASCOP:	Kenya National AIDS and STI Control Program
SCN:	Standing Committee on Nutrition
SD:	Standard Deviation
UNICEF:	United Nation Children's Fund
USAID:	The United States Agency for international Development
VAD:	Vitamin A Deficiency
VCT:	Voluntary Counselling and Testing
WHO:	World Health Organization

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CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Adolescence is a vital stage that occurs between 10 and 19 years, and is characterized by rapid growth and acquisition of adult physical appearance as well as hormonal and sexual change. This contributes to a wide fluctuation in metabolic rates and food needs (Beard, 2002 and Nsubuga, 2014). Adolescents form a quarter of the world's population (UNFPA, 2012) and about 85% of them live in developing countries Delisle *et al., (*1999) and SCN, (2006). In the least developed countries, adolescents comprise 23% of the population, 19% in developing countries and 12% in industrialized countries (UNICEF, 2012). In Kenya, they comprise 23.8% of the population (Kenya National Bureau of Statistics, 2010). Total nutrient needs are higher during adolescence than any other time in the lifecycle (Duyff *et al.,* 2002, Story and Stang, 2005).

According to Adolescent Nutrition (2013), there is a greater demand for calories and nutrients due to the dramatic increase in physical growth and development during this stage, over a relatively short period. Physical changes during adolescence affect the body's nutritional needs, while lifestyle changes may affect eating habits and food choices, thus increasing vulnerability to nutritional problems (Adolescent Medicines Committee, 2005). Adolescents form a significant proportion of the population globally, while this life stage is important in human development they remain highly vulnerable to nutrition problems and therefore consideration of their nutrition status remains vital for wellbeing.

Despite being an important stage in human growth, because of perceived low prevalence of nutrition and health related problems in this group compared to children under five and the elderly, it has been given little health and nutrition attention (Senderrowitz, 1995), which

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persists, as observed by Mwadime (2013). Developing countries have mostly focused on household food security and malnutrition in children under five years of age, pregnant and lactating mothers (WHO, 2005; Mwadime, 2011). Adolescence being a period characterised by rapid growth, meeting nutritional requirements to cater for the increased metabolic rate poses a challenge making adolescents more susceptible to dietary inadequacy (Mwadime, 2011).

Increased growth spurts, complex hormonal changes, and emotional and mental development increases adolescents' vulnerability to malnutrition (Laura, 2012). There is generally increased need of carbohydrates for energy, protein for increased muscle mass and growth; and other micronutrients such as iron, iodine and vitamins are required in larger quantities. If the increased nutrient needs are not met, adolescents become susceptible to nutrition related problems (IFIC Foundation, 2007). Unfortunately, in both developing and developed countries, nutritional needs and problems experienced during this stage have been given little attention (Mwadime, 2011; WHO, 2005).

Malnutrition in form of both under and over-nutrition has been reported in adolescents. An estimated 27% of adolescent girls in developing countries were reported to be underweight (Klindera *et al.,* 2004), and the prevalence has risen in the last decade to 41% in 2012, mostly in Asia and Africa as reported by Balci *et al.,* (2012). In an early study, Leenstra *et al*., (2005) reported a prevalence of 15.6% thinness among adolescent school girls in Western Kenya. Cheryl *et al.,* (2012) showed that the prevalence of overweight had doubled among adolescents in the preceding decade mostly in developed countries and urban areas, reporting a prevalence of 17.2% and 14.5% overweight and obesity, respectively, among adolescent girls aged 10-19 years in the USA. This trend was corroborated by CDC, (2014) which

reported that the prevalence of obesity among adolescents aged 12–19 years increased from 5% to nearly 21% from 1980 to 2012.

This data on adolescent girls is of notable concern because overweight adolescents are at increased risk of becoming overweight adults, while undernourished girls are likely to be less productive currently especially in school which may ultimately affect their productivity in adulthood. UNICEF, (2012) indicates that malnutrition during adolescence is likely to affect not only weight-for-height but also attainment of maximum height resulting in stunting. Stunted women are likely to have poor pregnancy outcomes and a higher chance of having obstructed labour. There is however little information on nutrition status of adolescent girls in Kenya making it difficult to conclusively understand the prevalence of malnutrition in this group across the country, hence to adequately address the nutritional needs and problems they experience. It is important to assess the nutrition status of adolescent girls to be able to corroborate the above literature or come up with a clear statement on whether or not the nutrition status of adolescent girls in Kenya differs from what has been reported in other countries.

Adolescence involves emerging autonomy and independence (Degner and Klockow, 2013). With increasing numbers of friends outside the family and leisure time outside the home, parents and teachers experience decreasing control over what and when adolescents eat. Family meals equally become less frequent in adolescence, (Story & Neumark- Sztainer, 2005). Moreover, menstruation, high cases of early pregnancies, cultural attitudes regarding intra-household food distribution and beauty as portrayed in both local and Western media, render girls more vulnerable to malnutrition than boys.

In developed countries use of fast foods, snacking, skipping meals and binge eating are very common among adolescent girls (Chapman, 1996). Personal preferences take precedence over eating habits learned at home, as adolescents progressively take control of what they eat, where and how. Shepherd *et al.,* (1996), Delisle *et al.,* (1999) and Videon and Manning, (2003) also reported that some eating habits appear to be common among adolescents. These included snacking, usually on energy-dense foods; meal skipping, particularly breakfast, or irregular meals; wide use of fast food, dieting low consumption of fruits, vegetables, and dairy products in some instances. Delisle *et al.,* (1999) observed that most adolescent girls in the United States of America initiate unhealthy dieting at some point in time especially between 16-18 years, with an aim of losing weight. Studies by Bulik (2000) established a relationship between dieting and development of eating disorders such as anorexia and bulimia, binge eating, unusual food choices and skipping of meals common in college students. Kilindera (2006) also reported that increasing incidences of malnutrition among adolescent girls in developed countries, believed to have adequate food, is linked to poor eating habits. This indicates that eating habits evident in adolescence in these contexts may result in malnutrition. This information is however mostly based on studies in the west, there is limited information on eating habits among adolescent girls in developing countries.

Milosavljević, *et al.,* (2015) reported that there is a strong influence of globalization facilitating fast spread of unhealthy eating habit globally including South America and Europe, while noting low level of information on appropriate eating habits particularly among overweight adolescents in developed countries and generally among adolescent girls in developing countries. In developing countries, poor nutrition has mainly been associated with household food insecurity and distribution among family members as well as lack of prioritization of adolescent nutrition in national policy-making processes and resultant

policies (Mwadime, 2011). However, according to Yamamura (2010) there has been tremendous change in lifestyles due to Western influence through media and urbanization, which has impacted the general perception of beauty and perfection among this group and the society in general.

Acknowledging the impact of globalization and urbanization on eating habits among adolescents, Ganasegeran, (2012) reported that environmental factors also contribute to adoption of unhealthy eating habits among adolescence while mushrooming of shopping malls, convenience stores, vending machines and fast food outlets have created an alarming situation for young adults to practice unhealthy eating habits. These trends in urbanisation are now also evident in developing countries. Milosavljević (2015) reported that maternal education, knowledge on eating appropriate diets, income significantly influenced eating habits among adolescents in Europe and North America.

According to Gunasegaram, (2012), both psychological such as self-esteem, weight related attitude and social demographic, such: age, ethnicity, household income, as well as maternal and education influenced eating habits among medical university students some of whom were adolescent girls. This evidence, however, is mainly derived from Western contexts. Studies carried out in Africa, including: Ethiopia, Nigeria, Egypt, Cameroon and western Kenya have mostly concentrated on skipping meals – which may be associated with food security; but have not looked beyond this, to factors that may portray a deliberate effort to manipulate food consumption as observed in the West; nor have they addressed potential factors that may determine broader behaviours related to nutrition status. It is necessary to assess what factors influence eating habits among adolescent girls in developing country contexts to broaden our understanding of nutrition during this life-stage.

Evidence suggests potential exhibition, in developing countries, of some dietary habits observed in developed countries. The Ministry of Foreign and European Affairs (2011) reported that contrary to the belief that food security solely determines nourishment in developing countries, eating habits and food culture tend to have a significant influence on nutrition especially among girls. This raises the question on whether, eating habits emulated from the West may exist in developing country contexts such as Kenya or whether eating habits in Kenyan context are unique; whether, adolescent eating habits in Kenya could explain some of the malnutrition (either under or over nutrition) that may exist, hence whether the relationships between eating habits and nutritional status in contexts such as Kenya do or do not mimic those observed in Western countries.

Concerns presented in literature underpin the necessity to understand adolescent nutrition and address attendant problems. Douketis *et al.,* (1999) emphasizes that prevention is crucial, and adolescents should be a priority target, even in developing countries, particularly in urban settings. They further observed that inappropriate eating patterns and lifestyle are more likely to occur in urban settings due to ongoing nutrition transition related to globalization and urbanization. Trends in food habits, perceptions and choices are strongly correlated with rapid urbanization in most urban areas in developing countries to increased exposure to western culture through the media, (Kurz, 1996 and WHO, 2002) and more recently social media. Wahl, (1999), recommends that since eating habits are mainly formed during adolescence, programmes targeting this group, especially for obesity, are likely to be more successful than in adulthood.

Kisumu, being the third largest City in Kenya, undergoing rapid urbanization; and a centre of civilization in western Kenya, is known to be relatively food secure Kenya National Bureau

of Statistics and ICF Macro (2010) due to its proximity to food producing communities. The City is rapidly growing with a growing number of middle-income families that have good access to media and social media, which as alluded to, have major influence on adolescent girls while still considered relatively food secure. Kisumu has several day schools where girls have the flexibility to choose what to either eat from school, at home or purchase food from the surrounding markets and *Kiosks* as opposed to boarding schools where the diet is more restricted and choice is limited. Kisumu therefore provides an ideal environment to assess eating habits of adolescents, their determinants and effects on their nutrition status.

1.2 Statement of the Problem

Adolescents form about a quarter of the Kenyan population, have the highest total nutrient needs rendering them vulnerable to nutrition problems, yet fall in the life-stage whose nutrition has been given little attention; with few programmes and policies targeting this group. Of adolescents in Africa and Asia, 41% are reported to be underweight having risen from 27% at a time when reported prevalence in a study conducted in western Kenya was 15.6%. This suggests that alongside the increase in underweight observed generally in Africa and Asia, currently the prevalence in Kenya may have risen given the global trends. Overweight in adolescents more than tripled in the USA between 1980 and 2012, and possibly continues to rise given current trends. Although underweight has been reported in adolescents in some studies in Africa, not much information is available on overweight in Africa. There is however need to establish the prevalence of both these forms of malnutrition in order to effectively address potential problems in this age group.

To compound this lack of information on adolescent nutritional status, evidence from developed countries indicate an association between eating habits and nutrition status of

adolescents arising from the concern with body image, especially of girls. Media is implicated in transmission of behaviours linked to unhealthy eating habits, and the rapid urbanisation occurring in developing countries has increased access of adolescents to western influence that may affect their eating habits, hence nutrition status. It is not clear however, whether eating habits observed in the west, and their attendant influence on nutrition status may exist in African contexts, further compromising the nutrition status of adolescents. Such information would help address potential nutrition problems that may occur in adolescents. Rapid urbanisation in Kisumu, the third largest city in Kenya, facilitating access of adolescents to Western influence, provides a suitable setting to explore these questions.

1.3 Broad Objective

To investigate eating habits and their association with nutritional status of school going adolescent girls in Kisumu city

1.4 Specific Objectives of the Study

i.   To assess the nutritional status of adolescent girls

ii.   To identify eating habits practiced by adolescent girls in Kisumu City

iii. To establish factors determining eating habits in adolescent girls.

iv.   To assess the relationship between eating habits and nutritional status of adolescent girls.

1.5 Research Questions

i.   What is the nutritional status of adolescent girls in Kisumu town

ii.   What are the eating habits practised by adolescent girls in Kisumu City

iii. What factors influence eating habits in adolescent girls

iv.   What is the relationship between eating habits and nutritional status of adolescent girls in Kisumu City?

1.5 Justification of the Study

Adolescence is a vital stage in human development as is a precursor for development of particular food habits, while nutrition status in this group has great influence on their health status in adulthood. Assessing the nutrition status will provide information on the prevalence of over and under nutrition in this group; hence the extent of malnutrition. Since health of adolescent girls is important because they will soon become mothers and their growth in part determines their ability to carry successful pregnancies. Understanding the nutrition status in this group is therefore vital in addressing nutritional needs and defining the level and type of nutritional investment relevant to this group by the Ministry of Health and other development actors in Kenya.

Eating habits and nutrition status of this group is believed to determine the well-being of the next generation. Information on eating habits of this group will help determine whether or not they may promote or deter healthy nutritional status in adolescents in an urban setting. Knowledge of factors that influence the eating habits would provide some understanding on what modifiable factors may be targeted to influence positive eating habits among adolescents. Information on the relationship between eating habits and nutrition status will provide insight on eating habits that may affect nutritional status among adolescents, hence inform the focus for addressing adolescent nutritional status.

1.6 Scope of the Study

The research was undertaken in Kisumu city. The study findings are restricted to school going adolescent girls in an urban setting. The study findings can be used as a reference but cannot be used to conclusively describe the nutrition status and eating habits among adolescent girls in rural areas or those out of school as nutrition status in these two groups could be affected by other dynamics. The study was designed with an assumption that BMI for age using weight for height would adequately define nutrition status in adolescent girls. The study was also confined to day schools because unlike boarding schools whereas students are confined within the school compound with limited access to food, students in day schools have access to foods other than the defined school meals.

1.7 Limitations of the Study

Whereas restricting the study to day schools to address the need for choice by the adolescent girls, which is not enabled in boarding school settings, this may limit the generalizability of the results to a broader context of adolescent girls which includes those in boarding schools. Similarly, the results may not apply to adolescents in rural settings, and those out of school. However this restriction improves the validity of the results to determine the association between eating habits and nutrition status of school going adolescent girls in Kisumu City.

1.8 Definition of Terms

1.8.1 Nutritional Status

In this study nutrition status was determined by BMI − for − age computed from individual weight and height as per the WHO recommendation and classification (WHO, 1995). BMI for age was taken into account as the best variable to ascertain the nutrition status because it

had had clear international accepted cut off points and takes into consideration the age of the girls

1.8.2 Eating Habits

Eating habits were defined as skipping meals, snacking, consumption of junk food, binge eating and low vegetable and fruit intake beyond pre-defined limits. Eating habits are described as:

i. Snacking in this study was defined as taking meals in between the three standards meals.

ii. According to DSM-5 Binge eating episodes are associated with three (or more) of the following: eating much more rapidly than normal, eating until feeling uncomfortably full, eating large amounts of food when not feeling physically hungry, eating alone because of being embarrassed by how much one is eating, feeling disgusted with oneself, depressed, or very guilty after overeating. In this study, binge eating, was defined as the frequency with which an individual consumed excess food, more rapidly than normal and continued consumption of food even without feeling physically hungry. An adolescent girl was considered to binge eat if at least one episode of bingeing was reported.

iii. Skipping meals was defined as consuming less than 67% (less than 3meals) of the normal daily meals.

iv. Vegetable and fruits consumption was defined as having two or more servings of fruits and vegetables per day.

1.8.3 Socio-cultural Factors

1.8.3.1Psycho-socialFactors

These both social and psychological factors affected how school going adolescent girls consumed their meals. They included; when they consumed their meals, where they found their meals and what influenced their meal intake. They also included Weight-related perception and attitudes which in this study perception and motivation was defined as how adolescent girls perceive their bodies, what they understand as beauty and their knowledge on food, health and optimal nutrition. This also included self-esteem which was defined as how adolescent girls felt was their worth

1.8.3.2 Cultural F actors,

This is factors defined in terms of how food was consumed, where it was sourced, and with whom it was consumed as these factors are culturally entrenched in Kenyan communities

1.8.3.3 Household Characteristics

Household characteristic were defined as number of household members, maternal and paternal education level, maternal and paternal occupation. Education was defined in terms of the number of years of schooling, with zero years defined as no education, 8 years of schooling being equivalent to primary education. 12 years as secondary education and more than 12 defined as having attained tertiary education. Occupation was defined as waged labour, business, house wife, and employment.

