SOCIO-CULTURAL DETERMINANTS OF MALNUTRITION AMONG CHILDREN AGED BELOW 5 YEARS IN GARISSA SUB COUNTY, KENYA.

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AGRICULTURE AND TECHNOLOGY.

2016

Socio-cultural determinants of Malnutrition among children aged below 5 years in Garissa Sub County, Kenya.

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A Thesis submitted in partial fulfillment for the Degree of Master of Science in Public Health in the Jomo Kenyatta University of Agriculture and Technology

2016

DECLARATION

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

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DEDICATION

I dedicate this thesis to my parents and family for their unlimited support and giving me the strength and the will to continue when the situation was tough. I also dedicate this research paper to my supervisors for their relentless support and guidance all the way.

ACKNOWLEDGMENT

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ABBREVIATIONS

Cm   Centimeter

ERC   Ethical Review Committee

FGDs   Focused Group Discussions

HAZ   Height for Age Z-scores

HIV   Human Immunodeficiency syndrome

IYCF   Infant and Young Children Feeding

KDHS   Kenya Demographic Health Survey

KEMRI   Kenya Medical Research Institute

Kg   Kilogram

KNBS   Kenya National Bureau of Statistics

MCH   Maternal child health

MDGs   Millennium Development Goals

mm   Millimeter

MUAC   Mid Upper Arm Circumference

NCHS   National Centre for Health Statistics

PEM   Protein Energy Malnutrition

SAM   Severe Acute Malnutrition

SD   Standard Deviation

SPSS   Statistical Package for Social Scientists

SSC   Scientific Steering Committee

UNICEF   United Nation Children Education Fund

UNSCN   United Nations System Committee on Nutrition

WAZ   Weight for Age Z-scores

WHO   World Health Organization

WHZ   Weight for Height Z-scores

ABSTRACT

Malnutrition is a serious condition that occurs when a person's diet doesn't contain the right amount of nutrients. It is a chronic public health problem among under-five children in the developing world. In Kenya it is also the single greatest contributor to child mortality yet information on contributing socio-cultural factors has not been well documented. The main objective of this study was to investigate the socio-cultural factors that contribute to under nutrition among children below five years in Garissa sub county, Kenya. A cross-sectional study was employed where mixed methods were used. A sample of 365 children under five years was selected from households using the systematic sampling method. Pre-tested questionnaire and FGDs were the instruments employed to collect data. Pearson's chi-square test and odds ratio with corresponding 95% confidence interval were used to establish the association between the dependent variable (Nutritional status) and independent variables. The level of statistical significance was set at P-value <0.05. Binary logistic regression analysis was performed to determine the independent factors associated with malnutrition. The findings of the study reveal that 38.1% of the children were found to be stunted, 31% underweight and 26% wasted. The factors that were independently associated with occurrence of stunting at multivariate analysis included: child's age (13-24 months) [AOR=2.71; 95%CI=1.50-4.87; P<0.001] and (25-36 months) [AOR=2.37; 95%CI=1.27-4.42; P<0.007], weaning within two months of age [AOR=3.12; 95%CI=1.87-5.23; P<0.001], cost of preparing food for the child[AOR=2.07; 95%CI=1.31-3.27; P<0.002]. Similarly factors that were independently associated with occurrence of underweight after multivariate analysis were: low birth weight (<2.5kgs) [AOR=3.16; 95%CI=1.90- 5.27; P<0.001]; child's gender (female) [AOR=1.86; 95%CI=1.12-3.08; P<0.017]; recent illness [AOR=1.76; 95%CI=1.07- 2.91; P<0.027] and households income [AOR=3.11; 95%CI=1.19-8.12; P<0.021]. The factors that were independently associated with occurrence of wasting after multivariate analysis were: child's age (37-54 months) [AOR=3.07; 95%CI=1.47-6.39; P<0.003], recent illness [AOR=2.54; 95%CI=1.52- 4.25; P<0.001]; mothers who

didn't attend ANC [AOR=2.06; 95%CI=1.18-3.62; P<0.012] and mothers/guardians age [OR=4.52; 95%CI=1.57-13.01; P<0.005] The prevalence of child malnutrition among the under five children was high, indicating that the nutrition situation in study area is very critical. Therefore, malnutrition still remains a major public health problem thus program planners and policy makers in the Ministry of Health and stakeholders should consider and strengthen collaboration and coordination of nutritional programs that aim to alleviate nutritional deficiencies by addressing the above significant factors.

CHAPTER ONE

INTRODUCTION

1.1 Background information

Malnutrition as a general term refers to a condition that results from eating a diet in which nutrients are too little or too much that it causes health problems including a number of diseases, each with a specific cause related to one or more nutrients and each characterized by a cellular imbalance between the supply of nutrient and energy and the body's demand for them to ensure growth, maintenance and specific functions (WHO, 2006). This may lead to either under nutrition or over-nutrition. Worldwide there are about 60 million children with moderate acute malnutrition and 13 million with severe acute malnutrition (Ashworth *et al.,* 2004). Malnutrition is consequently the most important risk factor for the burden of disease in developing countries (Muller & Krawinkel, 2005). It is associated with increased morbidity and mortality from malaria, diarrheal diseases, measles and respiratory diseases among other diseases. There are long-term detrimental consequences of malnutrition which include impaired cognitive development, growth impairment, greater behavioral problems, deficient social skills and inability to fulfill ones potential (Barnard, 2003).

There is an abundant literature detailing the causes of child malnutrition, especially under-nutrition, and the means of reducing it. Poor availability of food both in terms of quality and quantity, poor dietary diversification and high rates of infection are the major determinants of under-nutrition in the majority of developing countries (Mason *et al.,* 1999). But recent research suggests that poor composition of the diet; inappropriate caregiver-feeding behaviors' play an important role in child nutrition and development. These include mixed feeding and early cessation of breastfeeding, the untimely introduction of complementary foods, and low psychosocial stimulation of children,

poor food preparation and food hygiene practices, and inappropriate care for children during illness, among others. The quality and quantity of food available to a household are not the only factors explaining the determinants of malnutrition in infants and young children. Care and feeding practices of the caregiver are key factors that lead to undernourishment in young children (Engle *et al.,* 2000).

Globally, the practice of breastfeeding is declining. When exclusive breastfeeding is not practiced it can contribute to a high prevalence of malnutrition (NDoH, 2005a). In South Africa the practice of exclusive breastfeeding is very low. The South African Demographic and Health Survey (SADHS) found that of all three month old babies, only 10% were exclusively breastfed and 48.3% were bottle fed. In addition, inadequate complementary feeding practices and poor infant feeding practices lead to low protein and energy intake (NDoH, 2003).

1.2 Problem statement

Although Kenya has made substantial achievements in providing for the well-being of its citizens, malnutrition in young children remains a matter of major public health concern. Prevalence of child malnutrition in Kenya is high with stunting (29.6%), wasting (5.8%) and underweight (20.3%) among children under-five years old. The situation is worse in Northeastern Kenya where prevalence of malnutrition among children under five is much higher at 35.2% stunting, underweight at 24.5% and wasting at 19.5% (KDHS, 2008/09).

Although the causes of malnutrition can be broadly categorized into immediate causes (insufficient diet, poor breastfeeding practices, early weaning, food taboos and personal choices related to diet), underlying causes (house hold food security, inadequate children care, women low education/ information levels, unhealthy environments, social and religious norms, gender equity and maternal access to education) and basic causes (poor availability and control of resources i.e. political, social, ideological and economic) (UNICEF, 2004), they differ from one area to another area. Before interventions can be

planned for an area, it is necessary to understand and assess the factors contributing to malnutrition in that area. In Kenya it remains endemic in several areas and stands high among children less than five years country wide (KDHS, 2008/2009), yet its prevalence and information on associated socio-cultural factors has not been intensely studied.

1.3 Justification

Child malnutrition still remains a major health challenge in Kenya (Fuchs *et al.,* 2004). While the problem of malnutrition in Kenya is relatively well documented; its specific determinants are not well understood. Knowledge and understanding of these factors is crucial for development of sustainable control measures against malnutrition. To reduce malnutrition one must understand its causes. Nonetheless, there has been a paucity of micro-level data and information regarding the key determinants of malnutrition in different geographic regions. Thus, this study is an attempt to contribute empirical evidence to fill this gap. Specifically, the study was carried out in Garissa Sub County, which is one of the malnutrition endemic regions in Kenya. Moreover, in part it is expected to serve as a baseline reference for those who may wish to undertake further research in the area.

1.4 Research questions

1. What is the prevalence of malnutrition among children aged below five years in Garissa Sub County?
2. What are the demographic and socio-economic factors associated with malnutrition among children less than five years in Garissan Sub- County?
3. What is the level of knowledge, attitude and practices with regard to child nutrition among mothers of babies less than five years?
4. What are the cultural beliefs and practices that predisposes children less than five years to malnutrition?

1.5 Study objectives

1.5.1 General objective

To determine the socio-cultural determinants of malnutrition among children aged below 5years in Garissa Sub-county.

1.5.1 Specific objectives

1. To establish the prevalence of underweight, stunting and wasting among children aged below 5years in Garissa Sub County.
2. To determine the socio-demographic and socio-economic factors associated with malnutrition among children aged aged below 5years in Garissa Sub County.
3. To assess the perceptions and practices on nutrition among mothers of babies aged below 5years in Garissa Sub County.
4. To determine the cultural beliefs and practices associated with malnutrition among children less than five years old in Garissa sub county.

CHAPTER TWO

LITERATURE REVIEW

Malnutrition affects all groups with the general population but the problem is particularly significant among infants and young children worldwide. This is so because young children have increased nutritional needs for growth and development (Torun, 2006). Children under the age of five years are the most vulnerable and majority of those who are affected with malnutrition are in the developing world (Ashworth *et al.,* 2004).

Under nutrition is therefore a major threat to children's chances of survival as it hinders their optimal health, growth and development. It also increases the risk of infant child morbidity and mortality, diminished cognitive and physical development and impacts on child's future productivity in life (MOPHS, 2012).

2.1 Occurrence

2.1.1 Global situation

Malnutrition is a public health problem throughout the developing world. In fact, malnutrition remains a factor in 53% of all the 11 million deaths that occur each year in the world's 0 – 4 year old children (Muller & Krawinkel, 2005). Globally the nutritional status of children is gradually improving. There has been a global decrease in under nutrition from 47% in 1980 to 33% in 2000 (De onis *et al.,* 2000). Despite this, malnutrition is still on the rise in East Africa (Johanna, 2010).

For the past two decades malnutrition has been the leading cause of morbidity and mortality in children below five years worldwide. 1 out of 3 (177 million) under five years children were found to be malnourished in 1990 (Torun & Chew, 1994) and by 2002, 199 million children were still suffering from malnutrition (Zere & McIntyre, 2003). In 2004, 55% of child deaths worldwide resulted from under nutrition (Caulfield *et al*., 2004). Again malnutrition contributedto 2.2 million deaths of children under five

years old in 2008 (Black *et al.,* 2008) and in 2009 more than one third of all the children's deaths worldwide were caused by under-nutrition as well (UNICEF, 2009).

Recently adverse malnutrition effects have remained to be the most health burden globally. 7.6 million Children below five years died of under nutrition in 2010 (Liu *et al.*, 2012) and it is estimated that malnutrition still contributes to 60% of 11 million deaths of children under five years old worldwide every year (Mwagome *et al.,* 2010).

While cheap and nutritious foodstuffs are readily available in many areas of sub-Saharan Africa region (SSAR), millions of children are chronically malnourished and every year approximately 18 million people, especially children, die from mild to moderate malnutrition (Aboad, 2002). The number of under-five children suffering from malnutrition continues to increase (Smith & Haddad, 2000).

2.1.2 Kenyan situation

The major threat to child survival, growth and development in Kenya is malnutrition. Much of Kenyan young population is affected by under nutrition whether stunting, wasting or underweight (MOPHS, 2012). According to 2008/09 Kenya Demographic Health Survey, rates of under nutrition in children below five years are high. Overall, the proportion of underweight among children below five years nation-wide is (20.3%) and proportions of underweight by region present Nairobi with the least at (10%) and Northeastern province with the highest (31.1%).

Over the past three decades prevalence rates for wasting and underweight in children below five years in Kenya have shown declining (though remaining stable over the past 10 years). However, the stunting rates remain high with an astounding national average of (26%) with extremely high rates (36%) in Mandera of Northeastern region Wasting stands at (4%) nationally, with high rates of (11.4%) in Garissa of Northeastern region and Nairobi with the lowest at (2.5%). This shows significant disparities in nutrition

indicators in Kenya with Northeastern region among those having the highest levels (KDHS 2014).

Malnutrition is also the single greatest contributor to child mortality in Kenya. Of all the child's deaths in Kenya 53% are due to under nutrition (WHO, 2010). This is not only a threat to life but also to achieving both the MDGs and Kenya's vision 2030.

2.2 Indicators of malnutrition

2.2.1 Underweight

A child is under weight when the weight is 15% to 20% below that normal for their age group. The child is underweight and undersize, while at the same time has relatively normal body proportions, weight-to-height ratios (Golden & Golden, 2000; Wittenberg, 2004). The underweight child is common and an important presentation of malnutrition, which is missed a lot of times. When a diet is insufficient in protein and/or energy there will be a slowing down of linear height, failure to gain weight or weight loss, and this is seen when the child is exposed to an acute food shortage. In the developing world, 129 million of children younger than five years are underweight and 10% are severely underweight. Progress has been slow and Kenya could not meet the MDGs with the prevalence being (20.3%) in 2009, whereas it was (21.2%) in 2000 (KNBS, 2010).

2.2.2 Stunting

This refers to reduced growth rate whereby height for age value is less than -2 standard deviations of the WHO child Growth Standards median (WHO, 2014). In infants and children younger than five years stunting is a greater problem than underweight and wasting usually an indicator of nutritional deficiencies or illness that occurred during times of growth and development (Shetty, 2002; UNICEF, 2009c). Stunting is the first clinical sign of malnutrition and it affects about 195 million children younger than five years in the developing world and about one in three children in Africa (Piercecchi-

Marti *et al*., 2006). As of 2012 an estimated 25% children under 5years of age were stunted worldwide. More than 90% of the worlds stunted children live in Africa and Asia, where respectively 36% and 56% of children are affected (UNICEF and WHO, 2013). In Kenya stunting rates still remain high at 26% (KDHS, 2014).

