

**NUTRITIONAL STATUS AND ASSOCIATED FACTORS AMONG SCHOOL
GOING CHILDREN AGED 4-10 YEARS IN KISII CENTRAL, KISII COUNTY,
KENYA**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university

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DEDICATION

This thesis is dedicated to the love of my parents Mr. Absolom Opini and Mrs. Rael Bitengo Opini and my brother Reuben Ondieki. Thank you for always nurturing my dreams.

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ABBREVIATIONS AND ACRONYMS

CBS	Central Bureau of Statistics
CEO	County Education Office
CHV	Community Health Volunteer
CMR	Child Mortality Rate
ENA	Emergence Nutrition Assessment
FAO	Food and Agriculture Organization
GAM	Global Acute Malnutrition
H/A	Height-for-age
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of statistics
MDGs	Millennium Development Goals
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOH	Ministry of Health

MAM	Moderate Acute Malnutrition
MOPHS	Ministry of Public Health and Sanitation
NCHS	National Center for Health Statistics
OR	Odds Ratio
PEM	Protein Energy Malnutrition
RR	Relative Ratio
SAM	Severe Acute Malnutrition
SES	Socio-economic Status
SOP	Standard Operating Procedures
SPSS	Statistic Package for Social sciences
UNICEF	United Nations Children’s Fund
W/A	Weight-for-age
WFP	World Food Program
W/H	Weight for Height

DEFINITION OF OPERATIONAL TERMS

Anthropometric - It is the measure of the size and proportion of the human body. It measures things such as height, weight, skin fold thickness.

Diet - It refers to the routine foods and beverages consumed by a person including all the nutrient quantities.

Food – It is a product that is derived from plants or animals which ones consumed and yields energy and nutrients for the maintenance of live and for growth and repair of tissues.

Global acute malnutrition - It is the <-2 z- score weight-for-height/ or edema.

Low height for- age (stunting) - It is an under nutrition for a long time retards the growth of a child by height. The child is shorter for its age.

Low weight for-age (underweight) - It is a composite indicator of long term and acute short- term malnutrition. The body weight may be lost from malnutrition for a long time.

Low weight for-height (wasting) - It is a measure of weight relative to height and indicates a weight deficit with acute starvation or severe disease.

- Malnutrition -** It refers to all deviations from adequate, nutrition, including under nutrition and over nutrition resulting from inadequacy of food (or excess food) relative to need.
- Nutrient -** It is the chemical substance obtained from food and used by the body as a source of energy building materials and for regulation of growth maintenance, repair of body tissues and protection.
- Nutrition –** It is a science of food, the nutrients and other substances that they may contain their intake and action within the body of living organism.
- Nutritional status –** is the condition of the body in those respects influenced by the diet; the levels of nutrients in the body and the ability of those levels to maintain normal metabolic integrity.
- Nutritional assessment –** It is a comprehensive analysis of persons' nutrition status that uses health socio-economic, drug and diet histories anthropometric measurements, physical examinations and laboratory tests.

Nutrition status – It is the condition of the body in those respects influenced by the diet; the level of nutrients in the body and the ability of those levels to maintain normal metabolic integrity

Over nutrition - It is the excess energy of nutrients.

Severe acute malnutrition - It is the <3 z- scores weight-for-height/oedema.

Undernourishment – It is when the food intake is continuously insufficient to meet the dietary energy requirement when under nutrition is the result or outcome of poor absorption and poor biological use of nutrients consumed.

ABSTRACT

Nutritional status is the degree to which the individual's physiological need for nutrients is being met by the foods that an individual is eating. It is the state of balanced diet in the individual between the nutrient intake and the nutrient expenditure. A well-nourished child is one whose weight and height measurements are compared very well with the standard normal distribution of heights and weights of a healthy child of the same age and sex. The main objective of this study was to determine the nutritional status and associated factors among school going children aged 4-10 years old in Kisii Central Sub-County. This was a cross-sectional study where 315 pupils were involved. Simple random sampling method was used to select the 5 schools randomly strictly with those schools with above 200 pupils from the list of 54 public primary schools. Systematic random sampling method was used to select the pupils by class and gender ratio of 1:1 using probability proportion statistical formula. Semi-structured interviewer questionnaire and anthropometry were used to collect data from selected children. A total of 315 fresh stool samples were collected to examine for ova of *Ascaris*, hookworm and cysts of *E. coli* and *E. histolytica*. Data analysis was done using Statistical Package for Social Sciences (SPSS) software version 21.0 and ENA for SMART software was used for anthropometry. The study findings showed that the following factors were significantly associated with nutritional status; guardians' knowledge about a child's nutrition 73.35%, size of household ($\chi^2 = 45.8$, $p = 0.005$), amount of income per household ($\chi^2 = 45.82$, $p = 0.005$), and marital status of the guardians ($\chi^2 = 36.89$, $p = 0.045$). Taking a minimum of three meals per a day (28.3%; 95% C.I: 23.3-33.6) contributed to daily energy intake of school children. Few children consumed foods from less than three

food groups 0.3%. The prevalence of all parasitic infections was 51.1%. The prevalence of Global Acute Malnutrition 6-10 years was 3.9% where 1.0% was for boys while 6.2% was for girls. The prevalence of Global Acute Malnutrition 4-5 years was 6.5% where was for boys 8.2% while girls. This status was due to the sufficient food supply and food security found in the Sub- County. Socio-economic factors such as marital stability was slightly contributing to nutritional status of school children. Dietary factors such as balanced diet, and number of meals taken per day by each child was highly contributing to the child's nutritional status. There were slight associations between parasitic infections and nutritional status of children. The prevalence of stunting 3.9%, wasting 6.5%, and underweight 1.9% were below the 15.0% WHO threshold in Kisii Central Sub- County but there is still need of monitoring and controlling nutritional status of children.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Nutritional status is the degree to which the individual's physiological need for nutrients are being met by the foods that an individual is eating. It is the state of balance in the individual between the nutrient intake and the nutrient expenditure. There are three reasons why nutritional assessment is undertaken: to diagnose malnutrition, to provide a means of monitoring nutritional effectiveness of nutrition support, to identify the reasons for malnutrition (Thomas, 2005).

There are six types of nutrients in the diet of a healthy person. That include; the following: proteins, carbohydrates, fats, mineral elements, vitamins and water. Lack of such; nutrient leads to the state of malnutrition. The general deficiency of all nutrients leads to under nutrition and in extreme cases starvation (UNICEF, 2009). It is important to do nutritional assessment to children (Corish & Kennedy, 2003) because it is an early detection of nutritional risk especially in children. Nutritional conditions that are commonly related to children like overweight, underweight, stunting and wasting. These conditions most probably occur because of malnutrition. Children's eating habits that are developed during childhood affect their health and nutritional status during adulthood. Children from low socio-economic areas might not be able to exercise good nutritional practices due to limited household income and consequently food availability (WHO, 2008; Norwich *et al.*, 2005). Communities in rural areas are usually related to low

monthly income and it is very hard to provide their children with stable and nutritious diet (Abu-Bakr *et al.*, 2005).

Therefore, children from rural communities will most likely be under-nourished or face other nutritional deficiencies. Nutritional assessment from the early age of children may enable them to have a chance of changing their eating habits and consequently their nutritional status before reaching adulthood.

Anthropometric measurements are often used as proxies for assessing the eventual extent and severity of malnutrition (Chevassus, 2005). Anthropometry has an important place in nutritional epidemiology. It has advantage over the other nutritional assessment methods because; it is applicable, inexpensive, non-invasive method (WHO, 2005a). It is also a sensitive measure of nutritional status because growth and body size are influenced by dietary intake, energy intake and general health. Slowing of growth is an early response of nutritional inadequacy (Barrie, 2007). For children's anthropometric measurement; the indicators that are usually used are weight-for-age, height-for-age and weight for height. Weight for age reflects body mass relative to age. Low in weight for age index identifies children who are underweight based on their age. This index reflects both past and present under nutrition. Height-for-age, this term is for children aged 2 years and above and low in height-for-age is referred to as stunting. This condition reflects past under nutrition or chronic malnutrition (Barrie & Michael, 2007).

1.2 Statement of the Problem

Malnutrition is a major challenge in developing world with children less than 10 years bearing most of these conditions. In Kenya malnutrition is the greatest 53% contributor to child mortality (Onis, 2010). Malnutrition in Kisii Sub- County is complicated by lack of comparable data on incidence of nutritional deficiencies. This is because of the overall challenges with proper reporting due to lack of tools and insufficient training, although this is gradually being improved (DHIS, 2012). This has therefore hampered efforts that would have been used in the prevention of child mortality and morbidity in Kisii. The majority 51% of low income families in Kisii Sub- County live under poverty line (KNBS, 2010, 2011) and poverty is the underlying cause of malnutrition (Black, Morris & Bryce, 2003). There is insufficient awareness and knowledge on nutritionally adequate diets and limited resource allocation capacity to support the implementation of comprehensive nutrition programs in Kenya. Ignorance of nutritional requirements among parents has led to many children suffering and sometimes dies due to malnutrition causes. Protein Energy Malnutrition is the most serious nutritional problem in the country causing morbidity and mortality but mostly is never reported before the age of 10 years (KDHS, 2014).

1.3 Justification

It was recognized that the age from 4-10 years was vulnerable to malnutrition. Known as the ‘window of opportunity’, preventing malnutrition during this period benefits children and society throughout their life. Kisii Central Sub-county was fit for the study because the same study was conducted in more than five years ago thus best for nutrition comparison

purposes. Nutritional assessment from early age of children is important as it may enable them to have a chance of changing their eating habits and consequently their nutritional status before reaching adulthood. This study will generate useful information on nutritional status and associated factors among school going children in rural Kisii Kenya. The information will help in designing and implementation of nutritional intervention programs, policy formulation both locally and internationally. This study will therefore be obtained informal which will lead to a better understanding of nutritional status and associated factors among school going children of 4-10 years in Kisii Sub-County.

1.4 Research Questions

1. What is the nutritional status and associated factors with children aged 4-10 years using anthropometric measurements in Kisii Central Sub- County?
2. What are the socio-economic /cultural factors associated with nutritional status of children aged 4-10 years in Kisii Central Sub – County?
3. What is the dietary intake practices associated with nutritional status among children aged 4-10 years in Kisii Central Sub-County?
4. What is the prevalence of common parasitic infections in children aged 4-10 years in Kisii Central Sub-County?

1.5 Broad Objective

To determine nutritional status and factors associated among school going children aged 4-10 years in Kisii Central Sub-County.

1.6 Specific Objectives

1. To determine the nutritional status and associated factors with children aged 4-10 years using anthropometry in Kisii Central Sub-County.
2. To determine the socio-economic and cultural factors associated with nutritional status of children aged 4-10 years in Kisii Central Sub-County.
3. To determine dietary intake practices associated with nutritional status of children aged 4-10 years in Kisii Central Sub-County.
4. To determine the prevalence of common parasitic infections in children aged 4-10 years the in Kisii Central Sub-County.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Nutritional status can be assessed using several methods; anthropometry, clinical signs of malnutrition and biochemical indicators (Barrie & Michael, 2007). But this study will focus on anthropometric method and stool examination for intestinal parasites.

Scientists have been using growth assessment because it best defines the health and nutritional status of children while serving as useful indirect measurements of population's overall socio-economic status. Studies for vast numbers of subjects usually use anthropometry in nutritional status assessment (Garmel & Tanner, 2006). Growth statuses of children can be an indicator of children's nutritional status. There are two ways on how a child's body may respond to malnutrition, retardation of height (growth) and body wasting as body weight-for height is not suitable. However, growth status can be indicated by anthropometry measurement, anthropometry indices, in order to identify the prevalence of malnutrition. A child's eating patterns and dietary intake might influence a child's growth especially school-aged children (Grosver & Smolin, 2009; KNBS, 2010). Thus the dietary intake of a child must supply the nutrients that are needed for children's growth and development, and also for body maintenance and body's physical activities.