1.8.4 Eating Disorders

Eating was defined anorexia that was defined as uncontrolled compulsive urge to avoid food consumption and bulimia defined as eating food and then compulsively forcing one to purge

1.9 Conceptual Framework

The conceptual framework was adapted from a study by Delisle *et al.,* (1999) which noted an increase in the rates of malnutrition among adolescent girls in developed countries despite availability of adequate food. The study also noted that eating habits in this group were frequently erratic that could be associated with increased nutritional risk in developed countries. Many studies conducted in developing countries, particularly in Kenya have associated nutrition status with the level of household food security. Studies in developed countries however show a strong relationship between eating habits and nutrition status. Nutrition transition as a result of globalization, urbanization and development, is likely to cause changes in food patterns, choices and preferences in Kenya that could affect nutrition status of adolescents despite the level of household food security. The framework has been modified for causal and outcome analysis of eating habits in adolescent girls, thus focusing on the first two aspects of the framework by Delisle *et al*., (1999)
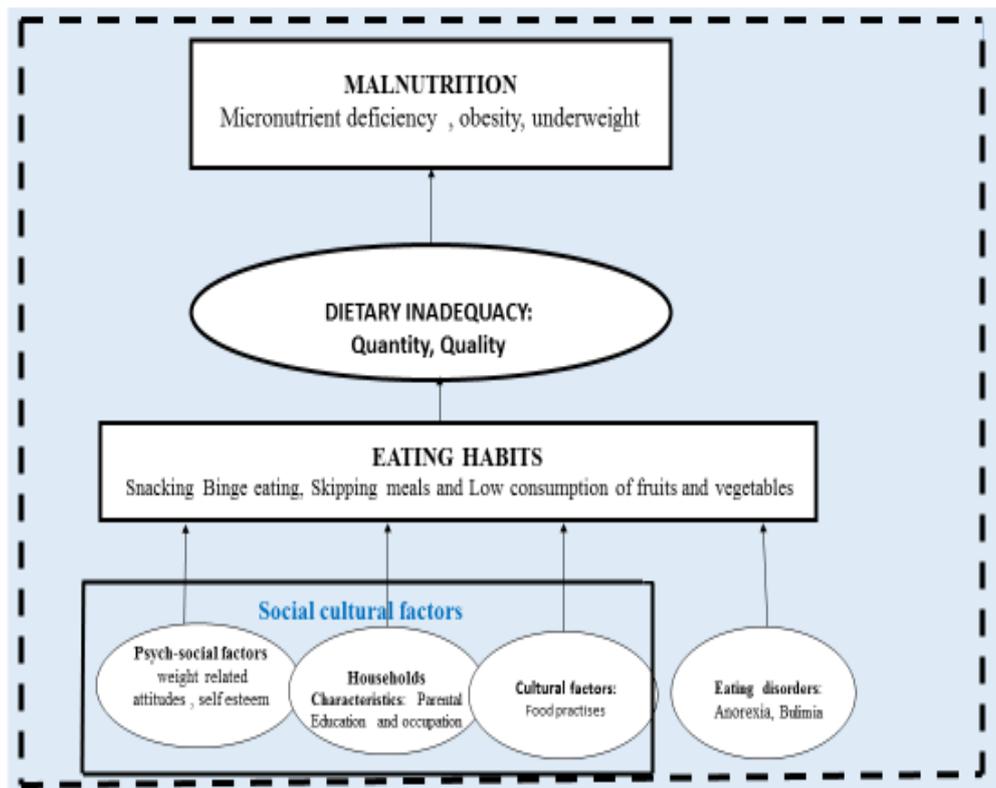
Figure 1: Conceptual Framework, adapted from Delisle *et al*., (1999)

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In this study, eating habits identified as snacking, binge eating, skipping meals, vegetable and fruit consumption were assessed as possible causative factors of nutrition status through dietary adequacy. Socio-cultural factors and eating disorders were analysed to establish how they affected eating habits. The identified eating habits were analysed as factors with the potential of influencing nutrition status.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Adolescents are considered relatively healthy compared to other lifecycle groups, because they have low prevalence of infections compared to children under five years of age; and low prevalence of chronic diseases compared to ageing people (Senderowitz, 2004). Because of this, health and nutritional concerns in this group have generally been accorded little attention. Traditionally, pre-school age children have been targeted as nutritionally vulnerable groups in developing countries, while in industrialized countries the focus tends to be on nutrition related chronic diseases of an ageing population (Delisle *et al.,* 1999).The observation by Leenstra *et al.,* (2005) that there is relatively little information available about the nutritional status of adolescents mostly in developing countries such as Kenya in comparison to other groups even though adolescence is an age group with the highest growth velocity after infancy; still holds true, more than one decade later.

This literature review focuses on nutrition status of adolescent girls, their nutritional needs and the nutrition situation of adolescent girls in developing countries. Finally, it provides an overview of eating habits and their implications on nutritional status of adolescent girls.

2.2 Nutritional Status of Adolescent Girls

2.2.1 Nutritional needs of Adolescent Girls

Adolescence is the only time following infancy when the rate of physical growth actually increases. This sudden growth spurt is associated with hormonal, cognitive, and emotional changes that make this stage an especially vulnerable period of life (WHO, 2005). The dramatic increase in physical growth and development over a relatively short period of time imposes a greater demand for calories and nutrients; and poor nutrition during this stage can

have lasting consequences on an adolescent's physical and cognitive development (Adolescent Nutrition, 2013).

Adolescence is a crucial period for skeletal mass and sexual development. About 15-25% of the adult height is achieved and 45% of the skeletal development occurs during this period (Rees, 2006). About 1200- 1500mg calcium is required per day, for bone development and to prevent early onset of osteoporosis in adulthood (Theobald, 2005). Maximum height gain is associated with reduced risk of obstetric complications in girls (Bisai, 2010). Protein needs increase due to increased muscle mass, with about 14 – 46g and 45 – 59g of protein being required per day for boys and girls respectively, to sustain their daily needs and maintain Nitrogen reserves (Aerenhouts *et al.,* 2013). As the metabolic demand for growth and energy increases, caloric needs also increase. Because of diversified growth patterns, individual caloric needs are varied but girls generally require fewer calories than boys. About 2200 and 2500-3000kcal per day is required for girls and boys respectively (William, 1994).To meet these calorie needs, adolescents should choose a variety of healthy foods, such as complex carbohydrates from whole grain, lean protein sources, low-fat dairy products, fruits, and vegetables, (Duyff *et al.,* 2002); emphasising the need for attention to diet in this period.

As adolescents gain muscle mass, more iron is needed to help new muscle cells obtain oxygen for energy and replace lost blood in girls. Jennifer *et al.,* (2012), in a study conducted in Nigeria, documented that requirement for iron is even higher in developing than in developed countries; and that infections such as malaria, schistosomiasis and hookworm, and other inflammations, significantly increased iron depletion and reduced its absorption in these contexts. Iron deficiency is associated with limited growth during adolescence, and anaemia that leads to fatigue, confusion, and weakness. Adolescent boys need 12 milligrams of iron

each day, while girls need 15 milligrams (Amy, 2006 and Bailey *et al.,* 2011). Vitamin A is important for growth, development and sexual maturation, with a positive association being reported between plasma retinol and indices of sexual maturation (Brabin *et al.,* 2005 and Herbert *et al., 2002*). The importance of folate, iodine, zinc and vitamin Bcomplex in adolescent nutrition is also noted because of the nutrients' vital role in growth and metabolism (Ransom, 2003). Increased nutrient and caloric needs in adolescence, with higher demand for some nutrients, especially micronutrients, in girls compared to boys is therefore evident.

2.2.2 Adolescent Nutrition in Developing Countries

In developing countries, nutritional problems have mostly been linked to poor dietary intake related to food insecurity, intra-household food distribution and cultural preference of certain foods rather than eating habits (Ministry of Foreign and European Affairs, 2011). The prevalence of malnutrition among adolescent girls in developing countries is very high. In Tanzania, Chen (2012) reported that adolescent girls' diets were largely deficient in macronutrients and micronutrients, with the mean intake of energy and protein being 810kcals/day and 21.9grams/day, respectively, reporting 16.2% and 62.2%, underweight and stunting respectively.

Malnutrition in adolescent populations is the main cause of slowed growth and height gain in developing countries. This results in stunting and delayed onset of menarche by an average of 24 months further affecting girls (Proos & Gustafsson, 2012). Inadequate nutrition is also associated with poor skeletal growth, contracted pelvis and difficult labour. Therefore, low maternal height as a result of poor nutrition is directly linked to high maternal and infant mortality in African countries. Leenstra *et al.,* (2005) reported 12.1% and 2.0% moderate and

severe stunting and severe underweight respectively for among adolescent girls in schools in Western Kenya. Recent data in Nigeria reported by Asinobi and Nwankwo (2010) indicate stunting prevalence of 48.4% in adolescent girls in Imo state.

Despite the rapid nutrition and economic transition associated with the increasing levels of overweight and obesity in both developed and developing countries, wasting is still persistent among adolescent girls in both worlds (Chen, 2012). Underweight is quite common in Africa especially among poor communities with girls being more vulnerable than boys. In Nigeria, Asinobi and Nwankwo, (2010) reported 38.2% underweight among adolescent girls while in South Africa, 9.9% girls were reported underweight by (Niekerk, Grimmer & Louw, 2014). Other studies reported varied prevalence of underweight: 58.3% in Tigray, Ethiopia (Afework *et al.,* 2009), 56.4% among adolescent girls in the rural Vizianagaram District (Wasnak *et al.,* 2012), 8.7% (Lazzeri *et al.,* 2008), as well as 5% reported among urban adolescent girls in Yaounde (Dapi *et al.*, 2009). Data on adolescent nutrition status in Kenya has mainly been generated in individual studies. Leenstra *et al.,* (2007) in a study in schools in Western Kenya, reported 15.6% underweight among adolescent girls and resultant delayed start of puberty and menarche by 1.5 years.

These studies reflect a tendency to higher prevalence of underweight in rural areas (Asinobi and Nwankwo, 2010; Afework *et al.,* 2009; Wasnak *et al.,* 2012) than in urban areas (Niekerk, Grimmer & Louw, 2014; Lazzeri *et al.,* 2008; Dapi *et al.*, 2009) ; indicating that underweight may be more of a problem in rural than in urban settings. Although they address prevalence of underweight none provides data on the prevalence of overweight in these countries. According to the Centres for Diseases Control (2002), overweight in children and adolescents had been relatively stable from the 1960s to 1980 in-developed countries but rose

two-fold in the next decades with almost similar trends observed in developing countries over the same period. This points to existence of overweight in developing countries, alongside the evidence presented on underweight.

Most interventions and studies conducted in developing countries have mainly focused on under nutrition, and most studies and policies are geared towards under nutrition. This may be related to the availability of information on underweight rather than the whole spectrum of nutrition status; and the focus on addressing food insecurity. However, obesity is said to be increasingly pandemic in these countries, but is a neglected public health problem (Wang *et al.,* 2002). There is little data on obesity worldwide particularly in developing countries but existing data is sufficient to show that the rate of obesity among adolescent girls is notably high particularly in urban settings (WHO, 2006). Although adolescent girls remain vulnerable to nutrition problems, there is lack of comprehensive and conclusive information on the extent and forms of malnutrition among adolescent girls in developing countries particularly Africa. More data reflecting the status of both under-nutrition and over-nutrition is necessary to effectively address adolescent nutrition in developing countries.

2.3 Eating Habits among Adolescents

Eating habits according to Rodriguez, (2009) refers to why and how people eat, which foods they eat, and with whom they eat, as well as the ways people obtain, store, use, and discard food. People eat according to learned behaviours regarding etiquette, meal and snack patterns, acceptable foods, food combinations, and portion sizes. Healthy eating is vital for adolescents' health and well-being. Contrary to the belief that food security solely determines nourishment in developing countries eating habits and food culture tend to have a significant influence on nutrition especially among girls (Ministry of Foreign and European Affairs,

2011). Good eating habits help prevent chronic illness in future, including obesity, heart disease, cancer and diabetes. Evidence from developed countries indicate that eating habits are frequently erratic in adolescents and this may be a common factor of nutritional risk (Barooah, 2012).

According to Delisle *et al., (*1999) adolescents' food choices are primarily determined by psycho-social factors. Ganasegeran *et al*., (2012) in a study in a Malaysian medical school also concluded that psychological factors were important determinants of eating habits among medical students, the study reported that behavioural control, and body image and perception significantly influenced eating habits mostly among female students. Considering that nutritional needs of teens vary tremendously, but increase due to the rapid growth and changes in body composition that occur during puberty (Baldwin *et al.,* 1998); eating habits in this group are likely to have a significant impact on nutrition status and general growth.

During adolescence, personal preferences take precedence over eating habits learned at home as adolescents progressively take control of what they eat, where and how they eat (Shepherd *et al.,* 1996). This is likely to define the eating habits they adopt that may or may not favour good nutrition. Search for identity; struggle for independence and acceptance; concern about appearance; vulnerability to peer pressure; and limited concern for health are features that are quite typical of adolescents, and have a bearing on diets (Spear, 1996 and WHO, 2005). Unfortunately, more often than not these eating habits are likely to lead to poor food choices rather than good ones with girls being more exposed than boys to inadequate intakes because of dieting, lower energy intake, social discrimination, and pregnancy (Ganasegeran *et al.,* 2012). This makes them more vulnerable to effects of eating habits. Most of the data that forms supporting evidence on this has been generated in developed country contexts.

Initial data on eating habits and associations between eating habits and nutritional status were reflected in early studies in developed countries. Kilindera (2006) reported that increasing incidences of malnutrition among adolescent girls in developed countries, believed to have adequate food, is linked to poor eating habits. According to Shepherd *et al.,* (1996) in a study conducted in California State, some eating habits appear to be common among adolescents. These included snacking, usually on energy-dense foods; meal skipping, particularly breakfast, or irregular meals; wide use of fast food, dieting low consumption of fruits, vegetables, and dairy products in some instances. A later study conducted in California by Videon and Manning (2003) established that one in five adolescents had skipped breakfast the previous day and 71% had taken less than the recommended vegetable servings. This shows the habits identified earlier were still evident, and tended towards poor eating habits that are likely to affect the overall nutrition status of girls during a very crucial stage of growth and development.

Although several studies have been carried out on eating habits, in developing countries they are mainly localized and targeted very small samples sizes making it difficult to conclusively establish the scope of eating habits and its impact on adolescent girls in developing countries. There is insufficient information on eating habits of adolescents in these contexts, to inform policies and programmes to support appropriate eating habits for optimal nutrition. Globalization, urbanization and nutrition transition greatly contribute to changes in eating habits mostly among youth in urban settings particularly in adolescent girls. With a possibility of these eating habits identified in developed countries have found their way to developing countries urban centres (Mallick *et al*., (2014). This could include rapidly urbanizing cities like such as Kisumu in Kenya.

Although poor nutritional status has mainly been associated with household food insecurity in developing country contexts (Mwadime, 2011), a potential role of eating habits, especially among adolescent girls cannot be ignored. Yamamura (2010) points out that there has been tremendous change in lifestyles due to western influence through the media and urbanization, which has impacted the general perception of beauty and perfection among this group and the society in general. Similarly, the Ministry of Foreign and European Affairs (2011) reported that contrary to the belief that food security solely determines nourishment in developing countries, eating habits and food culture tend to have a significant influence on nutrition especially among girls. This raises the question on whether, eating habits reported in developed countries may exist in developing country contexts such as Kenya, possibly contributing to some of the cases of under nutrition observed among adolescent girls; or whether eating habits observed are unique to developing country contexts.

2.4 Factors Influencing Eating Habits

Eating habits are determined by different factors among adolescents. Neumark-Sztaine *et al.*, (2012) in their assessment of adolescents' perceptions about factors influencing their food choices and eating behaviours, reported that hunger and food cravings, appeal of food, time considerations of adolescents and parents, convenience of food, food availability and parental influence determined how adolescents choose their food. Ganasegeran *et al.,* (2012) in his study in a Malaysian University reported that social and psychological factors were important determinants of eating habits among medical students aged 18-20. Videon and Manning (2003); as well as Adair and Popkin (2005) found a correlation between maternal education, place of food consumption, culture, food perception and body image with eating habits in adolescents.