2.2.3 Wasting

A child is moderately wasted when the weight for height is less than –2 SD from the mean. If the child weight for height is less than 70% of the median and is equal to a standard deviation score of –3SD then the child is severally wasted (WHO, 2014).. Moderate and severe wasting represents an acute form of malnutrition and children suffering from wasting are at a greater risk of dying (Williams, 2005). In 2011, the proportion of children below the age of five years who were found to be wasted was about 52 million globally and 1 out of every 10 children in Africa (Liu *et al*., 2012). In Kenya the prevalence of wasting is at 4% (KDHS, 2014). Wasting can be surmount by optimal feeding but may have permanent debilitating impacts such as cognitive impairment.

2.3 Signs and symptoms

Symptoms of malnutrition in children include; Slowing linear growth and Poor weight gain (Failure to grow at the expected rate, both in terms of weight and height), Behavioral changes (appearing unusually irritable, sluggish, anxiety, apathy, excessive crying, decreased social responsiveness and attention deficits), Changes in hair color (Child's hair appears dull brown in color, thin, sparse and easily pulled out), Skin changes (The skin becomes dry and flaky and hair may turn dry, dull and straw like in appearance), Decreased subcutaneous tissue (the most affected are the legs, arms, buttocks and face), Muscle wasting and lack of strength in the muscles, limbs may appear stick like, Swelling of the abdomen and legs. This is caused due to lack of vital

nutrients (Black Re *et al.,* 2008). These last two symptoms are seen in children with severe malnutrition.

2.4 Assessment of nutritional status

Assessments are used to provide information on the nutritional and health status of children and are an indirect measure of quality of life in a community or population (Shetty, 2002). The most common ways to assess malnutrition in children is through use of anthropometry, clinical and biochemical paramenters.

2.4.1 Use of body measurements (anthropometry)

Weighing a child and measuring his or her height; involves taking a measurement of their weight and height and then comparing it against what would be the expected average height and weight for a child of that age. Some children will be below average as they are naturally smaller, but a significant drop below the expected level for an individual could indicate a risk of malnutrition (Müller &Krawinkel, 2005).

Measuring the circumference of the mid-upper arm; a mid-upper arm circumference (MUAC) measurement band has different colors along the strip. If the arm band lands in the orange section it means the child is suffering from moderate acute malnutrition. If it lands in the red section, the child is suffering from severe acute malnutrition (Mother & Child nutrition, 2009).

Checking for fluid retention or swelling in the lower legs or feet. Oedema affects a child's appearance, giving him or her puffy, swollen look in either lower limbs and feet or face. It can be detected by small pits or indentations remaining in the child's lower ankles or feet, after pressing lightly with the thumbs. The presence of oedema in both feet and lower legs is always considered a sign of severe acute malnutrition (Garrow, 2005).

2.4.2 Use of biochemical and clinical indicators

Blood tests can also be used to measure levels of protein in the blood. Low levels of protein may suggest that a child is malnourished. The clinical findings and biochemical criteria are not effective to use for classification if the disease is not advanced, but can help to confirm a diagnosis (Torún, 2006).

2.5 Treatment and management of malnutrition

Malnutrition can be managed on five levels, namely in hospitals, in nutrition rehabilitation centers, in health centers, in the community and at home with regular follow up (Orach and Kolsteren, 2002). Rehabilitation programs should promote shorter hospital stay and the home or community based treatment, especially in areas were resources such as supplies and personnel are limited (Fuchs *et al.,* 2004).

2.6 Effects of malnutrition

Malnutrition generally affects the entire body, interfering with almost all body systems and functions and resulting in reduced functional capacity and body energy requirements. Malnutrition impairs immune functions which may lead to presence of infection or liver dysfunction resulting in loss of appetite and fever. Low food intakes on the other hand weakens muscles and this may cause pathological changes of the heart resulting in longer circulation time thus reduced heart rate, blood pressure or even stroke (Torun, 2006).

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study site

Garissa Sub County is among the six sub counties that make up the larger Garissa County. It covers an area of about 7.45% of the total area of the country and has a population of 65,881 (2009 census). The sub county has 3 administrative wards namely Sankuri, Central and Korakora. It is about 215 miles (350 km) east of Nairobi. The road from Nairobi to Garissa town is the only good tarmac road but the rest are dry weather roads. The sub county is low lying, with altitudes ranging between 70m and 400m above sea level. River Tana runs along the Western boundary of the sub county and is the only permanent river and single most source of water. Seasonal Rivers (laggas) are found all over the sub county that provides water during the wet seasons though they greatly interfere with road transportation. The area is hot and dry much of the year, receiving scarce rainfall in the range of 150mm -300mm annually. The temperatures range from 25°c − 38°c. The main inhabitants of the sub county are Somalis and are of Islamic religion. Nomadic pastoralism is the dominant form of land use, and the local people depend on livestock for livelihood, except for the few farmers who practice arable farming along the Tana River. The communities living outside the town center live in temporary huts constructed from grass and tree branches. In this setting, the temporary structures are grouped into about 3-4 huts to form a homestead commonly referred to as a *manyatta*. The Somali community lives together in villages comprising of an average of 10-20 *manyattas* and these villages are commonly called *bulla.* Health services in the sub county are provided through one Provincial general hospital, 8 health centers and a few private health clinics within the town centre. A map showing GarissaSub County attached (appendix 6).

3.2 Study design

A cross-sectional study applying mixed methods approach was carried out whereby both quantitative and qualitative approaches were used. The quantitative approach involved the administration of a questionnaire first and then qualitative approach was followed where FGDs were used.

3.3 Study population

The study population were mothers/guardians with children aged (below 5years) in the selected villages in Sankuri within Garissa Sub-County.

3.3.1 Inclusion criteria

- All mothers/guardians together with their children aged below 5 years old in the identified villages in Sankuri within Garissa Sub County were included in this study.

- Those whose parents/ guardian gave written consent to be interviewed.

3.3.2 Exclusion criteria

- Those who their parents/ guardians declined to give written consent were excluded from the study.

3.4 Sampling methods

3.4.1 Sample size determination

Sample size was determined using the (Fisher *et al.,* 1998) formula as follows; N = $z^2\infty pq/d^2$

Whereby;

N is the minimum sample size

d^2 is the degree of precision, which is 5%

α is the level of significance (95%)

Z is the standard normal deviate that corresponds to 95% confidence interval

P = Prevalence of malnutrition (stunting) in North Eastern Kenya is 31% (KDHS 2008/08)

Q= 1-P

Therefore, N = $(1.96^2 \times 0.31 \times 0.69)/0.05^2$ = 328+ non response rate (10%) =365

Therefore the minimum sample size was 328, but by considering 10% for non-response rate, a total of 365 children were recruited from the identified villages. One child less than five years old was selected from each household and if the selected household had two or more children within the age category of 0 to 59 months then one child was selected randomly.

3.4.2 Sampling techniques

Six villages (these had majority of children under five years) were purposively selected from Sankuri ward (sankuri was selected due to its accessibility and security reasons) of Garissa Sub County. After selecting the six villages, all the households with children under five years old were listed in alphabetical order from each selected village (six) and then systematic sampling method was used to select households in each village based on proportionate to sample size till the desired number was attained. If the selected household had two or more children within the age category of 0 to 59 months then one child was selected randomly.

Eight men and eight women were selected using systematic sampling from the list mentioned above in each village for FGDs. Eight mothers and eight fathers were recruited for FGDs. A total of 6 FGDs were implemented separately for women (3 FGDs) and for men (3 FGDs).

3.5 Data collection procedures

3.5.1 Questionnaire and Anthropometric measurements

Two public health officers and two nurses who were able to communicate in Somali were recruited. Data was collected using a pre-tested structured questionnaire (appendix 3) through interviewing mothers or caregivers and measuring weight and height of each child targeted for the study.The principal investigator strictly followed the measurement and recording of height and weight of children selected for the study to uphold consistency of anthropometric measurements. Date of birth ofchildren, in most cases was established relying on the date given by the mother or caretaker. For those with written evidence, date of birth was obtained from EPI cards from the households.

Anthropometric measurement was also taken for all children aged below 5years to assess their nutritional status; Length of the child aged <6-23 months was measured in a recumbent position to the nearest 0.1 cm using a board with an upright wooden base and a movable head piece. Height of children (24-59 months of age) was measured in a standing-up position to the nearest 0.1 cm using vertical board with adetachable sliding headpiece which was designed byUNICEF.

Weight of the child was measured with light clothing and without shoes to the nearest 0.1 kg using UNICEF Electronic Scale. Children who couldn't stand on the weighing scale were measured together with their mother or caregiver, the mother was weighed with the child and weighed without the child and then subtracted weight of the mother from the total weight.The difference between the two measures was the child's weight.

3.5.2 Focus group discussions

A total of six focused group meeting (3 for mothers and 3 for fathers separately) were held each with eight respondents. An FGD guide was developed to elicit information regarding socio-cultural issues (Appendix 4). This technique was used to provide data on food taboos, child feeding practices, social food norms and cultural beliefs affecting diet/food choices, beliefs on breastfeeding, general knowledge and other cultural associated issues. The moderator was a public health officer who was well versed in Somali language; there were two note takers and two observers. The guide was initially prepared in English and later translated to Somali (the local language).

3.6 Research variables

Data on the following variables was collected:

3.6.1 Dependent variables

Presence of malnutrition, defined by having any forms malnutrition that may be classified as underweight, wasting or stunting. Children whose height-for-age Z-score was below minus two standard deviations (-2 SD) and below minus three standard deviations (-3 SD) from the median of the WHO reference population were considered short for their age (stunted). Children with Z-scores below minus two standard deviations (-2 SD) and below minus three standard deviations (-3 SD) were considered thin (wasted). Children whose weight-for-age was below minus two standard deviations (-2 SD) and below minus three standard deviations (-3 SD) were considered as underweight.

3.6.2 Independent variables

3.6.2.1 Socio-demographic Factors

Age, Gender, Size at birth, Residence, Level of education, Religion

3.6.2.2 Economic factors

Mothers occupation, Fathers occupation, Amount of income, No of Dependants

3.6.2.3 Perceptions and practices towards malnutrition

Cause of malnutrition, Action taken when affected, Who takes the said action?, How it's done, Health seeking behaviour.

3.6.2.4 Dietary and breast feeding practices

Breastfeeding status, Exclusive breastfeeding practices, Duration of breastfeeding, Complementary feeding practices

3.6.2.5 Cultural factors

Food taboos, Beliefs and Cultural interventions

3.7 Data management and statistical analysis

Data was checked daily for completeness and was cleaned, edited, counter-checked for accuracy. Quantitative data from the questionnaires was double entered into a computer database designed using MS-Access application. Backup of the data was done and filled questionnaires was cross-checked then stored in a lockable cabinet accessible only to authorized persons so as to ensure confidentiality and to avoid data loss.

Quantitative data was analyzed by using Statistical Package for Social Science [SPSS] Version 20. Descriptive analysis was computed whereby means, standard deviation, proportion/percentages and frequency were calculated for the demographic variables. Prevalence of malnutrition was estimated by computing percentage of malnutrition outcome among the entire sampled under five years children nutrition status outcome.

Pearson's chi-square test and odds ratio with corresponding 95% confidence interval were computed to establish the association between the dependent variable (nutritional status) and independent variables. Multiple logistic regression analysis was used to

adjust the confounding variables in the association between dependent and independent variables. The level of statistical significance was set at p-value < 0.05.

For the anthropometric measurement analysis the WHO standards (2006) was considered. For reporting of Height for age, Weight for age and Weight for height relative to the reference 2 –scores (standard deviation scores) are commonly used. Children were classified as malnourished or normal (non-malnourished) based on stunted (chronic malnourished), wasted (acutely malnourished) and under weight (stunted, wasted, or both).

Qualitative data was analysed manually using a thematic manner. From the data collected, the key points were marked with a series of codes, which were extracted from the text. The codes were grouped into similar concepts in order to make them more workable for analysis.

3.8 Ethical considerations

Approval to conduct this study was obtained from the Kenya Medical Research Institute (KEMRI) Scientific Steering Committee (SCC) and Ethical review committee (ERC). A written consent for interview was obtained from each child's parents/ guardian after explaining the purpose of the study. No names were recorded and the respondents were assured of their confidentiality. Participants were enrolled into the study only after voluntary informed written consent. Prior to the study, sensitization meetings were held with the respective village heads and the objectives explained. Codes were also assigned on all information about the participants and handled with utmost confidentiality making it difficult to relate the data to respondents and only be used for intended purposes. Participants might decide to withdraw from the study at any time, without facing any consequences.

3.9 Study limitations

The study relied only on anthropometric methods to assess malnutrition. It did not include biochemical tests that would have determined specific micronutrient deficiencies.

CHAPTER FOUR

RESULTS

4.1 Socio-demographic characteristics of the mothers/guardians

The distribution of socio-demographic characteristics among mothers/guardians is shown in Table 4.1. The mean age of the respondents was 26.5 years. The findings also show that about half of respondents (51.8%) were within the age group of 16-25 years while the age group of 36 years and above were only 11.0%. With respect to level of education, more than half of mothers/guardians (57.5%) never attended school while only 10.4% attended secondary school and above. Most of the respondents (88.5%) and (92.3%) were married and Muslim respectively. A majority (72.3%) of the mothers were housewives. The monthly income of the majority of the household (75.1%) was less than 5000 Kenyan shillings.

Table 4.1: Socio-demographic characteristics of the mothers/guardians of the children in Garissa Sub County, 2014

Socio-demographic characteristics	Frequency (n=365)	Percentage (%)
Mean age (±SD) of mother/guardian	26.5(±8.32)	
Age in years		
16-25	189	51.8
26-35	136	37.3
36 and above	40	11
Level of education		
No school	210	57.5
Primary school	116	31.8
Secondary school and above	39	10.7
Marital status		
Married	323	88.5
Divorced	23	6.3
Single	19	5.2
Religion		
Muslim	337	92.3
Christian	28	7.7
Mother's occupation		
House wife	264	72.3
Self employed	57	15.6
Casual worker	44	12.1
Father's occupation		
Employed	158	43.3
Pastoralist	54	14.8
Farmer	102	27.9
Unemployed	51	14
Monthly income of the household		
<5000 Ksh	274	75.1
10000-15000 Ksh	44	12.1
15000-20000 Ksh	47	12.9

4.2 Socio-demographic characteristics of the children

The ages of the children ranged from 4 months to 54 months. Table 4.2 shows the description of children by socio-demographic characteristics. The highest percentage was in the age category of 4 to 12 months (31.0%) and 13 to 24 (30.1%). The gender distribution among the children indicates that there were 53.7% females and 46.3% males. About half (49%) of the children were with low birth weight (<2.5Kg). The distribution of mean age, birth weight, current weight and height among the children participated in the study was 24.28 months, 2.57kg, 9.37 kg and 85.2 cm respectively.

