DIETARY PRACTICES, NUTRITIONAL STATUS AND SCHOOL PERFORMANCE AMONG UPPER PRIMARY CHILDREN IN SELECTED PUBLIC SCHOOLS IN NAIROBI COUNTY, KENYA

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A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC HEALTH (MONITORING & EVALUATION) IN THE SCHOOL OF PUBLIC HEALTH OF KENYATTA UNIVERSITY.

NOVEMBER 2016
DECLARATION
I confirm that this thesis is my original work and has not been presented in any other university for certification. The thesis has been complemented by referenced works duly acknowledged. Where text, data, graphics or tables have been borrowed from other works including the internet, the sources are specifically accredited through referencing in accordance with anti-plagiarism regulations.

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ABBREVIATIONS AND ACRONYMS

BMI: Body Mass Index

ECD: Early Childhood Development

FGD: Focus Group Discussion

GPA: Grade Point Average

IQ: Intelligence Quotient

KDHS: Kenya Demographic and Health Survey

KNEC: Kenya National Examination Council

MoE: Ministry of Education

NCC: Nairobi County Council

PEM: Protein Energy Malnutrition

RDA: Recommended Daily Allowance

UNDP: United Nations Development Programme

UNICEF: United Nations Children’s Fund

USDA: United States Department of Agriculture

WFP: World Food Programme

WHO: World Health Organization
OPERATIONAL DEFINITION OF TERMS

Adolescents: Refers to young people between the ages of 10 and 18 years

BMI: It refers to a person’s weight in kilograms divided by the square of their height in meters.

BMI for Age: This is the interpretation of BMI for children aged below 18 years depending on age and gender

Classroom activities: It refers to the degree to which a child completes their assignments and how active they are in the classroom.

Dietary practices: These are the habitual decisions an individual/family makes when choosing what foods to eat, the number of meals, amount of food and the frequency of consumption of certain foods.

Extra-curriculum activities: These are the non-classroom/ out of class organized activities like games, sports and clubs in the school.

Involvement in school activities: The act of student participating and getting engaged in activities in school that may include extra-curricular activities like sports, drama, music and school clubs as well as classroom activities.

Nutritional status: Refers to the nutritional health of the child as determined by anthropometric measurements that include Body Mass Index (BMI) for age and Z-scores.
Parents: Any person or guardian in-charge of taking care of the daily nutritional needs of the child

Public schools: Schools that are funded and run by the Government of Kenya

School attendance: Refers to the regular going and remaining in school within the school’s academic term

School performance: Refers to children’s engagement in activities that include, school attendance, involvement in classroom activities and extra-curriculum activities.
ABSTRACT

Dietary practices influence nutritional status of school aged children and also impact on their school performance. The ability of pupils to engage in school activities and to perform well in school is dependent on a diet that supplies all the required nutrients. There is the emergence of the dual burden of malnutrition in urban setups like Nairobi and yet there is limited information on the effect of these on school performance. The main objective of this study was to investigate dietary practices, nutritional status and school performance among children in upper primary in selected public primary schools in Nairobi County, Kenya. The independent variable of the study was children’s dietary practices. Nutritional status was the intermediate variable, while the dependent variable was school performance. The participants of the study comprised of 256 pupils who were 142 boys and 114 girls, selected through simple random sampling and systematic random sampling techniques. Data was collected using a researcher’s administered questionnaire on school performance, 24 hour dietary recall schedule, food frequency questionnaire for assessing dietary practices and focus group discussion guide. Data on nutritional status was obtained using anthropometric measures from the children. A cross-sectional analytical design was employed. To analyze the collected data SPSS and Nutri-Survey were used. The relationships between the variables were examined using spearman rank correlation statistics. The findings confirmed that there is the dual burden of malnutrition among adolescent school children in Nairobi County: (8.6% were overweight while 9% were undernourished). On dietary practices and school performance, the study established that food adequacy positively influences school performance particularly in extra-curriculum activities ($r_s = 0.132*; P (0.035) < 0.05$). Higher consumption of food groups such as cereal ($r_s = 0.184**; P (0.003) < 0.05$), meats ($r_s = 0.159*; P (0.011$), fruits ($r_s = 0.163**; P (0.009) < 0.05$) and other vegetables ($r_s=0.128*; P (0.04) < 0.05$ also seemed to exert positive influence on school performance. As for the data on dietary practices and classroom activities; it showed no significant relationship between the two variables. However, on nutritional status children with higher Z-scores/ BMI were found to be more likely to be inactive during field games and they preferred sitting in the field during physical activities ($r_s =0.158*; P ≤ 0.05$). Children within normal weight for their age showed higher chances of performing well in classroom activities such as completion of assignments ($r_s = 0.133; P ≤ 0.05$). This study recommends policy change through the ministry of education to ensure scaling up of feeding programmes in public primary schools. The study also recommends nutritional education for parents on dietary practices of children. Moreover, the study recommends that children should be taught nutrition and the health impacts of their dietary practices.
CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

No doubt, proper nutrition which includes adequate protein, energy, certain fats, iron, zinc, copper, iodine, selenium, vitamin A, choline and foliate, affects brain development (Bryan et al., 2015). Nutrition is one of the many factors that potentially influence a child’s development besides genetic, socio-economic, environmental and behavioural factors (Mitchell, 2003). A diet in excess or lacking essential nutrients is likely to have adverse consequences for mental outcomes (Gidding et al., 2011). An understanding of the relationship between nutrition and mental performance in children is therefore important for children’s optimal productivity in school. Many children do not fully benefit from school experiences. They have low level activity, concentrate less in class and do not perform optimally in school (MoE, 2014). Moreover, the children are poorly prepared for schooling, have little motivation and poor learning capabilities (WFP, 2001; NCC, 2014).

Malnutrition is a quiet pandemic affecting millions of people throughout the world, it is therefore of public health significance because of the sheer number of people affected (Georgieff, 2007). Consequently, many children in the world are undernourished and this makes them more vulnerable to diseases. On the other hand, dietary excesses of total fat, saturated fat, cholesterol, sodium and sugar lead to overweight and obesity; another form of malnutrition with serious health consequences (Vohra et al., 2011). In Kenya, underweight is at 7% among urban children while overweight is at 5.7%
(KDHS, 2014). Bener (2013) contends that overweight and obesity are on the increase among school going children in both low and high income countries. Further, the World Health Organization (2012) reports that the situation is more serious in Sub-Saharan Africa (from 3 per cent in 1990 to 7 per cent in 2011).

Dietary practices that influence the nutritional status of school-aged children are more likely to impact on their educational achievement. Thus, schools can be an opportune setting to provide services to the nutritionally disadvantaged children (Kubik et al., 2013). Nevertheless, school-aged children are not commonly included in health and nutrition surveys (Taras, 2005). A report by the government of Kenya highlights that the rate of school enrolment in some regions is strikingly lower than the number of children expected to be enrolled (GOK, 2006). Besides, the report indicates that there is early school attrition, repetition and poor achievement in Nairobi. No doubt these educational concerns could perhaps be attributed to nutritional problems.

According to a UNICEF report (2013) children experience physical and psychological changes that influence their nutritional well-being. The UNICEF report notes that the eating behaviors and dietary practices are learned during childhood and are extended all the way to adulthood. Furthermore, the report indicates that nutritional inadequacies influence children’s health and put them at a higher risk of contracting chronic diseases in adulthood. It is noteworthy that many children from public primary schools in Nairobi reside in informal settlements where they face challenges such as lack of food
(NCC, 2014). Additionally, obesity is also noted among many school-children in Nairobi (Kyallo, Makokha & Mwangi, 2013). All these challenges are likely to limit education engagement. It is on the basis of these dietary concerns that the study sought to establish the relationship between dietary practices, nutritional status and school performance.

1.3 Statement of the Problem

Pupils’ ability to engage in school activities is dependent on factors such as intelligence, teacher facilitation, and parental involvement among others (World Bank, 2002). Equally, the capacity to perform well in school may depend on a diet that supplies all the required nutrients (Erickson, 2006). Studies conducted indicate that malnutrition (underweight, overweight) is common among school going children in developing countries (World Bank, 2002; Kyallo et al., 2013; KDHS, 2014). There is also evidence of low school enrollment, low achievement, poor performance and high rate of dropouts (NCC,2014) However, majority of studies in this area have focused on nutritional status and dietary practices as general surveys without correlating the findings to children’s school performance (Kyallo et al., 2013; Kimani, 2014; Story & Stang, 2005).

At the same time, most studies in this field have mainly focused on underweight children while ignoring overweight/ obese children and the emergence of dual malnutrition among the urban population (Chesire et al., 2008; Kimani, 2014). Additionally, the studies have mainly focused on academic achievement (measured
mostly by examinations) while ignoring other aspects of performance such as school attendance and involvement in extra-curriculum activities which are equally important (Florence et al., 2008). Consequently, the relationship between dietary practices, nutritional status and children’s school performance in Nairobi has not been established conclusively; it was therefore necessary to carry out this investigation.

1.4 Justification of the Study
The well-being of children is a fundamental issue in education. Good nutrition is important for the attainment of children’s normal growth and development (Hebbelinck et al., 2011). Education is at the center of enhancing children’s development and empowerment (Stones, 2012). However, children especially adolescents who are nutritionally disadvantaged are unlikely to optimize their educational potential. It was therefore imperative that the researcher investigated the relationship between dietary practices, children’s nutritional status and school performance with the intent to utilize the findings to promote children’s proper and adequate nutrition and performance.

1.5 Purpose of the Study
The researcher sought to explore whether feeding practices of adolescent school going children had any influences on their nutritional status and their school performance; all with the aim of using the findings to improve their nutritional wellbeing and school performance.
1.6 Broad Objective

The overall objective of this study was to establish the relationship between dietary practices, nutritional status and school performance among upper primary children in selected public schools in Nairobi County.

1.7 Specific Objectives

The study was guided by the following objectives:

i. To establish dietary practices of children in upper primary in selected public schools in Nairobi County.

ii. To determine nutritional status of children in upper primary in selected public schools in Nairobi County.

iii. To assess the school performance of children in upper primary in selected public schools in Nairobi County.

iv. To determine the relationship between dietary practices, nutritional status and school performance among children in upper primary in selected public schools in Nairobi County.

1.8 Hypotheses of the Study

The study made the following hypothesis:

\[ H_{01} \text{: There is no significant relationship between dietary practices and nutritional status among children in upper primary schools in Nairobi County.} \]
H$_{02}$: There is no significant relationship between dietary practices and school performance among children in upper primary schools in Nairobi County.

H$_{03}$: There is no significant relationship between nutritional status and school performance among children in upper primary in school in Nairobi County.

1.9 Significance of the Study

This study offers useful information about children’s dietary practices and how they relate to their nutritional status and their school performance. The findings will inform parents on proper nutrition and training on proper dietary practices for their children. Besides, teachers may gain knowledge for training children on the importance of proper and adequate nutrition. The knowledge from this study may also enable stakeholders to provide better nutrition for children in order to enhance their education potential. It is hoped that the findings from the research will impact on the existing nutritional habits and perhaps the educational policy. It would also act as a catalyst to the GOK and the private sectors to factor in nutrition for school going children as an important component for overall school performance through allocation of more funds to school feeding programmes. Finally, the study will add to the existing body of knowledge on nutrition and public health.

1.10 Assumptions of the Study

The researcher assumed that the respondents had no underlying chronic conditions or illnesses such as HIV/AIDS or anemia that could impair their nutritional status.
1.11 Limitations of the Study

This study inferred findings from the relationships of dietary practices on nutritional status and school performance. Confounding factors of this study such as intelligence quotient (IQ) and physical disabilities/handicaps were considered as limitations as they were not examined in the study yet they may affect children’s nutritional status and school performance and as a result affect the internal validity of the study. This study was also limited to Nairobi County, thus it did not cover other counties. This implies that the research findings are generalizable to school children in urban areas but not to those in rural areas whose contexts could be different.

1.12 Conceptual Framework

The framework Figure 1.1 is a perceived link between dependent and independent variable seeking to show the relationship between dietary practices on children’s nutritional status and school performance. The framework indicates that children’s dietary practices in the long-term could influence their nutritional status which affects their school attendance, involvement in class activities and extra-curriculum activities as well as overall school performance.
Nutritional Status  (Intermediate variable)
- BMI for age/ Z-scores

School Performance  
(Independent variable)
- School attendance
- Involvement in classroom activities
- Involvement in extra-curriculum activities

Dietary Practices  
(Independent variable)
- Number of meals consumed
- Frequency of meals
- Food portions/quantities

Socio-economic Status

Figure 1.1: Conceptual Framework: Effects of dietary practices on nutritional status and school performance.
Source: Adopted and modified from Chesire et al., (2008).
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents the review of related literature according to the objectives of the study.