Major barriers to eating more fruits, vegetables, and dairy products and eating fewer high-fat foods included a lack of sense of urgency about personal health in relation to other concerns, and taste preferences for other foods (Neumark-Sztaine *et al.,* 2012). Fitzgerald *et al*., (2010) further reported developmental differences between children's and adolescents' perceptions of factors influencing food choices with parental control diminishing and adolescents' exercise of increased autonomy over their food choices compared with children. Factors such as the quest for independence and acceptance by peers, increased mobility, and greater time spent at school/college and/or work activities and preoccupation with self-image may affect adolescent's food choices. Busy schedules may lead to meal skipping and snacking (Barooa, 2012). All these factors are likely to contribute to the reported erratic and unhealthy eating behaviours that are common among adolescents.

Age has been found to be predictor of dietary habits not only when comparing children and adolescents, but also when consumption in different age groups within adolescence is investigated (Henningsen, 2011). Socioeconomic position is a key determinant of eating habits as reported by several studies, according to Davies *et al.,* (2009) socio-economic factors some of the most formidable and least changeable. Several studies have found that families with low socioeconomic position tend to have unhealthier diets than those with higher socioeconomic position (Fahlman *et al*., 2010, Nilsen *et al*., 2009). Adolescents from low position families often have a lower consumption of fruits, vegetables (Bere, *et al.,* 2008); Proos *et al.,* 2012*)* and dairy products (Larson *et al*., 2006) than adolescents with higher socioeconomic position.

Self- esteem has been associated with eating habits. (Kansi *et al*. 2003, Daee *et al*. 2002, French *et a*l. 2001)   reported that low self-esteem is a risk factor for developing eating

disorders, and generally plays a role in development of eating habits especially among girls. However, Soo *et al*. (2008) found self-esteem to only be associated with binge eating, but not restrained dietary habits, which was associated with the fact that attitudes from peers and observation of their habits have shown to influence both self-esteem and body image in adolescent girls. However the study noted that, culture, religion, body image, habit, cost, media were of high significance in adolescent girls eating habits than boys. Using the Rosenberg Self-Esteem Scale, it will be interesting to assess the self-esteem of school going adolescent girls in Kisumu city as further analyse if it influences eating habits

2.4.1 Eating Disorders

Eating disorders influence dietary habits. These disorders are marked by extreme severe disturbances in eating behaviour, such as extreme reduction of food intake or extreme overeating, or feelings of extreme distress or concern about body weight or shape (National Institute of Mental Health, 2007). Eating disorders are complex illnesses that have been reported to affect adolescents with increasing frequency. They rank as the third most common chronic illness among adolescent females, with an incidence of up to 5% in developed countries (Mitchell *et al.,*2005); a rate that has increased dramatically over the past three decades. Three major subgroups of the disorders are recognized: a restrictive form, in which food intake is severely limited (anorexia nervosa); a bulimic form, in which eating is followed by attempts to minimize the effects of overeating via vomiting, catharsis, exercise or fasting (bulimia nervosa); and binge eating defined as recurrent consumption of objectively large quantities of food in a defined period (DSM-IV, 1994). Eating disorders are related to the severity and duration of dysfunctional dietary habits (Adolescent Medicines Committee, 2005); and are therefore associated with poor nutrition status.

There is limited data on eating disorders in developing countries with most studies confined to developed countries. Given that eating disorders affect food intake, they are likely to influence eating habits particularly among adolescent girls who are most vulnerable to eating habits in comparison to other groups (Szabo *et al.,* 2009). Eating disorders have been reported to affect food choices and eating habits particularly among adolescent girls and young women in developed countries. Habits established during childhood and adolescence (including eating habits) tends to persist into adulthood with consequences for long-term health (reference). There is however, lack of information on the existence of eating disorders in African contexts.

2.4.2 Nutrition Transition and eating habits in Developing Countries

Developing countries have experienced an accelerated rate of development and urbanization during the last decades, causing rapid livelihood changes, (Popkin, 1999). This has resulted in changes in cultures and food ecology among communities in developing countries. There is a rapid nutrition transition mainly in urban areas. Societal transition has further resulted in an influx of people from rural areas to urban areas. This migration is coupled with lifestyle and food supply changes that have led to diet changes (Egolf *et al.,* 1992).

Urban diets show shifting trends from diets rich in fibre, minerals and vitamins to greater consumption of polished grains, food higher in fat, more animal products, more sugar, and more processed foods (Lasker *et al.,* 1994). These processes have made urban populations in lower income countries more susceptible to overweight, obesity and lifestyle related non-communicable diseases (Popkin, 2002). This transition is likely to lead to adoption of new eating habits among adolescents that are traditionally not practised particularly in urban areas. Ganasegeran *et al.,* (2012) noted that adolescents in rural and urban areas are likely to

be affected by this transition, adolescents in urban areas were three times more likely to be affected by these changes and therefore more likely to adopt new eating habits.

Urbanization has also led to increased number of fast food and vending shops. Most adolescents eat away from home; therefore, habitually buy food from these stores as they are convenient and mostly cost effective (Adair and Popkin, 2005). Food taken by adolescents is very high in energy but inadequate in essential nutrients such as iron, vitamin A vitamin D and Zinc (Durrani, 2005; Esfarjani *et al.,* 2005; Mac Keown *et al.,* 2005). Rapid urbanization and its impact on societal norms is likely to have affected socio cultural factors that traditionally determined eating habits.

Studies in African and Asian countries show that nutrition transition linked to urbanization and globalization has led to changes in eating habits particularly for urban dwellers. The most affected populations are adolescent girls because of cultural and biological predispositions that make them more vulnerable than boys. A study by WHO, (2006) reported that obesity and societal recognition of thin women contributed to unhealthy eating habits among adolescent girls in both developed and developing countries in Europe and South America. The study also reported that eating habits in developing countries such as, Bangladesh, Malaysia, Pakistan and Palestine give a strong indication that there is a shift from the traditional eating habits to western meal patterns. WHO, (2006) identified increasing number of fast food outlets, meals consumed away from home as factors leading to poor eating habits that ultimately explained increasing prevalence of obesity and non-communicable diseases in developing countries including Africa. It is therefore important to pinpoint what factors determine eating habits among adolescent girls in Kenya, to see if the adolescent girls in a Kenyan context are affected by some of the factors identified in this literature review.

Kisumu being a rapidly growing City in Kenya will provide a good setting to assess these eating habits and how they impact nutrition status of adolescents. There is therefore the need to assess factors affecting eating habits in Kisumu to see if and how they compare to those reported above in developed countries to gain insights on adolescent nutrition in a developing country context.

2.5 Eating Habits and Nutritional Status of Adolescent Girls

Concern over adolescent obesity has mounted due to its rapid increase in prevalence, its persistence into adulthood, and its associated morbidity and mortality (WHO, 2006). According to Muammar, Nilsen *et al.,* (2009) numerous studies have demonstrated an association between body weight and eating behaviour: with adolescents who regularly skipped meals especially breakfast and snacked on energy dense foods likely to have higher weight. To the contrary, findings by El-Shafie and Feroze, (2012) showed no significant variation between BMI category and dietary patterns, the dietary pattern of the adolescent females and eating breakfast was associated with more regular eating habits and exercise patterns, healthy food choices and consistent energy intake in children and adolescents. In the United States Rampersaud (2005) reported that although cross sectional studies noted that eating breakfast was associated with a reduced risk for overweight or obesity, in his study in 2009 longitudinal studies were ambiguous and appeared to be mediated by factors such as initial BMI status, physical activity, energy intake and dieting behaviours. Some studies pointed towards an association between eating breakfast and lower BMI, whilst others found either no association or an opposite association between the two, findings that were corroborated by Mesas (2011). It is therefore difficult to conclude if skipping meals has any implication on the nutrition status of adolescent girls. These findings may suggest that associations between dietary habits and nutrition status could differ in different contexts.

In a longitudinal study in 2005 – 2006, higher snacking frequency was associated with higher total calorie intake. Adolescents who had 4 or more snacks in a day consumed over 1.5 times as many calories as did adolescents who reported no snacks (Rhonda, 2010). Although this study associated snacking with increased total caloric intake snacking more frequently was not related to BMI in adolescents. This study however did not report on activity level of the adolescent girls. Steiner-Asiedu *et al.,* (2012) in his justification to carry out a study on Snacking Habits in Junior High School Students in Ghana reported adolescents snack frequently but their choice of snacking foods may be poor. This, he noted, puts them at risk of being overweight. His study however found an inverse relationship between the frequency of snacking daily and the increase in BMI citing snacking may also be associated with less frequent consumption of meals. Considering that high caloric intake is associated with weight gain mostly in adults, it important to understand how snacking affects overall nutrition status on adolescent girls in developing countries to see if the trends persist as well assessing how binge eating, vegetable and fruit consumption are likely to impact nutrition status of adolescent girls.

The above literature review shows that under and over nutrition is a concern among adolescent girls, who practise various eating habits that need further analysis especially in a rapidly urbanizing town like Kisumu to assess how they compare to those identified in developed countries that may exist. There is a need to assess factors influencing eating habits and finally determine whether adolescent eating habits in Kenya could explain malnutrition (either under or over nutrition) by analysing the relationship between eating habits and nutrition status of school going adolescent girls

CHAPTER THREE: RESEARCH METHODOLOGY

This Chapter describes methodological procedures used in the study. It includes description of the research design, study area and population, sampling, data collection tools and data analysis methods that have been used.

3.1 Research Design

A cross-sectional study design was used where information on adolescent girls' eating habits, attitudes, relevant social, cultural and economic factors; and perceptions about food information was gathered. Anthropometric, weight and height, measurements were taken to assess nutrition status.

3.2 Study Area

The study was undertaken in Kisumu City, in Kisumu County, the third largest multi ethnic City in Kenya, the city is predominantly inhabited by the Luo community but also other communities from all over the country including Indians. It is the leading commercial/trading, fishing, industrial, communication and administrative centre in western Kenya. The county shares 52.4% of the national urban population nationally (KIRA, 2014)

Kisumu City has an unemployment of about 30%. Fifty-two percent of the working population is engaged in informal activities with monthly wages in the range of $30-$40 (Kenya National Bureau of Statistics and ICF Macro. 2010). About 48% of the urban population lives within the absolute poverty bracket. The main sources of income for the poor in this town include: wage employment in manufacturing and processing plants, petty/informal trade, public transportation (boda boda). Key health challenges facing Kisumu

City include high HIV and AIDS infection, Malaria and water borne diseases contributing to the high mortality rate.

3.3 Study Population

The study was carried out among school going girls ages 14-19 years in Kisumu City. It has a population of 390,164 and an approximate population of 28,296 girls aged 14-19 years (Kenyan Census, 2009), while 24,759 (87.5%) were attending school (Kenya National Bureau of Statistics and ICF Macro 2010.).the study population was therefore 24,759 school going adolescent girls in Kisumu City

3.4 Sample Size Calculation

The sample size was determined based on the most demanding indicator. WHO recommends the use of BMI based on weight for height as the most reliable measure of nutrition status in adolescents Fisher et a*l*., (1999) equation for representative sample for proportion in large populations   was used.

$n = $ $\underline{Z^2pd}$

d^2

where :

n=the desired sample (if the target population is greater than 10,000)

Z= value of specified level of confidence, set at 1.96

p= the population of adolescent girls

q= 1-p

d= the level of statistical significance set at 0.07

Considering

$Z^2=1.96$

P=0.5

q=1-0.5=0.5

d=was set at 0.07

$$n= \frac{(1.96)^2 (0.5) (0.5)}{(0.07)^2}$$

n = 196

Studies by Krista *et al., (*2001) and Gallant *et al.,* (2001) in adolescent girls indicate a non-response rate of 5% to 7%. To cater for non-response a conservative additional figure of 10% was included in the sample to give 215 girls. Considering that data was collected during sports time break as permitted by schools administration to avoid interference with classes, it was expected that the selected girls might not be available and therefore sample size was increased by a further 10% to 235 school going adolescent girls were selected this study.

3.5 Sampling Procedure

The sampling frame included all adolescent girls aged 14-19 years in day schools in Kisumu City. The sampling unit was an adolescent girl aged 14-19 years in day schools. Two stage sampling strategy was used, where a list of all public mixed-day and girls secondary schools was obtained from the Ministry of Education. At the first level stratified sampling was used three schools were randomly selected from a list of all schools in Kisumu City. A list of girls from all schools bearing admission numbers which are unique to each student irrespective of their class was created from the selected schools register books. A representative sample of 235 girls was randomly selected. A list of randomly selected student admission numbers were recorded and then referenced to the school. The list from each school was provided to research assistants and school administration were able to provide the names of the students upon provision of the list of admission numbers. Following this sampling procedure 97 girls

in Lions, 76 girls in Xaverian and 62 girls in Kisumu Highway Secondary were randomly selected.

3.6 Data Collection Instruments and Procedures

3.6.1 Data Collection Instruments

A questionnaire was administered to each selected adolescent girl to elicit information on household characteristics, eating habits, factors affecting eating habits; weight related attitudes and behaviour assessment measured on a 4-point Likert scale; while self- Rosenberg 10-item was used to asses self-esteem scale (Survey Questionnaire: Annex 5) Etek City® High Precision Digital Weight Scales were used for weight measurement; and Seca 217 Stadiometer for Mobile Height Measurement.

3.6.2 Data Collection Procedures

Data was collected by 8 research assistants, 4 were undertaking their Master's Degree while the other 4 had an Undergraduate Degree from Maseno University. All the Research assistants underwent a 2-day training on anthropometric measurements, interview skills and reviewed the questionnaire.

3.6.2.1Anthropometric Measurements

Nutrition status was primarily determined using BMI for age, computed from height and weight. Height and weight measurements were taken by research assistants. Standing height was measured, read and recorded to the nearest 0.1cm as recommended by WHO. The adolescent girl was positioned onto the large base plate of the stadiometer standing straight without shoes, with the back of the head on the sturdy facing straight ahead, feet together, knees straight, and heels, buttocks, and shoulder blade in contact with the sturdy. The head

piece was lowered slowly until it touched the head, and readings were taken by the research assistant. Two measurement readings were taken per subject and averaged to get the accurate height. Where differences between the two measurements was greater than 0.2 cm a third measurement was taken; and the two closest readings averaged.

Seca 217 Stadiometer for Mobile Height Measurement was used because it is one of the most reliable and accurate height measurement equipment (Seca Limited 2011) this is because all the connections are very stable and the space between wall and rod prevent the rod from wobbling and trembling, movements which impair measurement accuracy. While the spacer provided extra stability and ensures precise measurement results. Since the research assistants needed to move from school to school it was convenient to carry the Stadiometer as the measuring rod could be taken apart in just a few steps and conveniently carried anywhere with the integrated handle.

Weight was taken using Etek City® High Precision Digital Weight Scales and recorded to the nearest 0.1kg. The scale was placed on a flat hard surface and standardized. The adolescent girl then stepped onto the standardized scale without shoes and sweater and looked straight ahead as the research assistant took two readings that were recorded and later averaged to give the most accurate weight. The scale was standardized every morning with a standard weight of 5kg before each weight measurement. Since there was need for very accurate and reliable measurement the Etek City® High Precision Digital Weight Scale was chosen because of its high-precision sensors that ensure most accurate weight readings. Two measurements were taken and the two acceptable measurements were recorded and the average reported.

3.6.2.2 Administration of the Questionnaire

Information on eating habits: snacking, binge-eating, skipped meals, fruit and vegetable consumption in the past two weeks; and frequency of eating habits practised in the past 14 days, was collected from the selected girls using the survey questionnaire. Information on when the eating habits was practiced, the most common food, its source, reasons for practising the identified eating habits and where it was done, was also collected. Information on cultural factors was also collected through the questionnaire.