Table 4.2: Distribution socio-demographic characteristics among children in Garissa Sub County, 2014

Variables	Frequency (n=365)	Percentage (%)
Age of children in months		
4-12 months	113	31.0
13-24 months	110	30.1
25-36 months	88	24.1
37-54 months	54	14.8
Gender of the child		
Female	196	53.7
Male	169	46.3
Birth weight in Kgs		
<2.5	172	49.0
≥2.5	179	51.0
Missing	14	
Mean of age in months (+SD) = 24.28(13.8)		
Mean of birth weight in kgs (+SD) = 2.57(0.4)		
Mean of current weight in Kgs (+SD) = 9.37(2.80)		
Mean of height in cms (+SD) = 85.20(15.18)		

4.3 Child health practices by mothers/guardians

The table shows that majority of the children (68.2%) were born at health facility including hospitals and community health centers compared to 31.8% born at home. Table 4.3 presents the child health practice of mothers/guardians towards their children. Most mothers (77.0%) attended for antenatal care (ANC) during their pregnancy. The table further indicates that most of the children (90.7%) and (86.8%) supplemented with vitamin A and dewormed in the previous 6 months respectively. Majority (72.0%) of the children's immunization card was up to dated. With respect to source of water, there was almost equal distribution among those using river (29.6%), tap water (28.5%) and borehole (32.6%) while the remaining 9.3% were using a well as source of water.

Table 4.3: Child health practices by mothers/guardians in Garissa Sub County, 2014

Variables	Frequency (n=365)	Percentage (%)
Child place of birth		
Home	116	31.8
Health facility	249	68.2
Whether a mother attended ANC		
No	84	23.0
Yes	281	77.0
Whether the child's immunization card is up to date (verified)		
No	97	28.0
Yes	249	72.0
Missing	19	
Vitamin A supplementation		
No	34	9.3
Yes	331	90.7
Deworming of the child in the prevous 6 months		
No	48	13.2
Yes	317	86.8
Age difference between the two youngest children in months		
8-12 months	91	33.3
13-18 months	85	31.1
19-24 months	73	26.7
36 months and above	24	8.8
Not applicable	92	
Source of water used to prepare food for the child		
River	108	29.6
Well	34	9.3
Borehole	119	32.6
Tap water	104	28.5
Storage of the child's food		
Sufuria	214	58.6
Pan	65	17.8
Bowl	23	6.3
Hot pot and flask	63	17.3

4.4 Morbidity among the children and their perceived causes

4.4.1 Morbidity among children in Garissa Sub County, 2014

The mothers/guardians were asked about recent sickness of their children and nearly half of the children (49.9%) were sick as indicated in Figure 4.1. Moreover, it was indicated from the FGDs that some of the participants take the child to health centre if the child is sick.While others said they seek spiritual healing. It was also reported that various types of herbs are used for treating diarrhoea and some of the statements given by the participants of the FGDs were; *'when child has diarrhoea, we give animal fat or herbs to clear the stomach'*, *'traditional herbs are usually good to stop diarrhoea'*.
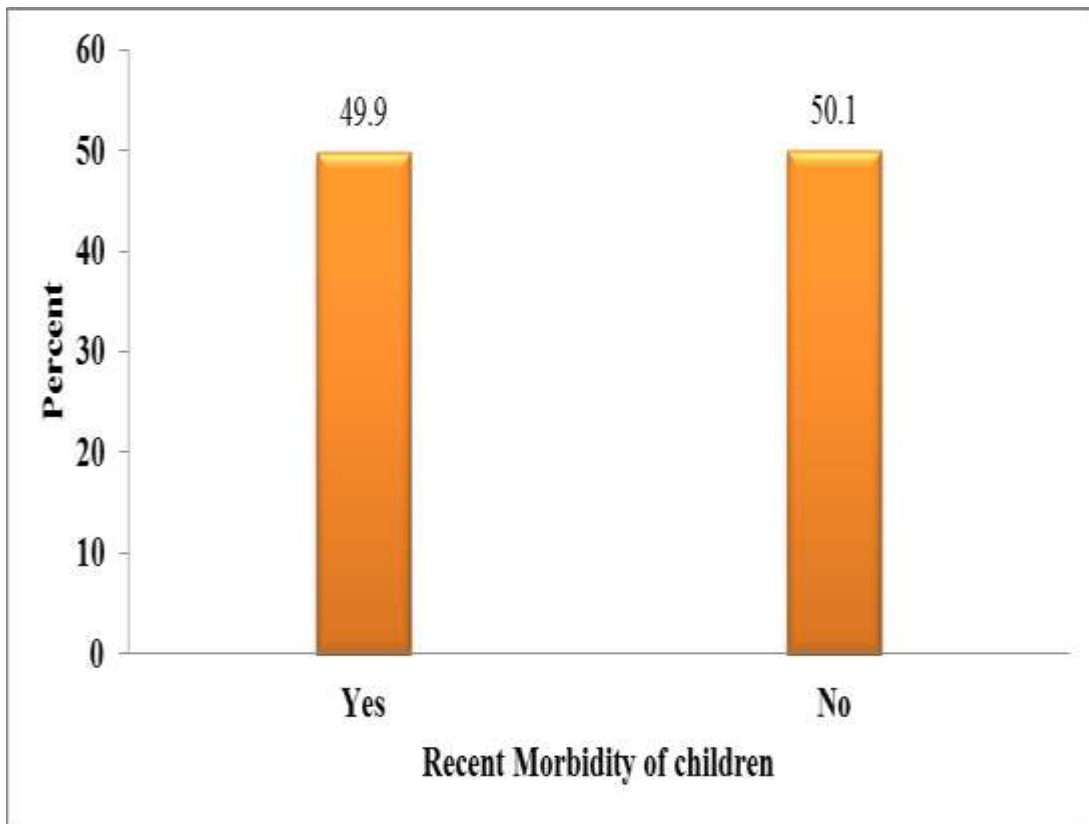
Figure 4.1: Recent illness among children in Garissa Sub County, 2014

4.2 Perceived causes of the child's morbidity among children below the age of 5 years in Garissa Sub County, 2014

Among children who were sick recently, the main cause of the sickness was respiratory infection (50.9%) followed by diarrhoea/vomiting (23.1%) as indicated in Figure 4.2.
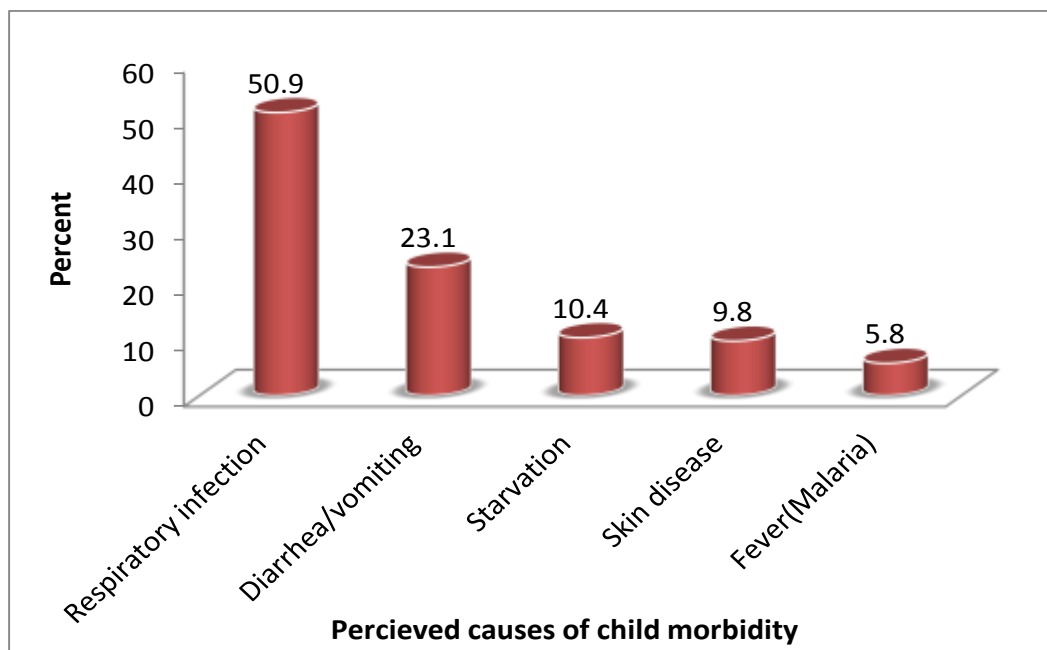
Figure 4.2: Perceived causes of child morbidity in Garissa Sub County, 2014

4.5 Socio-cultural beliefs on infant/child feeding

The socio-cultural factors related to infant/child feeding practices are shown in Table 4.4. With respect to initiation of breastfeeding after delivery, 55.6% of the children started immediately after delivery while 44.4% initiated between 1-5 days after delivery. Regarding to the age of weaning, the highest percentage (43.6%) were introduced within two months after delivery. Almost all respondents (99.4%) responded that there was no difference in feeding practices between boys and girls. Similarly, a large percentage (97.5%) of the respondents indicated that there were no culturally allowed foods to be given to children.

About two third (60.0%) of the respondents did not prepare the child's food separately from the rest of the family's foods. Majority of the respondents (87.4%) cooked the food for their children in the house. About half of the respondents (44.9%) reported that the cost of preparing food for the child was expensive.

Furthermore, the results from the FGDs revealed that majority of mothers initiate breast feeding after 2-3 days of delivery and the reason was to allow mothers to recover fully. During that time the child is given warm water and camel/goat milk. An example of a such information is the quote that; '*we give breast milk 3 days post-delivery to allow mothers time to recover*' and '*at birth we give warm water to soothe the child's gastro-intestinal tract and camel/goat milk until the mother recovers usually 2-3 days*'. Surprisingly most of the participants from the FGDs stated that colostrum is not given to the baby. They indicated that it is not for human consumption as it is too thick and strong. This was indicated in statements such as; '*the yellow milk is not good for human consumption*', and '*it is too strong and thick for the baby*'.

From the focus discussion it was pointed out by majority that there was early introduction to complementary foods. The reasons given were '*frequently crying of the child due to hunger*, *lack of enough production of breast milk by the mothers and societal pressure to introduce complementary feeding*'. With respect to preparing food separately from the rest of family, participants of the FGDs mentioned '*we stop preparing separate meals when the baby is 6 months old and above*'.

Certain food taboos practiced in the community were pointed out in the FGDs by the following quote; '*We avoid foods like Sukuma and leafy vegetables because they are believed to cause diarrhoea and stomach upset to young children*'. '*Yellow milk is harmful to the baby as it is very strong. Baby not breastfed for the first few days after delivery because yellow milk is not fit for babies, instead we give plain water, camel/goat milk until white milk comes out*'. '*Babies are not given liver, eggs and fish because the baby will delay in speaking*'.The above food items mentioned are the main

nutritious foods for the growth and development of young children and prevent children from being malnourished.

The practice on weaning was revealed from the focus group discussions that many women would apply bitter substances on the nipple of the breast so that the child will avoid breast milk. Moreover, in order to accustom the child not to breast milk the mother travels to another distant area without the child. For instance it was mentioned that; '*Mother travels or apply bitter things on the nipple of the breast* '. *'When baby is a year old or more mother travels to a distance village or apply something bitter on the breasts'*. *'If the mother travels away for one week, when she comes back the child will have forgotten about breastfeeding'*. With respect to the availability of food to feed children, most indicated that it differs from household to household. Participants said that '*we don't have enough food to feed our children but at least they don't die of hunger'*. In other FGDs participants mentioned *'children are fed what is available'* and '*feeding is done on demand and availability of food there is no particular time for feeding the child we just feed the child'*.

Table 4.4: Socio-cultural beliefs on infant/child feeding in Garissa Sub County, 2014

Variables	Frequency (n=365)	Percentage (%)
Breastfeeding initiation after delivery		
One day and above	162	44.4
Immediately after birth	203	55.6
Breastfeeding		
No	19	94.8
Yes	346	5.2
Age of the child to introduce complementary foods		
0-2 months	159	43.6
3-4 months	68	18.6
6 months	138	37.8
Duration of breastfeeding		
On-going	86	24.9
6-12 months	80	22.6
18 -24 months	54	15.5
> 24 months	134	37.0
Missing	11	
Whether boys or girls have different foods		
Yes	2	0.6
No	360	99.4
Missing	3	
Foods the child is culturally entitled to eat on certain occasions		
Yes	11	3.0
No	354	97.0
Food taboos (Yellow milk liver, eggs, fish, sukuma and leafy vegetables)		
Yes	9	2.5
No	356	97.5
Preparation of child's food separately from the rest of the family		
No	219	60.0
Yes	146	40.0
Source of food for the child		
Cooking in the house	319	87.4
Buying of ready-made food	28	7.7
Relatives	18	4.9
Perceived cost of preparing food for the child		
Expensive	164	44.9
Affordable	201	55.1