2.2 Socio-Economic Background Characteristics

Socio-economic factors such as household income level, number of assets owned, housing conditions and parents’ occupation affect children’s dietary practices and nutritional status (Tiyou et al., 2012). Studies conducted in Zambia, Rwanda and Uganda showed that household with more income or more assets and better housing, water and sanitation conditions were more likely to have better food security status (Kris-Etherton et al., 2012; Sirotin et al., 2012; Bukusuba, Kikafunda, & Whitehead, 2010). Further studies carried out in Ethiopia and Sri Lanka show that higher education correlated with better food security status since the more educated people are, the more likely they engage in better income opportunities (Tiyou et al., 2012; Jayawardena et al., 2013). In this current study related the parents’ or guardians’ education levels, occupation and income which influences the children’s overall dietary practice.

2.3 Dietary Practices among School Going Children

Adolescents tend to eat differently than they did as children (Barooah, 2012). The change is due to factors such as quest for independence and acceptance by peers, increased mobility, time spent in school and preoccupation with self-image (Semproli &
Gualdi-Russo, 2007). For this reason, adolescents tend to develop erratic and unhealthy eating behaviours such as meal skipping, snacking throughout the day and more eating away from home. Peer pressure during adolescence also creates the need to belong to the peer groups and thus eating non-nutritious foods (Thaver, 2008).

Zaborskis et al. (2012) conducted a cross-sectional study on eating habits and social inequality among Lithuanian school-age children using randomly selected 17,189 children of aged 11, 13 and 15. The study found that the children had low intakes of fruits and vegetables. Girls (27.1%) had higher consumption of fruits than boys (21.1%). Further, the study showed that both sexes had at least five days a week intake of sweets and chocolates, biscuits and pastries as well as soft drinks. In another qualitative study of low-income mothers carried out in Buenos Aires by Lindsay et al. (2012), the influence of socio-economic conditions, organizational structures, family relationships and food insecurity on child feeding practices and weight status was examined. The findings obtained through content analysis showed that child feeding practices are often influenced by their children's food preferences, mothers enticing their children with unhealthy foods and their fear that monitoring their children eating could lead to eating disorders (Neumark-Sztainer, 2006). The mothers also cited financial constraints and work demands as factors influencing children’s eating habits. These findings show an increased trend of under- and over-nutrition in the low-income families.
Similarly, a study was carried out by Warraich et al. (2009) to determine the prevalence of obesity in school-going children in Pakistan. Meat consumption was high in overweight and obese children, while 80% of all the participants had a high consumption of junk food. Junk food was eaten regardless of the socio-economic status of children’s families. Further, the demographic findings of the study showed that 70% of all obese children belonged to higher socio-economic status while the underweight children (63.3%) were in the lower socio-economic status, but nonetheless all children were at risk of overweight and obesity. To a large extent, this study provided insights to the current study on dietary practices of school-going children.

2.4 Dietary Practices and School Performance

Research indicates that health problems due to poor nutrition in primary school-age children is among the most common cause of low school enrolment, absenteeism, early dropout and unsatisfactory classroom performance (Li et al., 2008). Erikson (2006) points out key components required to keep the brain functioning correctly. First are proteins found in foods such as meat, fish, milk and cheese. These are necessary for body building and neurotransmitters that carry information from brain cells. Lack of protein also known as Protein Energy Malnutrition (PEM) leads to poor school performance and causes young children to be lethargic, withdrawn and passive. Secondly, Erickson notes that fats make up more than 60% of the brain and acts as a messenger in partial control of aspects such as mood. Thirdly, Omega-3 fatty acids are very important for optimum performance of the brain and a lack of these fats can lead to
depression, poor memory, low IQ and learning disabilities such as dyslexia (Lahey & Rosen, 2010).

Another important reference is Belachew et al. (2011) in a study conducted in Jimma zone in Southwest Ethiopia using participants aged between 13-17 years. They found that there were significantly more (33.0%) food insecure adolescents who were absent from school compared with their food secure peers (17.8%, P < 0.001). Food insecure households were found to be positively correlated with school absenteeism and a lower educational attainment.

2.5 Nutritional Status among School Going Children

School age is the active growing phase of childhood and a dynamic period of physical growth and mental development (Cartwright et al., 2003). Geier et al. (2007) conducted a study whereby they related the relative weight and school absenteeism among students in 6th and 8th graders. They found out that among the overall average children; absenteeism was 7.5 days, normal weight children, absenteeism average was 10.1 days while the overweight children, average absenteeism was 10.9 days. The obese students were absent on an average of 12.2 days. Being obese was associated with almost two days absent compared to normal weight after controlling the age factor, race/ethnicity and school.
Equally, Srivastava et al. (2012) carried out a study in which they explored nutritional status in school-age slum children. The findings of this research showed that undernutrition was significantly more prevalent in girls than boys. The mean height and weight of boys and girls in the study group was lower than the growth standards used (CDC, 2010). Nutritional status prevalence of stunting and underweight was found highest in the age group 11 years to 13 years whereas wasting was highest in age group five years to seven years. This study by Srivastava et al. (2012) validated the target population of this study who were children in upper primary who are at risk of malnutrition.

2.6 Nutritional Status and School Performance among School Children

Many studies have related student performance to quality of a school, quality of teaching, teacher remuneration, class size and student gender among others (Nairobi City Council, 2014). However, between nutritional and educational literature, nutrition has received little attention as a determinant of school performance (Neumark-Sztainer, 2006). According to Pollitt (2001) there is a direct relationship between the prevalence of malnutrition, socio-economic status and school wastage. Undernourished children tend to have decreased attendance, attention and academic performance and they experience more health problems compared to well-nourished children (Bener, 2013; Chege, 2000).
Kleinman et al. (2002) did a study in Boston which examined dietary intake and hunger among students who participated in school breakfast programmes, attendance and academic performance in Public Schools. Data collected showed that more than 70% of the students were able to receive free or subsidized meals at school. The results revealed that students who were nutritionally at risk were found to have higher absence rates than those students who were not at nutritional risk. Similarly, another study on nutritional status carried out by Shore et al. (2008) in the United States correlated achievement and performance. The study examined the differences in school achievement between overweight and non-overweight students. Academic achievement, attendance, discipline, physical fitness and athletic team participation, attendance, discipline measures, tardiness and suspension from school were examined. The study found out that there were differences in non-overweight students and overweight students in the areas of academic achievement, attendance and discipline.

According to Shore et al. (2008) the GPAs of non-overweight students were about 11% higher than those of the overweight students. At-risk for being overweight students had a higher GPA than overweight students (3.35 vs. 3.06). In the seventh grade, 75% percent of all non-overweight students participated in at least one school-based athletic team whereas only 61% of at-risk and 33% of overweight students did. The study is a pointer that children who are overweight perform less well when compared to those with normal weight in relation to physical performance (Florence, Asbridge &
Veugelers, 2012). Therefore, non-overweight students perform better than their peers in the other groups (Bharati et al., 2011).

2.7 Dietary Practices, Nutritional Status and School Performance

Bowman et al. (2004) carried out a survey of adolescents who were between the ages of twelve and seventeen years in the USA. The study examined the associations between fast-food consumption and measures of dietary quality using subject comparisons involving cohorts. The study found that children who ate fast food compared with those who did not, consumed more total energy by (187 kcal). It was also established that that there was an increased intake of sugar-sweetened beverages and fatty foods than intake of fruits, vegetables and fiber. The study concluded that such eating habits contributed to increased numbers of overweight/obese children in the American Society. Tobin, (2013) went slightly further by comparing fast-food consumption and educational test scores in the USA. Longitudinal data was collected from over 12,000 children and was analyzed using regression analysis. The analysis used propensity score matching to examine the relationship between students' reported fast-food consumption and their test scores in reading and mathematics. The regression showed that test scores decreased as reported fast-food consumption increased. It was concluded that that the relationship between poor nutrition and test scores was negative in nature.
In another study, Chepkwony, Kariuki and Kosgei (2013) sought to establish the relationship, between type of school, success of school feeding programme and the relationship between school feeding programme as well as academic achievement among ECD children. Data was collected through questionnaires responded to by head teachers in the ECD centers and was analyzed using percentages, frequencies, means, chi-square and F-test. The results indicated that schools providing feeding programmes showed higher academic achievement among ECD children.

2.8 Summary of Literature Review

The reviewed literature seems to suggest that children’s dietary practices have an effect on children’s nutritional status and their overall school performance. Nutritional status has been shown to impact on school performance where underweight children are unable to fully concentrate in their school work same case to overweight and obese children who are unable to fully participate and benefit from the learning process. It has also been shown that dietary practices correlate with nutritional status leading to the emergence of the dual burden of malnutrition. However, the extent of this relationship has not been fully established in the Kenyan context and more so in public primary schools. Therefore, there was need to carry out this study within the Kenyan context.
CHAPTER THREE: MATERIALS AND METHODS

3.1 Research Design

This study was a cross-sectional survey that employed an analytical approach to establish children’s dietary practices, nutritional status and school performance. This design was ideal since the aim of the study was to look at the relationship between variables at a single point in time and establish whether there are significant associations between the variables (Kothari, 2008; Verd, 2004). A mixed study of both quantitative and qualitative methods of data collection was used for purposes of triangulation (Kothari, 2008).

3.2 Research Variables

3.2.1 Independent Variable

The independent variable of the study was children’s dietary practices. Children’s dietary practice was based on the number of meals, frequency of consumption of foods and food amounts.

3.2.2 Intermediate variable

For this study, children’s nutritional status was an intermediate variable which was based on BMI for age measurements as per the growth reference for school age children and adolescents (WHO, 2007).
3.2.3 Dependent Variable

The dependent variable of the study was children’s school performance. School performance consisted of school attendance, children’s involvement in classroom activities and extra-curriculum activities.

3.3 Study Area

This research study was conducted in Nairobi County, Kenya. Nairobi County is divided into a series of nine administrative sub-counties but has overall seventeen political sub-counties (NCC, 2014); (MoE, 2014). The ministry of education as well as the Nairobi City Council who are the custodians of public primary schools administratively use nine sub-counties (NCC, 2014); (MoE, 2014). This study therefore used the nine main administrative sub-counties (Appendix L).

Nairobi hosts Kenya’s political, commercial and industrial capital (NCC, 2014). It is noted that malnutrition is prevalent in urban cities including Nairobi (Kimani, 2014) despite the ongoing industrialization within the county. The double burden of malnutrition which comprises of under- and over nutrition occurring simultaneously is a reality in Nairobi due to changes in nutrition and lifestyle (Kimani, 2014). There is also a growing prevalence of obesity and its related chronic diseases among children (Daboné, Delisle & Receveur, 2011). The government of Kenya also reports of lower than expected school enrollment, high dropout rates and poor achievement (NCC, 2014). Therefore, the double burden in Nairobi city, poor school outcomes as well as its
rapid growth in social, economic and political status made it a suitable location for the study. The study findings are thus generalizable to other urban cities in Kenya and other African regions.

3.4 Study Population

The study population comprised of children in public upper primary schools within Nairobi County. These children were deemed appropriate because they are at a period of rapid growth where nutritional needs increase due to heightened growth rate and changes in body composition associated with puberty (Baroah, 2012). Upper primary in Kenya consists of pupils from class 4 to class 8 aged between 11-15 years (MoE, 2014; NCC, 2014).

3.5 Target Population

In this study, the population consisted of children in upper primary in Nairobi County’s public Primary Schools. The target population comprised of class 4, 5, 6, 7 and 8 pupils. However, Kuhn and Franklin (2006) note that at the age of class 4 and 5 pupils may not have attained formal operational abilities hence may be unable to comprehend the research tool. On this basis, class 4 and 5 were excluded. Also not included in the actual study population was class 8’s on account that though ideal for the study they were a national examination class. Therefore, only the class 6 and 7 categories of pupils were considered as the target population ideal for this study.
3.6 Sample Size Determination

Fisher et al. (1998) formula was used to calculate the sample size that was used in the study

\[ N = \frac{Z^2 \cdot p \cdot q}{d^2} \]

\( N \) = Desired sample size (if target population is more than 10,000)

\( Z \) = Standard normal deviate (1.96) at the required confidence level

\( p \) = Proportion of the target population estimated to have the characteristics being measured (50% was used since the proportional characteristics being measured was an estimate)

\( q \) = Population without the characteristics being measured (1-p)

\( d \) = Degree of accuracy/ level of statistical significance (0.05)

\[ N = \frac{1.96^2 \cdot \{ 0.5 \times (1- 0.5) \}}{(0.05)^2} \]

\[ = 384 \]

Fisher’s finite population correction was done to produce a sample size that was proportional to the population; since population was more than 10,000 therefore the sample size was calculated as;

\[ nf = \left[ \frac{n}{1+ (n+1)/N} \right] + 10\% \]

\[ = 240 + 24 \]

\[ = 264 \]

The figure was adjusted by 10% to 264 to pupils to cater for non-response and for poor completion of the data collection tool.
3.7 Sampling Technique

To reach the sample size, multi-stage sampling was employed. Nairobi County has nine sub-counties (NCC, 2014), so simple random sampling was first employed to select the four sub-counties. Then, from each of the four sub-counties two schools were selected using still simple random sampling. Once the schools were selected, again simple random sampling was used to pick one class from each stream in both class 6 and 7. Furthermore, systematic random sampling was used to select every 2\textsuperscript{nd} pupil in the classroom. Every 2\textsuperscript{nd} pupil was chosen because the population size was 66 pupils per sub-county and the sample size needed was 33 pupils per school (Figure 3.1). Random techniques were appropriate because they reduce the potential for bias in the selection of cases and they yield a representative sample of the population being studied (Mugenda, 2008; Robson, 2002).