3.6.2.3 Weight-Related Attitudes

Data on attitudes related to weight and dieting were collected using questions designed. Data on perception of weight status was collected by asking participants how they would describe themselves. Importance of body weight was also assessed on a 4-pointLikert scale ranging from "very important" to "not at all important. Here the participants described how important their body weight was.

3.6.2.4 Self Esteem

The Rosenberg Self-Esteem was used as a self-appraisal scale. Self-esteem can be described as a favourable or unfavourable attitude towards oneself. Low self-esteem is a lack of respect for oneself, with feelings of unworthiness, inadequacies and deficiencies (Rosenberg M., 1965). The Rosenberg Self-Esteem Scale is a 10-item scale. On a 4-point Likert scale, respondents indicated the level of their agreement with statements ranging from strongly agree to strongly disagree (Rosenberg M, 1956) with statements on how they felt about themselves (see appendix 5).

3.6.2.5 Household Characteristics

Questions on socio-demographic characteristics were adapted from the Kenya National Bureau of Statistics (2004), (CBS, 2004). The following variables were assessed by asking adolescent girls about; the total number of household members, number of adolescents and number of adolescent girls was collected. Further data on household characteristics such parental education and occupation were also collected.

3.7 Validity and Reliability of Instruments

Questionnaires were pre-tested on 15% of the sample size who qualified to be included, the questionnaire was pretested at Jalaram Secondary school. To avoid prior discussion of the questions, the piloted school was not part of the final data collection sample and thus was not be included in the final data collection.

Data was collected by 8 research assistants, 4 were undertaking their Master's Degree in Community nutrition while 4 had completed their undergraduate degree from Maseno University. All the 8 research assistants underwent a two-day training on anthropometric measurement, interview skill as well as went through the questionnaire to determine its suitability and ensure that each question was clearly understood.

For further quality assurance, height measurements were taken from flat surfaces with a supportive straight wall in place. While for weight measurements the weighing scale was calibrated using a known weight every morning and after every 20 girls and also placed on a hard flat surface during assessment. The research assistant took three heights and weight measurement of each girl and recorded the measurements to the nearest 0.1cm or 0.1kgs for height and weight respectively.

3.8 Measurement of Variables

3.8.1 Nutritional Status

Weight and standing Height were used to compute BMI for age using WHO (2007) recommended formula of

$$BMI = \frac{(Height\ in\ Metres)^2}{Weigh\ in\ Kg}$$

A formula recommended by WHO, (2007). BMI provides a good indicator for levels of body fat, and it is known that having a BMI that is either too low or too high is associated with an increased risk of ill health during childhood as well as later in life Dinsdale, (2011). BMI is also recommended because it is relatively quick and easy to calculate and as a result, is used for population surveys and by health professionals when assessing individual patients. BMI is therefore the most frequently used measure for assessing whether adults or children are obese, overweight, underweight, or a healthy weight.

CDC (2011) also reported that BMI is the commonly accepted index for classifying adiposity in adults and it is recommended for use in children and adolescents and like weight-for-stature, BMI is a screening tool used to identify individuals who are underweight or overweight. CDC further illustrates that because adiposity varies with age and gender during childhood and adolescence, BMI is age and gender specific and therefore qualifies the use of BMI as an appropriate measure of nutrition status. BMI is also universally accepted because it is a proxy measure of body fat, has clear cut off points that guide interpretation of individual nutrition status and also can be used as to track body size throughout life cycle making it very relevant to our study subjects.

BMI was classified as interpreted using Body Mass Index-for-age percentiles recommended by WHO (2007) 5 to 19 years Z scores. The nutrition status was classified as follows

    i.   Over weight $>+1SD$ (equivalent to BMI $25kg/m^2$)

ii.   Obesity > +2SD (equivalent to *BMI 30kg/m^2*)

iii.   Underweight   < -2 SD (BMI <18.5kg/m^2)

iv.   Normal (equivalent to BMI 18.5- 24.9 kg/m^2)

3.8.2 Eating Habits

Snacking is a categorical variable that was measured based on the number and frequency of taking meals in between the three standards meals. Binge eating, a categorical variable (binge eating yes/no) that was measured by the frequency with which an individual has episodes of uncontrolled eating resulting in excess consumption of food in a sitting. A person was considered to be a binge eater if at least one episode of bingeing was reported. A participant was considered to have skipped a meal if she consumed less than 67% (less than 3meals) of the normal daily meals. An adolescent who had less than 2 servings of fruits or vegetables per day was considered to have a low vegetable and fruit intake.

3.8.3. Socio-Cultural Factors

Socio-cultural factors included psychosocial factors, cultural factors, and household characteristics. Psycho social factors included weight related attitudes and self-esteem.

3.8.3.1 Weight related attitudes

Weight related attitudes were measured on a Likert scale with responses ranging from 1 (very important) to 5 (not at all important). Adolescent girls who scored the lowed were rated as viewing their weight as very important were classified as vulnerable to nutrition problems while those who feel their weight as not very important were classified as not vulnerable to nutrition problems as illustrated in appendix 5

3.8.3.2 Self Esteem

Self-esteem was assessed using a Rosenberg 10-item self-esteem tool based on a 4-point Likert scale. Items are answered on a four-point scale - from strongly agree to strongly disagree on 10 statements. Each statement is scored as Strongly Agree =3, Agree =2, Disagree=1, Strongly Disagree=0, statements with an asterisk are reverse scored, that is, Strongly Agree =0, Agree=1, Disagree=2, Strongly Disagree=3. The scores for the 10 items are summed and range from 0 to 30. The higher the score, the higher the self-esteem. A score of 15 or less shows low self-esteem while a score above 15 shows high self-esteem.

3.8.3.3 Household characteristics

Household characteristics assessed included, household economic status based on the mothers, fathers and older sister's main occupation and level of education attained based on the , maternal and paternal level of education was also assessed. Number of people in the household, number of adolescents and number of adolescent girls was assessed.

3.8.3.4 Cultural factors

This included factors such as whom food was consumed with, where it was sourced

3.9 Statistical Data Analysis

Data was entered in SPSS version 20, before analysis the data was cleaned and in case of any missing information, the questionnaire was referred to and the data updated. BMI was determined by taking the average weight in kg and dividing with the average weight in metre squared. The BMI for age was then categorised into Obese (<30), overweight (25-29.9), normal weight (18.5-24.9) and underweight (< 18.5), nutrition status was then described using frequencies and percentages to show the prevalence of overweight, obesity, normal weight and underweight.

The prevalence of eating habits and eating disorders were described using frequencies and percentages. Social cultural factors: household characteristics, were described using frequencies and percentages, self-esteem was analysed as per Rosenberg model and then categorised, girls who scored less than 15 being categorised as having low self-esteem and coded as 0 while those who scored more than 15 were categorised as having high self-esteem and coded 1 this was then run using descriptive statistics to yield percentages. Weight related attitude that was defined as importance of body weight was described using percentages. Associations between eating habits and socio, cultural factors that demographic and cultural factors was determined by odds ratio generated using binary and multiple logistic regression while the relationship between eating habits and nutrition status was determined using linear regression with BMI as a dependent continuous variable while eating habits were independent variables.

3.10 Ethical Considerations

A letter of permission to proceed with the study was obtained from the School of Graduate Studies Board. Permission to conduct the study was obtained from the National Council for Science and Technology in the Ministry of Science and Technology where a research permit was granted (Appendix 1), with additional approval obtained from the Ministry of education in Kisumu Appendix 2).

CHAPTER FOUR: RESULTS

Results of the research work are presented in this section. The areas covered include: socio demographic status indicators of the household, nutrition status, and dietary intake, eating habits, knowledge on nutrition, self-esteem, and associations between different eating habits and nutrition status.

4.1 Respondents Characteristics

Of the 235 adolescent girls interviewed, only 226 provided all the information required in the questionnaires, the 9 girls were not willing to have their weight and height taken and did not provide most of responses to the questionnaire, hence a 3.8% non-response rate. Since their data was not adequate it was exempted from analysis. Most of the girls (56.2%) who responded were aged between 16 to 17 years, only 7.1% and 5.8% were aged 14 and 19 years respectively. The mean age of the adolescents was 16.34±1.3.

4.2 Nutrition Status of School Going Adolescent Girls in Kisumu City

BMI for age was used to assess the nutrition status of adolescent girls, based on WHO recommendations. Most of the girls (61.5%; n=139) whose weight and height were taken, had a normal BMI of 18.5 to 24.9, 29.2% were overweight, only 4.4 % were underweight and 4.9% were classified as obese. Summary results on BMI for age among adolescent girls are illustrated in figure 4.1below
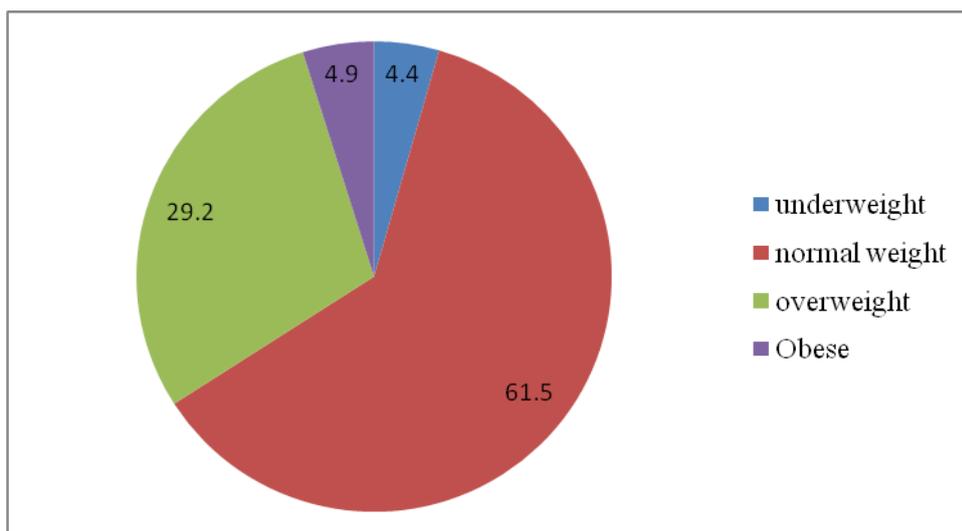
Figure 4.1: Overall distribution of nutrition indicator BMI

The prevalence of overweight and obese girls was significant. Assessment of BMI for age distribution per class showed that most overweight girls, (41.5%) were in form 2 while form 4 had 10.8% of obese girls. However, 78.0% and 75.7% of the girls in Form 3 and 4 had normal weight. Table 4.1 below summarizes distribution of BMI per class.

Table 4.1: BMI classification by class

Class	Underweight (%)	Normal weight (%)	Overweight (%)	Obese (%)
Form 1	4.1	58.9	35.6	1.4
Form 2	6.2	44.6	41.5	7.7
Form 3	6.0	78.0	14.0	2.0
Form 4	0	75.7	13.5	10.8
Total				

*Data is indicated as % of adolescents in each category

Prevalence of overweight was higher in the lower classes (form 1 and form 2), although most of the obese girls were in form 4. There was however no distinct pattern observed in the distribution of obesity across classes. The largest proportion of girls in all the classes had a normal BMI with form 3 and 4 having the highest percentage of girls with normal weight. No distinct pattern was observed in the distribution of underweight across the classes.

4.3 Eating Habits Practiced by School Going Adolescent Girls

Four eating habits identified through literature review were assessed among school going adolescent girls in Kisumu City. These included skipping meals, snacking, binge eating, vegetable and fruit consumption

4.3.1 Skipping Meals

In this study meal skipping was described as taking less than 67% of the daily three meals (breakfast, Lunch and Dinner), ideally missing one of the three major meals. About 82.7% had skipped one or more meals in 7 days preceding the interview day. Most girls, 59.3% reported missing breakfast, 40.7% and 26.5% had missed lunch and supper respectively. Breakfast was the most missed meal of the day.

4.3.1.1 Reasons for Skipping Breakfast

Most girls (62.8%) reported missing breakfast were late for school, 54.4% because they did not have time to prepare breakfast, 20.4% because they woke up late for school, 10.3% had to walk long distances to get to school and therefore decided to go to school without breakfast. Most girls had tea with *"mandazi", bread or "chapatti"* for breakfast. About 9.3% did not either like taking breakfast or feel like taking it. Other reasons given included being satisfied, having woken up late, lack of appetite, not feeling well, fasting and not being used to having breakfast. An interesting 0.8% skipped breakfast because it was not available. About 18.7% of 226 girls had missed breakfast 14 times, indicating that they had missed breakfast every morning, 16.7% had missed twice, 13.3% once, 11.7% three times, 10.8% five times and 10.0 four times. About 19.2% had missed breakfast between 6 to 7 times.

4.3.1.2 Reasons for Skipping Lunch

All the schools from which the respondents were sampled prepared lunch. However, in addition to tuition fees parents were expected to pay for the meals. Therefore, only girls whose parents had paid for school meals were allowed to get food from the school cafeteria. All the schools prepared a mixture of maize and beans and had rice and beans once a week on Wednesdays. About 40.7% (n=92) of the girls had missed lunch at least once within two weeks preceding the interview dates.

Of those who skipped lunch, 57.4% did not feel like taking the food prepared in school; and 23.8% did not take lunch because they were dieting or watching their weight. Other reasons given comprising of 18.8% of all reasons reported, included: food not appetizing, not well cooked, revising for exams, fasting for religious reasons, working on assignments, not feeling well and lack of money to either pay for lunch in school or buy from the nearby *kiosks*. About 30.1% of the girls had missed lunch twice in 14 days, 22.9% had missed most the once, 14.5% had missed thrice and 32.5% had missed between 4 to 14 times. A significant number of girls missed lunch often.

4.3.1.3 Reason for Skipping Dinner

Students left school between 5 and 7 pm. All the respondents were expected to have dinner at home. Of the 226 girls interviewed 60.8% indicated that dinner was served between 8pm and 9pm while the rest had dinner much later in the evening between 10-11 pm. Reasons given for skipping dinner included: not liking what had been prepared, had taken tea when they arrived home from school, supper was served late and they were too tired to take it, lack of appetite, working on homework, slept before dinner was ready. Less than 1% indicated that there was no dinner prepared in their house because there was no food. Lack of food still contributed to skipping dinner.

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About 30.0% of 60 girls who had missed dinner skipped it once, 18.0% twice and 14.0 % three times, 38.0% had skipped 4 to 14 times.

4.3.2 Snacking

Snacking was described as taking food in between three major meals (breakfast, lunch and dinner), the snacks were classified as either healthy or unhealthy, and 73.0% of the respondents reported snacking in the last 2 weeks. Most snacks 95.4% consumed were unhealthy foods which included chips (36.4%), biscuits (10.3%), '*mandazi' and chapatti'* (10.7%), crisps (5.7%). Other snacks included: ice cream, sweets, '*bajia'* popcorns, kebabs and sausages. Most of the girls, 98% purchased the snacks from the school canteen and kiosks and hawkers around the school while only 2% carried snacks from home. Most girls snacked on unhealthy snacks.