4.5.1 Culturally accepted complementary foods

Figure 4.3 presents the culturally accepted complementary foods. The highest percentage of the respondents (39.5%) indicated that milk and porridge were the culturally accepted complementary foods. It was also indicated in the FGDs that the kind of foods that are appropriate for children by the time they have stopped breast-feeding were '*mashed potatoes, diluted camel/goat milk, beans and tea*'.
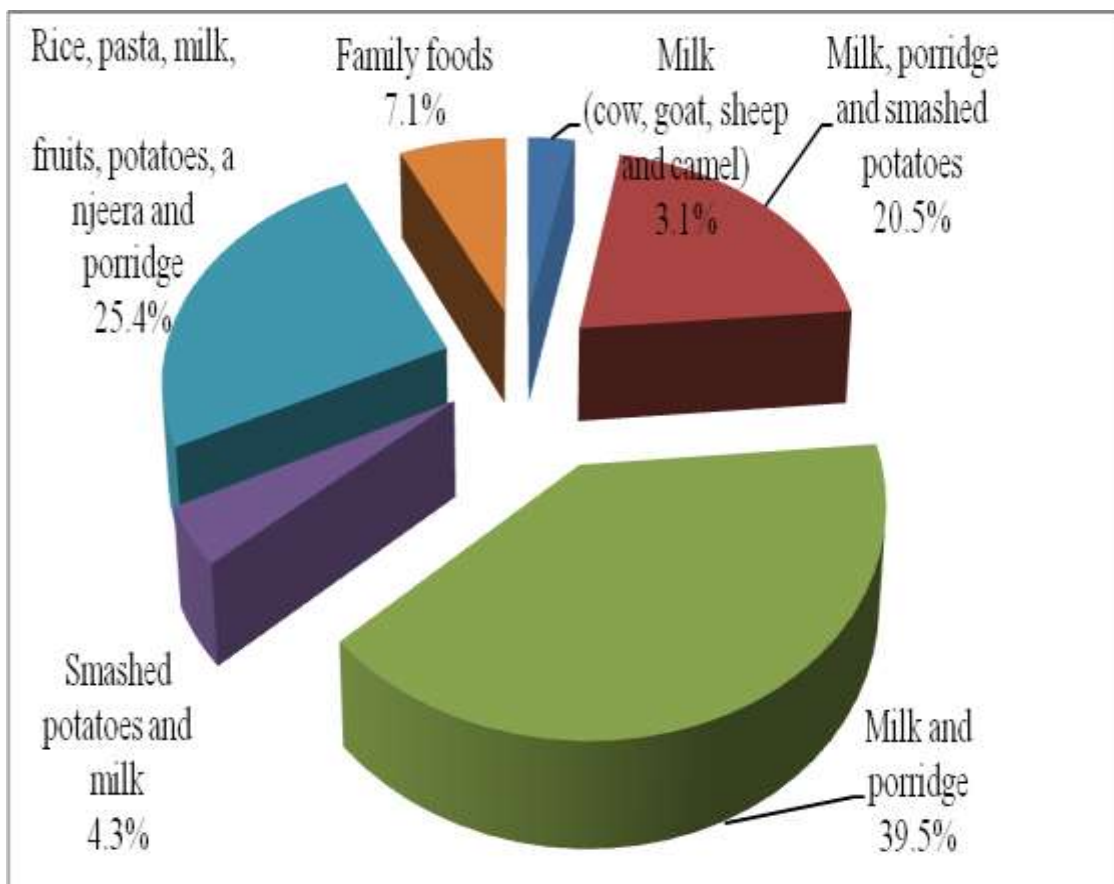
Figure 4.3: Culturally accepted complementary foods in Garissa Sub County, 2014

4.6 Food intake of children – 24 inventory on Childs Food Consumption

The respondents were asked to indicate the types of foods they fed their children based on the previous 24 hours. The findings are presented in frequencies and proportions in Table 4.5. More than half (52.9%) had eaten rice from the cereals and two third (65.8%) had consumed potatoes from the tubers and roots. The highest percentage from vegetables was cabbage (38.4%). Majority (65.2%) and (95.6%) did not eat meat and eggs respectively in the previous 24 hours. Patato was the main (65.8%) consumed food. Similarly, participants from FGDs were asked to mention the body building foods, energy giving foods and foods that can protect children from getting sick. The food most frequently mentioned by participants were '*ugali, chapatti, rice and patatoes'* from the body building foods. *'Bananas, water melon, mongoes and papaw'* were indicated as foods that give energy.And from thefoods that can protect children from getting sick easily respondents said '*meat and diluted milk ofcamel/cow/goat*. These implied that there was inadequate knowledge among the respondents on childfeeding and nutrition.

Table 4.5: Childrens food intake of – A 24 hour inventory on Childs Food Consumption in Garissa Sub County, 2014

Variables	Frequency (n=365)	Percentage (%)
Cereals		
Rice	193	52.9
Chapatti	37	10.1
Mandazi	3	0.8
Anjeera	35	9.6
Pasta	19	5.2
None	78	21.4
Vegetables		
Cabbage	140	38.4
Tomatoes	58	15.9
Kales	15	4.1
Onions	7	1.9
Spinach	20	5.5
None	125	34.2
Meat		
Camel	25	6.8
Goat	54	14.8
Sheep	16	4.4
Beef	10	2.7
Fish	11	3.0
Chicken	11	3.0
None	238	65.2
Milk		
Camel	63	17.3
Goat	110	30.1
Cow	54	14.8
None	138	37.8
Eggs		
Yes	16	4.4
No	349	95.6
Roots and Tubers		
Potatoes	240	65.8
Arrowroots	7	1.9
None	118	32.3
Oils and Fats		
Cowboy	23	6.3
Camel fat	16	4.4
Elianto	100	27.4
Others	40	11.0
None	186	51.0
Fruits		
Pawpaw	38	10.4
Melon	11	3.0
Mangoes	28	7.7
Bananas	80	21.9
None	208	57.0

4.7Awarenesson causes of malnutrition and actions taken on malnourished children

4.7.1 Awareness of mothers/guarians on causes of malnutrition

Majority of respondents (83.6%) indicated that the cause of malnutrition among children was inadequate food in the household as shown in Figure 4.4.

N.B: The percentages are taken to total responses as multiple responses were allowed.
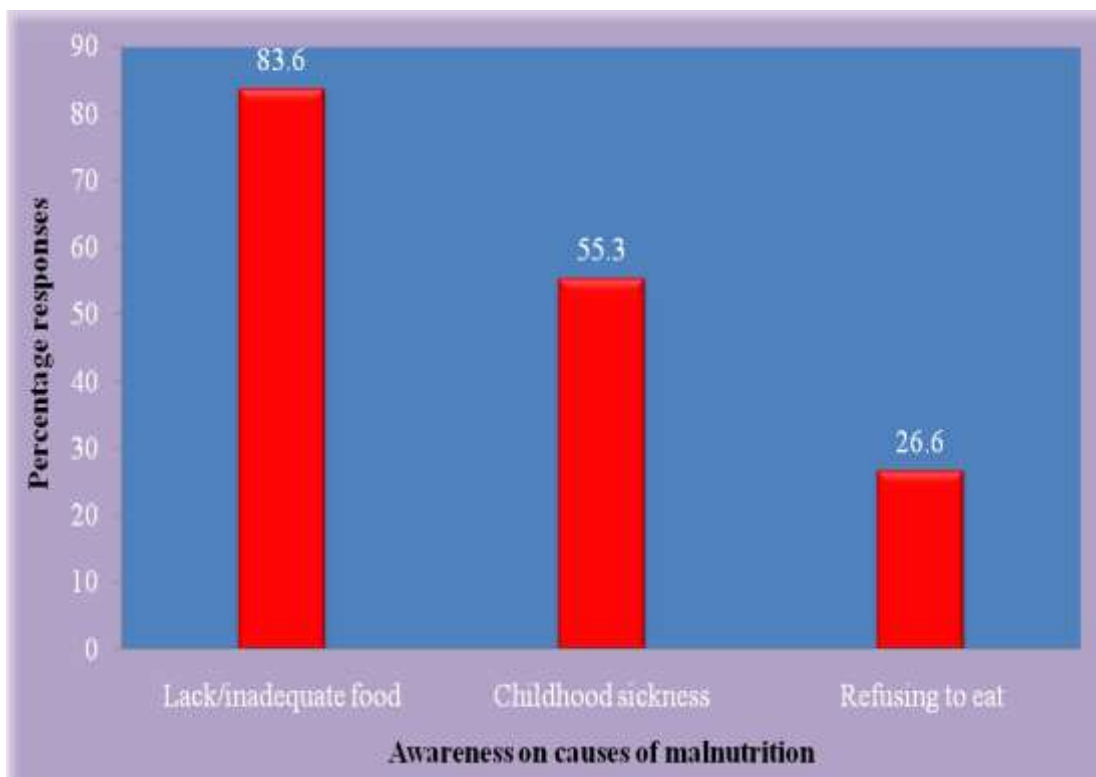
Figure 4.4: Awareness on causes of malnutrition among children below the age of five years in Garissa Sub County, 2014

4.7.2Actions taken if the child becomes malnourished

Mothers/guardians were asked on what action they would take if the child becomes malnourished and majority (76.3%) responded they would take the child to the health facility, 13% indicated that they would give fruits and foods frequently and 10.7% reported to seek spiritual healing (Figure 4.5).
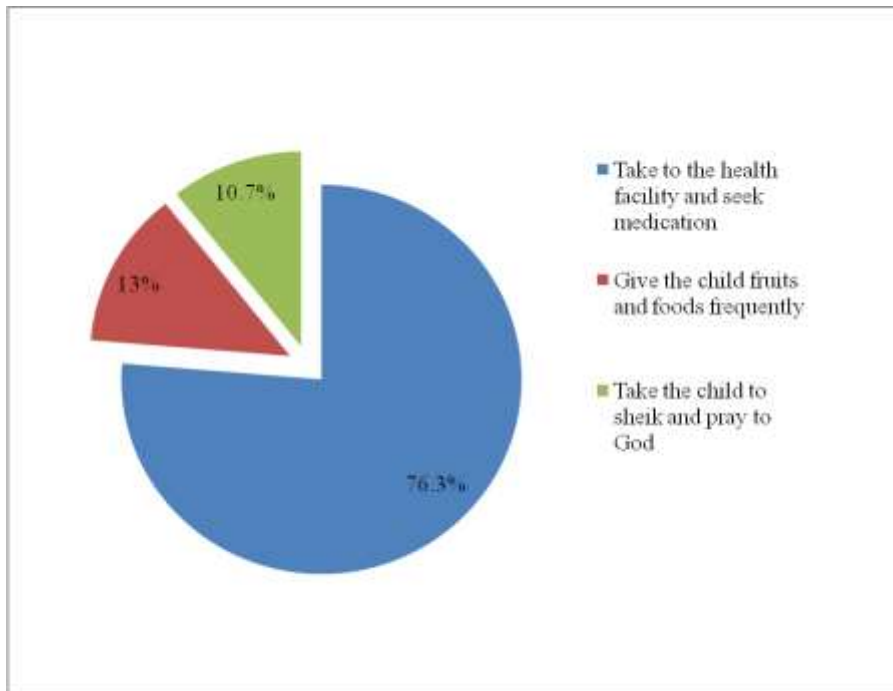
Figure 4.5: Actions taken if the child becomes malnourished in Garissa Sub County, 2014

4.7.3 Proportion of children receiving supplementary feeding

Figure 4.6 shows the distributions of children who have received supplementary foods. The figure depicts that more than half (58.4%) of the children had receieved supplementary foods.
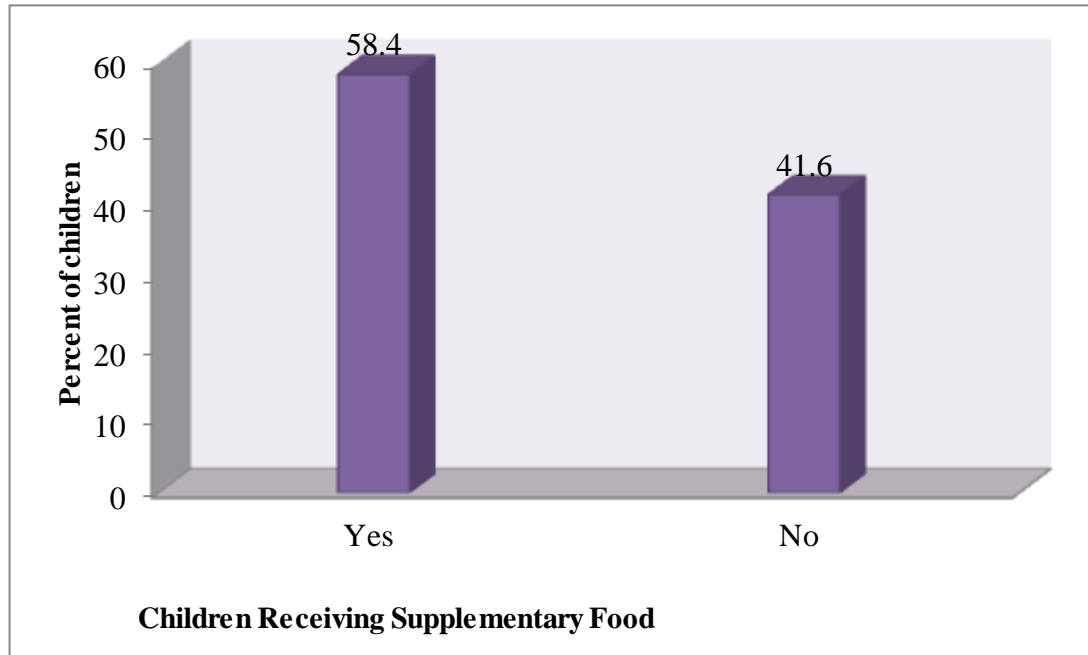
Figure 4.6: Proportion of children receiving supplementary feeding in Garissa Sub County, 2014

4.8 Prevalence of malnutrition among children

Malnutrition was determined by using Z-score for weight for age (under-weight), height for age (stunting) and weight for height (wasting) that is below minus two and minus three standard deviations (-2SD and -3SD) according to WHO (2006) standards.

The result of the study indicates that 38.1% of the sampled children were stunted, 31% were underweight and 26 % were wasted (Figure 4.7).
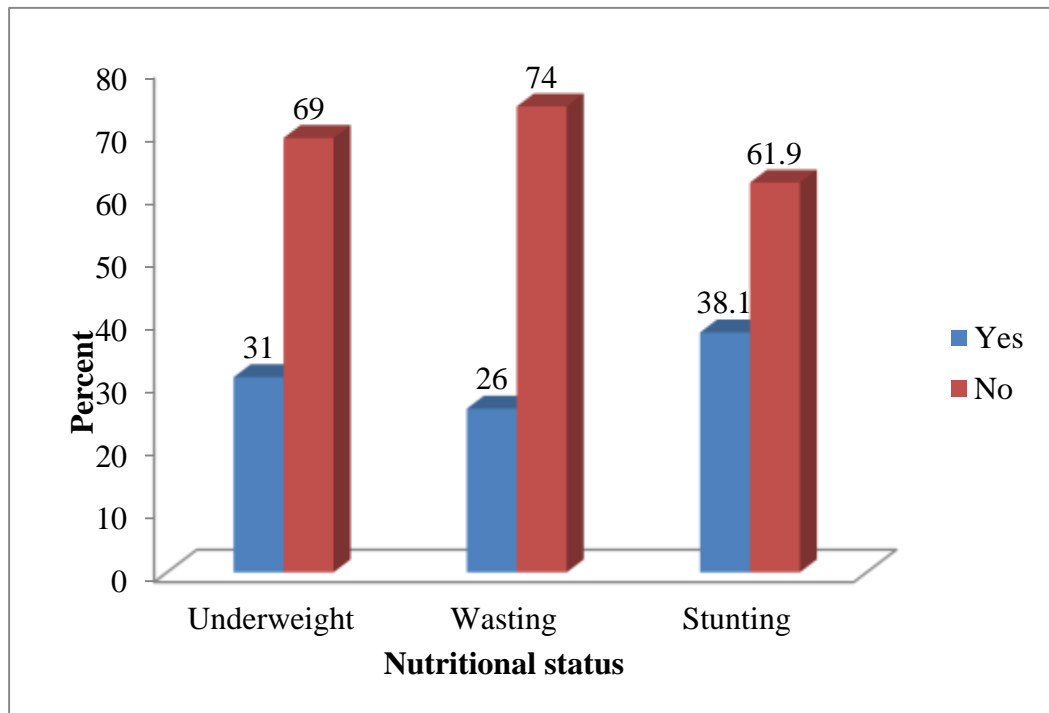
Figure 4.7: Prevalence of underweight, wasting and stunting in Garissa Sub County, 2014

4.9 Association between socio-demographic characteristics and stunting

Table 4.6 shows the relationship of socio-demographic characteristics among mothers/guardians and children with stunting in children below five years. Children aged 13-24 months were significantly more stunted (46.4%) than children aged 12 months and below (27.4%), [OR=2.29; 95%CI=1.31-3.99; P=0.004]. Similarly, stunting was significantly more among children aged 25-36 months (43.2%) than children aged 12 months and below (27.4%),[OR=2.01; 95%CI=1.11-3.63; P=0.020]. Households whose income was less than 5000 Ksh per month had significantly more proportion of stunting (42.3%) than households with income of 15000-20,000 Ksh (19.1%),([OR=3.10; 95%CI=1.44-6.66; P=0.004]. However, there was no significant association (P<0.05) observed between stunting of the child and the other socio-demographic characteristics.