![Sampling Frame Diagram]

*Figure 3.1 Sampling Frame*

*Note: 66 pupils (33 pupils per school)*

*16 pupils in class 6 per school and 17 in class 7*
3.8 Data Collection Tools

3.8.1 Questionnaire

For anthropometric measurements, the height and weight of each pupil was measured using calibrated scales. They were each recorded in the researcher’s questionnaire on nutritional status (Appendix B). The date of birth and the sex of each pupil was also recorded in this part.

This assessed pupil’s energy intake for purposes of comparison with their energy expenditure. The pupils were identified at school and the 24 hour recall was done at home in presence of their parent/guardian. There they were asked to try and recall what they had eaten within the last 24 hours. They were further prompted to try and recall for any foods forgotten. According to Sedlacik (2014) and Montgomery et al. (2011) the ability of children to provide dietary recall increases with age and with adult assistance. Children above 10 years of age have adequate memory to remember foods they have eaten within 24 hours (Sedlacik, 2014). Consequently, the pupils answered the 24 hour recall of all foods and beverages they had consumed. The pupils were also aided by demonstrations (Standard cups, plates, tablespoons, teaspoons, packets) given by the researcher to help estimate their food intake.

The Food Frequency Questionnaire (FFQ) evaluated dietary intake by assessing the frequency of consumption of different food groups. It was also used to collect individual portion size information as standardized portions. The FFQ is ideal in
collecting dietary information from large numbers of individuals (100 individuals or more) (Wrieden et al., 2003).

A self-administered questionnaire on socio-economic status and school performance was issued. The first part of the questionnaire assessed socio-economic status of the children’s family (Appendix E). This included information on parents’/caretakers’ level of education and occupation. The questions enquired about household size, accommodation/housing type and possession of household items. The second part of the questionnaire assessed school performance (school attendance, involvement in classroom activities and involvement in extra-curricular activities) (Appendix F). Data on school attendance which ideally was to be collected through the use of school attendance registers was instead collected through the use of the school performance questionnaire. During the pilot it was noted that majority of the schools did not keep updated attendance registers. Therefore, information sought through the class registers was factored into the school performance questionnaire.

### 3.8.3 Focus Group Discussion Guide

A FGD guide was used to collect information on dietary practices from the children. There were two focus groups for each school; one for each gender. FGD 1 comprising of the male adolescent pupils while FGD 2 comprised of female adolescent pupils. The discussions focused on themes exploring the children’s eating habits, the number of meals they consume and their perceptions about their nutritional status in relation to
their school performance. Children’s views are valid and thus some researchers have used them in gathering information (Nixon, Greens & Hogan, 2006). The researcher therefore gathered data from the children’s discussions.

3.9 Pre-testing of Data Collection Tools

A pretest was conducted using 10% of the sample size which equated to 26 pupils. These pupils were from a school within one of the selected sub-counties. However, the data was not included in the main study. Lancaster, Dodd and Williamson (2004) explain that the pre-test study sample size subjects should cover the entire characteristics of the range of subjects that will be included in the main study. It is for this reason that the sample school was in the same region and using children in upper primary level. The feedback from the pilot was used to correct unclear items and reorganize questions in a logical order. The changes were used to enhance reliability of the tools. The questionnaire's internal validity was enhanced through homogeneous grouping of question items and correlation of multiple items measuring the same underlying issues for ease of answering the questionnaire (Kothari, 2008). Peer evaluation and research supervisors were used to check the clarity and appropriateness of research instruments.

3.10 Training of Research Assistants

Five research assistants with at least bachelor degrees in foods and nutrition or closely related courses were recruited and trained on the purpose and objectives of the study
and on the various data collection tools. They were also trained on collecting of anthropometric measurements (Weight and height), administration of the questionnaires and on self presentation before the actual data collection exercise. They received two days of training on giving instructions to the pupils, on completion of the questionnaire and its administration. The training was conducted by the principal investigator. During training emphasis was laid on the questionnaire clarity and mastery of the content. Each question was explained to the research assistants and all arising questions were tackled until the assistants were satisfied. The assistants were also trained on anthropometric measurements and mastery was ensured through role play demonstrations. The researchers who portrayed great skill in anthropometry were mandated to conduct all measurements during the actual data collection, assisted by the other members.

3.11 Data Collection Procedures

Data on children’s nutritional status was gathered using standard anthropometric procedures (Weight and Height). The researcher gathered data on children’s anthropometric information using standard anthropometric procedures (FSAU, 2015). The weight of the children was measured in Kilograms using a bathroom scale which had been calibrated with an accuracy of 0.1 kilograms. Three weighing scales were used for this process. Height was measured in centimeters using a height board. During the process, two height scales were used to collect height measurements of the pupils. The data collected through this process was filled in the researcher’s questionnaire on nutritional status.
After gathering the children’s anthropometric data, they were immediately instructed to sit down whereby they were issued with the questionnaires. For data on dietary practices, the children were issued with the 24-hour diet recall questionnaire (Appendix C) and the food frequency questionnaire (Appendix D). As for data on school performance (Appendix F) and social economic status (Appendix E) the pupils were issued with a short closed ended questionnaire. To ensure accuracy, the pupils received comprehensive instructions and guidelines on how to answer the questions.

3.12 Data Analyses

After collecting data, it was coded and labeled. Nutri-survey software was used to convert data on nutritional status (anthropometrics) to BMI. Body Mass Index (BMI) was calculated as kg/m². From that BMI-for-Age (Z-scores) were calculated using WHO Anthropometric Plus which is a gender specific analytical tool for measuring BMI-for-age Z-scores (BAZ) for children aged 5-19 years. Furthermore, all data was entered into the software SPSS (Statistical Package for the Social Sciences) version 20. The study data was ordinal and therefore correlation between dietary practices, nutritional status and school performance was analyzed using Spearman’s rank correlation coefficient (r_s). This was determined using statistical testing. Data was assessed at 0.05 level of significance.
3.13 Ethical Considerations

Authority to conduct the research was sought from Kenyatta University Graduate School and ethical clearance was obtained from the Ethical Review Committee of the same institution. A research authorization permit was then obtained from the National Commission for Science, Technology and Innovation (NACOSTI). The clearance to conduct the study was sought from the selected school heads and consent from children’s parents was also sought through a permission slip that the children took home for their parents to sign and approve prior to the study (Appendix B). The principal investigator ensured that all protocol was observed. The research purpose and objectives were well explained to the participants and respective administrators. Confidentiality was ensured throughout the study.

Furthermore, the respondents were assured that the information they gave would be treated with utmost care, respect and confidentiality and that it would be solely used for statistical purposes of the study. No names or other personal information was revealed in any verbal or written reports to community members or other relevant users.
CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter contains the findings on the relationship between dietary practices, nutritional status and school performance. The results are presented in the order in which the objectives are stated in chapter one. Demographic data is presented first followed by results of the descriptive analysis and finally the relationship between the variables is presented.

4.2 Study Population

The study targeted a sample size of 264 pupils but a sample of 256 was available. Therefore, the study had a 97% response rate. According to Fleiss, et al. (2013); Fincham, (2015); Millar et al. (2011), AAPOR, (2011) a response rate of 97% is considered acceptable and is adequate representation. The results were therefore reported for 256 out of which 8 questionnaires were rejected due to incompleteness.

4.3 Demographic Characteristics of Respondents

Age and gender were important components of the study as they were useful in correlation of the variable of the study. The study population encountered in class 6 and 7 upper primary pupils ranged from 11 years to 15 years. Of this population, 55% were male while 45% female as shown in table 4.1. Pupils aged 12 and 13 years had the highest population as this is the official age of a class 6 and class 7 pupils according to the ministry of education (NCC, 2014).
**Table 4.1 Demographic characteristics of the study population**

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 years</td>
<td>12</td>
<td>4.7</td>
</tr>
<tr>
<td>12 years</td>
<td>118</td>
<td>46.1</td>
</tr>
<tr>
<td>13 years</td>
<td>80</td>
<td>31.2</td>
</tr>
<tr>
<td>14 years</td>
<td>26</td>
<td>10.2</td>
</tr>
<tr>
<td>15 years</td>
<td>20</td>
<td>7.8</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>142</td>
<td>55</td>
</tr>
<tr>
<td>Female</td>
<td>114</td>
<td>45</td>
</tr>
</tbody>
</table>

**4.4 Socioeconomic Status of the Respondents**

The socio-economic and demographic characteristics of households of the children were determined by the education level of the parents, size of the house, type of dwelling and household asset ownership.

**4.4.1 Education Level of the Parents’ Children**

Education level of parents does not directly influence dietary practices or nutritional status of children but it affects the level of decision making regarding the family’s food choices (UNDP, 2013). The education level may also determine income which may affect a family’s dietary practices. The survey data of this study revealed that most of the children’s parents had secondary education, while very few never went to school (Table 4.2).
Table 4.2 Education level of parents of the children

<table>
<thead>
<tr>
<th>Education level</th>
<th>Father</th>
<th></th>
<th>Mother</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Never went to school</td>
<td>3</td>
<td>1.2</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Primary education</td>
<td>26</td>
<td>10.2</td>
<td>34</td>
<td>13.2</td>
</tr>
<tr>
<td>Secondary education</td>
<td>127</td>
<td>49.6</td>
<td>87</td>
<td>34</td>
</tr>
<tr>
<td>College education</td>
<td>50</td>
<td>19.5</td>
<td>80</td>
<td>31.3</td>
</tr>
<tr>
<td>University education</td>
<td>50</td>
<td>19.5</td>
<td>50</td>
<td>19.5</td>
</tr>
</tbody>
</table>

4.4.2 Type of Dwelling

As revealed in figure 4.5 majority of the children (92%) lived in houses whose wall material was made of stone followed by 6% who admitted to living in houses whose wall material was iron sheet. Only 1% of the respondents agreed to be living in grass thatched or houses made of mud.

![Type of dwelling](image)

Figure 4.1 Type of dwelling
4.4.3 Size of the House

The majority of respondents said they lived in 2 roomed houses (43.4%), while 23% revealed that they had houses of more than 4 rooms and (19%) lived in one-room houses.

Table 4.3 Size of house

<table>
<thead>
<tr>
<th>Size of house</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 room</td>
<td>48</td>
<td>18.8</td>
</tr>
<tr>
<td>2 rooms</td>
<td>111</td>
<td>43.4</td>
</tr>
<tr>
<td>3 rooms</td>
<td>38</td>
<td>14.8</td>
</tr>
<tr>
<td>≥4 rooms</td>
<td>59</td>
<td>23</td>
</tr>
</tbody>
</table>

4.4.4 Asset Ownership

Assets are an important marker of socio-economic position. This study considered the ownership of six assets: Fridge, television, radio, computer, mobile phone and vehicle. All which are considered important by urban residents. They were classified and analyzed based on percentage of assets owned. The assets were arranged in form of a scale and a maximum of one assigned for each asset, the respondents gave an affirmative answer as owned. The scale used was classified into quintiles based on percentage of assets owned. Ownership of 24% was classified as lower socio-economic class, 25% to 49% as lower upper, 50% as middle, 51 to 74% as upper lower and 75 to 100% as upper class (Booyen et al. 2010). This classification was supported by studies by McKenzie (2014) and Kuppuswamy, 2005) whereby households with the highest
number of assets were considered as upper socio-economic status. It was noted that the number of assets decreased with socio-economic status as shown in figure 4.2.