Most of these foods (chips, *mandazi, bhajia and chapattis)* are sold as street foods in Kisumu making them easily accessible and affordable to adolescent girls. Only 4.6% of the snacks could be considered healthy; these were mangoes, roasted maize, porridge and bananas. Although snacks were reportedly consumed throughout the day, they were mostly taken between 10-11am (15.6%) during the morning break and 6-7pm (26.3%), after school. Figure 4.2 below summarises sources of snacks
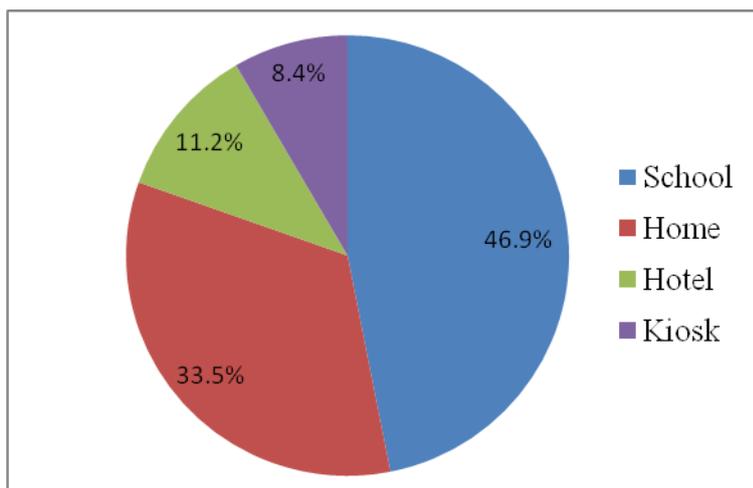
Figure 4.2: Sources of Snack

4.3.2.1 Reasons for Snacking

Most girls 26.5% (n=60), snacked because they were hungry 22.6 %(n=51) liked the snacks, 17.7% (n=34) were either given snacks or it was bought for them by friend, 15.0% had the snacks because it was cheap and 8.8% had either skipped breakfast or lunch. Figure 4.3 summarizes reasons for snacking
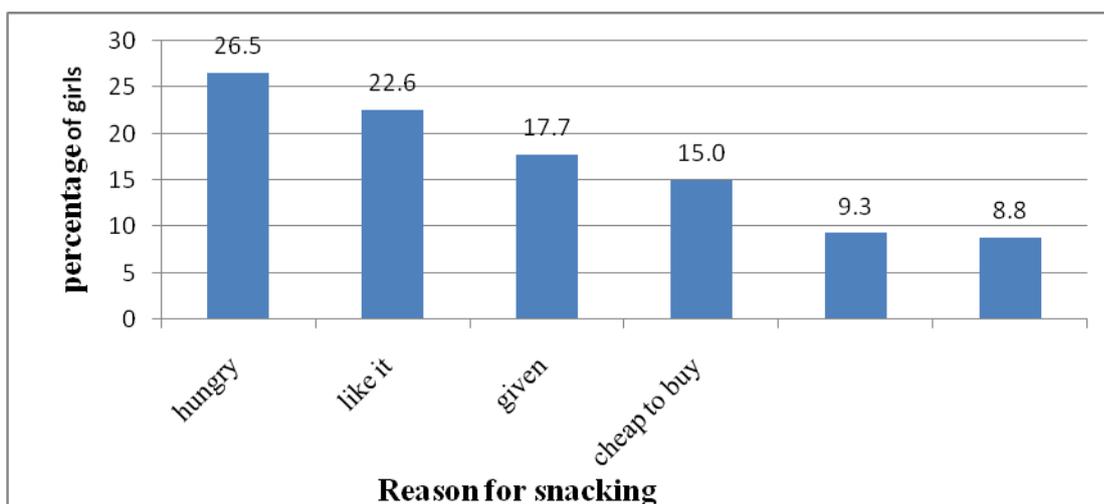
Figure 4.3 Reasons for Snacking

Based on this results most girls snacked because they were either hungry or liked the food.

4.3.3 Binge Eating

Binge eating was described as consumption of larger than normal amounts of food in one sitting as perceived by an adolescent girl. About 82% (n=92) had binge eaten, only 80.4% (n=90) of food binged on was healthy, this included: 27.2% rice with legumes or meat, roasted maize,' *ugali'* with fish or meat, bread, spaghetti. About 19.6% (n=22) of the food binged was classified as unhealthy (junk food defined as chips, crisps, ice cream, *mandazi, pizza, samosas,* pizza and sausages), 70% being chips and 30% comprising of crisps, ice-cream, *mandazi*, pizza , *samosa* and sausages. About 60.2% binged between 8.00pm and 9.00pm, which is mainly supper time. Bingeing episodes happened mainly when the girls were having meals with their families. Most of girls binged on healthy foods. Table 4.2 shows with whom the respondents were having food with when they binged.

Table 4.2: Who the respondents binged with

Whom food was consumed with	n	%
Sister/ Brother	15	6.5
Family	121	53.3
Friends	34	15
Alone	44	19.6
Classmates	12	5.6
Total	226	100

In this study however the 68% of girls reported bingeing because they had skipped lunch, were hungry, it was their favourite food, and availability of too much food.

4.3.4 Vegetable Consumption

Vegetable consumption over the last two weeks was assessed. Information on sources, number of times they were consumed in the two weeks and per day were obtained. More than a half, 68.6% (n=155) had consumed vegetables within the past 7 days. Although most girls had consumed vegetables, only 32.3%) had consumed vegetables at least 2 times every single day. Although a total of 155 had consumed vegetables 65.8%) had not had enough vegetables

while 31.2% \) had not had vegetables in two weeks. Vegetables were mainly taken at dinner time with 47.1% (n=73) taking vegetables at 8.00pm. The same number indicated that they had consumed vegetables at home with family members. Figure 4 4 illustrates type of vegetables consumed. Vegetable consumption was generally low.
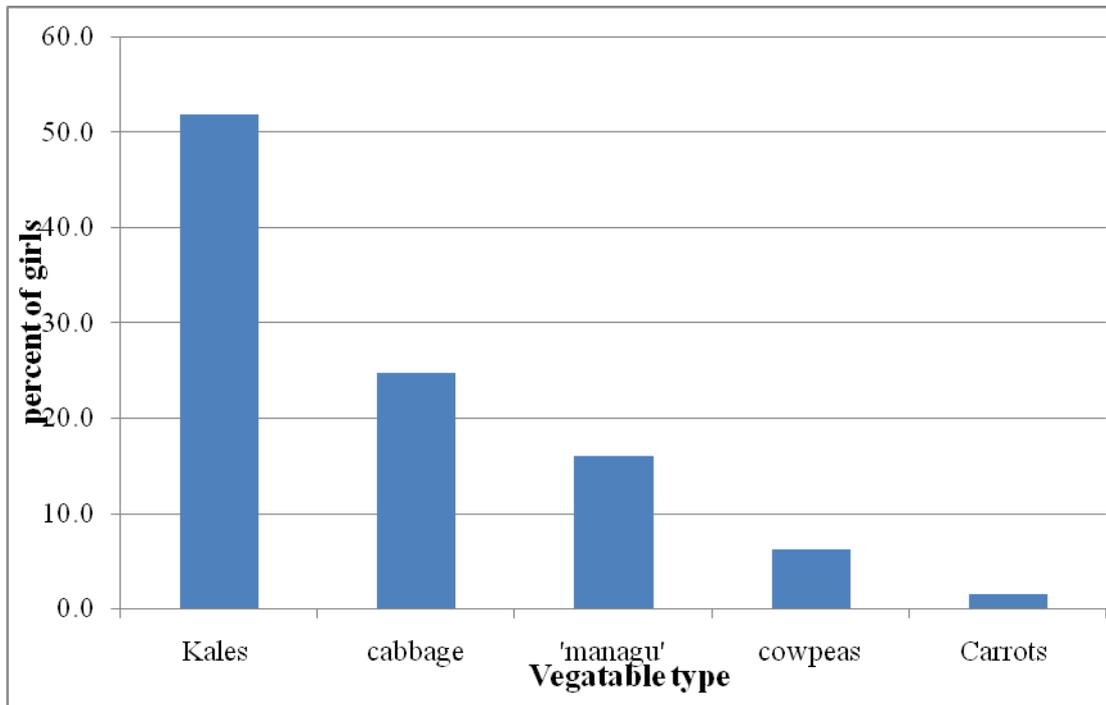
Figure 4.4: Type of vegetables consumed
Kales were the most consumed vegetables while carrots were least consumed.

4.3.5. Fruits Consumption

Only 41.2% had consumed fruits, 43% of the girls who had consumed fruits had at least two servings each day, the remaining 57% could not be considered as having adequate consumption of fruits while 58.8% did not have fruits at all in the last two weeks. About 50% of the girls who consumed fruits had taken them at home, mainly with family members. Figure 4.5 shows fruits consumed.
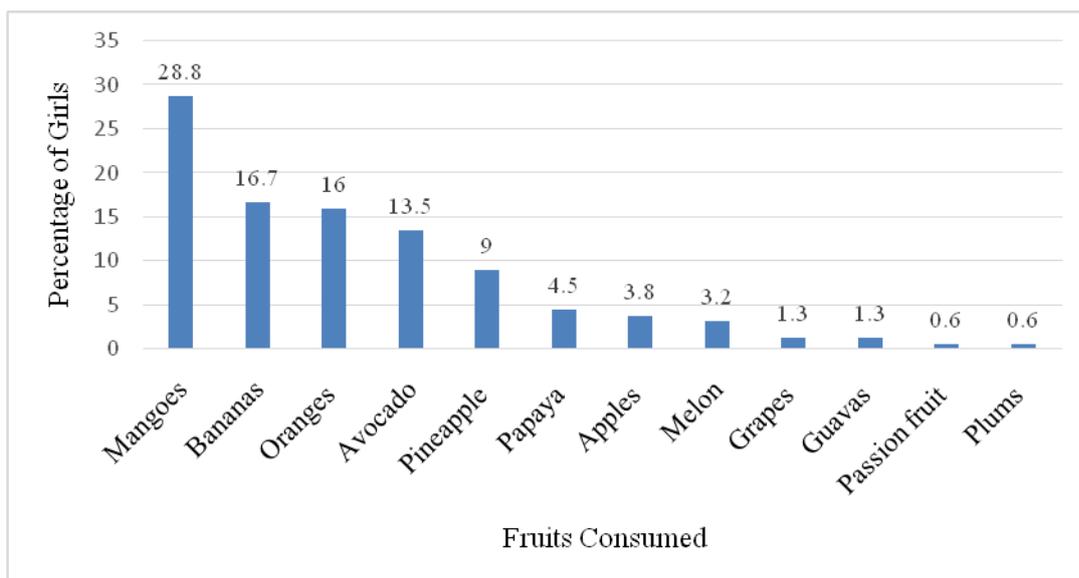
Figure 4.5: Fruits consumed by adolescent girls
Mangoes were the most consumed fruits while plums, passion and grapes were least

consumed fruits.

4.4 Factors Influencing Eating Habits

The third objective sought to identify factors that influence eating habits. Factors assessed

include: sources of food, nutrition education, body image and self-esteem, exercise, nutrition

education, dieting and eating disorders.

4.4. 1 Household Characteristics

The mean household number was 6.58±2.38; number of adolescents aged years14-19 was

2.45±1.45 per household. About 70.3% of the adolescents indicated that they were 1-3

adolescents in their family, 41.6% had one adolescent girl and 27.4% had two adolescent

girls. Household and participant characteristics are summarised in Table 4.3 below.

Table 4.3: Respondents and households characteristics

Participant age (Years)	Age		%
	14		7.1
	15		19.0
	16		30.1
	17		26.1
	18		11.9
	19		5.8
Parental education	**Level of education**	**Mother**	**Father**
	No formal education	13.0	4.9
	Primary Education	20.7	10.6
	Secondary education	22.6	23.4
	Tertiary education	35.7	46.4
	Not Applicable	8.0	14.7
Parental occupation	**Occupation**	**Mother**	**Father**
	Formal employment	12.7	36.7
	Businessman/woman	51.3	15.7
	Informal employment	17.4	18.4
	Housewife	20.6	-
	Unemployed	8.2	2.2
	Don't know what the parents do	0	12.3
	No parent	1.2	14.7

Table 4.3 above shows that majority of the participants' mothers (35.7%) and fathers (46.4%) had attained tertiary education. More than half (51.8%) of the elder sisters to adolescent girls had attained at least secondary and tertiary education. Parental occupation assessment showed that more than half of the mothers (51.3%) were engaged in business, most of the fathers 36.7% were employed. About 14.7 % of the respondents did not have fathers, 12.3% and 1.7% could not define or describe what their fathers and mothers did for a living respectively

4.4.2 Importance of Body Weight

Body was important to adolescent: 88.1% of the girls considered their bodyweight as either very important to them 70.8% 0r important (17.3%); while only 3.5% indicated that it was not at all important. Figure 4. 6summarises the percentage distribution of importance of body weight.
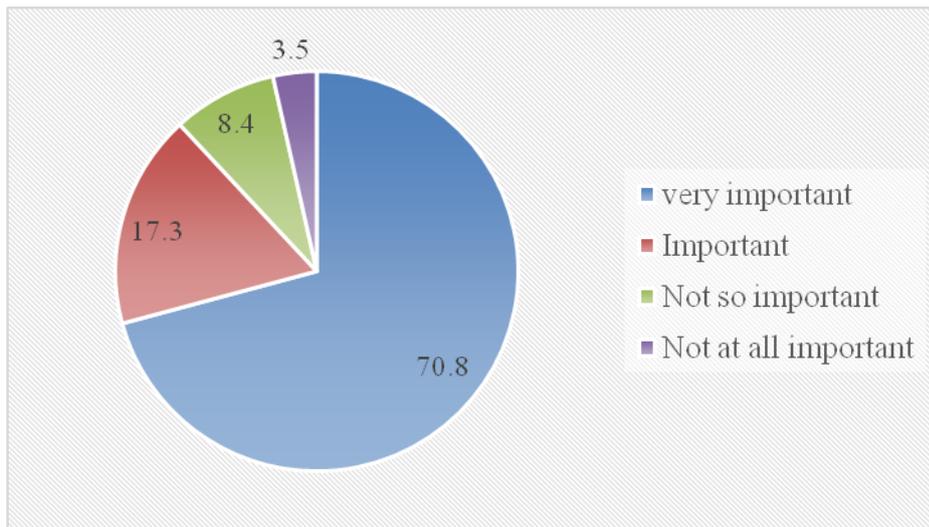
Figure 4.6: Importance of weight

4.4.3 Self Esteem

Self-esteem was assessed using a 10-item Rosenberg Self-Esteem scale which classifies self-esteem as high or low. About 79.2% (n=179) of the adolescent girls were classified as having low self-esteem as they had a score of less than15 on the Rosenberg Self Esteem Scale (appendix 5 section 7.1) and only 20.8% had a score of over 15, hence were classified as having a high self-esteem.

4.4.4 Eating Disorders

Questions adopted from the Eating Attitude Test-26 were used to assess the possibility of adolescent girls engaging in activities that could point to a risk of developing or having eating disorders. Table 4.4 below summarizes eating disorder assessment responses.

Table 4.4: Eating disorder responses

Measures of eating disorders	Yes (%)	No (%)
Have you made yourself vomit after eating food	15.2	82.2
Have you ever eaten more than enough food in one sitting	51.6	48.4
Have you ever used laxatives or Diuretics	2.6	96.7
Have you ever been treated for an eating disorder*	6.5	90.8
Have you ever attempted suicide (as a result of not liking your body or feeling depressed with how you look)	11	89

*Eating disorders in this study were defined as anorexia, compulsively avoiding food and bulimia where food was consumed and forcefully purged out

4.5 Association between Eating Habits and Social Cultural and Psychosocial Factors

To assess the association between eating habits and the above identified factors, bivariate logistic regression was used to identify factors that influence eating habits. Multivariate binary logistic regression was then conducted to determine factors that independently influenced eating habits.

4.5.1 Binge Eating

Bivariate logistic regression analysis of binge eating with psychosocial and socio cultural factors identified as having potential to influence eating habits show that maternal education, age of the adolescent girls and skipping meals increased the chance of binge eating while snacking and class reduced chances of binge eating. Table 4.5 below shows results of analyses on association between binge eating and social cultural factors that influence eating habits.