Table 4.6: Association between socio-demographic characteristics and stunting in Garissa Sub County, 2014

Socio-demographic attributes	Stunting status		OR	(95%CI)		χ2 value	* P value
	Stunted, n(%)	Normal, n(%)		Lower	Upper		
Age of children in months							
<12 months	31(27.4%)	82(72.6%)	1.00				
13-24 months	51(46.4%)	59(43.6%)	**2.29**	1.31	3.99	8.44	**0.004**
25-36 months	38(43.2%)	50(56.8%)	**2.01**	1.11	3.63	5.37	**0.020**
37-54 months	19(35.2%)	35(64.8%)	1.44	0.72	2.88	1.04	0.307
Gender of the child							
Female	75(38.3%)	121(61.7%)	1.02	0.67	1.55	0.01	0.938
Male	64(37.9%)	105(62.1%)	1.00				
Birth weight of child in Kgs							
≤2.5	70(40.7%)	102(59.3%)	1.23	0.80	1.90	0.71	0.341
>2.5	64(35.8%)	115(64.2%)	1.00				
Age of mother/guardian in years							
16-25	62(32.8%)	127(67.2%)	0.54	0.27	1.08	3.06	0.080
26-35	58(42.6%)	78(57.4%)	0.82	0.41	1.67	0.30	0.587
36 and above	19(47.5%)	21(52.5%)	1.00				
Mother/guardian level of education							
No school	87(41.4%)	123(58.6%)	1.53	0.73	3.20	1.29	0.256
Primary school	40(34.2%)	77(65.8%)	1.13	0.51	2.46	0.09	0.767
Secondary school & above	12(31.6%)	26(68.4%)	1.00				
Marital status of the mother/guardian							
Married	121(37.5%)	202(62.5%)	0.82	0.32	2.11	0.16	0.685
Divorced/separated	10(43.5%)	13(56.5%)	1.06	0.31	3.61	0.01	0.929
Single	8(42.1%)	11(57.9%)	1.00				
Religion of the mother/guardian							
Christian	13(46.4%)	15(53.6%)	1.45	0.67	3.15	0.90	0.344
Muslim	126(37.4%)	211(62.6%)	1.00				
Mother's Occupation							
Casual worker	23(52.3%)	21(47.7%)	1.86	0.98	3.53	3.56	0.059
Self employed	18(31.6%)	39(68.4%)	0.78	0.42	1.44	0.62	0.430
House wife	98(37.1%)	166(62.9%)	1.00				
Father's occupation							
Employed	66(41.8%)	92(58.2%)	1.11	0.58	2.12	0.10	0.747
Pastoralist	15(27.8%)	39(72.2%)	0.60	0.26	1.35	1.53	0.216
Farmer	38(37.3%)	64(62.7%)	0.92	0.46	1.84	0.06	0.814
Unemployed	20(39.2%)	31(60.8%)	1.00				
Monthly income of the house							
<5000- 10000 Ksh	116(42.3%)	158(57.7%)	3.10	1.44	6.66	8.40	0.004
10001-15000 Ksh	14(31.8%)	30(68.2%)	1.97	0.75	5.17	1.90	0.168
15000-20000 Ksh	9(19.1%)	38(80.9%)	1.00				

*Signficant p value bolded, OR= Odds Ratio, CI= Confidence Interval

4.10 Association between socio-demographic characteristics and underweight

Bivariate analysis of association between prevalence of underweight and socio-demographic attributes is summarized in Table 4.7. The proportion of underweight was significantly more among children aged 37-54 months (38.6%) than children aged 12 months and below (23.0%), [OR=2.13; 95%CI=1.06-4.29; P=0.035]. Child birth weight was significantly associated with underweight. Children with birth weight less than 2.5Kgs had significantly high prevalence of underweight (41.9%) than children with birth weight of 2.5Kgs and above (21.8%), [OR=2.59; 95%CI=1.62-4.12; P=<0.001]. Mothers/guardians who never attended school had significantly increased proportion of children with underwight (37.1%) compared to those attended secondary school and above (18.4%), [OR=2.62; 95%CI=1.10-6.23; P=0.030]. Children whose mothers worked as causal had significantly higher prevalence of underweight (45.5%) when compared to children whose mothers were house wives (28.8%), [OR=2.06; 95%CI=1.08-3.95; P=0.029]. Households whose income was less than 5000 Ksh per month had significantly more proportion of underweight (34.7%) than households with income of 15000-20,000 Ksh (14.9%), ([OR=3.03; 95%CI=1.31-7.03; P=0.010].

Table 4.7: Association between socio-demographic characteristics and underweight in Garissa Sub County, 2014

Socio-demographic attributes	Underweight status		OR	(95%CI)		χ2 value	* P value
	Underweight, n(%)	Normal, n(%)		Lower	Upper		
Age of children in months							
<12 months	26(23.0%)	87(77.0%)	1.00				
13-24 months	32(29.1%)	78(70.9%)	1.37	0.75	2.50	1.07	0.301
25-36 months	34(38.6%)	54(61.4%)	2.11	1.14	3.89	5.67	0.017
37-54 months	34(38.6%)	54(61.4%)	**2.13**	1.06	4.29	4.47	**0.035**
Gender of the child							
Female	69(35.2%)	127(64.8%)	1.54	0.98	2.43	3.569a	0.059
Male	44(26.0%)	125(74.0%)					
Birth weight of child in Kgs							
≤2.5	72(41.9%)	100(58.1%)	**2.59**	1.62	4.12	16.34	**<0.001**
>2.5	39(21.8%)	140(78.2%)	1.00				
Age of mother/guardian in years							
16-25	59(31.2%)	130(68.8%)	1.20	0.56	2.56	0.22	0.643
26-35	43(31.6%)	93(68.4%)	1.22	0.56	2.67	0.25	0.620
36 and above	11(27.5%)	29(72.5%)	1.00				
Mother/guardian level of education							
No school	78(37.1%)	132(62.9%)	**2.62**	1.10	6.23	4.73	**0.030**
Primary school	28(23.9%)	89(76.1%)	1.39	0.55	3.51	0.50	0.482
Secondary school & above	7(18.4%)	31(81.6%)	1.00				
Marital status of the mother/guardian							
Married	100(31.0%)	223(69.0%)	0.77	0.29	2.01	0.29	0.592
Divorced/separated	6(26.1%)	17(73.9%)	0.61	0.16	2.26	0.56	0.455
Single	7(36.8%)	12(63.2%)	1.00				
Religion of the mother/guardian							
Christian	7(25.0%)	21(75.0%)	0.73	0.30	1.76	0.50	0.478
Muslim	106(31.5%)	231(68.5%)	1.00				
Mother's Occupation							
Casual worker	20(45.5%)	24(54.5%)	**2.06**	1.08	3.95	4.75	**0.029**
Self employed	17(29.8%)	40(70.2%)	1.05	0.56	1.97	0.02	0.876
House wife	76(28.8%)	188(71.2%)	1.00				
Father's occupation							
Employed	48(30.4%)	110(69.6%)	1.15	0.57	2.33	0.16	0.691
Pastoralist	17(31.5%)	37(68.5%)	1.21	0.52	2.82	0.21	0.651
Farmer	34(33.3%)	68(66.7%)	1.32	0.63	2.77	0.55	0.460
Unemployed	14(27.5%)	37(72.5%)	1.00				
Monthly income of the house							
<5000 -10000Ksh	95(34.7%)	179(65.3%)	**3.03**	1.31	7.03	6.69	**0.010**
10001-15000 Ksh	11(25.0%)	33(75.0%)	1.91	0.66	5.46	1.44	0.231
15000-20000 Ksh	7(14.9%)	40(85.1%)	1.00				

*Signficant p value bolded, OR= Odds Ratio, CI= Confidence Interval

4.11 Association between socio-demographic characteristics and wasting

Table 4.8 presents the relationship of socio-demographic characteristics among mothers/guardians and children with wasting. Children aged 37-54 months were significantly more wasted (42.6%) than children aged 12 months and below (24.8%), [OR=2.25; 95%CI=1.13-4.48; P=0.021]. Mother's/guardians age was significantly associated with child wasting. Mothers/guardians aged 16-25 years had significantly higher proportion of children who presented with wasting (29.6%) compared to those aged 36 years and above (12.5%), [OR=2.95; 95%CI=1.10-7.91; P=0.032]. However, there was no significant association (P<0.05) observed between child wasting and the other socio-demographic variables.

Table 4.8: Association between socio-demographic characteristics and wasting in Garissa Sub County, 2014

Socio-demographic attributes	Wasting status		OR	(95%CI)		χ2 value	* P value
	Wasted, n(%)	Normal, n(%)		Lower	Upper		
Age of children in months							
<12 months	28(24.8%)	85(75.2%)	1.00				
13-24 months	21(19.1%)	89(80.9%)	0.72	0.38	1.36	1.05	0.306
25-36 months	23(26.1%)	65(73.9%)	1.07	0.57	2.04	0.05	0.826
37-54 months	23(42.6%)	31(57.4%)	**2.25**	1.13	4.48	5.35	**0.021**
Gender of the child							
Female	57(29.1%)	139(70.9%)	1.41	0.88	2.27	2.051a	0.152
Male	38(22.5%)	131(77.5%)	1.00				
Birth weight of child in Kgs							
≤2.5	48(27.9%)	124(72.1%)	1.12	0.70	1.80	0.22	0.640
>2.5	46(25.7%)	133(74.3%)					
Age of mother/guardian in years							
16-25	56(29.6%)	133(70.4%)	**2.95**	1.10	7.91	4.60	**0.032**
26-35	34(25.0%)	102(75.0%)	2.33	0.85	6.43	2.68	0.102
36 and above	5(12.5%)	35(87.5%)	1.00				
Mother/guardian level of education							
No school	61(29.0%)	149(71.0%)	1.81	0.76	4.34	1.79	0.181
Primary school	27(23.1%)	90(76.9%)	1.33	0.53	3.35	0.36	0.548
Secondary school & above	7(18.4%)	31(81.6%)	1.00				
Marital status of the mother/guardian							
Married	88(27.2%)	235(72.8%)	2.00	0.57	7.02	1.16	0.281
Divorced/separated	4(17.4%)	19(82.6%)	1.12	0.22	5.78	0.02	0.890
Single	3(15.8%)	16(84.2%)	1.00				
Religion of the mother/guardian							
Christian	6(21.4%)	22(78.6%)	0.76	0.30	1.94	0.33	0.564
Muslim	89(26.4%)	248(73.6%)	1.00				
Mother's Occupation							
Casual worker	9(20.5%)	35(79.5%)	0.77	0.35	1.69	0.42	0.516
Self employed	20(35.1%)	37(64.9%)	1.62	0.88	2.99	2.40	0.121
House wife	66(25.0%)	198(75.0%)	1.00				
Father's occupation							
Employed	35(22.2%)	123(77.8%)	0.75	0.37	1.55	0.60	0.438
Pastoralist	14(25.9%)	40(74.1%)	0.93	0.39	2.20	0.03	0.860
Farmer	32(31.4%)	70(68.6%)	1.21	0.57	2.54	0.25	0.618
Unemployed	14(27.5%)	37(72.5%)	1.00				
Monthly income of the house							
<5000-10000 Ksh	72(26.3%)	202(73.7%)	1.51	0.69	3.27	1.07	0.301
10001-15000 Ksh	14(31.8%)	30(68.2%)	1.97	0.75	5.17	1.90	0.168
15000-20000 Ksh	9(19.1)	38(80.95)	1.00				

*Signficant p value bolded, OR= Odds Ratio, CI= Confidence Interval

4.12 Relationship between stunting and child health practices

Bivariate analysis of association between prevalence of stunting and child health practices by mothers/guardians is summarized in Table 4.9. There was no significant association (P<0.05) observed between stunting of the child and child health practices.