![Mean household asset score by socio-economic group](image)

*Figure 4.2 Mean household asset ownership by socio-economic group*

### 4.5. Children’s Dietary Practices

The first objective of this study was to establish dietary practices of the school-going children. Dietary practices included the number of meals consumed by the children, nutrient intake of the children and frequency of consumption of different food groups. The 7-day Food Frequency Questionnaire and 24-dietary recall were used to assess the dietary practices of children. Approximately 51% of the children reported that the food they consumed the previous day was the normal amount, 24% said it was more than usual while 25% reported than it was less than usual. This was asked because of daily variations and irregular eating habits.
Table 4.4 Mean nutrient intake of children

<table>
<thead>
<tr>
<th>Sex</th>
<th>Energy (kcal)</th>
<th>Protein%</th>
<th>Fat%</th>
<th>CHO%</th>
<th>Dietary fiber (g)</th>
<th>Vit. A (µg)</th>
<th>Vit. C (mg)</th>
<th>Iron (mg)</th>
<th>Zinc (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1330.3</td>
<td>11.9</td>
<td>25.8</td>
<td>62.3</td>
<td>16.2</td>
<td>733.8</td>
<td>66.8</td>
<td>6.7</td>
<td>5.9</td>
</tr>
<tr>
<td></td>
<td>329.0</td>
<td>3.4</td>
<td>9.2</td>
<td>10.0</td>
<td>6.6</td>
<td>507.7</td>
<td>57.3</td>
<td>2.4</td>
<td>2.8</td>
</tr>
<tr>
<td>Female</td>
<td>1266.6</td>
<td>12.6</td>
<td>24.3</td>
<td>63.0</td>
<td>16.0</td>
<td>788.2</td>
<td>71.6</td>
<td>6.5</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>320.2</td>
<td>4.6</td>
<td>9.4</td>
<td>11.0</td>
<td>6.3</td>
<td>490.6</td>
<td>57.4</td>
<td>2.2</td>
<td>2.7</td>
</tr>
<tr>
<td>Total</td>
<td>1301.9</td>
<td>12.2</td>
<td>25.1</td>
<td>62.7</td>
<td>16.1</td>
<td>758.0</td>
<td>68.9</td>
<td>6.6</td>
<td>5.8</td>
</tr>
<tr>
<td></td>
<td>326.0</td>
<td>4.0</td>
<td>9.3</td>
<td>10.5</td>
<td>6.5</td>
<td>499.9</td>
<td>57.3</td>
<td>2.4</td>
<td>2.7</td>
</tr>
</tbody>
</table>

The mean energy intake of children was 1301.9±326 Kcal. The male children consumed more energy per day than the female, however there was no significant difference in their mean (Mann-U Whitney test; p≤0.05). With regard to percentage protein and carbohydrate contribution to daily energy consumption, the mean for girls was slightly higher than boys (Table 4.4). A similar trend was observed for micronutrients intake. Vitamin A and C intake was also slightly higher for girls than boys. Iron intake was however lower for girls than boys.

The data also revealed the frequency of consumption of different foods in the seven days prior to the survey (Table 4.5). The foods were later categorized into food groups: cereals, meats, eggs, milk and milk products; legumes, nuts and pulses; green leafy vegetables, other vegetables; vitamin A rich fruits and other fruits, sweets and sugars and beverages as shown in Table 4.5.

In general, children consumed food very frequently within the seven days preceding the survey. The mean cereal consumption for the seven days was approximately 28.9 times
per child; this translates to 4 – 5 times a day. It was discovered that the male children consumed cereals more frequently (29.9±14.4) than the female children (27.7±14.2). The same goes for milk and milk products, legumes, nuts and pulses and vitamin A rich fruits. It was however noted that the girls consumed sweets and sugars, beverages, other fruits and meats more frequently than boys (Table 4.5) Consumption of eggs was adequate for both boys and girls with the mean frequency consumption per week being 3.2±3.3 times.

*Table 4.5 Frequency of consumption of different food groups in 7 days*

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
<th>Total Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>29.9±14.4</td>
<td>27.7±14.2</td>
<td>28.9±14.3</td>
</tr>
<tr>
<td>Meats</td>
<td>10.7±7.9</td>
<td>11.3±8.4</td>
<td>10.9±8.1</td>
</tr>
<tr>
<td>Milk &amp; Milk products</td>
<td>12.1±9.7</td>
<td>10.1±7.2</td>
<td>11.2±8.7</td>
</tr>
<tr>
<td>Eggs</td>
<td>3.1±3.3</td>
<td>3.3±3.4</td>
<td>3.2±3.3</td>
</tr>
<tr>
<td>Legumes, nuts &amp; pulses</td>
<td>12.4±11.1</td>
<td>11.3±8.8</td>
<td>11.9±10.2</td>
</tr>
<tr>
<td>Green Leafy vegetables</td>
<td>8.1±4.8</td>
<td>9.7±6.1</td>
<td>8.8±5.5</td>
</tr>
<tr>
<td>Other Vegetables</td>
<td>9.3±8.4</td>
<td>8.3±6.8</td>
<td>8.8±7.7</td>
</tr>
<tr>
<td>Other Fruits</td>
<td>7.9±7.0</td>
<td>9.2±6.8</td>
<td>8.5±6.9</td>
</tr>
<tr>
<td>Vitamin A rich fruits</td>
<td>8.7±6.4</td>
<td>8.5±5.6</td>
<td>8.6±6.0</td>
</tr>
<tr>
<td>Sweets &amp; Sugars</td>
<td>14.6±10.3</td>
<td>16.1±9.0</td>
<td>15.3±9.8</td>
</tr>
<tr>
<td>Beverages</td>
<td>6.5±6.4</td>
<td>7.4±6.8</td>
<td>6.9±6.6</td>
</tr>
</tbody>
</table>

Qualitative data from FGD (Appendix G) gave an analysis on the theme of dietary practices and particularly number of meals consumed by the respondents as well as the adequacy of meals. FGD1 comprising of the male adolescent children responded that they had an average of two meals a day (lunch and supper) while FGD2 which comprised of female adolescent children reported an average of 3 meals per day (breakfast, supper and lunch). Of both genders, those who said they had all the three
meals a day highlighted that the amount of food they received per meal was not always enough and that at times they felt hungry. Of the interviews conducted during the FGD, majority of the students stated that if allowed, they would consume certain foods for breakfast, lunch and supper.

Majority of the students stated that if allowed they would choose bread, tea and mandazi for breakfast. For lunch and dinner, majority of the students stated that if allowed they would eat chips, indomie (noodles), rice or meat as a meal. None of the students mentioned that if allowed they would include vegetables, cereals or legumes in their diet. This was an indication of their dietary practices and their food choices.

4.6 Children’s Nutritional Status

The nutrition status of children was determined by measuring their weight and height. The BMI for age was then computed for each child and compared against the WHO (2006) reference standards for girls and boys to get the Z-scores. Table 4.6 and 4.7 shows the nutrition status of the school going children. The survey data revealed that majority (84%) of the children were of normal BMI (Z-score of between -1 to 1 SD) with a higher proportion (88%) of male children in this category than female (80%).
Table 4.6 Nutrition status of children by sex

<table>
<thead>
<tr>
<th>Nutrition status</th>
<th>Male (n=142)</th>
<th>Female (n=114)</th>
<th>Total (n=256)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severely underweight</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>(SD&lt;= -3.0)</td>
<td>2.8%</td>
<td>0.9%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Underweight</td>
<td>10</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>(SD&lt;= -2.0)</td>
<td>7.0%</td>
<td>7.0%</td>
<td>7.0%</td>
</tr>
<tr>
<td>Normal</td>
<td>125</td>
<td>91</td>
<td>216</td>
</tr>
<tr>
<td>(SD -1.0 - 1.0)</td>
<td>88.0%</td>
<td>79.8%</td>
<td>84.4%</td>
</tr>
<tr>
<td>Overweight</td>
<td>7</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>(SD&gt;=2.0)</td>
<td>4.9%</td>
<td>13.2%</td>
<td>8.6%</td>
</tr>
</tbody>
</table>

Only 9% of the children were undernourished with approximately 2% being severely underweight. Regarding over nutrition, more girls (13%) were overweight (Z-score of $\geq$ 2SD) than (5%) boys (Table 4.6). The mean BMI for age was higher for girls ($18.2 \pm 2.8$) than boys ($17.7 \pm 2.3$) (Table 4.7). The WHO Z-scores also showed that the mean for boys was lower than for girls but still within the recommended median range.

Table 4.7 The mean BMI for Age and Z-scores for children

<table>
<thead>
<tr>
<th>Sex</th>
<th>BMI for Age</th>
<th>Z-scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (n=142)</td>
<td>17.7 ± 2.3</td>
<td>-0.042 ± 1.06</td>
</tr>
<tr>
<td>Female (n=114)</td>
<td>18.2 ± 2.8</td>
<td>0.132 ± 1.17</td>
</tr>
<tr>
<td>Total (n=256)</td>
<td>17.9 ± 2.6</td>
<td>0.035 ± 1.11</td>
</tr>
</tbody>
</table>
4.7 Children’s School Performance

For this study a 5-point likert scale was used to capture pupil’s responses on school performance. Studies that have used likert scales have either analyzed the items separately or summed them to create a score for a group of items (Wuensch, 2011; Carifio & Perla, 2011; Dawes, 2008). The likert scale was ideal for this study as it prevents the respondents from trying to portray themselves or their families in a light that they believe the researcher or the society considers more favourable. The responses were scored based on whether they were positive or negative in terms of involvement. A sure proportion of the pupils were considered to be highly involved in extra-curricular activities (63%) and participation of after school games (46%) (Tables 4.8). A few (25%) love sitting in the field during games. However, approximately 31% reported that they hate involvement in field activities.

With regard to involvement in classroom activities, about 67.6% of the pupils reported that they volunteer to undertake classroom activities while (23%) reported that they rarely or never volunteer in class (Table 4.8). Most pupils (66%) reported that they respond to questions in class while (18.4%) answered that they rarely or never participate in responding to questions in class. Majority (68.4%) of the pupils reported that they completed assignments in time with (65.7%) agreeing that their class performance was good. Less than half (48.8%) of the pupils stated that they enjoy undertaking class work while a few (21.5%) were moderately involved as they only
enjoyed undertaking class work sometimes. 29.7% of the pupils stated that they rarely or never enjoy class work.

**Table 4.8 Pupils responses to questions on school performance**

<table>
<thead>
<tr>
<th>School Performance</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Involvement in extra-curricular activities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I'm involved in extra-curricular activities</td>
<td>15.2%</td>
<td>48.4%</td>
<td>13.4%</td>
<td>23.0%</td>
<td>0.0%</td>
<td>100%</td>
</tr>
<tr>
<td>I participate in after school games/clubs</td>
<td>9.8%</td>
<td>36.3%</td>
<td>14.5%</td>
<td>37.9%</td>
<td>1.6%</td>
<td>100%</td>
</tr>
<tr>
<td>I hate involvement in field activities</td>
<td>8.2%</td>
<td>22.7%</td>
<td>11.7%</td>
<td>42.2%</td>
<td>15.2%</td>
<td>100%</td>
</tr>
<tr>
<td>I love sitting in the field during games</td>
<td>9.0%</td>
<td>16.4%</td>
<td>9.0%</td>
<td>39.1%</td>
<td>26.6%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Involvement in classroom activities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I volunteer to take activities in class</td>
<td>36.7%</td>
<td>30.9%</td>
<td>9.4%</td>
<td>15.2%</td>
<td>7.8%</td>
<td>100%</td>
</tr>
<tr>
<td>I respond to questions in class</td>
<td>29.7%</td>
<td>36.3%</td>
<td>15.6%</td>
<td>13.7%</td>
<td>4.7%</td>
<td>100%</td>
</tr>
<tr>
<td>I complete assignments in time</td>
<td>28.9%</td>
<td>39.5%</td>
<td>18.0%</td>
<td>9.8%</td>
<td>3.9%</td>
<td>100%</td>
</tr>
<tr>
<td>I have good class performance</td>
<td>13.7%</td>
<td>52.0%</td>
<td>19.9%</td>
<td>7.4%</td>
<td>7.0%</td>
<td>100%</td>
</tr>
<tr>
<td>I enjoy undertaking class work</td>
<td>23.0%</td>
<td>25.8%</td>
<td>21.5%</td>
<td>18.8%</td>
<td>10.9%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>School attendance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I attend school regularly</td>
<td>37.5%</td>
<td>46.9%</td>
<td>7.8%</td>
<td>5.1%</td>
<td>2.7%</td>
<td>100%</td>
</tr>
<tr>
<td>I’m punctual to school</td>
<td>30.1%</td>
<td>43.0%</td>
<td>14.5%</td>
<td>7.0%</td>
<td>5.5%</td>
<td>100%</td>
</tr>
<tr>
<td>I always remain in school till end day</td>
<td>37.1%</td>
<td>34.8%</td>
<td>7.4%</td>
<td>12.1%</td>
<td>8.6%</td>
<td>100%</td>
</tr>
<tr>
<td>I’m regularly punished for absenteeism</td>
<td>5.5%</td>
<td>10.2%</td>
<td>8.6%</td>
<td>35.2%</td>
<td>40.6%</td>
<td>100%</td>
</tr>
<tr>
<td>I’m regularly punished for running away from school</td>
<td>7.0%</td>
<td>4.3%</td>
<td>6.3%</td>
<td>28.9%</td>
<td>53.5%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Regarding school attendance, majority (84.4%) of the pupils reported that they attended school regularly. A big percentage of the students (73.1%) reported that they were punctual to school and approximately 71.9% stated that they always remained in school till the end day. On the other hand, about 15.7% reported to have been punished for absenteeism and 11.3% reported to have been punished for regularly running away from school (Table 4.8).