Table 4.5: Factors influencing binge eating

Variable		Odds Ratio	95% CI	*p value*
Mother's Education	No education *	Ref.	Ref.	Ref.
	Primary Education	4.09	1.23, 26.96	**0.04***
	Secondary education	5.76	1.89,26.96	**0.03***
	Tertiary Education	6.05	1.23,28.31	**0.02***
Class of the adolescent girl	Form 1*	Ref.	Ref.	Ref.
	Form 2	1.14	1.06, 1.34	**0.02***
	Form 3	1.41	1.18,1.94	**0.04***
	Form 4	1.81	1.34,2.96	**0.01***
Age		1.30	1.05,1.61	**0.02***
Skipping breakfast		1.76	1.02, 3.05	**0.04***
Skipping lunch		2.04	1.19,3.50	**0.01***
Snacking		0.18	0.08, 0.37	**0.00***
Vegetable consumption		2.71	0.87, 4.81	0.65
Fruit consumption		0.38	0.15, 1.56	0.08
Self esteem		2.44	0.91, 4.67	0.15
Importance of body weight		0.35	0.01, 1.86	0.12
Eating disorders		0.56	0.28, 5.82	0.09

*Comparison group for categorical variables with more than 2 categories. All other variables are yes/no variables with the "no" group as the comparison group, hence not indicated.
*p<0.05

The odds of binge eating increased with the level of maternal education, with adolescents whose mothers had tertiary education being 6.05 times more likely to binge eat compared to those whose mothers had no education. Girls whose mothers had secondary education were 5.76 times more likely to binge respectively in comparison to those whose mothers only had no education. Self-esteem, eating disorders and importance of body weight did not influence binge eating in bivariate logistic regression

The odds of binge eating also increased with age with older girls 1.3 times more likely to binge eat. Girls who had skipped breakfast were 1.8 times likely to binge eat, than those who had breakfast. Those who skipped lunch were 2.0 times likely to binge, and overall those who had reported skipping any meal at all were 2.7 times more likely to binge than those who did

not skip meals. Girls who snacked were 82.4% less likely to binge than those who did not snack.

Multiple regression analysis were carried out to identify factors that independently influenced binge eating. All the factors that had a significant influence on binge eating with p-value of less than 0.05 in the bivariate analyses were included in the multiple regression analysis. Table 4.6 below shows that only class, skipping meals and snacking independently influenced binge eating:

Table4.6: Factors that independently influence binge eating

Variable	Odds Ratio	95% CI	*p* value
Maternal education			
No education	Ref	Ref	Ref
Primary education	0.63	0.14,3.30	0.24
Secondary education	0.40	0.12, 4.36	0.70
Tertiary education	0.92	0.52, 2.98	0.11
Class			
Form 1	Ref	Ref	Ref
Form 2	1.05	1.08, 3.11,	**0.01***
Form 3	1.24	2.61, 4.54	**0.02***
Form 4	2.31	1.71, 5.29	**0.01***
Age	3.81	1.57, 7.15	**0.03***
Skipping breakfast	0.55	0.25, 1.19	0.13
Skipping lunch	1.48	1.07, 2.99	**0.04***
Snacking	0.24	0.04, 0.79	**0.02***

Results generated from multivariate logistic regression analysis; Ref: Reference group indicating the comparison group for categorical variables with more than two categories; p value less than 0.05

After eliminating the effects of other factors, maternal education and skipping breakfast did not have an influence on binge eating however, class, skipping lunch and snacking showed significant influence on binge eating. Girls in Form 4 were 2.3 times likely to binge eat than those in Form 1, odds of binge eating increased with age with older girls being 3.8 times more likely to binge than younger girls. However the odds of bingeing was76.4% lower in girls who snacked than in those who did not snack.

4.5.2 Factors that Influence Snacking

Bivariate regression analysis showed that girls who binge ate; consumed vegetables and fruits were less likely to snack reduced negatively associated with snacking. Table 4.6 below shows factors that influence snacking.

Table 4.7: Factors that influenced snacking

Variable		Odds Ratio	95% CI	*p* value
Mother's Education	No education *	Ref.	Ref.	Ref.
	Primary Education	2.09	0.23, 7.91	0.07
	Secondary education	1.61	0.89, 4.23	0.12
	Tertiary Education	0.65	0.23, 3.14	0.32
Class of the adolescent girl	Form 1*	Ref.	Ref.	Ref.
	Form 2	2.54	0.06, 5.33	0.32
	Form 3	3.41	0.18, 5.01	0.11
	Form 4	3.82	0.34, 7.96	0.08
Age		1.30	0.05, 2.81	0.21
Skipping lunch		0.24	0.19, 3.50	0.41
Skipping breakfast		2.47	1.39, 3.14	**0.02***
Binge eating		0.18	0.08, 0.37	**0.01***
Vegetable consumption		0.42	0.23, 0.77	**0.03***
Fruits consumption		0.25	0.16, 0.51	**0.03***
Self esteem		1.21	0.45, 6.45	0.70
Importance of body weight		0.23	0.09, 2.31	0.12
Eating disorders		0.34	0.08, 3. 26	0.17

Comparison group for categorical variables with more than 2 categories. All other variables are yes/no variables with the "no" group as the comparison group, hence not indicated.$p < 0.05$

Table 4.6 above shows that girls who skipped breakfast were 2.47 times more likely to snack while those who binge eat were 82. % less likely to snack, those who consumed vegetables and fruits were 58 % and 75% less likely to snack respectively. Psychosocial factors such as importance of body weight, and self-esteem did not have any significant influence on snacking.

In a multivariate regression analysis where effects of other factors were eliminated, only binge eating and fruit consumption, independently influenced snacking with the girls who

binge ate having a 71% chance of not snacking while those who consumed fruits were 2.4

times more likely to snack. as illustrated in Table 4.7.

Table 4.7: Factors that independently influence snacking

Variable	Odds Ratio	95% CI	*p* value
Skipping breakfast	1.94	0.83, 1.06	0.45
Bingeing	0.29	0.10, 0.81	**0.02***
Vegetable consumption	0.94	0.40,2.20	0.89
Fruits consumption	2.40	1.18,5.87	**0.02***

Results generated from multivariate logistic regression analysis; Ref: Reference group indicating the comparison group for categorical variables with more than two categories; p value less than 0.05*p value less than 0.05

4.5.3 Factors Influencing Skipping of Meals

Table 4.8 below shows factors that influenced eating habits

Table4.8: Factors that influenced skipping of meals

Variable		Odds Ratio	95% CI	*p* value
Mother's Education	No education *	Ref.	Ref.	Ref.
	Primary Education	1.02	0.13, 3.72	0.08
	Secondary education	1.83	0.24, 2.25	0.13
	Tertiary Education	3.22	0.63, 6.27	0.32
Class of the adolescent girl	Form 1*	Ref.	Ref.	Ref.
	Form 2	1.48	1.12, 2.95	**0.03***
	Form 3	1.89	1.34, 2.45	**0.02***
	Form 4	2.50	1.25, 4. 95	**0.01***
Age		1.57	0.05, 1.85	0.03*
Binge eating		2.18	0.68, 4.37	0.08
Vegetable consumption		1.42	0.73, 3.77	0.13
Fruits consumption		3.25	0.89, 7.51	0.28
Binge eating		2.96	1.33, 6.58	**0.00***
Self esteem		4.21	0.95, 6.25	0.20
Importance of body weight		0.23	0.09, 1.34	0.42
Eating disorders		0.34	0.08, 3. 26	0.08

Ref: Refers to the reference or comparison category where a variable has more than two categories; *p-value less than 0.05

Girls in higher classes were more likely to skip meals than those in lower classes. With Form

4 girls 2.5 times more likely to skip meals than those in Form 1; girls in Form 3 and Form 2

were 1.9 and 1.5 times more likely to skip meals respectively, than girls in Form 1. Girls who

binge ate were 3 times more likely to skip meals than those who did not binge eat. Girls who were older were 1.6 times likely to skip meals. Self-esteem, and importance of body weight did not influence skipping of meals.

In multiple regression none of the factors hada significant statistical association with skipping meals or with binge eating as illustrated in Table 4.9

Table 4.9: Factors that independently influenced skipping of meals

Variable	Odds Ratio	95% CI	*p* value
Class			
Form 1	Ref	Ref	Ref
Form 2	1.48	0.02, 3.45	0.18
Form 3	2.09	0.38, 4.15	0.22
Form 4	3.01	0.25, 6. 27	0.10
Age	1.87	0.01, 2.32	0.34
Binge eating	0.16	0.13, 2.58	0.62

Skipping meals was not independently influenced by any of the factors.

4.5.4Factors that Influenced Fruit Consumption

Age and binge eating were found to have a positive and negative influence respectively on chances of consuming fruits while skipping of meals, snacking and vegetable consumption were associated with increased chances of consuming fruits as illustrated in Table 4.10 below.

Table 4.10: Factors that influence fruit consumption (Bivariate regression)

Variable		Odds Ratio	95% CI	*p* value
Mother's Education	No education *	Ref.	Ref.	Ref.
	Primary Education	0.09	0.03, 1.71	0.08
	Secondary education	1.61	0.19, 2.43	0.21
	Tertiary Education	2.01	0.93, 4.17	0.34
Class of the adolescent girl	Form 1*	Ref.	Ref.	Ref.
	Form 2	2.48	1.22, 6.91	0.13
	Form 3	0.49	0.14, 2.65	0.72
	Form 4	4.51	0.85, 8. 15	0.11
Age		1.39	1.12, 1.73	**0.01***
Skipping lunch		2.33	1.35, 4.02	**0.00***
Skipping breakfast		2.47	0.39, 3.14	0.12
Binge eating		0.18	0.08, 1.37	0.31
Vegetable consumption		8.15	3.78,17.55	**0.03***
Fruits consumption		1.25	0.76, 3.61	0.09
Snacking		3.94	1.95,7.93	**0.01***
Binge eating		0.32	0.15,1.58	**0.01***
Self esteem		2.21	0.45, 6.45	0.10
Importance of body weight		0.93	0.19, 2.31	0.32
Eating disorders		1.14	0.18, 3. 36	0.17

*Data generated by bivariate analysis; *p-value less than 0.05

Girls who reported binging were 68% less likely to consume fruits. Girls who snacked, skipped lunch or consumed vegetables were 3.94, 2.33 and 8.15 times more likely to consume fruits. Chances of consuming fruits also increased with age. Psychosocial factors such as self-esteem and importance of body image did not have influence on fruit consumption

In a multivariate regression analysis only vegetable consumption, snacking a and age independently influenced fruit consumption, with girls who consumed vegetables being 6.8 times more likely to consume fruits as illustrated in the Table 4.11 below.

Table4.11: Factors that independently influenced fruit Consumption

Variable	Odds Ratio	95% CI	p value
Snacking	2.58	1.15, 5.76	**0.02***
Age	1.29	1.00, 1.65	**0.04***
Binge eating	1.56	0.66,3.66	0.308
Vegetable consumption	6.83	3.03, 15.39	**0.01***
skipping lunch	1.80	0.95, 2.06	0.07

*Data generated from multiple regression analysis; *p-value less than 0.05

5.5.5 Factors that influenced Vegetable Consumption

None of the factors significantly influenced vegetable consumption as shown in Table 4.11 below.

Table 4.12: Factors influencing eating vegetable consumption

Variable		Odds Ratio	95% CI	p value
Mother's Education	No education *	Ref.	Ref.	Ref.
	Primary Education	1.09	0.23, 7.91	0.07
	Secondary education	2.41	0.89, 4.23	0.22
	Tertiary Education	0.45	0.23, 3.14	0.12
Class of the adolescent girl	Form 1*	Ref.	Ref.	Ref.
	Form 2	3.54	0.06, 5.33	0.32
	Form 3	3.41	0.18, 5.01	0.11
	Form 4	3.82	0.34, 7.96	0.08
Age		1.30	0.05, 2.81	0.21
Skipping lunch		0.14	0.19, 3.50	0.41
Skipping breakfast		2.47	0.34, 3.14	0.20
Binge eating		0.28	0.08, 4.37	0.17
Vegetable consumption		1.02	0.23, 3.77	0.13
Fruits consumption		1.25	0.16, 3.51	0.09
Self esteem		1.21	0.45, 6.45	0.70
Importance of body weight		0.23	0.09, 2.31	0.12
Eating disorders		0.34	0.08, 3. 26	0.17

Vegetable consumption was not influenced by any of the factors in bivariate regression

4.6 Association between Eating Habits and Nutrition Status

Association between eating habits and nutrition status was assessed using multivariate linear regression analysis. Only vegetable consumption and skipping meals had a significant

association with BMI. The Table 4.12below shows bivariate regression results between eating habit and nutrition status:

Table4.13: The relationship between eating habits and nutrition Status

Variable	Mean BMI Difference	95%CI	*P* value
Vegetable consumption	0.19	0.11, 2.52	**0.005***
Fruits consumption	0.08	-0.43, 1.55	0.265
Binge	0.04	-0.69, 1.27	0.563
Snacking	0.01	-1.02, 1.18	0.887
Skipped meals	0.01	0.44, 1.23	**0.039***

*Data generated by bivariate linear regression analysis; *p-value less than 0.05

The table shows that BMI was higher by 0.19 in girls who consumed vegetables as recommended compared to those who did not. Girls who skipped meals had a negligibly lower BMI (0.01 kg/m^2)[1] than girls who did not skip meals.

Results of multiple regression analysis where the two variables, skipping meals and vegetable consumption were included, only vegetable consumption had a significant association with BMI. The Table 4.13below illustrates the multiple regression output.

Table 4.14: The relationship between eating habits and nutrition status

Variable	Mean BMI difference	95% CI	*p* value
Vegetable consumption	0.189	0.06, 0.32.	**0.01***
Skipping meals	0.023	-1.50,1.05	0.73

Data generated by multiple linear regression analysis; *p-value less than 0.05

The above results showed that consumption of vegetables is independently associated with a BMI higher by 0.19 (p =0.01).

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[*]BMI units are usually not reported.

CHAPTER FIVE: DISCUSSION

5.1 General Characteristics of the Participants

This study sought to assess relationships between eating habits and nutrition status of school-going adolescent girls in Kisumu City. The participants were girls aged between 14-19 years in three day schools in Kisumu City. The study had a good response rate with most of the respondents aged 16 and 17 years. Although the girls were randomly selected in each school, majority of the girls were in Form 1, could be because there was a higher number of students in junior classes and the number decreases towards the examination classes (Form 4) by about 10 to 15% per class according to school registers. Most of the girls were from households of sizes larger than the national average size of 6 reported by the Kenya National Bureau of Statistics, (2010) with most parents having attained tertiary education and mostly engaged in business and formal employment.

5.2 Nutrition Status of School Going Adolescent Girls in Kisumu City

On average, school going adolescent girls in Kisumu City had optimal weight within the WHO 5th to 85th percentile. Both under-nutrition and over-nutrition exists in adolescent school-going girls. The combined prevalence of overweight and obesity of 34.1% is higher than WHO, (2008) reported average of 27% in middle income countries and 14% among young women globally. The overweight prevalence in this study is therefore considered high because it is just short of double the global prevalence. This high prevalence is a source of concern, given that, as corroborated by Afework *et al.,* (2009), overweight adolescents are likely to be overweight adults with increased risk for lifestyle-related chronic disorders.

Although the prevalence of obesity reported in this study was lower than the 21% reported by CDC, (2012), it was higher than 4.2% reported in Ile-Ife, Osun (Sabageh & Ojofeitimi, 2013), 1.8% in Benue State (Musa *et al.,*2012) and 2.6% in Oyo state (Akinlade *et al.,*2014) all in Nigeria where most obese girls were in urban areas.The proportion of adolescent girls in Kisumu City who were overweight and obese was also higher than the 19.7% reported by (Lazzeri *et al.,* 2013) in a slum in India as well as the 11% total obese and overweight reported by Le´onie, *et al.,* (2010) in Cameroon among the urban middle class. This study therefore shows that the prevalence of overweight in Kisumu City is notably higher than what has been reported in other developing countries.

The prevalence of obesity in this study was also higher than weighted averages of overweight and obesity of 10.6% and 2.5% respectively (Muthuri *et al.,* (2014) in her systematic review of evidence of an overweight/obesity transition among school-aged children and youth in Sub-Saharan Africa. Both the Sub Saharan Africa review and the study in urban Cameroon however showed a difference in the nutritional status of adolescent girls in rural and urban areas; with body composition measures being higher among girls in urban areas compared to their rural counterparts. The high prevalence of overweight/obesity found in the current study are corroborated by findings by Muthuri *et al., (*2014), who reported that prevalence of childhood overweight/obesity has increased considerably in recent years; even though consistent or representative data from lower income countries is scarce. It is also consistent with overall growing trend among the general Kenya urban population that has seen a surge in overweight adolescents and adults across the country (Kyalo *et al.,* 2013).