Table 4.9: Relationship between stunting and child health practices in Garissa Sub County, 2014

Child health practices	Stunting status		OR	(95%CI)		χ2 value	* P value
	Stunted,n(%)	Normal, n(%)		Lower	Upper		
Child place of birth							
Home	45(38.8%)	71(61.2%)	1.05	0.66	1.64	0.04	0.849
Health facility	94(37.8%)	155(62.2%)	1.00				
Whether a mother attended ANC							
Yes	33(39.3%)	51(60.7%)	1.07	0.65	1.76	0.07	0.796
No	106(37.7%)	175(62.3%)	1.00				
Whether the child's immunization card is up to date (verified)							
Yes	36(37.1%)	61(62.9%)	0.93	0.57	1.50	0.10	0.752
No	97(39.0%)	152(69.0%)	1.00				
Whether the child was sick recently							
Yes	75(41.2%)	107(58.8%)	1.30	0.85	1.99	1.51	0.220
No	64(35.0%)	119(65.0%)	1.00				
Vitamin A supplementation							
Yes	9(26.5%)	25(73.5%)	0.56	0.25	1.23	2.14	0.153
No	130(39.3%)	201(60.7%)	1.00				
Deworming of the child in the prevous 6 months							
No	15(31.2%)	33(68.8%)	0.71	0.37	1.36	1.09	0.296
Yes	124(39.1%)	193(60.9%)	1.00				
Age difference between the two youngest children in months							
8-12 months	33(36.3%)	58(63.7%)	0.80	0.32	1.99	0.24	0.627
13-18 months	29(34.1%)	56(65.9%)	0.73	0.29	1.83	0.46	0.497
19-24 months	29(39.7%)	44(60.3%)	0.92	0.36	2.36	0.03	0.866
36 months & above	10(41.7%)	14(58.3%)	1.00				
Source of water used to prepare food for the child							
River	47(43.5%)	61(56.5%)	1.14	0.66	1.96	0.21	0.644
Well	15(44.1%)	19(55.9%)	1.17	0.53	2.55	0.15	0.701
Borehole	35(29.4%)	84(70.6%)	0.62	0.35	1.07	2.94	0.087
Tap water	42(40.4%)	62(59.6%)	1.00				
Storage of the child's food							
Sufuria	72(33.6%)	142(66.4%)	0.59	0.34	1.05	3.19	0.074
Pan	29(44.6%)	36(55.4%)	0.94	0.47	1.90	0.03	0.872
Bowl	9(39.1%)	14(60.9%)	0.75	0.29	1.99	0.32	0.569
Hot pot and flask	29(46.0%)	34(54.0%)	1.00				

*Signficant p value bolded, OR= Odds Ratio, CI= Confidence Interval

4.13 Relationship between underweight and child health practices

The relationship between the child health practices by mothers/guardians and underwight among children is presented in Table 4.10. There was a significant increase in prevalence of underweight shown among children who had been recently sick (37.4%), when compared to those children who had not experienced any recent illness (24.6%), [OR=1.83; 95%CI=1.17-2.87; P=0.008].

Table 4.10: Relationship between underweight and child health practices in Garissa Sub County, 2014

| Child health practices | Underweight status | | OR | (95%CI) | | χ2 value | * P value |
	Underweight, n(%)	Normal, n(%)		Lower	Upper		
Child place of birth							
Home	32(27.6%)	84(72.4%)	0.79	0.49	1.28	0.91	0.341
Health facility	81(32.5%)	168(67.5%)	1.00				
Whether a mother attended ANC							
No	33(39.3%)	51(60.9%)	1.63	0.98	2.70	3.54	0.060
Yes	80(28.5%)	201(71.5%)	1.00				
Whether the child's immunization card is up to date (verified)							
No	24(24.7%)	73(75.3%)	0.63	0.37	1.08	2.86	0.091
Yes	85(34.1%)	164(65.9%)	1.00				
Whether the child was sick recently							
Yes	68(37.4%)	114(62.6%)	**1.83**	1.17	2.87	6.96	**0.008**
No	45(24.6%)	138(75.4%)	1.00				
Vitamin A supplementation							
No	10(29.4%)	24(70.6%)	0.92	0.43	2.00	0.04	0.838
Yes	103(31.1%)	228(68.9%)	1.00				
Deworming of the child in the prevous 6 months							
No	12(25.0%)	36(75.0%)	0.71	0.36	1.43	0.92	0.338
Yes	101(31.9%)	216(68.1%)	1.00				
Age difference between the two youngest children in months							
8-12 months	35(38.5%)	56(61.5%)	1.25	0.48	3.23	0.21	0.645
13-18 months	21(24.7%)	64(75.3%)	0.66	0.25	1.75	0.71	0.400
19-24 months	24(32.9%)	49(67.1%)	0.98	0.37	2.61	0.00	0.967
36 months and above	8(33.3%)	16(66.7%)	1.00				
Source of water used to prepare food for the child							
River	38(35.2%)	70(64.8%)	1.72	0.94	3.12	3.12	0.077
Well	9(26.5%)	25(73.5%)	1.14	0.47	2.76	0.08	0.775
Borehole	41(34.5%)	78(65.5%)	1.66	0.92	2.99	2.87	0.091
Tap water	25(24.0%)	79(76.0%)	1.00				
Storage of the child's food							
Sufuria	65(30.4%)	149(69.6%)	1.53	0.79	2.96	1.57	0.210
Pan	24(36.9%)	41(63.1%)	2.05	0.94	4.46	3.26	0.071
Bowl	10(43.5%)	13(56.5%)	2.69	0.98	7.44	3.65	0.056
Hot pot and flask	14(22.2%)	49(77.8%)	1.00				

*Signficant p value bolded, OR= Odds Ratio, CI= Confidence Interval

4.14 Relationship between wasting and child health practices

Table 4.11 portrays the relationship of the child health practices by mothers/guardians with occurrence of wasting among children. There was significantly higher proportion of children with wasting (35.7%) among mothers who didn't attend ANC during pregnancy than those who attended ANC (23.1%), [OR=1.85; 95%CI=1.09-3.12; P=0.021]. Children who had been recently sick also showed a significant increase in prevalence of wasting(33.0%), when compared to children who had not experienced any recent illness (19.1%), [OR=2.08; 95%CI=1.29-3.36; P=0.003].

Table 4.11: Relationship between wasting and child health practices in Garissa Sub-County, 2014

Child health practices	Wasting status		OR	(95%CI)		χ2 value	* P value
	Wasted,n(%)	Normal, n(%)		Lower	Upper		
Child place of birth							
Home	31(26.7%)	85(73.3%)	1.05	0.64	1.74	0.04	0.836
Health facility	64(25.7%)	185(74.3%)	1.00				
Whether a mother attended ANC							
No	30(35.7%)	54(64.3%)	**1.85**	1.09	3.12	5.32	**0.021**
Yes	65(23.1%)	216(76.9%)	1.00				
Whether the child's immunization card is up to date (verified)							
No	21(21.6%)	76(78.4%)	0.71	0.41	1.23	1.50	0.220
Yes	70(28.1%)	179(71.9%)	1.00				
Whether the child was sick recently							
Yes	60(33.0%)	122(67.0%)	**2.08**	1.29	3.36	9.08	**0.003**
No	35(19.1%)	148(80.9%)	1.00				
Vitamin A supplementation							
No	12(35.3%)	22(64.7%)	1.63	0.77	3.44	1.67	0.196
Yes	83(25.1%)	248(74.9%)	1.00				
Deworming of the child in the prevous 6 months							
No	12(25.0%)	36(75.0%)	0.94	0.47	1.89	0.03	0.862
Yes	83(26.2%)	234(73.8%)	1.00				
Age difference between the two youngest children in months							
8-12 months	25(27.5%)	66(72.5%)	1.44	0.49	4.27	0.43	0.511
13-18 months	25(29.4%)	60(70.6%)	1.58	0.53	4.71	0.68	0.409
19-24 months	20(27.4%)	53(72.6%)	1.43	0.47	4.36	0.40	0.525
36 months and above	5(20.8%)	19(79.2%)	1.00				
Source of water used to prepare food for the child							
River	28(25.9%)	80(74.1%)	1.11	0.59	2.06	0.10	0.751
Well	5(14.7%)	29(85.3%)	0.55	0.19	1.56	1.28	0.257
Borehole	37(31.1%)	82(68.9%)	1.43	0.79	2.58	1.37	0.242
Tap water	25(24.0%)	79(76.0%)	1.00				
Storage of the child's food							
Sufuria	58(27.1%)	156(72.95)	1.97	0.94	4.13	3.23	0.072
Pan	20(30.8%)	45(69.2%)	2.36	1.00	5.55	3.84	0.051
Bowl	7(30.4%)	16(69.6%)	2.32	0.76	7.08	2.18	0.140
Hot pot and flask	10(15.9%)	53(84.1%)	1.00				

*Signficant p value bolded, OR= Odds Ratio, CI= Confidence Interval

4.15 Relationship between socio-cultural factors and stunting

Table 4.12 shows the relationship between socio-cultural factors and occurrence of stunting among children aged below 5years.

Children who were initiated with breastfeeding 1-5 after days of delivery had significantly higher proportion of stunting (44.4%) than those who started immediately after delivery (33.0%), [OR=1.62; 95%CI=1.06-2.49; P=0.025].

Children introduced with complementary foods within two months had significantly increased proportion of stunting (49.7%) when compared to those introduced at 6 months (27.5%), [OR=2.60; 95%CI=1.60-4.23; P<0.001].

Mothers/guardians who reported the cost of preparing childs food as expensive had significantly increased proportions of children with stunting (45.7%) compared to those indicated the cost to be affordable (31.8%), [OR=1.80; 95%CI=1.18-2.77; P=0.007].

Table 4.12: Relationship between socio-cultural factors and stunting in Garissa Sub County, 2014

Socio-cultural beliefs	Stunting status		OR	(95%CI)		χ2 value	* P value
	Stunted, n(%)	Normal, n(%)		Lower	Upper		
Breastfeeding initiation after delivery							
≥ one day	72(44.4%)	90(55.6%)	**1.62**	1.06	2.49	5.00	**0.025**
Immediately after birth	67(33.0%)	136(67.0%)	1.00				
Breastfeading							
No	9(47.4%)	10(52.6%)	1.50	0.59	3.78	0.73	0.392
Yes	130(37.6%)	216(62.4%)	1.00				
Age of the child at weaning							
0-2 months	79(49.7%)	80(50.3%)	**2.60**	1.60	4.23	14.84	**<0.001**
3-4 months	22(32.4%)	46(67.6%)	1.26	0.67	2.36	0.51	0.475
6 months	38(27.5%)	100(72.55)	1.00				
Foods the child is culturally entitled to eat on certain occasions							
Yes	6(54.5%)	5(45.5%)	1.99	0.60	6.66	1.30	0.254
No	133(37.6%)	221(62.1%)	1.00				
Culturally not allowed foods for children							
Yes	4(44.4%)	5(55.6%)	1.31	0.35	4.96	0.16	0.691
No	135(37.9%)	221(62.1%)	1.00				
Preparation of child's food separately from the rest of the family							
No	82(37.4%)	137(62.6%)	0.94	0.61	1.44	0.10	0.758
Yes	57(39.0%)	89(61.0%)	1.00				
Source of food for the child							
Cooking in the house	127(39.8%)	192(60.2%)	2.32	0.75	7.19	2.11	0.157
Buying of ready-made Food	8(28.6%)	20(71.4%)	1.40	0.35	5.57	0.23	0.633
Relatives	4(22.2%)	14(77.8%)	0.01				
Perceived cost of preparing food for the child							
Expensive	75(45.7%)	89(54.3%)	**1.80**	1.18	2.77	7.39	**0.007**
Affordable	64(31.8%)	137(68.2%)	1.00				

*Signficant p value bolded, OR= Odds Ratio, CI= Confidence Interval

4.16 Relationship between socio-cultural factors and underweight

The relationship between socio-cultural factors and occurrence of underweight among children aged below 5 years presented in Table 4.13. There was a significantly higher proportion of underweight (38.3%) among children who initiated breastfeeding after one to five days of delivery compared to those who started immediately after delivery (25.1%), [OR=1.85; 95%CI=1.18-2.89; P=0.007].

Table 4.13: Relationship between socio-cultural factors and underweight in Garissa Sub County, 2014

Socio-cultural beliefs	Underweight status		OR	(95%CI)		χ2 value	* P value
	Underweight, n(%)	Normal, n(%)		Lower	Upper		
Breastfeeding initiation after delivery							
≥ one day	62(38.3%)	100(61.7%)	**1.85**	1.18	2.89	7.29	**0.007**
Immediately after birth	51(25.1%)	152(74.9%)	1.00				
Breastfeading							
Yes	5(26.3%)	14(73.7%)	0.79	0.28	2.24	0.20	0.653
No	108(31.2%)	238(68.8%)	1.00				
Age of the child to introduce complementary foods							
0-2 months	59(37.1%)	100(62.9%)	1.55	0.95	2.54	3.06	0.080
3-4 months	16(23.5%)	52(76.5%)	0.81	0.41	1.59	0.38	0.539
6 months	38(27.5%)	100(72.5%)	1.00				
Foods the child is culturally entitled to eat on certain occasions							
Yes	6(54.5%)	5(45.5%)	2.77	0.83	9.27	2.95	0.086
No	107(30.2%)	247(69.8%)	1.00				
Culturally not allowed foods for children							
Yes	4(44.4%)	5(55.6%)	1.81	0.48	6.88	0.79	0.376
No	109(30.6%)	247(69.4%)	1.00				
Preparation of child's food separately from the rest of the family							
No	71(32.4%)	148(67.6%)	1.19	0.75	1.88	0.55	0.460
Yes	42(28.8%)	104(71.2%)	1.00				
Source of food for the child							
Cooking in the house	100(31.3%)	219(68.7%)	3.65	0.82	16.19	2.91	0.088
Buying of ready-made	11(39.3%)	17(60.7%)	5.18	0.99	27.06	3.80	0.051
Relatives	2(11.1%)	16(88.9%)	1.00				
Perceived cost of preparing food for the child							
Expensive	58(35.4%)	106(64.6%)	1.45	0.93	2.27	2.71	0.100
Affordable	55(27.4%)	146(72.6%)	1.00				

*Signficant p value bolded, OR= Odds Ratio, CI= Confidence Interval

4.17 Relationship between socio-cultural factors and wasting

Table 4.14 shows the relationship between socio-cultural factors and occurrence of wasting among children aged below 5 years. There was no significant association (P<0.05) observed between wasting of the child and the socio-cultural factors.