4.8 Relationships between Variables

This section presents information on the associations and relationships between study variables. Such information gives insight on how the independent and dependent variables relate to bring out a clearer picture and understanding on the study.

4.8.1 Relationship between Socio-Economic Status and School Performance of Children

Socio-economic status was examined as a confounding variable to children’s school performance. The study deemed that this variable is linked to performance regardless of children’s dietary practices and their nutritional status (Hanscombe et al., 2012). The socio-economic status of the household was determined by variables like asset ownership such as fridge, vehicle, radio, television, computer and mobile phones), size of the house, education level of the mother and father and type of housing. Spearman correlation coefficient was used to determine the relationship between the non-parametric variables.
It was discovered that there was a weak positive correlation \((r_s = 0.160; P \leq 0.05)\) between household asset ownership and class attendance (Table 4.9). This implies that the pupils from households owning more household items had a better class attendance as compared to those with lesser household items.

\[\text{Table 4.9 Relationship between household socio-economic status and school performance of children}\]

<table>
<thead>
<tr>
<th>Social Economic Status</th>
<th>Involvement in Class activities</th>
<th>Involvement in extracurricular activities</th>
<th>School attendance</th>
<th>School performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ownership of household items</td>
<td>Correlation Coefficient</td>
<td>-0.009</td>
<td>0.095</td>
<td>0.160*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.887</td>
<td>0.128</td>
<td>0.011</td>
</tr>
<tr>
<td>Father’s education level</td>
<td>Correlation Coefficient</td>
<td>0.054</td>
<td>0.074</td>
<td>0.049</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.389</td>
<td>0.237</td>
<td>0.434</td>
</tr>
<tr>
<td>Mother’s education level</td>
<td>Correlation Coefficient</td>
<td>-0.01</td>
<td>0.174*</td>
<td>0.164*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.876</td>
<td>0.014</td>
<td>0.033</td>
</tr>
<tr>
<td>Size of the house</td>
<td>Correlation Coefficient</td>
<td>0.107</td>
<td>0.154*</td>
<td>0.129*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.088</td>
<td>0.014</td>
<td>0.04</td>
</tr>
<tr>
<td>No. of children</td>
<td>Correlation Coefficient</td>
<td>0.101</td>
<td>0.003</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.106</td>
<td>0.958</td>
<td>0.836</td>
</tr>
</tbody>
</table>

Note: *** = Correlation is significant at the 0.05 level and 0.01 level (2-tailed) respectively.

The data also revealed a weak positive relationship between the size of the house and class attendance \(r_s = 0.129; P (0.04) < 0.05\), involvement in extracurricular activities
r_s=0.154; P(0.014) < 0.05) and class attendance r_s = 0.179; P (0.004) < 0.01) combined (Table 4.9). Regarding education level of the parents, the data showed a positive relationship between mother’s education level and involvement in extra-curriculum activities, school attendance and with all the variables combined. There was no significant relationship observed between the number of children/siblings and involvement in class activities, class attendance and involvement in extracurricular activities.

### 4.8.2 Relationship between Dietary Practices and Nutritional Status of Children

The relationship between dietary practices and nutrition status of pupils was determined using spearman’s correlation co-efficient. As shown in Table 4.10, it was found that consumption of other food groups including other vegetables, other fruits and beverages exerted a weak positive influence on the nutrition status of children based on their Z-Scores (r_s = 0.164**; P (0.008) < 0.05, r_s = 0.164; P (0.008) < 0.05 and r_s = 0.148; P (0.018) < 0.05 respectively). This indicated that children who consumed more of these food groups had higher Z-scores. A similar trend was observed for BMI for Age as shown in Table 4.10. Consumption of foods from other food groups such as cereals, meat products, milk and milk products, legumes, sugar, protein, fat and carbohydrates did not show any significant correlation with either the children Z-scores or BMI for age (Table 4.10).
Table 4.10 Relationship between dietary Practices and Nutritional Status of children

<table>
<thead>
<tr>
<th></th>
<th>BMI for Age</th>
<th>Z-scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequacy</td>
<td>r</td>
<td>-0.076</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.226</td>
</tr>
<tr>
<td>Cereals</td>
<td>r</td>
<td>0.014</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.828</td>
</tr>
<tr>
<td>Meats, fish &amp; Chicken</td>
<td>r</td>
<td>0.094</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.132</td>
</tr>
<tr>
<td>Milk and milk Products</td>
<td>r</td>
<td>-0.001</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.986</td>
</tr>
<tr>
<td>Green Leafy Vegetables</td>
<td>r</td>
<td>0.086</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.17</td>
</tr>
<tr>
<td>Legumes, nuts &amp; pulses</td>
<td>r</td>
<td>0.107</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.088</td>
</tr>
<tr>
<td>Other Vegetables</td>
<td>r</td>
<td>.147*</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.019</td>
</tr>
<tr>
<td>Other Fruits</td>
<td>r</td>
<td>.135*</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.031</td>
</tr>
<tr>
<td>Vitamin A rich Fruits</td>
<td>r</td>
<td>0.108</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.086</td>
</tr>
<tr>
<td>Sugar</td>
<td>r</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.944</td>
</tr>
<tr>
<td>Beverages</td>
<td>r</td>
<td>.142*</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.023</td>
</tr>
<tr>
<td>Energy Intake (kcal)</td>
<td>r</td>
<td>-0.104</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.098</td>
</tr>
<tr>
<td>% Protein Intake</td>
<td>r</td>
<td>0.038</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.547</td>
</tr>
<tr>
<td>% Fat Intake</td>
<td>r</td>
<td>-0.023</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.716</td>
</tr>
<tr>
<td>% CHO Intake</td>
<td>r</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.963</td>
</tr>
</tbody>
</table>

Note: *, ** = Correlation is significant at the 0.05 level and 0.01 level (2-tailed), respectively.
4.8.3 Relationship between Dietary Practices and School Performance of Children

Spearman correlation coefficient was used to determine the relationship between dietary practices and school performance of children. The results showed that food adequacy had a positive correlation ($r_s = 0.132*$; $P(0.035) < 0.05$) with performance of extracurricular activities in school (Table 4.11). This implies that the children who reported to consume sufficient amount of food also performed extracurricular activities in school. A similar trend was observed for consumption of cereals ($r_s = .184**$; $P(0.003) < 0.05$), meats, fish and chicken ($r_s = .159*$; $P(0.011) < 0.05$), other vegetables ($r_s = .128$; $P(0.04) < 0.05$), vitamin A rich fruits ($r_s = .163**$; $P(0.009) < 0.05$), other fruits ($r_s = .147*$; $P(0.019) < 0.05$) and beverages ($r_s = .164**$; $P(0.008) < 0.05$) (Table 4.11). Higher consumption of these food groups by the pupils seemed to exert a positive influence on performance of extracurricular activities in school. Energy intake (Kcal) ($r_s = .005$; $P(0.934)$) seemed to exert influence on overall school performance (attendance, class and extra-curriculum).

Consumption of other fruits and beverages showed a weak positive influence on school attendance, performance and involvement in extracurricular activities combined (Table 4.11). However, there was no significant correlation between consumption of other food groups and pupils school performance. Likewise, consumption of other fruits and beverages revealed a weak positive influence on school attendance, performance and involvement in extracurricular activities combined (Table 4.11). Nonetheless, there was
no significant correlation between consumption of other food groups and pupils school performance.

**Table 4.11 Relationship between dietary practices and school performance of children**

<table>
<thead>
<tr>
<th></th>
<th>Class activities</th>
<th>School attendance</th>
<th>Extracurricular activities</th>
<th>School performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adequacy</strong></td>
<td>r</td>
<td>-0.088</td>
<td>0.032</td>
<td>.132*</td>
</tr>
<tr>
<td>P value</td>
<td>0.159</td>
<td>0.607</td>
<td>0.035</td>
<td>0.934</td>
</tr>
<tr>
<td><strong>Cereals</strong></td>
<td>r</td>
<td>0.059</td>
<td>-0.021</td>
<td>.184**</td>
</tr>
<tr>
<td>P value</td>
<td>0.351</td>
<td>0.738</td>
<td>0.003</td>
<td>0.138</td>
</tr>
<tr>
<td><strong>Meats, fish &amp; Chicken</strong></td>
<td>r</td>
<td>-0.021</td>
<td>-0.082</td>
<td>.159*</td>
</tr>
<tr>
<td>P value</td>
<td>0.733</td>
<td>0.192</td>
<td>0.011</td>
<td>0.965</td>
</tr>
<tr>
<td><strong>Milk and milk Products</strong></td>
<td>r</td>
<td>0.006</td>
<td>-0.021</td>
<td>0.113</td>
</tr>
<tr>
<td>P value</td>
<td>0.928</td>
<td>0.734</td>
<td>0.071</td>
<td>0.712</td>
</tr>
<tr>
<td><strong>Green Leafy Vegetables</strong></td>
<td>r</td>
<td>0.00</td>
<td>0.027</td>
<td>0.117</td>
</tr>
<tr>
<td>P value</td>
<td>0.994</td>
<td>0.666</td>
<td>0.062</td>
<td>0.412</td>
</tr>
<tr>
<td><strong>Legumes, nuts &amp; pulses</strong></td>
<td>r</td>
<td>-0.073</td>
<td>-0.03</td>
<td>0.113</td>
</tr>
<tr>
<td>P value</td>
<td>0.247</td>
<td>0.629</td>
<td>0.072</td>
<td>0.796</td>
</tr>
<tr>
<td><strong>Other Vegetables</strong></td>
<td>r</td>
<td>0.032</td>
<td>0.049</td>
<td>.128*</td>
</tr>
<tr>
<td>P value</td>
<td>0.606</td>
<td>0.432</td>
<td>0.04</td>
<td>0.086</td>
</tr>
<tr>
<td><strong>Other Fruits</strong></td>
<td>r</td>
<td>0.056</td>
<td>0.069</td>
<td>.147*</td>
</tr>
<tr>
<td>P value</td>
<td>0.374</td>
<td>0.271</td>
<td>0.019</td>
<td>0.033</td>
</tr>
<tr>
<td><strong>Vitamin A rich Fruits</strong></td>
<td>r</td>
<td>0.06</td>
<td>-0.008</td>
<td>.163**</td>
</tr>
<tr>
<td>P value</td>
<td>0.335</td>
<td>0.903</td>
<td>0.009</td>
<td>0.072</td>
</tr>
<tr>
<td><strong>Sugar</strong></td>
<td>r</td>
<td>0.002</td>
<td>0.071</td>
<td>0.044</td>
</tr>
<tr>
<td>P value</td>
<td>0.978</td>
<td>0.26</td>
<td>0.479</td>
<td>0.287</td>
</tr>
<tr>
<td><strong>Beverages</strong></td>
<td>r</td>
<td>0.077</td>
<td>0.042</td>
<td>.164**</td>
</tr>
<tr>
<td>P value</td>
<td>0.221</td>
<td>0.502</td>
<td>0.008</td>
<td>0.031</td>
</tr>
</tbody>
</table>
Table 4.12 Relationship between dietary practices and school performance of children

<table>
<thead>
<tr>
<th></th>
<th>Class activities</th>
<th>School attendance</th>
<th>Extracurricular activities</th>
<th>School performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Intake (kcal)</td>
<td>r 0.041</td>
<td>-0.048</td>
<td>0.005</td>
<td>0.139*</td>
</tr>
<tr>
<td></td>
<td>P value 0.517</td>
<td>0.448</td>
<td>0.934</td>
<td>0.925</td>
</tr>
<tr>
<td>% Protein Intake</td>
<td>r 0.046</td>
<td>0.09</td>
<td>0.054</td>
<td>0.098</td>
</tr>
<tr>
<td></td>
<td>P value 0.459</td>
<td>0.153</td>
<td>0.389</td>
<td>0.117</td>
</tr>
<tr>
<td>% Fat Intake</td>
<td>r 0.074</td>
<td>0.01</td>
<td>0.112</td>
<td>0.073</td>
</tr>
<tr>
<td></td>
<td>P value 0.238</td>
<td>0.877</td>
<td>0.074</td>
<td>0.242</td>
</tr>
<tr>
<td>% CHO Intake</td>
<td>r -0.095</td>
<td>-0.04</td>
<td>-0.111</td>
<td>-0.101</td>
</tr>
<tr>
<td></td>
<td>P value 0.128</td>
<td>0.524</td>
<td>0.078</td>
<td>0.107</td>
</tr>
</tbody>
</table>