Although WHO does not have a cut off on acceptable prevalence of obesity among adolescents, the high number of girls who are overweight means that there is a possibility of

those who are overweight to become obese in future, increasing their risk of lifestyle diseases in adulthood. The study in Cameroon showed some difference in overweight among adolescents from different social economic groups with 8% from low income, 11% from middle income and 9% of girls from high income households were overweight (Dapi *et al.*, 2009). Most of the girls in Kisumu came from middle income areas just as the middle class group in Cameroon that registered the highest level overweight therefore provoking the need to further research to interrogate the Barker hypothesis and its impact on the nutrition status of adolescent girls from middle income groups across the country.

The prevalence of underweight is relatively lower among adolescent school-going girls in Kisumu, than has been reported by most African studies. It is much lower than the 15.6% reported by Leenstra *et al.,* (2005) in Western Kenya schools, 58.3% reported by Afework *et al.,*(2009) in Tigray, Ethiopia, 56.4% reported by (Wasnak *et al.,* 2012) among adolescent girls in the rural Vizianagaram District of India that focused on adolescent girls in a welfare programme. It however closely compares with the findings of a study on adolescent girls in an urban slum in India ((Lazzeri et *al.,* 2008) that reported 8.7%, as well as 5% reported among urban adolescent girls in Yaounde (Dapi *et al.*, 2009).

The low prevalence of underweight in Kisumu in comparison to other studies could be attributed to the environmental and socio-economic structure of Kisumu City, an urban area with a relatively vibrant economy in comparison to the Indian District and Tigray studies. For example the studies in India's welfare program and rural Tigray were carried out in rural areas with high poverty index and very food insecure communities. Much as the prevalence of underweight among adolescent girls in Kisumu Citywas relatively low, considering underweight could mean sub-optimal nutritional status that is likely to affect adolescent girls'

health and productivity it cannot be ignored. Leenstra *et al.,* (2005) reported menarche and start of puberty were delayed by approximately 1.5-2 years in undernourished girls compared to a US reference population. This supports evidence of the role of optimal nutrition in development of adolescent girls. The prevalence of underweight in this study, albeit lower than reported by others, therefore calls for more attention to ensure that underweight girls attain optimal weight. It is also notable that the prevalence of underweight among adolescent girls is likely to be different in urban and rural settings, but was not addressed in the current study.

The underweight among school going adolescent girls in Kisumu City was much lower than what has been reported in Western Kenya by (Leenstra *et al.,* 2005) and Africa in general. However considering that optimal nutrition during adolescence in girls is likely to impact their productivity in future the presence of underweight in this group cannot be underscored.

5.3. Eating Habits

Snacking, skipping meals, binge eating, vegetable and fruit consumption were practised by the school going adolescent girls in Kisumu City. This is in keeping with the observation that adolescents tend to skip meals, binge and snack on non-healthy foods (Alexy, *et al.,* 2002; Hoglund *et al.,* 1998). This agrees with Moreno *et al., (*2007) whose findings stipulate that the period of adolescence is very crucial, involving a variety of physiological and psychological changes that usually affect dietary needs and eating habits.

Most girls had skipped one or more meals within the two weeks of the study. Breakfast was the most skipped meal with over a half of the girls missing it in the two week period while dinner was least skipped. These study findings corroborate study results in Nigerian urban

schools by Onyiriuka *et al.,* (2013)where 48.1% of the assessed school going adolescent girls admitted to skipping at least one meal a fortnight with breakfast being the most frequently skipped (46.3%) and dinner the least frequently skipped (21.5%). On skipping breakfast, this study echoes the findings reported by Gross *et al.,* (2004), Chin *et al.,* (2009) and Thompson-McCormick *et al.,* (2010) in Pakistan, China and Mexico respectively who also indicated that breakfast was the most skipped meal of the day among adolescents and young females. Onyiriuka *et al.,* (2013) and El-Gilany, *et al.,* (2012) also reported that breakfast was the most skipped meal while dinner was least skipped by school girls in Nigeria and Egypt. In Egypt Breakfast was consumed by 71.6% of students on daily basis, while daily intake of lunch and dinner were reported by 92.6% and 94.6% of students. Although the number of girls who took breakfast was much higher in Egypt than observed in the current study, breakfast remained the most skipped meal of the day while dinner was the least skipped meal in both studies.

Although breakfast is the most important meal of the day, most girls found it very challenging to consistently take it, citing lack of enough time as the main reasons for skipping breakfast, the same reasons cited by Soyer, (2008) in Turkey. This finding therefore reflects similar patterns among adolescents across two different geographical regions with breakfast being the most skipped meal of the day; and is contrary to the findings in Western settings that reflect a deliberate attempt to skip meals in order to maintain a perceived body image. However there is a need to further establish whether these trends occur widely in other African contexts. This will enable us further establish whether factors associated with skipping meals seen in Western contexts are also present in Africa.

Contrary to the belief that lack of food is the main cause of reduced meal frequency in developing countries (FAO, 2010), only 0.9% of the girls reportedly skipped breakfast because there was nothing to prepare in the morning. According to the education officer and head teachers in Kisumu City, girls were expected to be in school by 6.30am, as per the school regulations, most of them therefore woke up at 5.00am to prepare for school. This meant that since girls at this age culturally are expected to prepare their own and sometimes family breakfast, most of them found it difficult to prepare breakfast and even when they did they hardly had enough time to take it therefore leading to the high number skipping breakfast in comparison to lunch that was prepared by schools or bought within the school vicinity and dinner that was mostly prepared by caregivers or the rest of the family members. In this context therefore skipping breakfast, rather than being a conscious decision as is seen in Western contexts among girls trying to maintain a given body image, or as a result of food inadequacy may be rather as a result of lack of time.

The study showed that most girls had snacked within the past two weeks, mostly on unhealthy fast foods. This was also reported by Sibi, (2013) in a study in India that stipulated that adolescents frequently snacked and their snack selection was based on taste over nutrition. These findings also relate to the United States national survey data that reported 88% of adolescents consume at least one snack per day, with a range of 1 to 7 and snacks accounting for 25-33% of daily energy intakes among adolescents (Stang and Story, 2005). Chaplin and Smith (2011) also reported an 80.0% snacking with an average of 3 meals and 1.5 snacks per day resulting in 4.5 eating episodes among adolescent girls. The high rate of snacking on unhealthy food could be attributed to the availability and affordability of junk food sold around the school compound, it was observed, in the current study, that there were about 8-12 *kiosks* around the school that sold "*mandazis*" chips and biscuits. Although at

most 2 *Kiosks* sold fruits mostly oranges, mangoes, bananas and apples, these fruits were much more expensive than biscuits, chips and fizzy drinks.

Fruits were not frequently available, although most of the girls who ate fruits ate them as snacks rather than as part of the three main meals. Accessibility to street foods mostly chips, hawked biscuits and cheap fizzy drinks in the kiosks around schools and within the streets of Kisumu City could explain high level of snacking on unhealthy foods. This maybe a reflection of the findings by Wyshak, (2012) who illustrated that food choices made by adolescents while snacking are based on convenience, availability and cost of the snacks rather than the nutritional value. The snack choices in this study also agree with Stang and Story (2005) who showed that soft drinks are the most commonly chosen snacks for adolescent females and accounted for about 6% of total caloric intake. A study in Cameroon on eating habits by Le´onie *et al.,* (2010) also reported that food from vendors is cheap and consists mostly of junk food. This study's findings therefore corroborates that adolescents in the urban area were therefore accustomed to buying junk food from vendors during break times, at lunch and in-between meals.

Most of the snacks in this study were however taken around break time at about 10.00-10.30am and the most common reason for snacking was hunger. Considering that a significant number of girls had missed breakfast, snacking could therefore have been a compensatory mechanism to make up for missed breakfast while the choice to snack on junk food could be based on convenience as well as affordability. This also showed that despite the fact that most parents paid for lunch as part of school fees, girls were still given pocket money to buy snacks. It will therefore be good to know who provided pocket money for

snacks despite paying for lunch meals, and why; to better understand factors that may contribute to consumption of energy-dense snacks in this group.

Less than half of the girls reported binge eating at least 4 times within the past 14 days, mostly on healthy foods, and in the evenings. In a study in Turkey, Nuray, (2008) reported an overall prevalence of 23.5% binge eating among adolescents in Turkey in comparison to 42.9% reported in this study. Binge eating is an important aspect of eating habits particularly among adolescents since Roslyn (2012) reported that binge eating was more common in adolescence and showed a significant association with onset of eating disorders mostly bulimia nervosa among adolescent girls. Although there was no significant association between binge eating and BMI in this study, another study by Tanofsky-Kraff, *et al.,* (2012) reported that adolescents who reported binge eating had higher triglycerides and BMI in comparison to those who did not.

There is general lack of information on binge eating among adolescent girls in Africa. However, studies in developed countries have shown an increased trend of binge eating among adolescent females which increased with age. Tanofsky- Kraff, *et al.,* (2012), Roslyn (2012), and Johnson (2010) reported that 17% African American girls and 18% white girls' binged and depressive symptoms and consumption of high-fat foods predicted their binge status. In Kisumu City, this study showed, however, that binge eating was mostly done in the evenings at dinner and the girls had indicated that they ate large quantities of food in the evening because they were hungry and also had enough time to take food in comparison to breakfast and lunchtime. These findings suggest that the girls were compensating for missed and inadequate meals during the day, rather than taking a conscious decision to binge-eat. This seemed to be the only meal that the girls had adequate time to take as the food was

prepared mostly by caregivers and they had enough time with other family members to enjoy the meal in comparison to breakfast and lunch where they only had 15 and 45 minutes to take the meals.

High consumption of fruits and vegetables is associated with reduced risk of chronic diseases such as heart disease, diabetes, and cancer, as well as increased health-related quality of life (Rieth *et al.,* 2012). In this study only 32.3% of the participants had consumed at least two servings of vegetables per day. This low intake is the same as another study which showed that adolescents from Southern Brazil had lower frequency of consumption of five servings a day of fruits and vegetables combined (Rieth *et al.,* 2012). Most of the girls who consumed fruits and vegetables had consumed them at home. The low consumption of vegetables and fruit observed among the Kisumu school-going adolescents could be explained by the fact that schools rarely had vegetables and fruits as part of their lunch menu, and fruits were mostly expensive and rarely available in the kiosks that sold food and snacks around the school compound. Since this study was mostly restricted to girls who had lunch at school and had access to other snacks rather than fruits it will be interesting to assess the rate of fruit consumption in a rural population where girls rarely had access to junk food and had all these three meals at home.

This study showed that all eating habits identified mainly in Western contexts were practised by school going adolescent girls in Kisumu City, but the motivation for these habits were occasioned more by prevailing circumstances than by a conscious decision to modify food intake. However since the study focused on urban school girls, we cannot conclusively say that they are practised by all adolescent girls across the country especially those in rural areas

as well as out of school until a further research is conducted to effectively assess eating habits among adolescent girls in rural areas, out of school and those in boarding schools.

5.4 Factors That Influence Eating Habits

Bargiota *et al.,* (2013) reported that food choice in general is a complex process that depends on culture and can be influenced by personal, social, economic and emotional factors. Teenagers make many more choices for themselves than they did as children. Moreover, since eating is a social act, social networks and family can affect their food choices even more (Contento, *et al.,* (2006). This has further been affected by globalization that has eroded traditional foods, offering more food choice and availability, all of which have further influenced eating patterns. In this study, factors affecting eating habits were assessed based on Delisle *et al.,* (2009) framework.

Class, age, skipping meals and snacking had association with binge eating. The likelihood of binge eating increased with class, with those in Form 4 most likely to binge eat in comparison to those in lower classes. Older girls were also more likely to binge eat than younger girls. This corroborates Duckworth & Freedman (2013) article which reported that binge eating in women increased with age, peaking between 17-24 years. Since binge eating was mostly practiced in the evening as a compensatory mechanism for missed or inadequate meals during the day it would possibly explain why older girls who are likely to be in higher classes that required girls to be much earlier in school and had much shorter time for lunch were likely to consume more food in the evenings in comparison to younger girls in lower classes.

Girls who skipped meals were more likely to binge eat. Those who skipped breakfast and lunch were more likely to binge eat than those who did not skip meals. However, girls who

snacked during the day were less likely to binge eat. This suggests that the girls who snacked during the day were less likely to binge later in the day mostly because since they are likely to have catered for either missed meals or make up for inadequate meals taken in the course of the day. These findings are quite different from most research that show that most binges were done during snack times rather than the general three meals of the day. Masheb *et al.,* (2013) reported that adolescent girls in USA binged on snacks. However, for Kisumu City school-going adolescents, those who snacked were less likely to binge eat. Although there are limited studies carried out on binge eating among adolescents in African countries, studies from the west such as a longitudinal study by Neumark–Sztainer *et al.,* (2008) in the USA reported an association between skipping meals and binge eating among adolescent, with girls who skipped meals being more likely to binge eat. Gluck, (2006) associated binge eating with emotional eating and loss of control that is later associated with guilt. However, in this Kisumu study, although girls ate rapidly and had more food than normal quantities of meals in one sitting, this did not fit a typical description of binge eating as an eating disorder as girls seemed to be compensating for either missed food or inadequate food taken during the day.

Binge eating also took place mostly during dinnertime and when having meals with family; most of the girls who binged were likely to have missed meals during the day. It was observed that older girls who were mostly in form three and four were expected to be in school much earlier for remedial teaching and they mostly took about 20-30 minutes for lunch as they rushed to back to class to attend to their pending assignments, they hardly left their desks and therefore were more likely to either have inadequate time to eat their food or were likely to miss their meals in the morning and at lunch time. They however tended to have more time in the evening to sit down for family dinner, which could explain the increased intake of food per sitting in the evenings as reported by the respondents.

Only binge eating and fruit consumption had an independent influence on snacking with girls who binge ate less likely to snack (corroborating the relationship between snacking and binge eating) while those who ate fruits were more likely to snack than those who did not eat fruits. This is mostly because girls who ate fruits, ate them as a snack rather than as part of the main meals. Although there are no documented studies that have reported any association between fruit consumption and snacking, in this study however the positive association could be explained by the fact that most girls who ate fruits consumed them as a snack rather than as part of the general three main meals.

Snacking and age influenced fruit consumption, with girls who snacked and those who were much older more likely to consume fruits than those who did not snack or were much younger. These findings contradict a study by Lazzeri *et al*., (2013) where snacking was associated with reduced fruit intake/low fruit intake. This could mainly be because most of the fruits were taken as snack as the general main meals mostly did not have fruits servings, and therefore girls ate fruits as snacks.

Self-esteem and importance of body weight, factors otherwise considered to have an impact on food choices and eating habits did not have any association with eating habits of school going adolescent girls in Kisumu City. This suggests that motivation for the eating habits mainly described in Western contexts do not apply in this Kenyan context; and that psychosocial factors more commonly implicated in negative eating habits in the West, in spite of potential exposure to Western lifestyles, are not a problem in the context of the current study. This study pointed to a different concept of eating habits. It showed that eating habits among school going adolescent girls in Kisumu City were mostly adopted as a

compensatory mechanism in comparison to Western studies that reported that eating habits in adolescent girls presented as deliberate efforts to promote a certain body image, a preference or adopted as a mechanism to establish a sense of belonging to specific peer groups

5.5 Nutrition Status and Eating habits

There was no significant relationship between nutrition status and most of the eating habits other than vegetable consumption. The findings showed that BMI increased by 0.19% in girls who consumed vegetables. This trend was also shared by a study in Southern Brazil where a general increase in BMI was associated with higher intake of five-a-day servings of vegetables, (Rieth *et al.,* (2012). It however, differs with a study by Schroder (2010) that reported that vegetable consumption was not associated with weight gain. The findings also differed with other studies that have associated skipping meals with being overweight. A study by Sjoberg, (2003), Moy, (2006) & Chitra *et al.,* (2007) an association between skipping meals and overweight. The current study did not show any significant association between skipping meals and increased BMI or weight of the girls who skipped meals. This could be because the girls were only compensating for missed foods during the day and they hardly took extra calories, overall. Although vegetable consumption was relatively lower, adolescent girls who consumed them were likely to have a higher BMI than those who did not. This is contrary to many studies that have associated high vegetable consumption with lower weight, however noting that in most households vegetables are taken as an accompaniment to starchy foods mostly *"ugali,"* rice, mashed bananas and *"chapati"* and mostly in the evening when most girls reportedly binge ate, it is possible that a combination of these factors could have contributed to the increase in BMI, rather than vegetable consumption in itself. This suggests that vegetable consumption may therefore be a proxy indicator of overall higher energy consumption attributable more to the accompanying staple food, and/or the method of cooking of vegetables.