Normal growth of children depends on many factors such as race, nutrition, and environment if being inflicted with diseases (Onyango, Esrey & Kramer, 2009). Children's inadequacies in nutrient would eventually alter child's growth status, as

children would adapt to low supply of nutrient intakes through the reduction of physical activity and slowed rate of growth. Socio-economic status; as children's from better off socio-economic circumstances tend to be on the average, taller, heavier and fatter than from poorer socio-economic circumstances (KNBS, 2010).

2.2 Anthropometry Measurements

Anthropometry refers to the measurements of the size and proportion of the human body. Body weight and stature are measures of body size, and ratios of body weight to height can be used to represent body proportion (Grosver and Smolin, 2009). This procedure is applicable to large sample size. It can be used to identify target groups of population or areas for intervention, as a tool for nutritional surveillance, and in cross-sectional evaluation (Chevassus, 2005).

2.3 Anthropometry Indices

These are measurements used together with a child's age and can provide information on children's nutritional status (WHO, 2008a). There are three indices commonly used in children's nutritional status assessment these are; weight-for-age, height-for-age and BMI-for-age. Most nutritional studies on primary school children in the World use these anthropometric indices as children's nutritional status indicator (Black *et al.*, 2005).

2.3.1 Height-for-age-This index reflects achieved linear growth and its deficits indicate long-term, collective inadequacies of wellbeing or diet. Standing height measurement is often referred as stature and usually used for those who can stand well. Shortness is an expensive definition of low height-for-age. Stunting is another commonly used term

reflecting low height-for-age and it reflects a process of failure to reach linear growth potential as a result of nutritional conditions. High height-for-ages is an indicator that is less significant with public health concern (WHO, 2005a).

2.3.2 Weight-for-age-is influenced by both weight of the child and his age. Its composite nature make understanding complex. Weight-for-age reflects long term health and nutritional status of individual or population. Changes in weight-for-age reveals in weight-for-height. According to WHO low weight-for-age refers to underweight and reflects underlying pathological process. The term underweight has been widely used to express the condition in high prevalence of low weight –for-age. High weight for-age is seldom used for public health studies because other indicators such as high BMI-for-age are more useful in expressing overweight or obesity problems (WHO, 2005b).

2.3.3 BMI-for age-Body mass index (BMI) is calculated using kilograms/meter square BMI –for-age index was usually used in determining prevalence of overweight and obesity. High BMI-for-age indicates underweight but commonly used index for underweight is weight-for-age index. In BMI for-age growth curve developed by NCHS/CDC variation of age widen until children aged 2 years old. Usage of BMI as a reference did not only limit to youths but also to adults (WHO, 2005a). Various factors such as race and genetics can influence growth status of children; thus different countries need to use their specific relevant growth model (Black & Yusuf, 2010).

2.4 Stool Investigation for Parasitic Infections

Intestinal parasitic infection is a common cause of morbidity in children (Broke *et al.*, 2005). It is estimated that one billion people are infected with *A. lumbricoides*, another one billion with hookworm and 1 billion with *T. trichuris* worldwide (Patel *et al.*, 2009).

Children are more infected than adults and age groups most commonly affected are those between 6-15 years followed by 1-5 years of age (Luke, Ajogi and Umuh, 2009). Children infected with helminthes are at high risk of impaired growth (Ikpai & Ugwu, 2007). This is because helminthes play an important role in the etiology of childhood malnutrition (Nagai *et al.*, 2005).

2.5 Global Trend

Globally, poor nutrition contributes to 53% deaths of children are associated with infectious diseases. They mostly affect children aged less than 5 years in developing countries each year (Abu-Bakr *et al.*, 2008). Malnutrition as one of nutritional status condition accounts for a third of the deaths that were observed in children aged less 5 years in 2011 (Grosver & Smolin, 2005). Malnutrition is implicated in about 40% of the 11 million deaths of children aged 5 years and below in developing countries (Barrie & Michael, 2007). This same age group less than 5 years bears the consequences of malnutrition such as kwashiorkor, marasmus and impaired mental development. According to UNICEF/WHO (2012), 162 million being stunted, 99 million underweight and 51 million are wasted worldwide. Under nutrition and over-nutrition problems and diet- related chronic diseases account for more than half of the world's diseases and hundreds of dollars in public expenditure. In Padapur VDC, Chit man prevalence of

under-weight, stunting and wasting was 22.7%, 37.3% and 25.7% respectively. The study indicated that stunting increases with age (Onis, 2010).

2.6 Situation of Nutritional Status in Africa

In Sub-Saharan Africa, malnutrition remains a major challenge and the burden is worrying with the rate of stunting reported to be approximately 40% (56 million) in children aged less than 5 years. According to KDHS, (2014), 35% of children aged less than 5 years were stunted, 7% were wasted and 16% were underweight. Other effects of malnutrition include anemia, delayed growth and mental development. A study conducted in rural Nigeria indicated that nutritional status showed that children with underweight were 67.2%, overweight 5.9% and obese 0.0% compared to normal weight of 29.9% (Amao *et al.*, 2009).

2.7 Situation of Nutritional Status in Kenya

According to the KDHS (2014) 35% of children less than 5 years are stunted, 16.16% are underweight, and 7% are wasted. Today in Kenya an estimated 2.1 million children are stunted which is a serious national development concern as these children will never reach their full physical and mental potential. Regional potentialities in nutrition indicators in Kenya are significant with Mandera County having the highest proportion of children exhibiting severe wasting (8%) while Garisa County has the highest level of stunted children (44%). As in many other parts of the world, children living in rural areas and children from poorer households in Kenya are more likely to lack nutritional diversity. A third of Kenyans are chronically food insecure and up to 4 million people required food assistance at any given time (UNICEF, 2010a).

2.8 Situation of Nutritional Status in Kisii County

In Kisii County poor nutritional status is one of the most health welfare problems facing it and it afflicts most vulnerable young age groups. At individual level, inadequate or inappropriate feeding patterns lead to malnutrition (Odhiambo, 2009). Another study conducted by (WHO, 2008). In Kisii/Nyamira showed that 29.2% children aged less than 5 years were stunting 35%, diarrhea 10.6%, fever 38.0%, and respiratory disease was 17.9% which all are contributing factor to mortality and morbidity rates in the area KDHS, (2014).

2.9 Importance of Nutrition for Health

A child's entire life is determined in large measures by the food given to him during his first five years (Zillah, Bond & Johnson, 2006). This is because childhood period is of the influencing factors in this period. Good wholesome food is essential for normal growth and development (Dorothy & Marlow, 2009) said that good nutrition is essential in maintaining life. Health can be regained with or without medicine but it cannot be maintained without proper nutrition. Food is the chief source of essential materials which our body needs for wellbeing. Good food is indispensable for health at all stages of life and satisfactory growth during infancy childhood and adolescence (UNICEF, 2009).

In Kenya many studies have been conducted on the nutritional status of pre- school children and have revealed a high rate of malnutrition (KNBS, 2010; Jose, 2009). They have shown that tribal populations living in different ecosystems have varying degrees of nutritional status. This is because of their dependence on primitive agricultural practices; they often face uncertainty of food supply and thus tend to suffer from under nutrition.

The nutritional status of tribal community is sad reflection of nature's fluctuation of rain; drought, floods, temperature variation, lack of storage facilities, primitive processing, cooking techniques and lack of health and nutritional input make malnutrition a very serious problem for the country (Onis, 2010). But there are hardly only studies on nutritional status of pre-school children among them are like a study carried out in Machakos showed that malnutrition levels were high among school going children and close to 35% among children under 5 years old (UNICEF, 2010b). In Dagoretti study result indicated that 2.5% were stunting, 14.9% were underweight and 9.7% were wasted this indicated test was significantly increased with age which was similar to the study conducted in Brazil which found stunting worsened as the study population grows older (Aura, 2011).

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Site

The study was carried out at the Kisii Central Sub County, Kisii County Kenya. The site was selected as the area for the study because it has a well-established County administrative units, infrastructure, and access to schools. The study was conducted in 5 selected public primary schools in Kisii Central Sub-county. It is one among the ten Sub-Counties in Kisii County. Kisii County covers a total area of 2862 square kilometers with estimated population of 200,000 according to 2012 estimates. It has a large metropolitan population of over 100,000 residents (NPHS, 2009). Its Latitude is 0° 40'54'26" N and Longitude is 34° 45' 59' 98" E. The annual average rainfall is between 1700-1800 millimeters. There are two main rain seasons (March to May and October to November). Water was easily available from rivers, wells, springs, roof catchments and bore holes. The only treated water was found in Kisii Municipality. The major agricultural staple foods were bananas, maize, beans, cassava, fruits and vegetables and daily. Cash crops were coffee, tea and pyrethrum. Due to high population almost all land in Kisii was put to maximum agricultural use (FAO, 2011). Intensive farming in hilly regions has increased the rate of soil degradation and erosion. According to this annual report health facilities were inadequate (Figure 3.1)



Figure 3.1: Map of Kisii County(Source: picture from Google maps Kenya)

3.2 Study Design

This was a descriptive cross-sectional study employing quantitative techniques for data collection. This study was adopted because the data was collected at only one point in time to sort out the existence and magnitude of malnutrition. This design was suitable for testing the associations among variables e.g. anthropometric measurements of children,

socio-economic and cultural factors, demographic characters of children and prevalence of parasitic infections among school children in Kisii Central Sub- county.

3.3 Study Population

The study targeted 315 school children (girl's 1:1 boys) aged 4-10 years attending 5 selected public primary schools with their guardians within Kisii Central Sub-County.

3.4 Inclusion Criteria

Children aged 4-10 years and present in selected public primary schools and their guardians.

Children whose guardians signed/thumb printed the consent form.

3.5 Exclusion Criteria

Children aged 4-10 years who were selected but because of the illness and their guardians did not sign/thumb print the assent or consent forms were be excluded.

Children who had already taken anti- worms in less than three months

3.6 Research Variables

3.5.1 Dependent Variable

Underweight, stunting and wasting.

3.5.2 Independent Variable

Amount of income per household, Religion, Education level, Prevalence of parasitic infections, marital status, Number of meals taken per day Guardian's knowledge about nutrition of the child.

3.7 Sample Size

The sample size was calculated using the formula (Cochran, 1977) for the exact probability test.

$$n = \frac{z^2 pqd}{d^2}$$

Where n = Sample size

Z is the value corresponding to the 95% confidence interval (usually taken as 1.96)

P = prevalence of malnutrition 35%

The Kenya national prevalence rate of 35% (KDHS, 2014) was used to estimate the proportion receiving nutritional status in Kisii Central Sub-County.

d = allowable error margin (0.05)

$$n = \frac{1.96^2 \times 0.35 \times 0.65}{0.05^2} = \frac{0.873964}{0.0025} = 349.58$$

=350 children

This sample size was adjusted for refusal at the rate of 10%.

Thus the final sample size was: $n = 350 * (0.1) = 315$ children and their guardians

Thus the final samples size was 315 children and their guardians.

3.8 Sampling Design

In this study two methods were employed in sampling. These included simple random sampling and systematic random sampling methods.

3.8.1 Selection of Schools

Simple random sampling technique was used to recruit the 5 schools within the Sub-County for nutritional status exercise from the list of 54 public primary schools. Those five schools were among the schools with 200 children aged 4-10 years and above while those with children below 200 were excluded. The five primary schools were selected randomly to represent the 54 public primary schools in Kisii Central Sub-County.