4.8.4 Relationship between Nutritional Status and School Performance of Children

The relationship between nutrition status in terms of BMI for Age and Z-scores and school performance was determined using Spearman’s correlation co-efficient. A weak positive correlation (r_s = 0.133; P ≤ 0.05) was observed between BMI for Age and pupils’ completion of school assignment in time (Table 4.12). This implies that the higher the BMI for Age, the higher the chances of a pupil completing assignments in time. Z-scores on the other hand, showed a weak positive correlation with inactivity during field games. The children/pupils who reported that they love sitting in the field during games are more likely to have a higher Z-scores (meaning that there nutrition status was inclining towards overweight).
### Table 4.13 Relationship between Nutritional Status and School Performance of children

<table>
<thead>
<tr>
<th>School Performance</th>
<th>BMI for Age</th>
<th>Z-scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>I'm Involved in extra-curricular activities</td>
<td>r: -0.025</td>
<td>P: 0.69</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: -0.032</td>
</tr>
<tr>
<td>I participate in after school games/clubs</td>
<td>r: -0.022</td>
<td>P: 0.732</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: 0.282</td>
</tr>
<tr>
<td>I love sitting in the field during games</td>
<td>r: 0.108</td>
<td>P: 0.085</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: 0.158*</td>
</tr>
<tr>
<td>I volunteer to take activities in class</td>
<td>r: -0.013</td>
<td>P: 0.84</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: 0.048</td>
</tr>
<tr>
<td>I respond to questions in class</td>
<td>r: 0.055</td>
<td>P: 0.379</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: 0.022</td>
</tr>
<tr>
<td>I complete assignments in time</td>
<td>r: .133*</td>
<td>P: 0.033</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: 0.118</td>
</tr>
<tr>
<td>I have good class performance</td>
<td>r: -0.088</td>
<td>P: 0.161</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: -0.069</td>
</tr>
<tr>
<td>I enjoy undertaking my class work</td>
<td>r: -0.014</td>
<td>P: 0.827</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: -0.03</td>
</tr>
<tr>
<td>I attend school every day</td>
<td>r: 0.035</td>
<td>P: 0.576</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: -0.071</td>
</tr>
<tr>
<td>I'm punctual to school</td>
<td>r: -0.104</td>
<td>P: 0.097</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: -0.09</td>
</tr>
<tr>
<td>I always remain in school till end day</td>
<td>r: -0.012</td>
<td>P: 0.849</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: -0.02</td>
</tr>
<tr>
<td>I'm regularly punished for absenteeism</td>
<td>r: 0.056</td>
<td>P: 0.398</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: 0.24</td>
</tr>
<tr>
<td>I'm regularly punished for running away from school</td>
<td>r: -0.013</td>
<td>P: 0.865</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z: 0.568</td>
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</table>

Note: * = Correlation is significant at the 0.05 level and 0.01 level (2-tailed) respectively. No significant relationship was observed between BMI for Age and Z-scores with the other variables.
CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter gives the interpretation and explanation of the findings presented in chapter four. It also shows how the findings of the present study relate with those of other studies. Lastly, this chapter gives a summary of the study as well as the conclusions and recommendation of the study.

5.2 Socio-economic Characteristics of the Respondents

Education level of parents, asset ownership, number of children, size and type of dwelling are some of the most important socio-economic indicators that determine children’s dietary practices and nutritional status. Majority of the respondents revealed that their parents had secondary school education while very few (1%) had never been to school. According to UNDP (2013), Kenya urban cities have a high population of educated persons. This study found that there was a positive relationship between mother’s education level and their children’s school performance. These findings are consistent with those of NAEP, 2015; Heath, 2013; Mann & Truswell, 2012) who found that highly educated mothers have a greater success in providing their children with skills that contribute to success in school. The parent’s education to a large extent determines the type of occupation they engage in; people with post-secondary training
often have entry into formal employment compared to those with secondary education or less (Dauda, 2010).

Evidently, the study revealed that there is positive relationship between household asset ownership and class attendance as well as a positive relationship between the size of the house and class attendance and involvement in extracurricular. Wealthier households have more income that can be converted to household assets and they have been seen to play a major role in determining the different aspects of school performance. Studies conducted by Buchman (2010) and Jansen and Nielson (2008) found that household assets had a positive effect on school attendance. Moreover, Destin and Oyserman (2009) found that when children believed that they had adequate household and financial assets then they tend to have higher grades and put more effort into their school work.

Consequently, for this study socio-economic factor was viewed as a confounding variable as evidence showed that various aspects of socio-economic status influenced children’s school performance.

5.3 Dietary Practices of Children

The first objective of this study was to find out the dietary practices of adolescent children within public primary schools in Nairobi County. The food composition and the frequency as well as the amount of food are important in terms of school performance. At ages between eleven and fifteen years, the children are in their
developmental state of puberty. During this state of brain development, there are greater requirements for energy and nutrients. Deficiencies in nutrients and energy could result in impaired development of the structure of the brain. The effects of the impaired development are long-term for the mental functioning of the children (Mann & Truswell, 2012).

This study found out that male children consumed more energy per day than the female. Barooah, 2012 states that male adolescent children have higher energy requirements than females and therefore they tend to consume more food than their female counterparts. Contrary to this, the study found out that proteins and specifically meats and eggs as well as carbohydrate had the highest contribution to the daily energy consumption for girls. Subsequently, the mean consumption of these food groups was higher for girls than for boys. It was also noted that adolescent girls had a higher consumption of sweets, sugars and beverages than their counterparts. Overall consumption of protein, fats and carbohydrates was higher for girls than for boys (Table 4.4).

Zarborskis et al. (2012) had conducted a cross-sectional study on eating habits among school-age children aged between 11 and 15 years in Lithuania. Similar to this study, it was found that school aged children had low intakes of fruits and vegetables. The study also found that there was increased intake of high sugar snacks, sweets, chocolates, biscuits and soft drink beverages among the adolescent school-aged children and in
particular girls. High consumption of meat, high sugar foods and high fat foods can be attributed to feeding practices where children are primarily allowed to choose what they want to eat, as well as financial situations and work demands of parents that prevent them from actively participating in planning and organizing their children’s diet (Neumark-Sztainer, 2006). Besides, high intake of fat and sugar foods can be linked to many upcoming fast food establishments that sell food near schools and target school children (Onyiriuka, et al., 2013)

The mean cereal consumption for the seven days was approximately 28.9 times; this translates to 4 – 5 times a day and the study further discovered that male children consumed cereals more frequently (29.9±14.4) than the female children (27.7±14.2). The same goes for milk and milk products, legumes, nuts and pulses and vitamin A rich fruits. Generally, male adolescents showed higher intake of energy and dietary fiber. Consequently, Iron intake and Zinc was also higher for male adolescents than female. A similar trend goes for Micronutrient intake involving Vitamin A intake which was also slightly higher for boys than girls. Consumption of eggs, vegetables and fruits was notably low for both boys and girls.

These findings concurs with a study in Nigerian by Onyiriuka et al. (2013) which focused on assessing the eating habits of adolescent school girls. It was found that adolescent girls have a high consumption of daily starch and more worrisome was that they have low consumption of fruits and vegetables. Onyiriuka et al. (2013) also
revealed a high consumption of soft drink beverages among adolescent girls despite the fact that high consumption of soft drinks has been linked to poor bone formation and increased risk of bone fractures (Erikson, 2006). This findings on high intake of sweets, sodas, chocolates and beverages high in sugar among school girls is consistent across many previous researches studies carried out (Stang, et al., 2007; Onyiriuka, et al., 2013;Warriach, et al., 2009). These foods have high glycemic index making them quite unhealthy (Brands, 2011).

In general, children had a high frequency of consumption of food within the seven days preceding the survey. This was proof that eating of snacks in between meals is a common phenomenal among the adolescent children in public primary schools in Nairobi County. Qualitative data from the FGD also showed that the children preferred fatty and processed foods (Mandazi (ngumu), rice, chips and Indomie (noodles). Majority of the children did not consider vegetables as a core part of their diet. This is in line with other studies such as Liu et al. (2006), where adolescents increasingly indulge in nibbling non-nutritious foods (snacks mainly) in between meals which contributes to their overall energy intake. Similarly, Zarborskis et al. (2012) found that both sexes had high intake of sweets, chocolates, biscuits, soft drinks and pastries while Lindsay et al. (2012) attributed the high intake of sweets and other refined foods by adolescents to mothers enticing their children with unhealthy foods as a way of compensating their absence brought by work demands.
Further, from the findings of this study it can be presumed that female adolescents showed a higher risk of obesity as compared to males due to their increased consumption of foods rich in fats and processed sugars (Table 4.2.2). This contradicts the study done by Srivastava et al. (2012) where findings showed that under-nutrition was significantly more prevalent in girls than boys. Perhaps this is because the study by Srivastava et al. (2012) was carried out in a rural setting and the dietary practices of children differ from those in an urban setting. However, in support of this study’s findings are Law et al. (2007) in the journal of public health who observed that there were differences in obesity prevalence by both age and gender and that adolescent females were at higher risk of obesity than males.

5.3.1 Dietary Practices and School Performance
The dietary practices in this study were assessed using the 24-hour food recall and the 7-day food frequency. Using the 24-hour food recall and the 7-day food frequency, the study found that 51% of the children who were interviewed consumed the normal amount of food in the day preceding the data collection. The study also showed that 24% of the children consumed an amount which was more than the usual while 25% consumed an amount that was less than usual in the day preceding the data collection. With regards to energy intake, the study found that the average intake for the male respondents was 1330.3 kilocalories per day while that for. The average intake for the female respondents was 1266.6 kilocalories per day.
In reference to the journal of the American Dietetic Association, the energy needs of adolescent are influenced by their activity level, metabolic rates as well as the increased need to support pubertal growth. As such, adolescent males require higher caloric requirements due to their variability in growth in comparison to females. Even though the males require more energy compared to their female counterparts, the mean energy intakes for both the male and female members in the study were found to be lower than the recommended daily allowances for the ages studied. The children used in this study were between the ages of eleven and fifteen years. The recommended daily energy intake for adolescent females aged between nine and thirteen years is 2,071 kilocalories (Story & Stang 2005) while those aged between fourteen to eighteen years is 2,368 kilocalories.

Based on these recommended energy intakes, it is evident that the mean energy intake for the female respondents was significantly lower than the recommended daily intake for the adolescents in the age bracket in which the female respondents were derived. Similarly, Story and Stang (2005) recommend daily intakes for male adolescents aged between nine years and thirteen users as 2,279 kilocalories while those aged between fourteen and eighteen years is 3,152 kilocalories. At 1330.3 kilocalories per day as the average intake for the male respondents according to our study is far lower than that of the recommended daily intakes. The mean energy intake of children was 1301.9±326 Kcal. This average energy intake is still lower than the recommended daily intakes for the children aged between eleven and fifteen years (Story & Stang 2005).
A diet low in energy can lead to delayed puberty and growth retardation among adolescents (Stang et al., 2007). Insufficient intake of energy may occur because of certain factors. The most common being inadequate monetary resources to purchase food, restrictive dieting or chronic illness (Bandura, 2006).

The results showed that food adequacy had a positive correlation ($r_s = 0.132; P \leq 0.05$) with performance of extracurricular activities in school. This implies that the children who reported to consume sufficient amount of food performed better in extracurricular activities in school. Adolescent children who received adequate amounts of food had better school performance. These findings also parallel those by Belachew et al. (2011) conducted in Jimma zone in Southwest Ethiopia where adolescent participants aged between 13-17 years who were food insecure had higher cases of absenteeism and lower educational attainment in comparison to their more food secure peers.