Although this study did not assess the impact of eating habits on academic performance, other studies including Pearson *et,al.,* (2009) research in United Kingdom have reported poor academic achievements among participants that skipped breakfast in comparison to those who had breakfast. This means that the high prevalence of skipping breakfast among the school going adolescent girls in Kisumu City could have long term implications on their school performance that could have a negative impact on their overall productivity in life. There is therefore need to further assess the impact of missing breakfast on school performance.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Four conclusions can be drawn from this study:

First, underweight, overweight and obesity are present among school going adolescent girls in Kisumu City. The prevalence of obesity and overweight combined is high, at 34.1%. Prevalence of underweight at 4.4% is lower than those reported in other African countries, but should however be addressed.

Second, the eating habits: snacking, binge eating, missing meals vegetable and fruit consumption, present in Western contexts are practised by school going adolescent girls in Kisumu City. Low vegetable and fruit consumption as well as skipping breakfast are the most common eating habits of those discussed in Western contexts; and are all negative eating habits.

Third, self-esteem, household size, maternal and paternal employment, and cultural factors assessed do not influence eating habits of school going adolescent girls in Kisumu City; but, the level (form) in which an adolescent girl is in, influences binge eating. The eating habits in this group, unlike adolescents in the West that result from psychosocial factors, are more of compensatory mechanisms to cater for missed meals or limited time to permit consumption of meals, rather than conscious decisions to reduce food intake or to cater for preferences.

Fourth, snacking, binge eating, fruit consumption and skipping meals do not influence nutrition status in school going adolescent girls in Kisumu City. Although vegetable consumption in this group is associated with increase in BMI, this increase is more likely associated with the starchy staples consumed along with vegetables rather than the vegetables themselves, which are normally associated with good nutritional status. Although several

studies had explicitly reported a relationship between eating habits and nutrition status of adolescent girls, in this study only one eating habit, vegetable consumption influenced nutrition status.

6.2 Recommendations

The high prevalence of obesity and overweight, and the presence of underweight should be addressed. From this study, it is recommended that this may be achieved by:

1. Empowering adolescent girls through nutrition education that should address the following areas:

    a. The importance of breakfast to maintaining good nutritional status

    b. The importance of ensuring that meals are not skipped

    c. Healthy food choices

    d. The importance of fruit and vegetables in achieving good health.

2. The Schools' management through the Parents Teachers Association should facilitate sensitization of parents on the importance of ensuring that their daughters have breakfast every morning and on addressing the time constraints faced by the girls because of school and therefore the need to ensure that breakfast was prepared in good time. Practical ways to address the problem of time for breakfast preparation should be addressed.

3. School management, The Ministry of Health and other stakeholders should consider practical ways of influencing the types of foods sold in *kiosks* around schools to facilitate availability of healthy, affordable food options for the students.

6.3 Further Research

1. There is need to studies on nutrition status and eating habits among adolescent girls in both rural and urban areas; and adolescents who are not school-going, to establish if there are any differences in these different groups of adolescents.

2. The current study did not include the adequacy of the diets consumed by the adolescents. There is a need to conduct a study on the nutritional value of school diets in Kisumu to establish if they are adequate and possibly if they are contributing to the high prevalence of overweight cases among adolescent girls as well as why adolescent girls purchase food despite the school providing at least two meals.

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APPENDICES

APPENDIX 1: RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams:"SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: NCST/RRI/12/1/MED-011/40/4

Date: 20th April, 2011

Caroline Kanaiza
Maseno University
P. O. Box Private Bag
MASENO

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on **"Eating habits and the nutritional status of school going adolescent girls in Kisumu City, Kenya"** I am pleased to inform you that you have been authorized to undertake research **in Kisumu East District** for a period ending *30th November, 2011.*

You are advised to report to **the District Commissioner and the District Education Officer, Kisumu East District** before embarking on the research project.

On completion of the research, you are expected to submit **one hard copy and one soft copy** of the research report/thesis to our office.

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:
The District Commissioner
Kisumu East District

The District Education Officer
Kisumu East District

PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
CAROLINE KANAIZA
MASENO UNIVERSITY
of (Address) P.O. PRIVATE BAG, MASENO
has been permitted to conduct research in

KISUMU CITY — Location
KISUMU EAST — District
NYANZA — Province

on the topic EATING HABITS & THE
NUTRITIONAL STATUS OF CHOOL GOING
ADOLESCENT GIRLS IN KISUMU CITY KENYA.

for a period ending 30th November, 2011

PAGE 3

Research Permit No. NCST/RR1/12/1/MED-011/40
Date of issue 20th April 2011
Fee received KES1,000

Applicant's
Signature
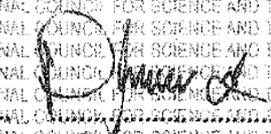
Secretary
National Council for
Science and Technology

106

APPENDIX 2: MINISTRY OF EDUCATION APRROVAL FOR RESEARCH

MINISTRY OF EDUCATION

Telegrams:

Telephone: Kisumu (057) 43409
When replying please quote

REPUBLIC OF KENYA

REF: KSM/MIS/29/III/123

DISTRICT EDUCATION OFFICE
KISUMU EAST
P.O. BOX 1914
KISUMU

7th June, 2011

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION – CAROLINE KANAIZA

The bearer of this letter is a student of Maseno University College. She has been authorized to carry out research on Eating habits and the nutritional status of school going adolescent girls in Kisumu East District for a period ending 30th November, 2011.

Kindly accord her the necessary assistance.

B. OWUOR
FOR: DISTRICT EDUCATION OFFICER
KISUMU EAST

APPENDIX 3: SCHOOLS IN KISUMU

KISUMU EAST DISTRICT – SECONDARY SCHOOLS STATUS, ENROLMENT AND STAFFING

SCHOOL	FORM 1			FORM 2			FORM 3			FORM 4			TRS ESTAB.		
	B	G	T	B	G	T	B	G	T	B	G	T	M	F	T
AROMBO	40	40	80	17	11	28	19	26	45	22	6	28	4	2	6
NDURU	40	40	80	52	40	92	26	34	60	25	26	51	8	5	13
WITHUR	145	-	145	45	-	45	62	-	62	56	-	56	4	2	6
ALENDU	45	52	97	51	42	93	58	59	117	32	25	57	6	7	13
LELA	85	80	165	105	63	168	97	59	156	75	51	126	6	6	12
MASOGO	40	40	80	26	34	60	20	25	45	20	10	30	6	2	8
MIGINGO	-	120	120	-	129	129	-	112	112		80	80	6	10	16
NYAKAKANA	40	40	80	34	19	53	26	15	41	27	14	41	1	3	4
KANYAGWAL	40	40	80	21	19	40	40	20	60	35	20	55	3	0	3
KOBURA	-	40	40	-	40	40	-	40	40	-	40	40	2	5	7
ONGECHE	25	25	50	27	29	56	25	13	38	20	16	36	3	3	6
OTIENO OYOO	210		210	265	-	265	239	-	239	167	-	167	17	15	32
BISHOP ABIERO	40	40	80	43	34	77	45	39	84	33	24	57	2	6	8
DR. ALOO GUMBI	77	28	105	64	33	97	08	34	102	61	22	83	6	7	13
JOEL OMINO	34	27	61	42	47	89	47	42	89	45	38	83	9	10	19
KASAGAM	79	67	146	63	72	135	96	68	164	49	57	106	9	14	23
KISUMU BOYS'	251	-	251	298	-	298	278	-	278	238	-	238	32	23	55
KISUMU GIRLS'	-	281	281	-	278	278	-	262	262	-	235	235	22	34	56
KISUMU DAY	240	-	240	263	-	263	226	-	226	197	-	197	26	11	37
LIONS	104	96	200	116	115	231	102	115	217	96	92	188	16	24	40
MIWANI	99	-	99	100	-	100	93	-	93	73	-	73	13	1	14
NYALUNYA	38	40	78	41	49	90	52	53	105	28	24	52	6	5	11
NYAMASARIA	15	25	40	23	13	36	36	25	61	37	24	61	9	6	15
OBWOLO	62	40	102	61	39	100	64	33	97	52	24	76	6	7	13
OKOK	25	20	45	22	20	42	29	23	52	17	14	31	2	6	8
ORONGO	49	47	96	27	41	68	15	10	25	11	6	17	3	3	6
ST. ALBERT ANGIRA	40	40	80	19	27	46	27	15	42	21	14	35	6	3	9
MAYIENYA	26	19	45	30	20	50	38	29	67	33	17	50	5	2	7
ST. IGNATIUS MAGADI	73	81	154	54	51	105	57	47	104	37	30	67	5	8	13
KINDU	29	31	60	25	27	52	31	23	54	11	17	28	4	4	8
ST. PETER'S NANGA	12	10	22	24	19	43	32	23	55	25	18	43	5	5	10
ST. TERESA'S	-	160	160	-	162	162	-	116	116	-	105	105	4	24	28
XAVERIAN	40	40	80	40	53	93	48	46	94	39	45	84	9	8	17
HIGHWAY	25	40	65	30	38	68	28	42	70	33	36	69	11	5	16
LIBERTY															16
MUSLIM															
NEW KISUMU GRACE	3	6	9	4	8	12	5	7	12	5	12	17	8	2	10
NYANZA CHRISTIAN	14	17	31	11	9	20	8	9	17	18	18	36	8	6	14
OASIS OF HOPE	27	32	59	28	24	52	26	23	49	25	22	47	10	4	14
ST. PATRICK	12	22	34	07	08	15	13	09	22	20	18	38	6	1	7
CONVENT	10	19	29	9	17	26	22	7	29	25	10	35	8	3	11
KISUMU SOUTH	17	22	39	11	28	39	14	13	27	11	19	30	8	1	9
DR. ELHEENI	16	18	34	17	27	44	12	28	40	14	13	27	11	2	13
VISPA EMANUEL				-			-			-			1		1
ODIENYA	20	20	40	-			-			-					
	1353	1112	2465	1355	1100	2455	1384	1003	2387	1103	806	1909	266	277	443

APPENDIX 4: MAP OFSECONDAY SCHOOLS IN KISUMU

Kisumu Secondary Schools
By Type

LEGEND
● Private Secondary Schools
● Public Secondary Schools

MKENDWA
GOTNYABONDO
OKOK
KADERO
BAR
KONYA
NYAHERA
DAGO
WATHOREGO
MANYATTA 'A'
MANYATTA 'B'
KORANDO
KANYAKWAR
CHIGA
OJOLLA
KIBUYE
KOGONY
MILIMANI
MAYENYA
KANYARWEGI
LAKE VICTORIA
NYALENDA 'A'
KASULE
NYALUNYA
BUOYE
NYALENDA 'B'

0 1.5 3   6   9   12
                              Kilometers

(c) Moumié Maoulidi, MCI, The Earth Institute, Columbia University

APPENDIX 5: QUESTIONNAIRRE
1.0 Questionnaire Information

Questionnaire No	Date of the interview	Interviewer	Name of school	Class	Estate

2.0 Demographic Data

2.1	**Household Data**
2.10	Total No of HH members
2.11.	Total No of HH members 12-19 years
2.12	Total No. Of girls 12-19 years
2.2	**Education level**
2.20	Mother: *1*. < or = 8years*: 2*. 9<or=12 years*: 3*. 13 and above years
2.21	Father: *1*. < or = 8years*: 2*. 9<or=12 years*: 3*. 13 and above years
2.22	Elder sisters: *1*.< or = 8years*: 2*. 9<or=12 years*: 3*. 13 and above years
2.3	**Occupation**
2.30	Mother: *1*. Formal employment 2. Business woman *3*.informal employment *4*.H.wife
2.31	Father: Formal employment 2. Business woman *3*.informal employment 5. Unemployed
2.32	Elder sisters: Formal employment 2. Business woman *3*.informal employment 5. Unemployed

3.0 Anthropometry

3.1		3.2		3.3		3.4	
Age in years		Height in Metres		Weight in Kg		BMI	

4.0 Eating habits
4.1Skipping of meals
Have you skipped the following foods in the last 7 days?

Yes………. No

Meal	Reasons for skipping	Number of times in the last 7 days
Breakfast		
Lunch		
Dinner		

4.2 Vegetable consumption
Have you consumed vegetables in the past 7 days : Yes……. No…..

Vegetable	Reason	Source	Where it was taken	With whom was food consumed with	No of times in the last 7 days

4.3 Fruit consumption
Have you consumed fruits in the past 7 days?

Yes …….. No……

Food	Reason	Source	Where it was taken	With whom was food consumed with	No of times in the last two weeks

4.4 Snacking
Have you had any snacks in between meals in the last 7 days?

Yes …… No…….

Food	Reason	Source	Where it was taken	With whom was food consumed with	No of times in the last 7 days

4.5 Binge eating
Have you had more than normal serving of food in one sitting the last 7 days?

Yes …….. No……..

Food	Reason	Source	Where it was taken	With whom was food consumed with	No of times in the last 7 days

5.0 Factors Affecting Eating habits

5.1Psychological factors

Weight-Related Attitudes	
How important is your body weight to you Very important : 2. Important: 3. Not so important: 4. Not at all important	

Has this influence

Snacking	Yes/ No/ l can't tell	Binge eating	Yes/ No/ l can't tell	Skipping meals	Yes/ No/ l can't tell	Vegetable fruit consumption	Yes/ No/ l can't tell

5.2Self-esteem assessment

	Adopted from Rosenberg Self-esteem assessment tool				
1.	On the whole, I am satisfied with myself.	SA	A	D	SD
2.*	At times, I think I am no good at all.	SA	A	D	SD
3.	I feel that I have a number of good qualities.	SA	A	D	SD
4.	I am able to do things as well as most other people.	SA	A	D	SD
5.*	I feel I do not have much to be proud of.	SA	A	D	SD
6.*	I certainly feel useless at times.	SA	A	D	SD
7.	I feel that I'm a person of worth, at least on an equal plane with others.	SA	A	D	SD
8.*	I wish I could have more respect for myself.	SA	A	D	SD
9.*	All in all, I am inclined to feel that I am a failure.	SA	A	D	SD
10.	I take a positive attitude toward myself.	SA	A	D	SD
11	Total score				

Scoring: SA=3, A=2, D=1, SD=0. Items with an asterisk are reverse scored, that is, SA=0, A=1, D=2, SD=3. Sum the scores for the 10 items. The higher the score, the higher the self-esteem.

a.   **Has this influence**

Snacking	Yes/ No/ l can't tell	Binge eating	Yes/ No/ l can't tell	Skipping meals	Yes/ No/ l can't tell	Vegetable fruit consumption	Yes/ No/ l can't tell

5.3Eating Disorder assessment

Adopted from Eating Attitudes Test (EAT -26)	
Have you gone on eating binges where you feel that you may not be able to stop? (Eating much more than most people would eat under the same circumstances) *Yes : 2. No*	
How many times in the last 6 months? Always = 0 : Usually = 0: Often = 0: Sometimes = 1: Rarely = 2: Never = 3	
Have you ever made yourself sick (vomited) to control your weight or shape?	

Yes : 2. No	
How many times in the last 6 months? Always = 0 : Usually = 0: Often = 0: Sometimes = 1: Rarely = 2: Never = 3	
Have you ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape? *Yes : 2. No*	
How many times in the last 6 months? Always = 0 : Usually = 0: Often = 0: Sometimes = 1: Rarely = 2: Never = 3	
Have you ever been treated for an eating disorder? *Yes : 2. No*	
When (count the number of months)	
Have you recently thought of or attempted suicide?	
When (count the number of months)	
Do you participate in any of the following : 1. Modelling: 2 Advertisement: 3.Dancing 4. singing: 3. Athletics	