Table 4.14: Relationship between socio-cultural factors and wasting in Garissa Sub County, 2014

Socio-cultural beliefs	Wasting status		OR	(95%CI)		χ2 value	P value
	Wasted, n(%)	Normal, n(%)		Lower	Upper		
Breastfeeding initiation after delivery							
≥ one day	48(29.6%)	114(70.4%)	1.40	0.87	2.23	1.96	0.161
Immediately after birth	47(23.2%)	156(76.8%)	1.00				
Breastfeading							
No	3(15.8%)	16(84.2%)	0.52	0.15	1.82	1.09	0.296
Yes	92(26.6%)	254(73.4%)	1.00				
Age of the child to introduce complementary foods							
0-2 months	43(27.0%)	116(73.0%)	0.91	0.55	1.51	0.14	0.710
3-4 months	12(17.6%)	56(82.4%)	0.53	0.26	1.08	3.04	0.081
6 months	40(29.0%)	98(71.0%)	1.00				
Foods the child is culturally entitled to eat on certain occasions							
Yes	3(27.3%)	8(72.7%)	1.07	0.28	4.11	0.01	0.924
No	92(26.0%)	262(74.0%)	1.00				
Culturally not allowed foods for children							
Yes	4(44.4%)	5(55.6%)	2.33	0.61	8.86	1.63	0.202
No	91(25.6%)	265(74.4%)	1.00				
Preparation of child's food separately from the rest of the family							
No	56(25.6%)	163(74.4%)	0.94	0.59	1.52	0.06	0.808
Yes	39(26.7%)	107(73.3%)	1.00				
Source of food for the child							
Cooking in the house	84(26.3%)	235(73.7%)	2.86	0.64	12.70	1.91	0.167
f Buying of ready-made	9(32.1%)	19(67.9%)	3.79	0.71	20.14	2.44	0.118
Relatives	2(11.1%)	16(88.9%)	1.00				
Perceived cost of preparing food for the child							
Expensive	44(26.8%)	120(73.2%)	1.08	0.67	1.72	0.10	0.752
Affordable	51(25.5%)	150(74.6%)	1.00				

OR= Odds Ratio, CI= Confidence Interval

4.18 Multivariate analysis of factors associated with malnutrition among children aged below 5 years

Logistic regression analysis was conducted to assess factors independently associated with stunting, wasting and underweight among children aged below five years. All factors found to have P value less than 0.15 with occurrence of malnutrition at bivariate analysis were considered together in a multivariate analysis. Nine (9) variables for stunting, 9 variables for wasting and 15 variables for underweight were considered together in multivariate analysis respectively. After running all these factors using binary logistic regression for each indicator of maluntutrition by specifying *'backward conditional progressive stepwise'* with removal at P<0.05, three factors for stunting, three factors for wasting and four factors for underweight were retained in the final analysis (reduced model) as presented in Table 4.15.

Children aged 13-24 months and 25-36 months were 2.71 fold more likely to be stunted than children aged 12 months and below, {[AOR=2.71; 95%CI=1.50-4.87; P=0.001] and [AOR=2.37; 95%CI=1.27-4.42; P=0.007]} respectively. Similarly, children aged 37-54 months were 3 times more likely to be wasted than children aged 12 months and below {[AOR=3.07; 95%CI=1.47-6.39; P=0.003].

Children introduced with complementary foods at two months had significantly 3.12 times more likely to be stunted compared to those introduced at 6 months [AOR=3.12; 95%CI=1.87-5.23; P<0.001].

Children with low birth weight (<2.5kgs) were 3.16 fold more likely to be underweight than children with birth weight of 2.5kgs and above [AOR=3.16; 95%CI=1.90- 5.27; P=<0.001].

Female children were significantly about 2 fold more likely to be underweight than male children [AOR=1.86; 95%CI=1.12-3.08; P=0.017]. Children who were recently ill were significantly 2.54 times more likely to be wasted when compared otherwise [AOR=2.54;

95%CI=1.52- 4.25; P<0.001]. Likewise, underweight was 1.76 times more among children who were sick recently when compared to those who did not experience recent sickness [AOR=1.76; 95%CI=1.07- 2.91; P0.027].

Mothers/guardians aged 16-25 years had 4.5 fold more children with wasting compared to those aged 36 years and above [OR=4.52; 95%CI=1.57-13.01; P=0.005].

Mothers who didn't attend ANC during pregnancy had 2 fold more children with wasting and underweight than those who attended ANC, [AOR=2.06; 95%CI=1.18-3.62; P=0.012].

Mothers/guardians who reported the cost of preparing food for the child to be expensive were 2 times more likely to have children with stunting than to those who indicated the cost to be affordable [AOR=2.07; 95%CI=1.31-3.27; P=0.002].

Households whose income per month was less than 5000 Ksh were 3.11 times more likely to have underweight children than households with income of 15000-20,000 Ksh [AOR=3.11; 95%CI=1.19-8.12; P=0.021].

Table 4.15: Multivariate analysis of factors associated with malnutrition among children aged below five years in Garissa Sub County, 2014

Predictor	AOR	95%CI		*P value
		Lower	Upper	
Stunting				
Age of children in months				
<12 months	1.00			
13-24 months	2.71	1.50	4.87	0.001
25-36 months	2.37	1.27	4.42	0.007
37-54 months	1.31	0.64	2.71	0.463
Age of the child to introduce complementary foods				
0-2 months	3.12	1.87	5.23	<0.001
3-4 months	1.51	0.78	2.90	0.219
6 months	1.00			
Perceived cost of preparing food for the child				
Expensive	2.07	1.31	3.27	0.002
Affordable	1.00			
Wasting				
Age of mother/guardian in years				
16-25	4.52	1.57	13.01	0.005
26-35	2.07	0.91	4.94	0.063
36 and above	1.00			
Whether a mother attended ANC				
No	2.06	1.18	3.62	0.012
Yes	1.00			
Whether the child was sick recently				
Yes	2.54	1.52	4.25	<0.001
No	1.00			
Underweight				
Birth weight in Kgs				
<2.5	3.16	1.90	5.27	<0.001
>2.5	1.00			
Whether the child was sick recently				
Yes	1.76	1.07	2.91	0.027
No	1.00			
Gender of the child				
Female	1.86	1.12	3.08	0.017
Male	1.00			
Monthly income of the household				
<5000 Ksh	3.11	1.19	8.12	0.021
10000-15000 Ksh	1.68	0.52	5.39	0.384
15000-20000 Ksh	1.00			

*Signficant p value bolded, AOR= Adjusted odds Ratio, CI= Confidence Interval

CHAPTER FIVE

\DISCUSSION, CONCLUSSIONS AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Prevalence of malnutrition among children aged below five years

The prevalence of stunting, underweight and wasting in the present study were reported as 38.1%, 31% and 26% respectively and this indicates high levels of malnutrition as judged against World Health Organization criteria. This high prevalence could be due to the fact that majority of the households in the study area belonged to persons of low socioeconomic status and a direct relationship between low socio economic status and under nutrition is well known.

Low height for age (stunting) is a measure of linear growth and is a reflection of chronic under-nutrition as a result of failure to receive adequate nutrition for a long period and recurrent or chronic illness. Stunting reported in this study area was almost similar to Eastern region of Kenya (41.9%) and national level of 35% (KNBS and ICF, 2010). However, it was lower from studies carried out in Kwale Region in the Coast of Kenya at 51.3% (Adeladza, 2009) and in Western Kenya 47% (Bloss *et al.,* 2004).

Low weight for age (underweight) is a measure of both acute and chronic under-nutrition. The underweight level reported in this study area is higher than Eastern province (19.8%) and the national level (16%) (KNBS and ICF, 2010) but comparable to Kwale in the Coast of Kenya at 34% (Adeladza, 2009) and in Western Kenya (30%) (Bloss *et al.,* 2004). It was alsosimilar to other studies conducted in developing countries for instance in Ethiopia; in Hidabu Abote district 30.9% (Mengistu et al., 2013) and in Gumbrit 28.5% (Edris, 2006) and in Dhankuta district in Nepal located in South Asia 27% (Siddiqi et al., 2011). However, it was high compared to the study conducted in West Gojam of Ethiopia which was 49.2 % (Teshome *et al.,* 2006).

Low weight for height (wasting) is a measure of body composition especially the fat and muscle mass. Wasting is a reflection of recent nutritional deficient; it therefore indicates acute under-nutrition. Wasting is significantly associated with seasonal shifts in food availability as well as disease prevalence. The prevalence of wasting reported in this study is much higher than the national level at 7% (KNBS &ICF, 2010) and in Kwale District in the Coast of Kenya at 7.3% (Adeladza, 2009). However, it was lower than in a study carried out in Western Kenyaat 47% (Bloss *et al.,* 2004).

5.1.2 Factors associated with malnutrition among children aged below 5 years

The result of the present study indicated that the child's age was the predictingfactor for stunting.Children in the age group of 13-24 months and 25-36 months were significantly at higher risk of stunting compared with children in the youngest age category (<12 months). The result of the study highlights that the ages of children between 1st and 3rd year of life are the most critical period. This result is consistent with other studies carried out in Ethiopia (Beka *et al*., 2009; Yimer, 2000), in Ghana (Colecraft *et al*. 2004) and in other developing countries (Kumar *et al.,* 2006; Bomela 2009). This could be attributed that older children are mixed breastfed, even not breastfed at times, while younger children may be protected by the mother's immune system at birth (Kandala et al., 2009). Another factor may be children's growing ability to explore their environment and therefore becoming more exposed to infections that compromisetheir nutritional status.

World Health Organisation and UNICEF have recommended that complementary foods should not be given before six months of age (WHO/UNICEF, 1998). Introducing these foods too early reduces the amount of breast milk the child is taking in and introduces the child to pathogens and subsequent diarrhoeal diseases and in most cases in developing countries, these foods are not really tailored to the needs of the infant (Kikafunda *et al*., 2003). In this study, introduction of complementary foods within two months was found to play a significant role in predicting stunting. This finding is in agreement with those of other studies conducted in informal settlements in Kenya

(Kimani-Murage *et al.,* 2011; Ochola, 2008; Reygal, 2007; Muchina, 2007). Despite the well-known advantages of exclusive breast feeding and WHO recommendations, many studies have demonstrated a high prevalence of early introduction of water and complementary foods before the age of 6 months especially in the African setting (WHO, 2003).The reasons given for early introduction of complementary foods in the FGDs of this study were frequently crying of the child due to hunger, lack of enough breast milk production and societal pressure to introduce complementary feeding.

Birth weight below 2,500g was an important risk factor for underweight. This finding concurs with a study conducted in Vietnam which indicated that LBW babies had 5, 6 and 8 times higher risk of being stunted, underweight and wasted respectively (Hien & Kam, 2008). It is also in line with previous studies from Ludhiana reporting the prevalence of malnourished was observed being significantly higher (p=0.024) in LBW children (Sengupta *et al.,* 2010) and in Bangladesh (Rayhan & Khan, 2006). This could be due to the fact that children born with a low birth weight might from the time of their birth lack certain nutrients that are essential for their future normal growth and development. But it could also suggest that children born with low birth weight might take a longer period of time to reach the normal weight for their age.

The analysis showed that female children were about 2 times more likely to be underweight than male counterparts. This conforms to the findings of other researches in India (Benjamin & Zachariah, 1993; Dwivedi *et al.,* 1992; Joseph *et al.,* 2002). However, it contradicts to a number of other researches conducted in Dollo Ado District, Somali Region, Ethiopia (Solomon & Amare, 2013), in Chandigarh India (Bhatia *et al.,* 2007), in Kwara State, Nigeria (Raphael *et al.,* 2011), in Eastern Uganda (Ingunn et al., 2006) and in Botswana (Mahgoub *et al*., 2006) that found out males were more likely to have under-nutrition than females. These differences could be closely linked with culture or traditional norms and gender issues which might be a reflection of preferential treatment among the opposite sex and provision of better quality food and health facilities which might need further investigation.

Children who were recently sick were significantly more wasted and underweight. This finding corroborate by a study in Chandigarh India where there was a statistically significant relationship between acute ailments (diarrhoea, ARI) and malnutrition ($p < 0.001$) (Bhatia *et al.,* 2007). Under-nutrition and childhood morbidity have a synergistic relationship. The interrelationship of the two is in such a way that illness can suppress appetite precipitating under-nutrition of a child while, on the other hand, nutritional deficiencies increase the susceptibility of the child to infectious diseases (Pelletier *et al.,* 1995). Infection can suppress appetite and directly affect nutrient metabolism, leading to poor nutrient utilization.

In the present study, mothers/guardians age independently correlated with wasting. Mothers/guardians aged 16-25 years had significantly more children with wasting compared to those aged 36 years and above.This finding agreed with other studies reported that maternal age was significantly associated with malnutrition (Nure-Alam *et al.,* 2011; Latham, 1997). Age of the mother may influence the nutritional status of a child in various ways. For example, very young mothers are known to have psychological feelings that they are not knowledgeable enough to take good care of their children (Nube *et al.,* 1997), something that may lead to poor caring of their children. Moreover, older mothers have more experience in child care than young mothers and are likely to find solutions to their problems.

The study revealed that significantlyhigher prevalence of wasting among underfive children whose mothers did not attend ANC during pregnancy compared to those whohadattended ANC. Likewise, a study conducted in Colombia and Peru indicated that the use of prenatal care (PNC) was strongly associated with a reduction in child malnutrition (Forero-Ramirez *et al.,* 2014). ANC programs, which typically identify high-risk mothers, and include nutritional and educational interventions such as information and advice on food hygiene, diet, and lifestyle advice, are designed to deal with factors that are most likely to be associated with malnutrition (Todd Jewell &Triunfo, 2006; Gajate-Garrido, 2013).

Family/household income was a significant predictor of underweight in this study. Household socio-economic status is more often associated with child nutrition (Zere &McIntyre, 2003; Jones *et al*., 2008) and, therefore, the observed interaction between socio-economic status and nutritional outcomes was anticipated. The prevalence of underweight was increased when the monthly income is lower than 15,000 Ksh in this study. Households whose income was less than 5000 Ksh per month had 3.11 times more likely to have children with underweight than households with income of 15000-20,000 Ksh. Also, households with income between 10,000 to 15,000 Ksh per month had 3.5 times more likely to have children with underweight than households with income of 15000-20,000 Ksh. Similarly, poor family income has been found as a risk factor for under-nutrition in other studies done in Nigeria (Odunayo and Oyewole, 2006), Sudan (Coulter *et al.,* 1988), Zimbabwe (Radebe *et al.,* 1996), India (Jeyaseelan & Lakshman, 1997), Bangladesh (Islam *et al.,* 1994) and Ethiopia (Haidar *et al.,* 2005; Zewditu et al., 2001; Solomon *et al.,* 2008; Melkie, 2007; Alive & Thrive, 2010).This similarity might be due to the fact that high socio-economic households can get enough food for children to feed and households with low economic status are not able to afford the nutritious foods for their child.

Similarly, as expected the study reveals that mothers/guardians who reported the cost of preparing food for the child as expensive had about 2 times more likely to have children with stunting compared to those indicated affordable. A research carried out by Save the Children UK in Bangladesh, Ethiopia, Myanmar (Burma),Tanzania and the UK also revealed that up to three quarters of families in some of the poorest places in the world cannot afford enough nutritious food for their children to grow up healthy and strong (Save the Children UK, 2007).