Also noted was the higher consumption of cereals, meats, other vegetables, vitamin A rich fruits, other fruits and beverages (Table 4.11) which seemed to exert a positive influence on performance of extracurricular activities in school. The study also found that the consumption of other fruits and beverages showed a weak positive influence on school attendance and involvement in extracurricular activities (Table 4.11).
During childhood, the brain development includes among others the frontal lobes of the brain. The development of the frontal lobes is greatly impacted by nutrition. The adequate provision of nutrients and energy causes higher cognitive functions that are controlled by the frontal lobes. Such functions include the inhibition of irrelevant stimulation and focusing attention (Bryan et al., 2015). Additionally, various nutrients affect the integrity and structures of the brain cells. Nutrients also affect the neurotransmission, brain energy supply, signal transduction and metabolism (Schmitt, Benton & Kallus, 2005). However, for this study there was no significant correlation between consumption of the different food groups and pupils involvement in classroom activities such as completion of assignments and direct participation in class. This aspect of the research posed stern challenges. According to Brands, (2011) research into the influence of particular nutrients on mental development is particularly challenging. The challenge arises from the specification and characterization of the interaction that occurs between a single nutrient in the diet and cognitive development and mental performance in school going children. Given this hurdle in the research, it was not possible to quantify the effect of the various food groups on the classroom activity performance of the student beyond the correlation. A review of studies examining the exact relation of diet and classroom performance in children has only revealed inconclusive results (Ells et al., 2008, Erickson, 2006).
5.4 Nutritional Status of Children

The nutrition status of children was determined by measuring their weight and height. The BMI for age was then computed for each child and compared against the WHO (2006) reference standards for girls and boys to get the Z-scores. Nutritional status is an important factor in the performance of school-going children. Numerous studies have shown the effect that malnutrition has on the cognitive development. Grantham-McGregor (2001) argued that chronic undernutrition results in low performance levels, especially for school-going children. In order to achieve the full educational potential, optimal nutrition and good health are required.

According to Ernesto (1990) and UN/ACC/SCN (1990), nutrition affects the learning ability and intellectual development of children. Many researchers have explored the effect of nutrition on school performance. Many of the researchers have reported a significant correlation between the nutritional status of the school-going children and their school performance and cognitive tests. For instance, Pollitt (2001) and WHO (2008) show that school-going children who are supplied with adequate nutrition show higher scores in the tests of factual knowledge when compared to children who do not have optimal nutrition.

The study data revealed that majority (84%) of the children had normal Z-score of between -1 to 1 SD with a higher proportion (88%) of male children in this category than female (80%). Only 7% of the children were undernourished with approximately 2% being severely underweight. Regarding over-nutrition the study found that 8.6% of
children were overweight with girls having a higher prevalence than boys. These findings concur to some extent with the findings by KDHS (2014) which indicates that underweight prevalence in urban children is at 7% while overweight among children is at 5.7% and rising. Similarly, the findings in this study relates to the study by Kimani (2014) who found that the double burden of malnutrition which comprises of under- and over nutrition occurring simultaneously is a reality in Nairobi County. Kyallo et al. (2013) also conducted a similar study and found that the prevalence of overweight children in public schools was at 11.5 %, with girls being at higher risk. The differences in outcome of the two studies may be due to a difference in methodology but it is worth noting that both findings pose a public health concern.

The mean BMI for age was higher for girls (18.2 ± 2.8) than boys (17.7 ± 2.3) (Table 4.7). WHO Z-scores also showed that the mean for boys was lower than for girls but still within the recommended median range. The findings are relatable to findings by Kyallo et al. (2013) who conducted a study on overweight and obesity among public and private primary school children in Nairobi. The study found that the prevalence of overweight and obesity was higher among girls (19%) than boys (16%), which is indicative of a public health problem. The study by Kyallo et al. (2013) just like this study showed a trend of increasing overweight/obesity within Nairobi County.

Moreover, the findings of this study showed that 7% of the children were undernourished with approximately 2% being severely underweight. Hence, there is a
need to ensure that this number is reduced sustainably. It is also worth noting that the percentage of underweight children (7%) who were undernourished is similar to that by KDHS (2014) which reported a comparable figure for children in urban like Nairobi. However, it is significantly lower compared to the prevalence rates reported by other studies. For instance, Chesire et al. (2008) carried out a cross-sectional descriptive study in Kawangware peri-urban slum in Nairobi, Kenya to establish the determinants of under-nutrition among the school going children between ages six and twelve. Their study showed that the number of underweight children were 14.9% while 4.5% were wasted. The study by Chesire et al. (2008) concluded that there was evidence of under-nutrition among the school going children. The recommendations given were for increased awareness among the parents, children and teachers on the daily recommended intakes for the boys and the girls as well as the need for policy development by the Ministry of Education and Ministry of Health with the aim of alleviating under-nutrition among the school going children.

The differences between the findings of Chesire et al. (2008) and those of this study may be because their study was limited to Kawangware peri-urban slum while this study concentrated on the whole of Nairobi County. The findings of this study may also be indicative of the improvements that have been made since then and the need for sustained efforts in order to reduce the prevalence of under-nutrition among school going children. Similarly, Mwaniki and Makokha (2013) conducted a descriptive cross-sectional study in Dagoretti Division in Nairobi, Kenya to assess the nutrition status and
the associated factors for the children in public schools. Their findings revealed that the prevalence of underweight children was 14.9% while 9.7% of the sampled children were wasted. Even though the study by Mwaniki and Makokha (2013) and Chesire et al. (2008) are five years apart, it is worth noting that the setting of the two studies have similar socio-economic characteristics. Both settings comprise of unplanned settlements while this study focused on different sub-counties within Nairobi. This shows concern that the nutritional status of the school going children still requires concerted efforts.

Even though only 7% of the children were undernourished with approximately 2% being severely underweight, the findings of this study offer no reprieve in terms of improvements in the nutrition status of the children. This is because the socio-economic characteristics of the parents of the children on whom this study was performed are different from the social-economic settings of the families in the studies by Mwaniki and Makokha (2013) and Chesire et al. (2008).

5.4.1 Nutritional Status and School Performance

There has been a lot of focus on the effect of under-nutrition on the performance of school going children. This study, in addition to assessing the effect of under-nutrition on the performance of school going children also explored the effect of over-nutrition on the performance of school going children. It is worth noting that performance was operationally defined to include school attendance, involvement in classroom activities and involvement in extra-curricular activities. The relationship between nutrition status
in terms of BMI for Age and Z-scores and school performance was determined using Spearman’s correlation co-efficient. A weak positive correlation \( (r_s = 0.133; P \leq 0.05) \) was observed between BMI for Age and classroom performance in particular pupils’ completion of school assignment in time (Table 4.12). This implies that the higher the BMI for Age, the higher the chances of a pupil completing assignments in time. Z-scores on the other hand, showed a weak positive correlation with inactivity in during field games. The children/pupils who reported that they love sitting in the field during games were more likely to have a higher Z-scores (meaning that there nutrition status was inclining towards overweight).

According to the reviewed literature by Tobin (2013) and Bowman et al. (2004) the growth of the fast-food industry and busy lifestyles means that children are consuming more empty calories on a daily basis. Similarly, Shore et al. (2008) found that the GPAs of non-overweight students were about 11% higher than those of the overweight students. In the seventh grade 75% percent of all non-overweight students participated in at least one school-based athletic team, whereas only 61% of at-risk and 33% of overweight students do. The study by shore et al. (2008) was a pointer that children who are overweight perform less well compared to those with normal weight in relation to physical performance. The findings by Bowman et al. (2004) and Shore et al. (2008) are relatable to the findings of this study where it was found out that that the girls consumed more sweets and sugars, beverages and that more of the girls than boys were overweight (13.2%). Just like the reviewed study by Shore et al. (2008) the findings showed that the
children/pupils who reported that they love sitting in the field during games were more likely to have a higher Z-scores and were inclining towards overweight/obese.

5.5 Recommendations

The findings have shown that malnutrition (under and over nutrition) co-exists among adolescent school going children within Nairobi county. They also show that various dietary practices directly influence children’s nutritional status and school performance (involvement in class activities, involvement in extra-curriculum activities and school attendance). The following recommendations are made for parents:

**Recommendations for Parents**

i. Children’s dietary practices are directly influenced by their parents/guardians and if the parents are well informed then, they might offer positive dietary influence on their children. Nutrition education should be provided in schools. The school setting provides a good avenue of reaching large numbers of parents. The need for education is founded on the findings that have established that adolescent school children who eat adequate quantities of food have better school performance. This recommendation is based on the fact that the findings have showed that adolescent boys and adolescent girls have various eating preferences that may need to be encouraged or discouraged depending on their effect on health. For instance, it was noticed that girls have higher consumption of sweets and sugars.
ii. The basis of nutrition for children begins at home where parents are directly involved in planning, purchasing and preparation of the food. Findings from this study showed that what children eat influence their performance in extra-curriculum activities, class activities as well as attendance. Therefore, parents and caregivers should be educated to become aware of the foods that significantly affect their children’s brain development which directly affect their school performance. Hence, the parents should be encouraged to take an active role in teaching their children so as they make healthy food choices as a way of life

Recommendations for Schools

i. Schools have a role to play in encouraging parents to provide support for their children. This recommendation is based on the findings that adolescent school going children who are provided with adequate amounts of food have better performance more so school attendance. Schools should conduct awareness forums on the importance of nutrition/diet on their children’s education.

ii. From the findings it is also clear that schools also have a role to play in educating school children; the importance of nutrition, physical activity and more so the importance of making healthy food choices.
iii. Schools should engage in programmes and activities aimed at providing nutrition information to children/parents/communities for purposes of raising healthy children with gained advantage of performing well in school.

Recommendations for Government Practice

This study has showed that both over and under nutrition are existent within Nairobi County and that they affect children’s performance which according to the ministry of education has been deteriorating for the last years (NCC, 2014). As such, some action plan is needed. Therefore, the researcher recommends that:

i. The ministry of education should ensure that primary schools have professional nutritionists attached to the schools. At least three per county whose work will entail providing nutrition education and counselling to the children, parents, teachers as well as working with them to ensure that children meet their nutritional needs.

ii. The government should launch programmes to train and empower citizens on nutrition information such as use of USDA’s my plate, consumer education on point of purchase, provisional of recipes as well as information on eating healthy on a lean budget. When such information is accessible to the general public/communities, then it will trickle down to school going children.

iii. The government may liaise with private organizations to provide basic meals (Breakfast & Lunch) to school-children especially those from the very poor and food insecure households.
**Recommendations for Policy**

i. The government should come up with policies safeguarding children’s school performance by offering greater financial assistance in scaling up of school feeding programmes throughout the country.

**5.6 Suggestions for Further Research**

The following recommendations for further studies are made in view of the limitations of the current study

i. Future studies can gather data on parental role in children’s dietary practices

ii. Future researchers can also investigate class-teachers perception on children’s nutritional status and school performance

iii. This study was conducted in primary schools in Nairobi County. Future researchers can use a nationally representative sample to study dietary practices on nutritional status and school performance.

iv. Future studies can also employ an experimental design to examine dietary practices on nutritional status and aspects of school performance.
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association of the school food environment with dietary behaviors of young


APPENDICES

APPENDIX A: INTRODUCTION AND CONSENT LETTER

Dear respondent,

My name is Phrashiah Wanjiru Githinji, an MPH research student from Kenyatta University. I am undertaking a study on, “Dietary practices, nutritional status and school performance among upper primary children in selected public schools in Nairobi County, Kenya”. The information will be used by governmental ministries such as Ministry of Education, Ministry of Health and other programme implementers to improve the dietary practices, nutritional status and school performance of school children in Nairobi County and other regions in Kenya.

Procedures to be followed

With your consent and with that of your parents/guardians, we (principal investigator and research assistants) intend to ask you questions on socio-economic status, dietary practices and school performance. With your permission you will undergo a diet assessment session where your weight and height will be taken. Lastly, participants are required to participate in a 30 minutes focus group discussion.

Please note that all the above activities will be conducted at the school setting with the approval of the school headmaster. We will endeavour to make the sessions as short as possible and also make sure that you the participant is comfortable. I assure you that the
research team has been trained appropriately to take an approach that protects you by making discussions wholesome, discreet and confidential as possible.

**Confidentiality**

The participant should note that any information given to the researchers will be treated with care, respect and strict confidentiality. The information will be used solely for statistical purposes and records relating to the participant’s identity such as name and school performance records will not be revealed to any community members.

**Benefits/risk and Discomfort**

The selected persons may benefit from long-term programmes that are likely to be rolled out in the region as a result of the recommendations this study will make. Please note that there will be no payment associated with this study. There may be risk of information leakage during this study, more especially on dietary practices and nutritional status. This information is sensitive to young people and therefore as a way of minimizing this risk, the participant should be assured of high professionalism and confidentiality during data collection and in handling the information given. Some of the questions you will be asked will touch on subjects otherwise perceived as personal/private/family matters and may make you uncomfortable or embarrassed; in such cases you may refuse to answer those questions if you choose
Liability/termination

Please note that participation in this study is voluntary and for this reason, the participant shall release all researchers involved in the study from any liability on any arising issues subsequently occurring in connection with the study. If for any reason you do not wish to participate in the study, you may choose not to

Person to Contact

You are welcome to ask questions before consenting and at any time thereafter. The principal investigator (Phrashiah Wanjiru Githinji) and other research team members will be available to answer your questions anytime during the data collection. In case of further queries regarding the study you may contact me or the Kenyatta University Ethical Review Secretariat on the contact information given below.

Your participation will be highly appreciated.