3.8.2 Selection of Study Participants

Systematic random sampling technique was used to recruit children in the selected public primary schools for nutritional status measurements. This was done first by calculating the sampling interval (k) of participants in the five selected public primary

schools. The skip interval was calculated as: $K = N/n =$

(Total population/sample size).

Total population of children aged 4-10 years in the 5 selected public primary schools was 1300 and calculated sample size was 315.

Probability proportional to size sampling (PPS) was used to determine the number of children in each school and it was calculated as follows:-

Example: Nyambara primary school;

*= Total number of pupils/ Total population of pupils * sample size*

= $300/1300 * 315 = 73$ Children, thus the calculation applied the same to all 5

schools selected (Table 3:1).

Therefore, $K = N/n = 1300/315 = 4.12698$, hence random start was established where

every 5th child was recruited using class registers in each class level. The fifth child interval selection was repeated whereby for each interval if the first child was a boy then it was followed by a girl exchanging the sex, grade and age until the calculated total number of pupils was achieved for each school.

The recruitment of children was conducted at school first using their registers then they were followed back to their homes where their guardians were to sign/thumb print their consents/assent before taking their anthropometric measurements.

Table 3.1: Distribution of school children with regard to schools attended

Name of school	Total no. of pupils	Total no. of pupils calculated
1. Nyambara	300	73
2. Menyinkwa	300	73
3. Nyamemiso	300	73
4. Suneka	200	48
5. Jogoo	200	48
Total	1300	315

3.9 Methods of Data Collection

3.9.1. Questionnaire

A total of 315 children/guardians were able to participate in the study out of 350 children calculated. A total of 315 guardians were given questionnaires to sign/thumb print consent form for their children to participate in the study.

3.9.2 Anthropometry

The procedures to be followed in taking anthropometric measurements were as described by (WHO, 2008c). The weights were measured to the nearest 0.1 kilograms using a portable bathroom scale. The heights were measured to the nearest 0.01 meters using the height board.

3.9.2.1 Procedure of Measuring the Heights of School Children

The height board was employed after removing the shoes the child stood on a flat surface by the scale with feet parallel and with heels, buttocks, shoulders and back of head touching the upright. The head was held comfortably erect, with the lower border of the orbit of the eye in the same horizontal plane as the external canal of the ear. The arms were hanged loosely at the sides. The presence of unusually thick hair was taken into account. The measuring scale was 175 centimeters high and capable of measuring to an accuracy of 0.1 centimeters.

3.9.2.2 Procedure of Weighing School Children

Children were weighed using the bathroom scale. The scale was measuring up to a maximum of 50 kilograms with increments of 100 grams with this type of balance. The zero scale was ensured first. Before weighing, the child was asked to remove his/her shoes and to be in lighter clothes. The researcher ensured that the child stood upright. The scale was read when the arrow was steady. The weight was recorded in kilograms to the nearest 100.

3.9.2.4 Procedure of Measuring Mid Upper Arm Circumference (MUAC)

The tip of the child's shoulder was located using fingers. The child's elbow was bent to make the right angle. The tape was placed at Zero. The number at the tip of the elbow was read to the nearest centimeter. It was divided by two to get the mid-point. The midpoint was marked using a pen on the arm. The child's arm was wrapped using a tape around the mid- point. The readings were recorded to the nearest 0.1 centimeters. The weight-for-height was calculated as "z-score" using (WHO, 2006)

3.9.2.6 Collection of Stool Samples

After the guardians had signed/thumb printed the assent or consent form for their children, the following day the pupils were instructed to collect their stool samples at school compound where each selected pupil was given a well labeled polypot to collect the stool sample. Those who were aged four years and cannot be able to do were being assisted by the person investigating to put the stool in their polypot. Those who were unable to produce stool sample were allowed to repeat the exercise the subsequent day. The stool specimen were immediately being taken to the laboratory and kept in the refrigerator for analysis later the same day.

3.9.2.7 Examination of Stool Samples for Intestinal Parasites

Stool specimens were examined under direct microscopy of smears in normal saline wet mount and iodine wet mount. Smears were also being done concentration and permanent fixation procedures. The laboratory diagnosis was based upon demonstration of ova, cysts or trophozoites.

3.9.2.8 Methods Used in the Examination of Stool Samples

1. Saline Wet Mount

It was used for the examination of trophozoites, cysts of protozoa, eggs and larvae of helminthes. Saline wet mount was made by mixing a small quantity (about 2 milligrams) of feces in a drop of saline will be placed on a clean glass slide. Gross fibers were removed and smears were covered using cover slip. Smear was examined under microscope as described by (Arora, Mcjunkin and Kuhn, 2007).

2. Iodine Wet Mount

It was used for the examination of nuclear character of cysts and trophozoites for identification of species. Stool was emulsified in a drop of five times diluted Lugol's iodine on a clean glass slide covered with a cover slip and examined under microscope as described by (Arora, Mcjunkin and Kuhn, 2007).

3. Formalin-Ether Sedimentation

It was used for the examination of eggs, cysts and trophozoite in much low numbers in faecal material. Half teaspoonful of feces were thoroughly mixed in 10 milliliters of water and strained through two layers of gauze in a funnel. The filtrate was centrifuged at 2000 revolutions for 2 minutes. The supernatant was discarded and sediment was re-suspended in 10 milliliters of physiological saline. It was again centrifuged and supernatant was discarded. The supernatant was re-suspended in 7 milliliters of formalin saline and allowed to stand for 10 minutes. To this was to be added 3 milliliters of ether. The tube was Stoppered and shaken vigorously to mix. Then the tube was centrifuged at

2000 revolutions per minute. The tube was allowed to stand for few seconds then the debris was discarded. The sediment was put on the slide and was to be examined under microscope as described by(Aura, 2011).

4. Direct Smear Egg Count

It was used for the quantification of eggs of worms. Two milligrams of feces were mixed in a small drop of saline on a slide and a cover slip was applied avoiding formation of bubbles. The entire preparation was examined under low power of the microscope and the numbers of eggs (in 2 milligrams of feces) were counted and then the numbers of eggs per gram of feces were calculated as described by (Arora &Mcjunkin, 2007).

Fixed stool samples were subjected to ether concentration technique and examined under a microscope for intestinal protozoa (Botero *et al.*, 2009). Helminthes eggs were also recorded. 10% of all the slides examined by the researcher was randomly selected and re-examined by another laboratory technicians within Kisii level 5 Hospital laboratories.

3.10 Data Management

Children were given identification numbers. Data was double entered into computer and protected into a file. Data was cleaned using Epi-info and keyed in into computer. Norminal and ordinal data were entered in data base. Data was stored in backups and flush disks.

3.11 Data Analysis

Data was entered using Microsoft Access Software. Errors were minimized by cleaning and rechecking all data entries with original data forms. The data was then imported into excel which was used for coding and validation. Data from demographic characteristics, socio-economic/cultural factors, intensity of common parasites and dietary intake practices was analyzed using Statistical Package for Social Sciences (SPSS) version 21. Descriptive analysis were summarized where data for demographic characteristics of the study population were expressed as frequency, percentages and mean (SD). The anthropometric data were analyzed using ENA FOR SMART Software and were referenced using (WHO, 2006; NCHS, 1977).

Chi-square test and Odds Ratio were used to establish significant associations between children's age, parental demographic characteristics and anthropometric measurements. The differences between parameters were dimmed significantly at ($p < 0.05$).

3.12 Ethical Considerations

This study was submitted to the Ethics and Research Committee (ERC) of the Kenyatta National Hospital/University of Nairobi. Permission to visit schools was obtained from the Kisii County Education Office (CEO). Permission was sought from the chief's office that was creating awareness to the community about our household visitation. The purpose of the study was explaining to the head teachers of the selected schools and then was seeking their permission to recruit children. The information on the study to parents was presented in three languages {Kiswahili /English and Kisii} according to an individual's understanding. Permission was sought from Kisii level 5 Hospital in charge

of Laboratories based on stool processing/analysis. Informed consent/assent was obtained from parents of the selected children after following them back to their homes. The consenting process was explained to the participants in Kiswahili/Kisii and English. A question and answer session was encouraged to ensure the participants have an understanding of what the study was entailing. It was expected that the information used in this study was doing no harm to participants.

The participants were expected to willingly participate in the research. The subjects were told the truth and were given all information in order to make an informed decision about participating or not. Identification of the researchers including address was included and identification of the number of subjects involved. The study subjects were children aged 4-10 years. The findings were also being submitted to the Ministry of Health under County government to implement the policy.

CHAPTER FOUR

RESULTS

4.1: Demographics characteristics of (Guardians of children)

4.1.1: Percentage distribution of guardians with regard to age

The mean age for the guardians of school children was 36 with the youngest and oldest being 18 years and 55 years respectively (Table 4.1).

Table 4.1: Percentage distribution of guardians of school children with regard to age

Parent's Age (Years)	Frequency	(%)
18-25	56	16.00
26-35	159	45.42
36-45	119	34.0
46-54	13	3.71
> 55	3	0.86
Total	315	100.0

4.2: Socio-Economic Status of guardians of the children

4.2.1: Marital Status of Guardians of the children

Majority of the guardians of the children 269(85.4%; 95%; C.I: 81.0-89.0) were married, 21(6.6%; 95%; C.I:4.0-10.0) were singles, 16(5.1%, 95%; C.I: 3.0-8.0) were divorced, 6 (2.2%; 95% C.I:1.0-5.0) widowed and 3(0.6%, 95%; C.I: 0.00-29.0) were separated. This signified that the proportion of marital status was significantly associated with nutritional status of children ($\chi^2 = 36.890$, $df = 24$, $p = 0.045$) (Fig 4.1).

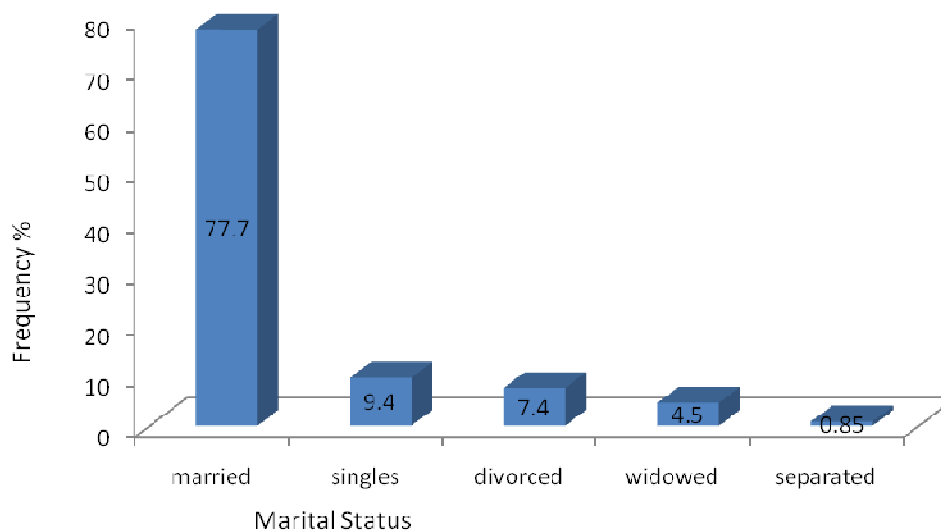


Figure 4.1: Marital status of guardians of the children

4.2.2: Education Level of guardians of the children

Majority of the children' guardians 172 (54.6%; 95% C.I: 49.0-60.0) achieved primary level of education, 100 (31.7%; 95% C.I:27.0-37.7) achieved secondary level of education, 28 (8.9%; 95% C.I:6.0-13.0) did not attempt schools, 14 (4.4%; 95% C.I: 2.0-7.0) achieved tertiary level of education while 1 (0.3%; 95% C.I: -0.5-2.7) attained university level of education. These proportion of guardians of children's education was not significantly different from to those who were illiterate ($\chi^2 = 177.30$, $df = 136$, $p = 0.10$) (Fig. 4.2.)

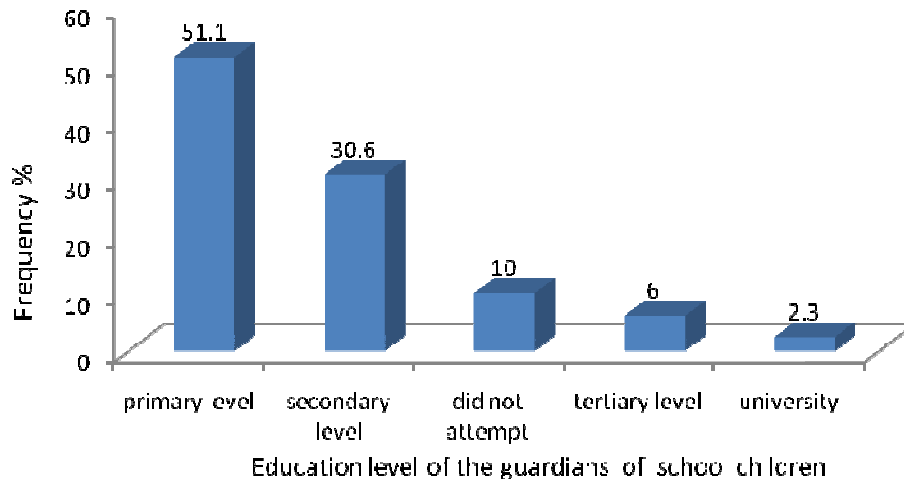


Figure 4.2: Education level of guardians of school children

4.2.3 Type of religion practiced by the school children

The school children had various cultural believes namely; 300 (95.2%; 95% C.I: 92.0-97.0) were Christians, 9 (2.9%; 95% C.I: 1.0-5.0) were Muslims while 6 (1.9%; 95% C.I:1.0-5.0) were Hindus. This showed that the proportion of children's guardian with religion was not significantly different to all religions ($\chi^2 = 6.356$, $df = 12$, $p = 0.897$) (Fig 4.3)

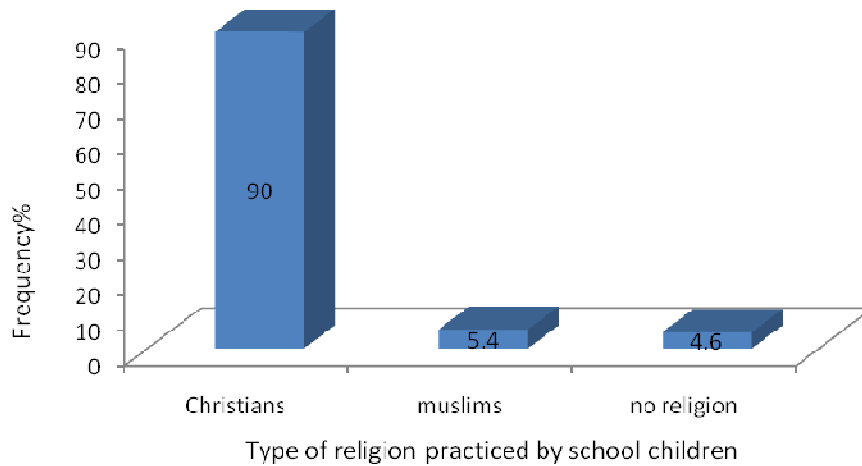


Figure 4.3: Type of religion practiced by school children

4.2.4: Amount of income per household

Majority of the guardians of school children had a monthly income of above Kshs above Kshs. 5, 000 149(47.3%; 95% C.I: 42.0-52.0) followed by above Kshs 10,000 144 (45.7%; 95% C.I: 40.0-51.0), Kshs. 10, 000-30,000.00 7 (2.2%; 95% C.I: 1.0- 4.0) while above Kshs. 60,000 15(4.7%; 0.3% 95% C.I: -.0.5-6.0).This study showed that the amount of income per household was not significantly associated with the nutritional status among school children ($\chi^2 = 52.589$, $df = 42$, $p = 0.122$) (Figure 4.4).

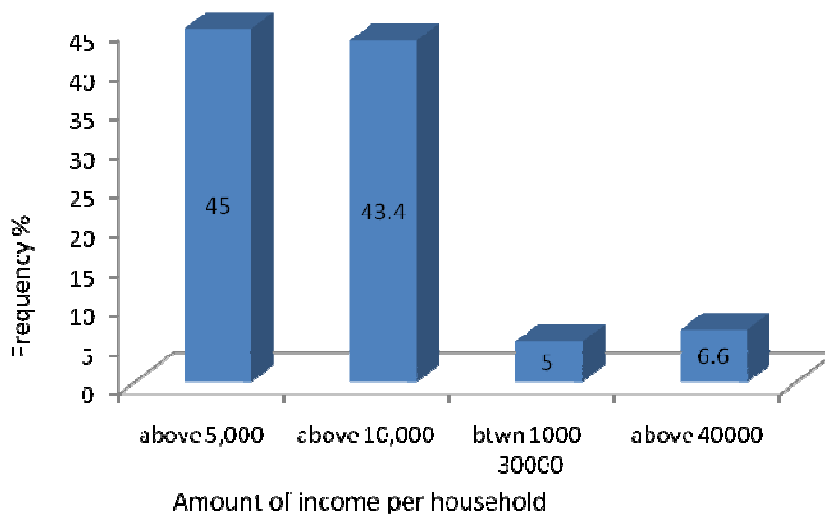


Figure 4.4: Amount of income per household

4.2.5: Size of the Household

The highest percentage of children's home houses 173 (54.9%; 95% C.I: 49.0-60.0) had two bed roomed houses, 61 (19.4%; 95% C.I: 15.0-24.0) while others had three bed roomed houses, 57 (18.1%; 95% C.I: 14.0-23.0) had 17 (5.4%; 95% C.I: 3.0-9.0) had four bed roomed houses, 3 (1.0%; 95% C.I: 0.0-3.0) and 4 (1.3%; 95% C.I: 0.00-3.0) had six bed roomed houses. This study showed that the size of household was significantly associated with nutritional status among school children ($\chi^2 = 45.822$, $df = 24$, $p = 0.005$) (Figure 4.5)

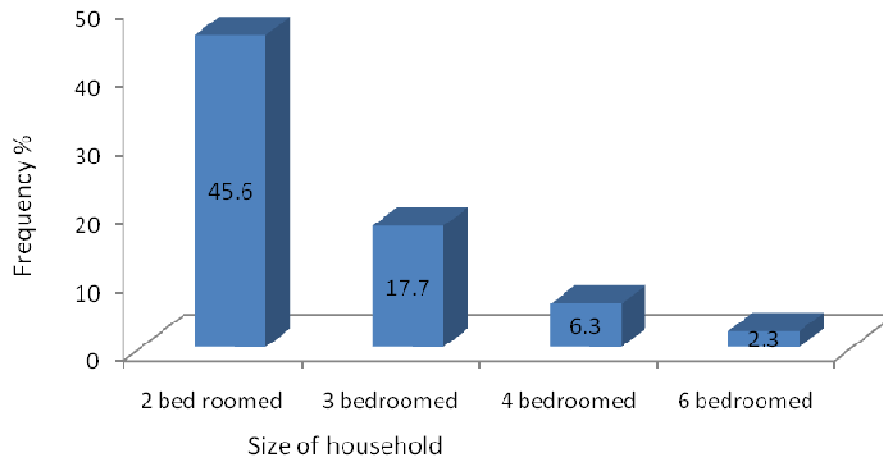


Figure 4.5: Size of household

4.2.6: Number of children found in each family

Majority of children were from families with 3 children 89 (28.3%; 95% C.I: 23.0-34.0) where 65(20.9%; 95% C.I: 16.6-25.9) with 4 children, 64(20.3%; 95% C.I:16.0-25.2) with 2 children, 43 (13.7%; 95% C.I: 10.1-17.9) with one child, 29(9.2%; 95% C.I: 6.2-12.9) with 5 children, 23(7.3%; 95% C.I: 4.6-10.8) with six children while 1 (0.3%; 95% C.I: 0.0-1.0) had 8-12 children respectively. The study showed that the proportion of the number of children among school children was not significantly associated with nutritional status among school children ($\chi^2 = 52.589$, $df = 42$, $p = 0.127$) (Fig 4.5) (Fig 4.6)

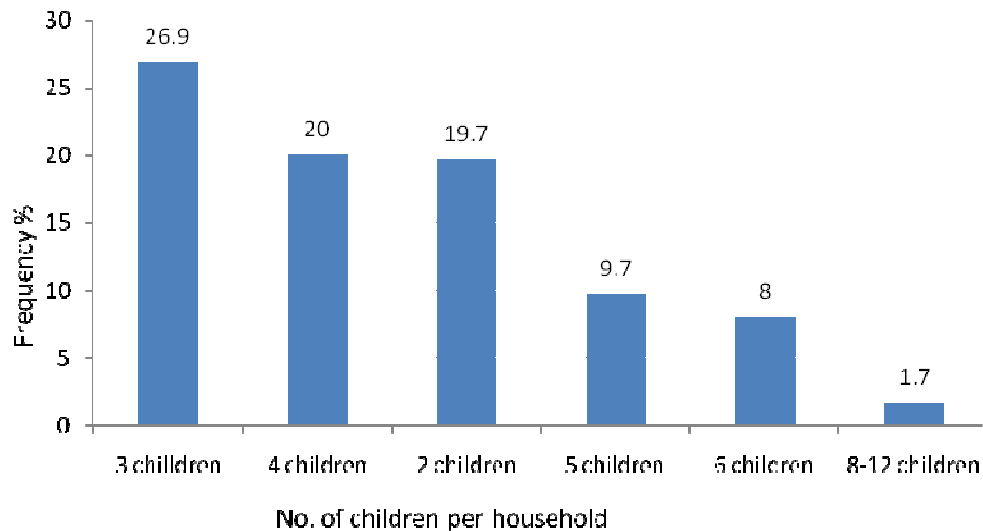


Figure 4.6: Number of children found in each family

4.2.7 Sanitation

Most families in Kisii Central Sub-County had access to a toilet facility. Out of 315 children, 279 (88.6%; 95% C.I: 85.0-91.0) had traditional toilets facility within 100 meters from the house while 36 (11.4%; 95% C.I: 8.0-15.0) had flush toilets. Findings showed that 185 (58.7%; 95% C.I: 53.1-64.2) children were washing hands with soap while 130 (41.3%; 95% C.I: 35.8-46.9) were not washing hands with soap after visiting toilet. This proportion was not significantly associated to sanitation ($\chi^2 = 10.877$, $df = 12$, $p = 0.540$).

4.3: Children demographic Characteristics

4.3.1: Children's Age

The ages of the children were (4 -10) years with mean age of 7 and standard deviation of 2.118.