Phrashiah Wanjiru Githinji
Principal Investigator
Kenyatta University
P.O Box 43844-00100, Nairobi
Tel: +254-726151941

Kenyatta University Ethical Committee
P.O Box 43844-00100, Nairobi
Tel: 8710901/12
**Respondent’s consent**

I have understood the above information as fully explained to me by the principal investigator, and I voluntarily consent to participate in this study (Please indicate by signing your willingness to participate in this study)

Name of participant __________________

Yes ___________________ No ___________________

Signature ___________________ Date ___________________

**Investigator’s Statement**

I, the undersigned, have explained to the volunteer participant in the most understandable way and language, the procedures to be followed, risks and benefits involved in this study.

Name of investigator ___________________

Investigator’s signature ___________________ Date ___________________
APPENDIX B

PARENTAL PERMISSION/CONSENT FORM

Ph rashiah Wanjiru Githinji,
Kenyatta University,
P.O Box 43844-00100,
Nairobi

Thro,

The Head Teacher,
.................... Primary School,
P.O. Box.............,
Nairobi.

Dear Parents,

I am a Masters student in Public Health, Kenyatta University. I am undertaking a study on, “Dietary practices, nutritional status and school performance among upper primary children in selected public schools in Nairobi County, Kenya”. The research study will involve class 6 and 7 pupils and data collected may lead to increased understanding of the relationship between children’s dietary practices, nutritional status and school performance. The Ethical Review Committee of Kenyatta University, the school management, as well as the National Commission for Science, Technology and Innovation (NACOSTI) have allowed me to conduct the research. Upon your approval, I will also explain the study to the children and ask for their agreement to participate. I would appreciate it if you would sign below for approval.

Signature of Parent or Guardian ______________ Date __________________


APPENDIX C

RESEARCHERS’ QUESTIONNAIRE ON NUTRITIONAL STATUS

ADMINISTRATIVE DETAILS

Que. No. ___________________ School ___________________

Date of Interview ___________________ Sex ___________________

Date of Birth: Day_______ Month _______ Year _______

SECTION A: ANTHROPOMETRY

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</tbody>
</table>
APPENDIX D

24 HOUR RECALL

<table>
<thead>
<tr>
<th>NAME OF CHILD:</th>
<th>DATE OF BIRTH</th>
<th>D</th>
<th>D</th>
<th>M</th>
<th>M</th>
<th>Y</th>
<th>Y</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tick the day of the week which you are recalling (it should be the day before the interview)

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step 1:** Please think back to when you woke up yesterday morning to the time you went to sleep in the evening. Now, I want you to try to remember what you ate or drank yesterday from the moment you got up until you went to sleep again last night. Run through the whole day in your mind and try to remember everything that you ate or drank. Now I would like you to write in the table below what you ate and drank for the following meals.

<table>
<thead>
<tr>
<th>Food or drink taken (List all foods, beverages or snacks for every meal during the last 24 hour period including, tea, or coffee)</th>
<th>Portion size (How many pieces, slices, packets, cups, teaspoons, tablespoons?) (Demonstrations used)</th>
<th>How was it prepared? (Baked, boiled, fried, steamed, fried) (Try to probe if child is able to identify or recall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morning snack/ Break-time snack:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lunch:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afternoon snack:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supper:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late night snack:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step 2:** Enter the answers to the questions below in the table provided.
Did you have any sweets and or chocolate yesterday?  
Did you have any snacks like samosa yesterday?  
Did you have any fruit yesterday?  
Did you have any mandazi yesterday?  
Did you have any cold drinks/soda yesterday?

<table>
<thead>
<tr>
<th>Forgotten foods (PROMPTED)</th>
<th>Portion size (How many pieces, slices, packets, cups, teaspoons, tablespoons?) (Demonstrations used)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Question:** What you ate/drank yesterday; was it same as, more than or less than usual?  
(MARK X WHERE APPROPRIATE)

<table>
<thead>
<tr>
<th>Same as usual</th>
<th>More than usual</th>
<th>Less than usual</th>
</tr>
</thead>
</table>
APPENDIX E
7-DAY FOOD FREQUENCY QUESTIONNAIRE

Indicate how often you have eaten the following food items by indicating the number of times per day or per week.

Once = 1  twice =2  thrice = 3  more than 3 times = 4  Never = 5

For example: If you have eaten Fish two times this week then write 2 do this for all the food items.

<table>
<thead>
<tr>
<th>Food Item</th>
<th>No. of times Food eaten per day</th>
<th>No. of days food eaten per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals, Carbohydrates, Starch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sphagetti/Pasta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chapati</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Githeri</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porridge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roasted/Boiled Maize</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mandazi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breakfast cereals e.g. Weetabix, cornflakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chips</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roots and Tubers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green Bananas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet potatoes (Ngwashi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dairy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yogurt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ice cream</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ghee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Margarine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheese</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Item</td>
<td>No. of times Food eaten per day</td>
<td>No. of times food eaten per week</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td><strong>Meats, Meat Products and Eggs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beef</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matumbo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sausages/ Smokies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Legumes Pulses and Nuts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peas (Minji)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lentils (kamande)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green grams (Ndengu)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black eye peas (Njahe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simsim</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groundnuts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coconut</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vegetables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kales (sukuma wiki)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabbage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinach</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cucumber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>French Beans (Michiri)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African vegetables e.g. Kunde, Managu, Terere</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mangoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Item</td>
<td>No. of times Food eaten per day</td>
<td>No. of times food eaten per week</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Citrus fruits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pawpaw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Melon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avocado</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pineapple</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar Alternatives and Sweets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biscuits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beverages and Spreads</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Margarine/ Blueband</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanut butter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX F

QUESTIONNAIRE ON SOCIO-ECONOMIC STATUS

Tick ( √ ) the one that describes your most appropriate answer to the questions

A. What is your father’s highest level of education?
   1 = Primary education
   2 = Secondary education
   3 = College education
   4 = University education
   5 = Never went to school

B. What is your mother’s highest level of education?
   1 = Primary education
   2 = Secondary education
   3 = College education
   4 = University education
   5 = Never went to school

C. What type of house do you live in?
   1= stone house
   2= mud house
   3= grass thatched house
   4= Iron sheet (mabati) house

D. What is the size of the house you live in?
   1= one room
   2= 2 rooms
   3= 3 rooms
   4= 4 rooms and above

E. How many children are there in your home? __________

F. Tick ( √ ) any of the following items that you may have at home

   Fridge ____  Radio ____  Computer/Laptop ____  Television____
   Mobile phone ____  Car ____
APPENDIX G

PUPILS’ QUESTIONNAIRE ON SCHOOL PERFORMANCE

Kindly tick (✓) in the brackets the most correct response to each of the question according to you

A. Pupils involvement in extra-curricular activities
1. I’m involved in extra curriculum activities like football, sports, drama and other clubs
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
2. I participate in after school games or clubs with friends
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
3. I hate involvement in field activities
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
4. I love sitting in the field during games
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]

B. Pupils involvement in classroom activities
1. I volunteer to take up activities in class
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
2. I respond to questions in class
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
3. I complete my class assignments in time
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
4. My class performance is good
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
5. I enjoy undertaking my class work
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]

C. Pupils Attendance
1. I attend school regularly
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
2. I’m punctual when it comes to going to school
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
3. I always remain in school till the end of the day
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
4. I’m regularly punished for being absent from school
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
5. I’m regularly punished for running away from school
   Always [ ] Often [ ] Sometimes [ ] Rarely [ ] Never [ ]
APPENDIX I

FOCUS GROUP DISCUSSION GUIDE

Questions for focus group discussion

A) Dietary practices

1. If allowed what would be your ideal menu for the whole day today?
   Breakfast:

   Lunch:

   Supper:

2. What does eating healthy mean?

3. On average how many main meals do you consume per day?

B) Dietary practices and school performance

1. How many feel that what they eat affect how they perform in class or in the field?
   Explain
## APPENDIX J

### SAMPLING FRAME: LIST OF SUB-COUNTIES IN NAIROBI COUNTY

<table>
<thead>
<tr>
<th>S/NO.</th>
<th>SUB-COUNTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dagoretti</td>
</tr>
<tr>
<td>2</td>
<td>Njiiru</td>
</tr>
<tr>
<td>3</td>
<td>Embakasi</td>
</tr>
<tr>
<td>4</td>
<td>Kamukunji</td>
</tr>
<tr>
<td>5</td>
<td>Kasarani</td>
</tr>
<tr>
<td>6</td>
<td>Langata</td>
</tr>
<tr>
<td>7</td>
<td>Makadara</td>
</tr>
<tr>
<td>8</td>
<td>Starehe</td>
</tr>
<tr>
<td>9</td>
<td>Westlands</td>
</tr>
</tbody>
</table>

*Source: Taskforce Report on Improvement of Performance of Public Primary Schools (Nairobi City County, 2014)*
## APPENDIX J

**SAMPLING FRAME: LIST OF SAMPLED SUB-COUNTIES AND SCHOOLS**

<table>
<thead>
<tr>
<th>S/NO.</th>
<th>SAMPLED SUB-COUNTY</th>
<th>SAMPLED SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Embakasi</td>
<td>Kayole 1 Primary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Busara Primary</td>
</tr>
<tr>
<td>2</td>
<td>Kamkunji</td>
<td>Nairobi River Primary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Buruburu 1 Primary</td>
</tr>
<tr>
<td>3</td>
<td>Westlands</td>
<td>Kileleshwa Primary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lavington Primary</td>
</tr>
<tr>
<td>4</td>
<td>Makadara</td>
<td>Harambee Primary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joseph Apudo Primary</td>
</tr>
</tbody>
</table>
APPENDIX K

MAP OF NAIROBI COUNTY

Source: NCC Draft Master Plan (NCC, 2014)
APPENDIX L

 Variaty Approval of Research Proposal

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

Internal Memo

FROM: Dean, Graduate School

TO: Githinji W. Phirashian
C/o Community Health Dept

DATE: 6th August, 2015

Subject: Approval of Research Proposal

This is to inform you that Graduate School Board, at its meeting of 29th July, 2015, approved your Research Proposal for the M.P.H Degree Entitled, “Dietary Practices on Nutritional Status and School Performance among Upper Primary Children in Selected Public Schools in Nairobi County, Kenya”.

You may now proceed with your Data Collection, subject to clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University’s Website under Graduate School webpage downloads.

Thank you.

David Njoroge
For: Dean, Graduate School

c.c. Chairman, Department of Community Health

Supervisors

1. Dr. Chege Peter
   C/o Department of Food, Nutrition and Dietetics
   Kenyatta University

2. Dr. Okumbe Gaudencia
   C/o Department of Environmental Health
   Kenyatta University
APPENDIX M

ETHICAL APPROVAL LETTER

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Email: chairman.kuero@ku.ac.ke
secretary.kuero@ku.ac.ke
enku2008@gmail.com
Website: www.ku.ac.ke

Our Ref: KU/R/COMM/51/618

Date: 4th February, 2016

Githinji W. Phrashiah,
Kenyatta University,
P.O Box 43844,
Nairobi

Dear Phrashiah,

RE APPLICATION NUMBER PKU/422/1 391- “DIETARY PRACTICES ON NUTRITIONAL STATUS AND SCHOOL PERFORMANCE AMONG UPPER PRIMARY CHILDREN IN SELECTED SCHOOLS IN NAIROBI COUNTY, KENYA.”

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic “Dietary practices on nutritional status and school performance among upper primary children in selected public schools in Nairobi, Kenya.”

2. APPLICANT

Githinji W. Phrashiah

3. STUDY SITE

Nairobi, County, Kenya

4. DECISION

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines. It is APPROVED that the research may proceed for a period of ONE year from 4th February, 2016.

5. ADVICE/CONDITIONS

i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to the Ethics Review Board immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space below and return to KU-ERC a copy of the letter.

[Signature]

DR. TITUS KAHIGA
CHAIRMAN ETHICS REVIEW COMMITTEE

[Signature]

Dated this day of .................. 2016.

cc: Vice-Chancellor
DVC-Research Innovation and outreach
APPENDIX N

RESEARCH PERMIT

THIS IS TO CERTIFY THAT:

MISS. PHRASIAH WANJIRU GITHINJI
of KENYATTA UNIVERSITY, 0-622
Nairobi, has been permitted to conduct
research in Nairobi County

on the topic: DIETARY PRACTICES,
NUTRITIONAL STATUS AND SCHOOL
PERFORMANCE AMONG UPPER PRIMARY
CHILDREN IN SELECTED PUBLIC
SCHOOLS IN NAIROBI COUNTY, KENYA

for the period ending:
1st April, 2017

Permit No. : NACOSTI/16/2878/9713
Date Of Issue : 15th April, 2016
Fee Received: Ksh 1,000

Applicant’s Signature

Director General
National Commission for Science,
Technology & Innovation

[Signature]