4.3.2: Children's Sex

155 (49.2%; 95% C.I: 44.0-56.0) children were males while 160 (50.8%; 95% C.I: 45.0-56.0) were among females. The male: female ratio was 1:1 thus making the proportion of male child was not significantly different from the proportion of female child. ($\chi^2 = 8.118$, $df = 6$, $p = 0.23$) (Fig 4.6 (Figure 4.7))

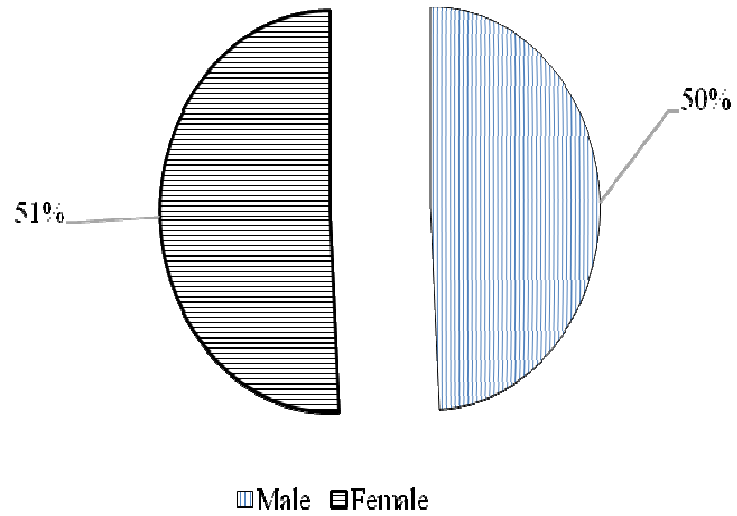


Figure 4.7: Percentage distribution of children with regard to sex

4.3.3: Children’s Class Levels

Children in this study were presented as follows: preparatory class had 93 (26.5%) children, class one had 72 (20.6) children, class two had 77 (22.0) class three had 25(7.14%) children, while class four had 23 (6.8%) children. class five 50(14.2%) Figure 4.8.

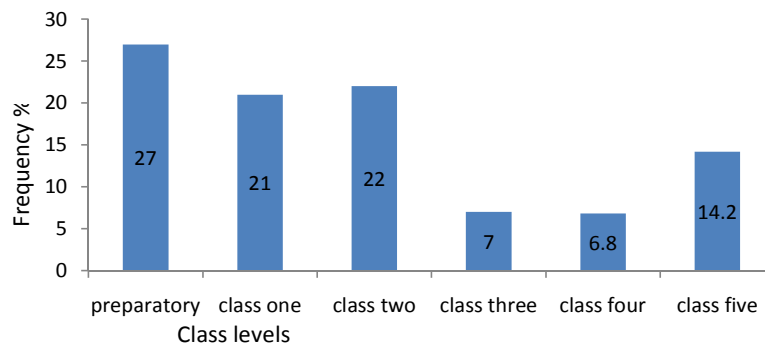


Figure 4.8: Distribution of Children's class levels

4.4: Knowledge of guardians about Children's Nutrition

Most guardians 221(70.15%; 95% C.I: 66.68-76.37. OR=1.242) had knowledge about a child's nutrition while 94(29.84%; 95% C.I: 23.62-33.31. OR=1.059) had no knowledge about a child's nutrition. This showed that the proportion of guardians who had knowledge about a child's nutrition was not significantly associated with nutritional status among school going children ($\chi^2 = 10.3$, $df = 6$, $p = 0.112$) (Table 4.2).

Table 4.2: Knowledge of guardians about children’s nutrition

Guardian’s knowledge about	Frequency	%	95% C.I	Odds ratio	95% C.I.
a child’s nutrition =YES	221	(70.15)	(66.68-76.37)	1.242	(0.53-2.051)
Guardian’s knowledge about a child’s nutrition=NO	94	(29.8)	(23.62-33.31)	1.059	(0.927-12.10)
Total	315				(100.00)

4.6: Food Consumption and Diversity

4.6.1: Number of Meals the children Consumes per Day

Majority of these children were consuming three meals 94(29.84%) per day. The two age groups 4-6 years and 6-8 years had no significance $p=1.0$ and $p= 0.203$ respectively while age 8-10 years had significant difference of $p= -0.961$ from the other age groups (Table 4.3)

Table 4.3: Number of Meals the children Consumes per Day

Age of Child(yrs)	No. of meals taken per day						Pearson's Correlation Sig.
	1	2	3	4	>4	No meal	
4-6	2	16	34	14	11	5	1.0
6-8	4	14	32	19	10	6	0.203
8-10	6	19	32	45	34	6	-0.961
Total(n=315)	12	49	94	78	55	27	

4.6.2: Number of Children Who Never Ate in the Previous Day Preceding the Survey

These were only 290 (92.1.0%); 95% C.I: 82.0-.100.0) children who ate the previous day while 7.9% children never ate the previous day (Table 4.4).

Table 4.4: Number of children who never ate in the previous day preceding the survey

Respondent	n	%	95% C.I
Children who ate	290	92.1	(82.0-100)
Children who			
Never ate	25	7.9	(6.0-12.0)
Total	315	100.0	(85.0-100.0)

4.6.3: Reasons as to why children who never ate previous day preceding survey

Majority 32.1% of the children who never ate previous day preceding survey had no response to the interview while 27.6% of children were away from home that led them not to eat at home (Table 4.5)

Table 4.5: Reasons as to why children never ate previous day preceding survey

Reasons why they never ate	F	%	95% C.I
No response	101	32.1	(34.0-45.0)
Away from home	87	27.6	(22.0-32.0)
Sickness	68	21.6	(16.0-25.0)
Food not enough	42	13.3	(0.07-0.14)
Fasting	18	1.2	(1.1-4.9)
Total	315	100.0	(85.0-100)

4.6.4: Consumption of Food by children from Various Food Groups.

The majority of school children were consuming food containing vegetables 110 (34.9%; 95% C.I: 29.0-40.5) while minority of them were consuming food containing meat, eggs 19 (6.0%; 95% C.I: 3.7-6.0). This was due to affordability and availability of those foods (Table 4.6)

Table 4.6: Percentage distribution of children with regard to consumption of food groups

Type of food group	n	%	p
Food containing vegetables	110	34.9	0.15
Food containing meat, eggs,	112	35.6	0.451
Food containing cereals/products	95	30.2	90.34
Food containing milk / products	30	9.52	0.098
Food containing fruits/sugars	3	0.95	0.320
Total	315	105	

4.6.5: Percentage Distribution of children with Regard to their Methods of Cooking

Majority of guardians of children 170 (54.0%; 95% C.I:48.0-59.0) were using boiling method in cooking their foods while few of the children's guardians were using drying/freezing methods of cooking 4(0.01%; 95% C.I: 0.0-0.3). The study showed methods of cooking were not significantly associated with the nutritional status among school children ($\chi^2 = 0.428$, $df = 2$, $p = 0.807$) (Table 4.7).

Table 4.7: Percentage distribution of respondents with regard to methods of cooking

Methods of		(n=315)					
Cooking C.I.	n	%	95% C.I.	Combined methods	n	%	95%
Frying	78	24.8	(20.0-29.0)	frying/drying	50	15.8	(12.0-15.8)
Boiling	170	54.0	(48.0-59.0)	boiling/drying	5	1.5	(0.0-3.0)
Drying	8	2.5	(1.1-4.9)	drying/freezing	4	0.01	(0.0-0.3)
Total	256			total	59		

4.6.6: Source of Dominant Foods Consumed by the children in Each Category

Majority of dominant foods consumed were from guardian's own production 169 (53.7%; 95% C.I: 48.0-59.0) while the least source of cereals was borrowed food 2 (0.6%; 95% C.I: 0.0-2.2). The study showed that majority (53.7%) of the guardians were farmers and they were producing their own food (Table 4.8)

Table 4.8: Source of dominant foods consumed by children

Source of the food (cereals)	n	%	95% C.I
On production	169	53.7	(48.0-59.0)
Some Purchases	132	41.9	(36.4-47.6)
Gift from a friend	12	3.8	(19.0-65.0)
Borrowed	2	0.6	(0.0-2.20)
Total	315	100.0	(95.0-100.0)

4.7 Prevalence of Common Parasitic Infections in school children

The total prevalence of parastic infections was 179(56.83%) where Askaris were the most prevalent 40 (6.3%; 95% C.I: 4.0-10.9) followed by hookworms/E.coli 10 (3.17%; 95% C.I: 2.0-6.0).The study showed that the majority of the children were infected with mixed infections111(35.23%; 95% C.I: 30.0-40.00). This study showed that more than fifty percentage of the children were infected with various types of common parasites. The jiggers were statistically significantly associated to nutritional status $p= 0.03$ while Askaris, Hookworm, *E.Histolytica* , *G. Lamblia*, Ringworms, *E.coli* were not significantly associated to nutritional status ($p=>0.05$). (Table 4.9)

Table 4.9: Percentage distribution of school children with regard to common parasites.

Type of parasite	Total no. (n=315)	Infected with Single parasite		Infected with parasite/ (n=210)		Boys (n=105)		Gi
		n	% 95% C.I	n	% 95% C.I.	n	%	
Of positives								OR
Askaris	40	20 (6.3)	(4.0-10.0)	20 (6.35)	(4.0-10.0)	24 (7.6)	16 (5.1)	0.15
Hookworm	31	10 (3.17)	(1.2-6.0)	21 (6.67)	(4.2-10.0)	12 (3.8)	19 (6.03)	0.11
E.H	22	2 (0.63)	(0.0-2.0)	20 (6.35)	(4.0-10.0)	12 (3.8)	10 (3.2)	0.08
G.lambliia	29	9 (2.85)	(1.0-5.0)	20 (6.35)	(4.0-10.0)	15 (5.1)	14 (4.4)	0.10
E.coli	30	10 (3.17)	(2.0-6.0)	20 (6.35)	(0.1-2.7)	16 (3.8)	14 (4.4)	0.11
Jiggers	10	7 (2.2)	(1.0-5.0)	3 (0.95)	(0.1-2.7)	5 (4.8)	5 (4.8)	0.0
Ringworms	17	10 (3.17)	(2.0-6.0)	7 (0.63)	(0.0-2.2)	1 (0.3)	1 (0.3)	0.0
Total	179	68 (21.59)	(17.1-26.5)	111 (35.23)	(30.0-40.0)	85 (27.0)	94 (29.8)	1.9

4.8: Prevalence of malnutrition among school children aged (4-5 years)

4.8.1: Prevalence of Weight-for-Height z-scores by Sex (-2 z-Score and/ or Oedema) of children aged (4-5 years)

The prevalence of weight-for-height among children aged 4-5 years was 6.5% where boys 8.2% were more prone than girls 5.2%. 5.6% was the prevalence of moderate malnutrition (MM) and still boys 6.1% had more prevalence than girls 5.2%. (Table 4.10)

Table 4.10: Prevalence of weight-for-height z –score of children aged 4-5years

Prevalence of	All		Boys		Girls	
	n	%	n	%	n	%
Malnutrition	(n)=107		n = 49		n = 58	
	n %	95% C.I	n %	95% C.I.	n %	95% C.I.
Prevalence of global malnutriti (<-2 z-score and/or oedema)	7(6.5)	(1.9-11.2)	4(8.2)	(0.5-15.8)	3 (5.2)	(-0.5-0.9)
Prevalence of Moderate malnutrition (<-2 z-score, no oedema)	6(5.6)	(1.2-10.0)	3(6.1)	(-0.69-12.8)	3 (5.2)	(-0.5-10.9)

4.8.2: Prevalence of Height-for-Age Z-Scores and/or Oedema of children aged (4-5 years)

(Table 4.11)

The prevalence of stunting was (1.9%; 95% C.I: -0.7-4.4) children where (1.1%; 95% C.I: 3.2-4.3) was the prevalence of boys while (1.7%; 95% C.I:3.2-4.3) was for girls. The prevalence of moderate stunting was 1.9% boys and were more 2.0% prone than girls 1.7% (Table 4.11)

Table 4.11: Prevalence of height-for-age z-scores of children aged 4-5 years

Prevalence of Malnutrition	All Sample size(n)=108			Boys(n)=50		Girls(n)=58	
	n	%	95% C.I.	n	95% C.I.	n	95% C.I.
Prevalence of stunting (<-2 z-score and/or oedema)	2	(1.9)	(-0.7-4.4)	1	(1.1) (-1.9-5.9)	1	(1.7) (-1.6-5.1)
Prevalence of moderate stunting (<-2 z-scores)	2	(1.9)	(-0.7-4.4)	1	(2.0) (-1.9-5.9)	1	(1.7) (-1.6-5.1)

4.8.3: Prevalence of Weight-for-Age Z-Scores (underweight) of children aged 4-5 years

The prevalence of weight-for-age was (1.9%; 95% C.I: 10.7- 4.4) where (WAZ) (4.0%; 95% C.I: -1.4-9.4) was for boys. The prevalence for moderate underweight was 1.9% where 4.0% was also for boys, girls had no effect (Table 4.12).

Table 4.12: Prevalence of weight for-age z-scores of children aged (4-5 years)

Prevalence of Malnutrition	All Sample size(n)=108			Boys(n)=50			Girls(n)=58		
	n	%	95% C.I.	n	%	95% C.I.	n	%	95% C.I.
Prevalence of underweight (<-2 z-score and/or oedema)	2	(1.9)	(-0.7-4.4)	2	(4.0)	(-1.4-9.4)	0	(0.0)	(0.0-0.0)
Prevalence of moderate underweight (<-2 z score, no oedema)	2	(1.9)	(-0.7-4.4)	2	(4.0)	(-1.4-9.4)	0	(0.0)	(0.0-0.0)

4.9: Prevalence of malnutrition among children aged 6-10 years

4.9.1: Prevalence of Weight-for-Height Z-Scores among children aged 6-10 years

The prevalence of acute malnutrition was (3.9%; 95% C.I: 3.1-4.6) where (1.0%; 95% C.I: -0.7-2.7) was for school boys while (6.2%; 95% C.I: 6.2-7.0) was for girls. The prevalence of acute moderate malnutrition was 3.4% where (1.0%) was for boys and (5.7%) was for girls. The prevalence of severe acute malnutrition was 0.5% where 0.9% was for only girls (Table 4.13)

Table 4.13: Prevalence of weight-for-height z scores of children aged (6- 10 years)

Prevalence of	All n = 206			Boys n = 100			Girls n = 106		
	n	%	95% C.I.	n	%	95% C.I.	n	%	95 C.I.
Prevalence of global acute malnutrition (<-2 z-scores and or oedema	8	(3.9)	(3.1-4.6)	1	(1.0)	(-0.7-2.7)	7	(6.2)	(6.2-7.0)
Prevalence of acute moderate malnutrition (<-2 z score	7	(3.4)	(1.5-5.3)	1	(1.0)	(-0.7-2.7)	6	(5.7)	(3.8-7.6)
Prevalence of severe	1	(0.5)	(-0.7-1.6)	0	(0.0)	(0.0-0.0)	1	(0.9)	(-1.3-3.2)

4.9.2: Prevalence of Weight-for-Age Z-Scores (Underweight) of children aged 6-10 years

The prevalence of underweight was (1.9%; 95% C.I: 0.6-3.3) where (1.0%; 95% C.I: -0.7-2.7) was for boys while (2.8%; 95% C.I: 1.8-3.8) was for girls. 4.14)

Table 4.14: Prevalence of weight-for-age z scores of children aged 6-10 years

Prevalence of malnutrition	All n = 207	Boys n = 100	Girls n = 107
Based on weight-for-age	n % 95% C.I.	n % 95% C.I.	n %95% C.I.
Prevalence of Underweight (-2 z-score)	4 (1.9) (0.6-3.3)	1 (1.0)(-0.7-2.7)	3(2.8) (1.8-3.8)
Prevalence of moderate Underweight (-2 z-score)	4 (1.9) (0.6-3.3)	1 (1.0) (-0.7-2.7)	3(2.8) (1.8-3.8)

4.9.3:Prevalence of malnutrition based on height-for-age of children aged 6-10 years

The prevalence of stunting among school children was (3.9%; 95% C.I: 1.1-6.6) where (7.0%; 95% C.I: 2..9-11.1) was for the boys while (0.9%; 95% C.I: -0.7-2.5) was the girls. (Table 4.15).

Table 4.15: Prevalence of malnutrition based on height-for-age 6-10 years

Prevalence of malnutrition based on height-for-age	All (n)= 207			Boys n = 100			Girls n = 107		
	n	%	95% C.I.	n	%	95% C.I.	n	%	95% C.I.
Prevalence of Stunting (<-2 z-score)	8	(3.9)	(1.1-6.6)	7	(7.0)	(2.9-11.1)	1	(0.9)	(-0.7-2.5)
Prevalence of Moderate stunting (<-2 z-score)	3	(3.9)	(1.1-6.6)	7	(7.0)	(2.9-11.1)	0	(0.0)	(0.0-0.0)

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1: Discussion

5.1.1: Demographic and Socio-economic characteristics of children with their guardians

The ages of school children were 4-10 years where 7 years was the mean age with standard deviation of 2.118 and their gender ratio was 1:1. Majority of the guardians of the children were between 26-35 years(50.48%) and were married.

Majority of the household had (54.49%) which showed significant $p=0.005$ relationship to school children whereby they had 2 bedroomed houses. However the number of children found in those families had no significance $p=0.127$ relationship with nutritional status of school children. Income per household is a contributing factor to the dietary practices of a child since they influence the ability to procure food. Guardians' knowledge about a child's nutrition had no significant association $p=0.112$ to nutritional status of school children. This was not similar to study findings of Nairobi slums which showed that mother's education about a child's nutrition was significantly associated with nutrition (Abuya *et al.*, 2012).

5.1.2: The dietary intake practices associated with nutritional status of school children

Majority of children were mainly fed with three meals per day (40.0%) and these was almost similar to normal diet practice although the recommended meal requires to be

mixed with snacks in between. (Rajabium, 2009).The prevalence of malnutrition was not significantly $P > 0.05$ associated with dietary consumption and food diversity in these school children. Reason; most foods were available both from own production 53.7% and through purchase 41.0%. Most children had high consumption of vegetables 34.0% and cereals 32.0%, foods rich in vitamins and carbohydrates. These resulted to high fiber content leading to high energy nutrient intake. Most of the children consumed more than four food groups required in the diet. This study was not similar to study carried out in Dagoretti which showed that few children consumed foods from more than 4 food groups. Consumption of food was inadequate in required calories and from less than 4 varieties of food groups by the children were important predictors of malnutrition (Annual Health Survey, 2013).

5.1.3: The prevalence of common parasitic infections in school children.

Prevalence of parasitic infections among school children was 56.83% where girls 29.8% were more prone to parasitic infections than boys 27.0%. Those with mixed infections were more 35.23% compared to single infections 21.59%. This was not unique to study, (Onyango *et al.*, 2009) reported close similar for Nyamira County prevalence of parasitic infection among school children was 58.0%.

5.1.4: The prevalence of nutritional status of school children aged 4-10 years among school children

The prevalence of Height –for-height (Global malnutrition was 6.5% where 8.2% was among boys and 5.2% was among girls. This was in reverse to 6-10 years where 3.9% was the prevalence of Height- for-age where 1.0% was for boys while 6.2% was for

girls. This showed that in both age groups the severity of malnutrition was increasing with age because in less than 5 years there was no acute nor severe cases reported as in those aged 6-10 years with 3.9% acute and 0.5% severe acute malnutrition respectively (Table 4.13) This finding was not similar to study findings in Nyambene district, Kenya which showed that 6-10 years children's nutritional status was better among girls than among boys (Kogi *et al.*, 2009).

The prevalence of stunting in less than five years children was 1.9% (Table 4.11) while those aged 6-10 years their prevalence was 3.9% (Table 4.15). This showed that the prevalence of stunting increases with age. The findings differs from (KDHS, 2014) which showed that Kisii County stunting prevalence stood at 9.3% and nationally it was 26.0%.

The prevalence of underweight was 1.9% (Table 4.12) in children less than five years similar to 6-10 years 1.9% in (Table 4.14%). These findings were slightly similar to result for underweight in Kisii Central Sub- County which stood at 1.8% (KDHS, 2014).

The overall prevalence of Global Malnutrition (4-5) years (wasting) stood at 6.5% where 8.2% were for boys while 5.2% were for girls. Global Acute Malnutrition for 6-10 years the prevalence was 3.9% where 1.0% was for boys while 6.2% was for girls. These findings were slightly different to national findings which showed that wasting was 3.9% and there were no cases of acute in (KDHS, 2014).

5.2: Conclusion

Socio-economic factors such as marital stability is slightly contributing to nutritional status of school children. Dietary practices does not influence nutritional status of school children aged 4-10years. There were slight associations between parasitic infections and nutritional status of children. This was shown in the total prevalence of *Ascaris* infection was 40.0% where boys were more prone 7.6% than girls 5.1%. This reflected the sign of contributing factor to underweight where the total prevalence was 1.9% where 4.0% was for boys.

The prevalence of stunting 3.9%, wasting 6.5%, and underweight 1.9% were below the 15.0% WHO threshold in Kisii Central Sub- County but there is still need of monitoring and controlling it.

5.3: Recommendations

- The Ministry of Health together with the County Government of Kisii and Ministry of Education should strengthen nutrition education to ensure that the guardians/parents should cope with early nutritional status monitoring both at home and at health facility.
- Similar studies should be done in other public/private primary schools to ensure that proper nutritional assessment are given to all school going children
- Efforts should be made in school by teachers/guardians to ensure proper usage of latrines and hand washing are practiced to all school children to control and prevent spread of parasitic infections

- Timely deworming of children should be practiced by parents/guardians to control and prevent re-infection of the parasites

5.4 Recommendation for further research

- i. A study to determine the nutritional status of school children in early ages of life, knowledge and practices of dietary intake.
- ii. Similar studies should be done in other Sub-Counties to establish early nutritional status and the associated factors with children aged 4-10 years in Kisii County
- iii. An intervention study on strategies/ methods of effectively educating guardians on early malnutrition assessment will have more weight taking into cognizance other socio- economic factors.

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APPENDICES

Appendix 1: Informed Consent in English language

Study title: Nutritional status and associated factors among school going children aged 4-10 years children in Kisii Central Sub-County.

Introduction

Good morning/Afternoon My name is Ruth Opini. I am a master of science Epidemiology student at the Jomo Kenyatta University of Technology. Today i am here to carry out a study on nutritional status and associated factors among school going children in Kisii Central Sub-County residents. This form will give you information you need, so that you can make a decision on whether to participate or not in the study. There are no wrong or right answers. You will be given time to consider if you will like to be in this study. Please read the form well and ask where you don't understand please be honest and truthful in answering the questions. I assure you that the information you will give will be totally confidential and will not be required to identify yourself by name. Your participation is voluntary and you may therefore refuse to answer any question or stop the interview at any time without suffering any consequences.

Purpose

The purpose of this research will be to determine the nutritional status and associated factors among school-going children aged 4-10 years in Kisii Central Sub- County. This information will be used to improve nutritional status of children in Kisii Central Sub-County.

Procedures

If you agree to be a participant in this study, we will ask you to fill in the questionnaire regarding nutritional status or give thumb print as we interview you. To ensure complete confidentiality your name will not be used but an identification number will be assigned to label the questionnaire. The information you give will recommend and design appropriate interventions to promote their rational use.

Day 1

The PI will go to school to seek permission for recruitment of children aged 4-10 years and explaining the aim of the study to the head teacher. The PI will also seek permission from the area chief to conduct house hold visitation.

Day 2

It will be the day for the PI to identify the selected children and following them back to their home to seek for consent. This will be the day when the parents will be interviewed on behalf of their children to answer some objective issues. Thereafter a consented child will be taken anthropometric measurements in their household.

Day 3

After all children in each school will be examined for anthropometry, stool samples will be collected before going to the next selected school for parasitic analysis.

Risk/Benefits

During this procedure there will be no physical harm. You will not be given any monetary benefits; neither will you incur any costs however it will help you to understand the importance of nutritional status as we shall answer any questions you have. The study will also benefit the public as we will recommend and design appropriate interventions to promote their rational use.

Confidentiality

We will make every effort to protect your identity. You will not be identified in any report or publication of this study or its results.

Voluntaries

Your participation is voluntary, and you may therefore refuse to answer any question or stop the interview at any time without suffering any consequences.

Instructions

When you sign below it shows that you have agreed to participate in the study. If you do not understand any part of the information that has been read to you/you has read, be sure to ask questions. Do not sign until you have understood all that is expected or required. I wish to take part in the study entitled: Nutritional status and factors associated with it among children aged 4-10 years in Kisii Central Sub-County, during the study withdraw my consent without any consequences. I have understood the information given in this sheet and I give my consent to be interviewed (parent on behave).

Participation

Is voluntary. You are free to withdraw or refuse to answer any questions at any time without facing any penalties or loss of benefits to which you or your child are otherwise entitled. If you agree to participate (and also for your child to participate) in the study, please sign your name below, indicating that you have read and understood the nature of this study and your responsibilities as a study participant and that all your questions and concerns regarding the study have been answered satisfactorily. You will receive a copy of this consent form to take with you. We thank you for your co-operation and time. Please feel free to approach or contact us should you have any queries in the future.

Respondent _____ number.....

Signature.....Date.....

CONTACTS

- For any questions or concerns about the study or in the event of a study related injury, contact:
NAME: Ruth Opini

MOBILENUMBER: -0710756935.

- For any questions concerning your rights as a research participant, contact: The Secretary, KNH/UON Ethics Review Committee,
- Telephone number 2726300 Ext 44102
- Email address: erc-secretariat@uonbi.ac.ke
- Website:www.uonbi.ac.ke
- Link:www.uonbi.ac.ke/activities/KNHUoN

Appendix 2: Informed Consent in Kiswahili Language

Hoja kuu: Vyakula bora na vipengele vinavyo husishwa katika watoto wa shule ya msingi kati ya miaka 4-10 katika wakazi wa jimbo la Kisii ya kati.

Utangulizi

Nawasabu hamjambo, kwa majina ni Ruth Opini. Mwanafunzi wa kitengo cha “Master of science Epidemiology” katika chuo kikuu cha Jomo Kenyatta of Agriculture and Technology. Leo hii niko hapa niwapelekeni katika somo la vyakula bora na vipengele vinavyo huzishwa na matumizi ya vyakula bora mwiongoni mwa wakazi wa jimbo la Kisii ya kati. Hii fomu itatoa maelezo yatayokuwesheza kufanya machumuzi kamaungaliweza kushilika katika somo hili na kama utapendelea kulifanya. Waombwa kulisoma fomu vizuri kwa makinifu ili uweze kuuliza swali au maswali ili yaweze kujibiwa kwa ufasaa. Wewe kama mshuka unahakikisha ya kuwa yale utakayo yaeleza yatachukuliwa kwa uzito wake pamoja na siri inayoandamana nayo. Kuchangia kwako ni wa hiari hakuna wakukushukuru, hata kujibu maswali yako. Yawe na ukweli mtu, bila shida yeyote.

Kusudi

Kusudi la somo hili au utafiti huu ni kuangalia vyakula bora na vipengele mbalimbali vinavyohushika na huduma ya vyakula bora kwa mwili katika jimbo la Kisii ya katiya watoto miaka 4-10.

Kukubaliana

Kama utakubali uchumuishe kwa utafiti huu tutakuuliza maswali kuhusu vyakula bora na vipengele mbalimbali kuuzu watoto kati ya miaka 4-10. Nawe utaakikishiwa kutuzwa kwa mchango wako kwa siri ipasavyo na hata kulibana jina lako. Mchango wako utakaotoa, utapelekea mapendekezo ili hatua mwafaka kuchukuliwa kuifanikisha vyakula bora kwa mwili.

Maagizo

Kipindi hiki chochote cha utafiti hakutakuwa na madara yoyote. Usaidizi wa kifedha hautakuwa na hakuna hera wewe kama mhusika utatoa ila utafaidhika kwa kuelewa matumizi ya vyakula bora kwa mwili na vipengela mbalimbali. Tutajibu swali lolote utakalo uliza. Utafiti pia uta saidia jamii kwa jumla kwa kutoa mwelekeo mwafaka wa matumizi ya vyakula.

Siri

Tutahakikisha siri imetunzwa kwa kuribana jina lako na hata kutolijumisha katika uandishi wa ripoti hili.

Appendix 3: Informed Consent Form in Kisii Language

Efomu Ya Gokorerwa Obotuki

Ring'ana rinene riobotuki: Ebirengo bio okoragera amo nechichera abana bakogenda chisukuru korwa emiaka ene goika ikomi bamenyete ime ya ekaunti ya kisii.

Omochakano

Bwakire buya gose bwairire buya, Ruth Opini naro amarieta ane. Nigo inde omorokerigwa bwe esukuru ya Jomo Kenyatta University of Technology na gosomera ebigwango bia Masters of science Epidemiology. Rero iga nigo inde aiga ase ogokora obutuki igoro ye ebirengo biokoragera amo nechichera abana bakogenda esukuru bamenyerete ase ekaunti ya Kisii. Efomu eyeiga nebegete amang'ana onsi buya erinde ayeonyare koiria egetambokero nyuma gwachorire. Machibu taiyo amabe gose amaya. Ekiagera noegwe chingaki chisaine gokora ogochora kwao ase obutuki obo. Soma buya efomu erinde onyeigwe na koiraneria ase obomaene koreng'ana no okomanya kwao. Nindabenkoyaira amang'a onsi koba ayabene onde atanyare. Nigo oraganerigwe oerwe kegima monto atabe okogusuma.

Ekerenga

Ekerenga kio obotuki obo koreng'ana na okoragera amo neching'echo chio okomenya kwa abana bakogenda esukuru korwa emiaka 4-10 ime ya ekaunti ya kisii. Obotuki borakorwe mboobe bweng'echo enene ase ogokonya abana buna bagwenerete koragera buya.

Echera Ekobwatigwa

Onye kogoitaberena obe oyomo bwo bwa ogosoma oko, noraborigwe oichorie amachibu ao ase amoboria oraborigwe koreng'ana nokoragera. Amarieta ago takoganerigwa aiga igo nobwate obosibore bwo okoiraneria amaborio onsi koreng'a no okomanya kwao okuya. Amachibu ago naire ensemu enene ase ogokonya ebirengo bia okoragera okuya ase ebitambokerio biraimokeigwe.

Rituko Ritang'ani

Okogenda ase chisukuru erinde korigia abana baraganie gokorerwa obutuki gwetera ase Omwalimu obo Omonene. Omotuki narigie naboigo ribaga korwa ase omogambi bwe ekenyoro gotarera chinyomba amo nabamenyeteo.

Rituko ria Kabere

Abana barabe berure mbabwatigwe goika chinka chiabo erinde ababori babo baborigwe kobakonya abana babo ase obotuki obo. Rituko eri ndibe abaibori barabe bakoiraneria amaboria erinde bakonye abana babo.

Rituko ria Gatato

Chichuba chio okobeka echoo nigo chirarugwe na abakoreri obotuki obo erinde abana n'ga baborigwe korwa echo yabo ase ogopiana ebianda.

Ogokonywa

Ase ogosoma oko onde tagosumburia nchera ende yonsi. Aye omonyene tebwenereti korwa chibesa gose koegwa kende erinde omanyenye koba oyo babo. Obotuki mbobe bwe ing'echo enene ase ogokonya gokinia ebirengo bia ching'echo chiokoragera na komenya.

Obobisi

Tobe tokorenda erieta riaga. Erieta ria ndikobekwa ande onsi gose eripoti ende yonsi.

Okwerwa

Omochango ogo nokwerwa kegima ase okoba oyomo bwe obutuki obo otari gosukumwa na onde bwosi.

Ebierokererio

Ekero orabe kogosaini nebe ekemanyererio ng'a gwaitabire koba oyomo bwa amasomo aya. Obe ang'e koboria ase otaigweti buya; Tobaisa gosaini ande onsi onye toigweti ayakobwenerete gokora. Ning'ani koba oyomo bwa amosomo: Okoragera amo nechingecho chio okomenya kwa abana bakogenda esukuru korwa emiaka 4-10 ime ya ekaunti ya Kisii. Naigure na gotwara obomanyi obuya na koba ang'e oyomo bwa ogosoma oko.

Oboiranerania

Obotuki obo nigo boganeti ng'a omonto airwe kegima as okwerusia gose koba oyomo bwa obutuki obo; Onye kogochia koba oyomo bwo obutuki, noganerigwe oichori erieta

riao na gosaini ensemu oraire ase ogosomo okwo.Nonyore ekobi ye efomu obe nero;
Mbuya mono ase korwa chinsa amo nechingaki chiao; N obwate obosibore bwo
okoboria engaki oratware ng'ana ende yonsi.

Enamba ya
oyokoiraneria.....Esiginecha.....Chitariki.....

Ebimanyererio

- ERIETA: Ruth Opini; Ase amaborio gose okogania konde gwonsi moikere
Ruth Opini.

Esimu ya koboko: 0710756935.

- Ase amabori akobwati obomaene bwa ekerenga kia obotuki obo bwa abachangi
nigo moramonyore ase enamba eye. Ase ekarani ya omoriki oyo Kenyatta
National Hospital. Ethics Review Committee,

Enamba ye esimi726300 Ext 44102

Enamba ye imeiri : erc-secretariat@uonbi.ac.ke

Appendix 4: Research Authorization Permit



REPUBLIC OF KENYA

**MINISTRY OF EDUCATION SCIENCE & TECHNOLOGY
STATE DEPARTMENT OF EDUCATION**

Telegram: "EDUCATION"

Telephone: 058-30695

E-mail address: deokisiicentral@gmail.com

When replying please quote

SUB COUNTY EDUCATION OFFICE

KISII CENTRAL SUB COUNTY

P.O. BOX 79,

KISII.

Our Ref: ED/K/100/VOL.XV/64

Date: 4th November, 2014



TO WHOM IT MAY CONCERN

**RE: RUTH OPINI REG. NO. TM306 1935/2013- RESEARCH WORK-NOVEMBER
2014 TO FEBRUARY, 2015.**

The above referred person is a student of Jomo Kenyatta University of Agriculture and Technology. Her Area of Study is on "*Nutritional Status and Associated Factors among School going Children Aged 4-10 Years in Kisii Central Sub-county, Kisii County*".

The purpose of this letter is to offer an opportunity to conduct her research-work during the period under reference.

Any assistance given to her will be greatly appreciated.

C.O. NYARIBO
SUB-COUNTY DIRECTOR OF EDUCATION
KISII CENTRAL SUB COUNTY.

**OFFICE OF THE PRESIDENT
MINISTRY OF STATE FOR PROVINCIAL ADMINISTRATION
AND INTERNAL SECURITY**

Telegrams: "DISTRICTER

Telephone: Kisii 0720 957161

When replying please quote



OFFICE OF THE CHIEF

BOSONGO

... LOCATION

P.O. BOX 590 - 40200

KISII

Ref. No. BOS/2014/GEN/18/11/VOL 12/(79)
and date

04/11/2014

TO WHOM IT MAY CONCERN

RE: RUTH OPINI - JOMO KENYATTA UNIVERSITY -
STUDENT REG. NO. - TM 3061935/2013

The lady referred to here above is on a nutritional status and associated factors among school going children aged 4-10 years in Kisii Central Sub-county mission whereby she will be covering the following primary schools; Jogoo, Nyambora, Bobarachu and Nyamemiso primary schools.

Any Co-operation accorded to her in order to enable her achieve this noble function, will be highly appreciated.

Thanking you,

ANIENDA MO KAYA

0720957161



Appendix 5: Ethical Approval



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/346

Link: www.uonbi.ac.ke/activities/KNHUoN

21st October 2014

Ruth Opini
Reg. TM306-1935/2013
JKUAT

Dear Ruth

RESEARCH PROPOSAL- NUTRITIONAL STATUS AND ASSOCIATED FACTORS AMONG SCHOOL GOING CHILDREN AGED 4-10 YEARS IN KISII CENTRAL SUB-COUNTY (P492/08/2014)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 21st October 2014 to 20th October 2015.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- g) Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website www.uonbi.ac.ke/activities/KNHUoN.

Protect to discover

REPUBLIC OF KENYA



**KISII COUNTY
MINISTRY OF HEALTH
KISII TEACHING & REFERRAL HOSPITAL**

Telegrams:
Telephone;
E mail; kisiihospital@gmail.com
Ref; KL6/DR.14/37/Vol.1
Date: 10th November, 2014

DEPARMENT OF RESEARCH
KISII LEVEL 5 HOSPITAL.
P.O. BOX 92 -40200
KISII

TO WHOM IT MAY CONCERN

Dear Sir/Madam

RE: RUTH OPINI REG NO: 306-1935/2013- RESEARCH WORK NOVEMBER 2014 TO FEB 2015.

The above referred person is a student of Jomo Kenyatta university of Agriculture and Technology. Her area of study is on **Nutritional status and associated factors among school going children aged 4-10 years in Kisii central sub county.** The purpose of this letter is to offer her permission to carry out Laboratory research work on stool specimens for intestinal parasitic infections in Kisii level 6 hospital laboratories. During her work period any assistance given to her will be greatly appreciated.

Director of Research


Dr Evans Masanta
Department of Research
CC: CEO, KTRH



Appendix 6: Questionnaire in English

TOPIC: Nutritional Status and Associated Factors Among School Going Children Aged 4-10 Years In Kisii Central Sub-County.

CHILD PART

ID	Interviewer	Date dd/mm/yyyy	Sex 1=M 2=F	Age	Standard level class level of the child 1==preparatory 2=class one 3=class two 4=class three 5=class four 6=class five	Anthropometry of th child 1.Weight (Kgs)= 2.Height(m)= 3. Mid upper arm circumference MUAC(weight –for- height) (cm)=	Observer one	Observer two	Average

A. Parent part

ID(Please	Interview	Date of	Sex	Ag	Marital statu	Education	Religion	Source of incom	Size	Sanitation	Mother'	Father's
Must be t		Interview	1=M		1=single	level/ 1=no attempt	1=Hindu	1=<5,000.00	house	1=traditional	knowled	knowled
of the child		dd/mm/yy	2=F		2=married	2=primary	2=Christ	2=<10,000.00	hold	pit latrines	about a	
					3=divorced	3=secondary	3=Musli	3=10,000.00- 30,000.00	1=number	2=flush toile	child's	About
					Widowed	4=tertiary		4=30,000.00- 60,000.00	Of childr	3=others	1=Yes	a child's
					4=separated	5=university		5=60,000.00+	2=number	specify	2=No	nutritio
									of	4. washing o		1=Yes
									bedroom	Hands w		2=No
										soap		
										After visitin		
										Toilet		
										5. washing o		
										Hands with		
										Soap after		
										visiting toile		

C. FOOD CONSUMPTION AND DIET DIVERSITY-ASK IN HOUSEHOLD WITH CHILDREN AGED 4-10 YEARS

Food groups	How often particular food/beverage consumed per day 1=never 2=less than once 3=3+per day	Consumption of milk 1=1/2 a cup 2=3/4 3=1 cup	Methods used to cook food 1=fried food 2=boiled food 3=dried food	Type of cooking fat /oil used 1=salad 2=solid 3=cream 4=none	Other additions to food while cooking 1=with milk 2=without milk 3=With salt 4=without salt	What is the main source of the dominant food item consumed (please insert the appropriate code) 1=own production 2=purchases 3=gift from friends/family 4=food aid 5= borrowed 6=gathering/wild 7=others specify
Milk and milk products(e.g. goat, sheep, pig, cow's milk, powdered milk,yogurt,cheese, cream, butter, eggs,						

D. Please probe and accurately indicate the number of meals a child consumes per day. Information on children who ate and those who did not eat should be given

<p>Including food eaten in the morning, how many meals does your child eat per day?(please indicate the number of meals consumed e.g. 1, 2, 3, 5, 6)</p>	<p>Do all the members of the family that household Eat every day? 1=yes 2=no, if no give reason</p>	<p>If some household members Do not eat, Who did Not eat? 1=mother 2=father 3=a child</p>	<p>Why did the child Not eat? 1=food not enough 2=sickness 3=away from home 4=Fasting 5=Others specify</p>	<p>Source of dominant food 1. Own production 2. Purchases 3. Borrowed 4. Gift from friend</p>
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E.STOOL INVESTIGATION

Code number	Name of sample (stool)	color	Consistency	Ova	Cysts	Trophozoite	Vectors	Other
			1.soft 2.formed 3.semi-formed	1.Askaris 2.Hookworm	1.E.H 2.G.Lamblia 3.E.Coli	1.E.H 2.G.Lamblia 3. E .coli	1.jiggers.	Parasites 1.ringworms
Worm load	1. few 2. moderate 3. heavy							

Appendix 7:. Jadawali Ya Maswali

HOJA KUU: VYAKULA BORA NA VIPENGELE VINAVYO HUSISHWA KATIKA WATOTO WA SHULE YA MSINGI KATI YA MIAKA 4-10 KATIKA AKAZI WA JIMBO LA KISII.

A. Sehemu ya mtoto

Ujasili wa mtoto	Mhoji	Tarehe kujasiliwa	Njisia ya mtoto 1=Mvulana 2=Msichana	Umri wa mtoto	Mtoto yuko Darasa la ngapi? 1=masiri 2=darasala kwanza 3=darasa la pili 4=darasa la tatu 5=darasa la nne	Vipimo vya mtoto Aina ya kipimo 1. Uzito= 2. Urefu= 3. Mid upper arm circumference (MUAC)(weight-for-Height)in cm=	Mhuguzi wa kwanza	Mhuguzi wa pili	wastani

B. Sehemu ya Mzazi/Mlezi

Ujasili(Tafadhali iwe ile nambari ya mtoto)	Mhoji	Tarehe Kujasiliwa	Njisia ya mzazi/mlezi 1=Mwanaume 2=Mwanamke	Umri Mzazi Mlezi	Uko katika Ndoa mzazi/mlezi Kama ndio tibithisha ni aina gani hiyo ndoa 1=niko kipweke 2=niko katika ndoa 3=nimepotoza mwezangu 4=tumetarikiana 5=tumeajana kwa muda	Kiwango cha elimu cha mzazi /mlezi 1=hamna masomo 2=shule msingi 3=shule ya Upili 4=chuo kikuu	Dhehebu La familia 1=Wahindu 2=Ukristo 4=Usilamu	Kiwango Cha Mapato Kila Mwezi 1=<10,000.00 2=10,000.00 -30,000.00 3=30,000.00 -60,000.00 4=>60,000.00	Ukubwa Wa Familia 1=watoto Wangapi? _____ 2=nambari ya vijuma katika hiyo nyumba _____ 3=kuna aina Nyingine Taja_____	Usafi 1=kuna Choo/ Vyoo Kwa Kiwanja Cha Boma? Kama kuna 2=kuna Choo/vyoo Ndani ya nyumba 3=kuna aina Nyingine Taja_____	Elimu Ya Mama Kuhusu Vyaku Bora 1=ndio 2=la	Elimu Ya Baba Kuhusu Vyaku Bora 1=ndio 2=la	

C. Ulaji wa vyakula bora kwa kimapangilio. Uliza kwa kila nyumba ya wale watoto wamejasiliwa katika umli wa 4-

10.

Kikundi cha vyakula	Ni mara ng vyakula /vinywaji uliwa kwa siku?	Mara ngapi maziwa hunywa kwa siku? 1=Nusu kikomb 2=Tatu na robo Kikombe k siku	Taja aina ya upis 1=kuchemsha 2=kukaanga 3=kukausha	Taja aina ya mafut Hutumika kwa kupika vyakula 1=saladi 2=fafuta ya kugan 3=Kirimu ya mazi 4=hawatumii mafu yoyote	Taja vitu ving vinaongezwa Kwa vyakula wakati kupika 1=pamoja na maziwa 2=Bila maziwa 3=pamoja na chumvi 4=Bila chumvi
Kikundi cha maziwa na mapato ya (k.m.mbuzi, kondoo, nguruwe, maziwa yang'ombe, maziwa ya po yourgurt, kirimu ya mayai					
Kikundi cha mafuta ya kuganda/ya Saladi(k.m.mafuta ya kupika					

butter, ghee magariina, mafuta ya kondoo na njugu).					
Kikundi cha matunda na vyakula vya sukari tamu(k.m.sukari, asali, mjuzi wa matunda, soda, vyakula vitamu vya sukari,glukosi, nanasi,pai-pai, majungwa)					
Kikundi cha vyakula vya mbegu (k.m.legume,kabichi, njugu, coconati,mbizi majano, mb ya kukaushwa, macadamia, len dengu)					

D. Tafadhali taja kwa umakini na uonyeshe ni mara ngapi mtoto wako kwa siku upata vyakula bora. Toa maagizo jinzi mtoto/ wako amekula na Yule hakula.

<p>Pamoja na kiamsha kinywa, ni mara ngapi mtoto wako hula kwa siku?(Tafadhali taja ni mara ngapi kwa mfano;1, 2, 3, 4, 5, 6</p>	<p>Watu wote kwa familia hula kwa siku? 1=ndio 2=la</p>	<p>Taja kama kuna mmwao wao Hakulana ni kwa nini? 1=Mama 2=Baba 3=Mtoto</p>	<p>Kwa nini mtoto hajala? 1=Hakuna vyakula kutosha 2=Ni mgonjwa 3=Hakuwa nyumbani 4=Amefunga sababu maombi 5=Taja sababu zingine</p>	<p>Njia ya kupata chakula kwa nyumba 1. kulima mwenyewe? 2. kununua? 3. kuzaidiwa na rafiki? 4. kuomba kwa wengine?</p>
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F: UCHUNGUZI WA KINYEZI

Numbari ya	Aina ya	Rangi	Upesi wa kinye	Mayai	Cysti	Trophozoito	Vecto	Parasito ingine
Motto	kipimo	kinyezi	1.nyepesi Sana 2.nyepesi Katili 3.Ngumu kiasi	1.Askaris 2.Hookworm	1.E.H 2.G.lamblia 3.E.coli	E.H 2.G.lamblia 3.E.Coli	1.jiggers	1.ringworms
Uzito wa minyoo	1. kidogo 2. kiasi. 3 mingi							