Even though breastfeeding initiation after one day of delivery was significantly associated with stunting and underweight at the bivariate analysis, it was not significant after adjustment was made for other variables at multivariate analysis. However, from the FGDs almost all participants indicated that breast milk was not initiated immediately

after delivery because they belief that the mother should recover fully and this takes 2-3 days. This difference could be the reliability of the response from the individual participants. Furthermore, people tend to withhold giving the colostrum to the child when it's the most nutritious and appropriate diet for the newly born child as the participants from the FGDs reported it is too thick and strong for the child. As per the recommendation of UNICEF (2011), breast feeding should be initiated within half an hour of birth instead of waiting several hours as is often customary. However, instead they tend to give the child the various other feeds like the plain water and camel/goat milk which are delirious to the child's health. These feeds predispose the child to various external infectious agents and the child falls prey to diseases at early stages of life (WHO, 1989).

Furthermore, in most societies colostrum is recognized to differ from breast milk because of its colour and its creamy consistency, but its enormous value to the baby is not universally acknowledged. A study conducted in Sudan shows that the main contributing factors for under-five stunting were found as deprivation of colostrums and pre-lacteal feeds (Ajao *et al.,* 2010). A study in Turkey also showed a commonly held belief that colostrum, the "yellow, dirty milk", caused discomfort and jaundice for newborns, therefore removal of colostrum was considered as a tradition (Saka *et al.,* 2005). This misbelief on colostrum is also common in the present study.

Based on the 24 hour inventory on food consumption, it was indicated that rice and mashed potatoes were the main food consumed by the children. Cereals and roots/tubers were the major foods consumed by the child, while consumption of other food groups especially meat, eggs and milk remained very low. Cereal based foods may be energy dense; they lack other essential nutrients, such as proteins and micronutrients, required for optimal growth in infants and children. A cross-sectional study in Tanzania reported increased prevalence of under-nutrition among children fed energy-dense foods (Nyaruhucha *et al*., 2006). Similarly, an increased intake of cereals, poor dietary diversity and low intake of micronutrients resulted in stunting among children aged < 5

years in a rural South African community (Faber & Benadé, 1999; Faber *et al.,* 2001). These studies further support the observation of high under-nutrition prevalence and its association with poor diet quality as confirmed in the quantitative descriptive data on the 24 hour inventory on food consumption and qualitative data of the study.

Weaning practice is crucial for the child developmental progress. However, from the FGDs, the results on weaning show that many women apply bitter substances on the the breast nipple so that the child avoid breast milk. Moreover, in order to accustom the child not to breastfeed, the mother travels to another area without the child. This implies that women in the community didn't know the appropriate weaning process and practices for their children. The poor weaning practice or process might be the main contributing factor for the high prevalence of malnutrition among children in the community.

5.2 Conclusions

1. The prevalence of stunting, underweight and wasting in this study were found to be 38.1%, 31.0% and 26.0% respectively.

2. Children aged 13-24 months and 25-36 were 2.71 times and 2.37 times more likely to be stunted than younger children ($\leq$12 months) respectively. Mothers/guardians aged 16-25 years had 4.52 fold more children with wasting than mothers/guardians who were aged above 36 years. Households whose income per month was less than 5000 Ksh were 3.11 times more likely to have children with underweight than households' whose income was 15000-20,000Ksh. Similarly, mothers/guardians who reported cost of preparing food for their child to be expensive had 2.07 fold more chances to have children with stunting than to those indicated the cost to be affordable.

3. Children who were recently sick were significantly 2.54 times and 1.76 times more likely to be wasted and underweight respectively when compared to those who did not experience recent illness. Children with low birth weight (<2.5kgs)

were 3.16 fold more likely to be underweight than children with birth weight of 2.5kgs and above.

4. Children weaned within two months were found to be 3.12 times more stunted than children weaned at 6 months of age. Mothers who never attend ANC during their pregnancy had about 2 times more children with wasting than those who attended ANC. Female children were significantly about 2 fold more likely to be underweight than male children

5.3 Recommendations

The following recommendations were made based on the findings of this study:

1. Awareness programs regarding affordable but nutritious foods should be introduced by the government through community participation and involvement of NGOs in attempts of combating malnutrition.

2. Socioeconomic development among the community by the government needs to be ensured, which is the important factor to tackle malnutrition.

3. Ministry of Health should encourage pregnant mothers to attend antenatal care (ANC). Special attention needs to be paid to reduce low birthweight. It is recommended that during pregnancy maternal food supplementation along with iron and treatment of malaria are the most effective interventions to increase birth weight.

4. Mothers should be advised to initiate breastfeeding within 30 minutes of delivery (as per the WHO recommendation) through campaigns by the Ministry of Health. The Ministry of Health and concerned NGOs should advocate and initiate enlightenment campaign strategies to the community about the importance of colostrum, avoiding pre-lacteal feeding, appropriate time for weaning and other food taboos.

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Appendix 1: Informed Consent Formfor Parent/Guardian and the Child

Title of Study: Social cultural determinants of Malnutrition in children aged (0 to 59months) in Garissa Subcounty

Institutions and Investigators:

Researchers	Institution	Contact
Miss. Maryam. A. Abdulrahim	Kenya Medical Research Institute	+254721751054
Prof. M. Karama	Kenya Medical Research Institute	+254722885366
Prof. A. O. Makokha	Jomo Kenyatta University of Agriculture and Technology	+2547

Introduction

My name is Miss. Maryam. A. Abdulrahim, a Masters student at Jomo Kenyatta University of Agriculture and Technology. I am the principal investigator in this study thataims at determining the prevalence and socio-cultural factors associated with malnutrition among children aged less than five years old in Garissa. Your child has been selected to take part in this study. Since the child is too young to decide on his/her own, if you agree to be recruited in this study, I would like to interview you, and ask you for your permission to assess the nutritional status of your child. With your permission, I would like voluntary participation from you and your child. The study will take about 20 minutes only.

The detailed information about the purpose, procedure, confidentiality, risks, benefits and as right to participate in this proposed study are described below. You can ask any questions you have at any time.

Purpose of study

The purpose of this study is toidentify the socio-cultural factors that are associated with malnutrition among children less than five years old. It is expected to help in addressing social cultural factors affecting malnutrition among children in Garissa Subcounty by finding out the associated factors of malnutrition.

Study Procedures

If you decide to join the study, you will be asked questions regarding socio-demographic, socio-economic and socio-cultural information related to nutrition, dietary and breastfeeding and etc. Your child's weight, height and arm circumference will be measured for nutritional status.

Benefits

Children recruited for this study will be able to know whether they have malnutrition or not; those with malnutrition will be referred to the nearest health facility for further medical attention.

Risks

I do not anticipate any risks or discomforts to you and your child during this study apart from your precious time. You will be requested to avail yourself for an interview at a time and place that you are most comfortable. You may become worried or anxious about discussing matters of your child's nutrition status and such related questions. Your child's weight and height will also be measured but be assured that every effort will be made to protect your privacy and confidentiality while you are participating in the study.

Study Costs

If you agree to participate, there will be no payment to you and your child for any study procedures to be carried out.

Confidentiality and privacy: Information obtained about your child for this study will be kept confidential and will be used only for the purposes of the study. The interviews

will take place in private. No name(s) will be used in the questionnaire instead; a unique code for each informant will be used. The information will only be accessible to the researchers of this study.

Participation in this research study is voluntary

You and your child are free to decline to participate in this research study at any point without penalty.

Problems and questions

You will be given a copy of this form to take with you. If you have any questions or concerns about your rights as a research participant, please contact to:

The Principal;

College of Health Sciences

Jomo Kenyatta University of Agriculture and Technology

P.O. Box 62200-00200; Nairobi

Tel: 254-67-52711/52181-4

Fax: 254-67-52161

director@itromid.jkuat.ac.ke

Your rights as a study participant

This research has been approved and reviewed by the KEMRI's Scientific Steering Committee. This committee has reviewed this study in order to help protect participants. If you have any questions about your right as research participant you may contact to: The secretary, KEMRI Ethics Review Committee, P.O.Box 54840-00200, Nairobi. Tel: 020-2722541. E-mail address: ERCadmin@kemri.org.

Consent of agreement

I read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to participate as a subject in this study and understand

that my child has the right to withdraw from the study at any time without penalty. You will be given a copy of this signed form to take with you.

As a parental or GuardianI am hereby giving permission for my child

_____ to participate in this research.

(Child's name)

Parent's or Guardian's name: _____

Parent's or Guardian's signature: _____

Date: _____

Witness's name: _____

Witness's signature: _____

Date: _____

Interviewer's name: _____

Interviewer's signature: _____

Date: _____

Researcher's name: _____

Researcher's signature: _____

Date: _____

Appendix 2: Informed Consent Form for Focus Group Discussions

Title of Study: Social cultural determinants of Malnutrition in children aged (0 to 59months) in Garissa District

Institutions and Investigators:

Researchers	Institution	Contact
Miss. Maryam. A. Abdulrahim.	Kenya Medical Research Institute	+254721751054
Prof. M. Karama	Kenya Medical Research Institute	+254722885366
Prof. A. O. Makokha	Jomo Kenyatta University of Agriculture and Technology	+2547

Introduction

My name is Miss. Maryam. A. Abdulrahim, a Masters student at Jomo Kenyatta University of Agriculture and Technology. I am the principal investigator in this study that aims at determining socio-cultural factors associated with malnutrition among children aged less than five years old in Garissa Subcounty.

You are invited to take part in this research study. With your permission, we would like voluntary participation in the study. You can ask any questions you have at any time.

Purpose of the study

The purpose of this study is toidentify the socio-cultural factors that are associated with malnutrition among children less than five years old. It is expected to help in addressing social cultural factors affecting malnutrition among children by identifying the associated factors of malnutrition.

Procedure of the study

If you participate in this study, you will be in a group of seven for discussion. The group discussion will be led by the researcher of the study and two other research assistants. If you volunteer to participate in this group discussion, you will be asked some questions relating to food taboos, child feeding practices, social food norms and cultural beliefs affecting diet/food choices, beliefs on breastfeeding, general knowledge and other cultural associated issues. The focus group will take approximately one hour.

Voluntary Participation

This discussion is voluntary-you do not have to take part if you do not want to. If you do not take part, it will have no effect on you and your child. If any questions make you feel uncomfortable, you do not have to answer them. Your participation is completely voluntary. You may withdraw from this study at any time without penalty.

Benefits and Risks:

There will be no direct benefit to you, but your participation is likely to help us find out more about the socio-cultural factors that are associated with malnutrition among children less than five years old and then address the factors to prevent malnutrition in your community.

Confidentiality and tape-record permission

The group discussion will be tape-recorded in order to accurately capture what is being said. If you participate in the study, you may request that the recording be paused at any time. You may choose how much or how little you want to speak during the group. All information obtained in this study will be kept strictly confidential.All materials will be stored in a secure location and access to files and tapes will be restricted to authorized people.

Problems and questions:

You will be given a copy of this form to take with you. If you have any questions or concerns about your rights as a research participant, please contact to:

The Principal;

College of Health Sciences

Jomo Kenyatta University of Agriculture and Technology

P.O. Box 62200-00200; Nairobi

Tel: 254-67-52711/52181-4

Fax: 254-67-52161

director@itromid.jkuat.ac.ke

Your rights as a study participant

This research has been approved and reviewed by the KEMRI's Scientific Steering Committee. This committee has reviewed this study in order to help protect participants. If you have any questions about your right as research participant you may contact to: The secretary, KEMRI Ethics Review Committee, P.O.Box 54840-00200, Nairobi. Tel: 020-2722541. E-mail address: ERCadmin@kemri.org.

Consent of agreement

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study.

Participant's name: _____

Participant's signature: _____

Date: _____

Research assistant's name: _____

Research assistant's signature: _____

Date: _____

Researcher's name: _____

Researcher's signature: _____

Date: _____

Appendix 3: Referral Letter

Dear Parent/Guardian:

I have found that your Child…………………………………………………..

has the following nutritional problem(s)

………………………………………………………………………………..

………………………………………………………………………………….

…………………………………………………………………………………

I recommend that you take him/her to _____ health centre.

Referring officer's name: _____

Referring officer's signature: _____

Date: _____

Researcher's name: _____

Researcher's signature: _____

Date: _____

Appendix 4: Questionnaire

Social cultural determinants of Malnutrition in children below 5years in Garissa Subcounty.

1. Basic Information

Questionnaire number: _____

Date of interview: _____

Name of Interviewer: _____

Village (place): _____

    Details of the Child

    1. Birth weight: _____

    2. Age: _____

2. Background information

1. Household head (M/F): _____   Age: _____

2. Respondent (M/F): _____   Age: _____

3. Relation to child: _____

4. What was the weight of your child when you last weighed: _____

5. Education level: (1) Primary: _____   (2)   Secondary: _____

                (3) University/college: _____ (4) others: _____

                (0) never attended school: _____

6. Number of children in the household: _____

7. Monthly income (in Ksh)

    < 3000   _____   3000-5000   _____
    10000-15000   _____   15000-20000   _____
    20000-30000   _____   >30000   _____

8. Mother's occupation: _____

9. Father's occupation: _____

10. Marital status of mother: a. Married   b. Divorced   c. Single   d. Separated

11. Religious Affiliation: a. Moslem   b. Christian   c. Traditionalist   d. No religious affiliation

3. Knowledge/ Attitude and Practice

1. Child place of birth: (1) Hospital _____   (2) Community Health Centre _____

        (3) Home   _____   (4) others   _____ (please specify)

2. Antenatal care

2.1 Did you attend ANC clinic? Yes _____   No _____

2.2 If yes, how many times? _____

3. MCH

3.1 Did/do you attend MCH clinics? Yes _____   No _____

3.2 How often do you attend? _____

3.3 For what reasons do you attend these clinics?

_____

_____

3.4 Is the child's immunization up to date? (Verified with the card)

     Measles, polio, BCG, tetanus, whooping cough and diphtheria

3.5 Has your child received Vitamin A supplementation in the last 6months?

     Yes _____   No _____

3.6 How old are your two youngest children? A. _____   B. _____

     Age difference: _____

3.7 Has your child been dewormed in the last six months?

     Yes _____   No _____

3.8 Has your child been recently sick?

     Yes _____   No _____

3.9 What was the cause?

_____

_____

4. What causes malnutrition?

a. Lack/inadequate food   b. Childhood sickness   c. Refusing to eat

d. Lack of time to feed child

e. Others (specify):

_____

    22. How do you tell your child is malnourished?

      _____

      _____

    23. What actions do you take if your child is malnourished?

      _____

      _____

    24. How do you know that your child is growing slowly?

      _____

      _____

4. **Dietary and breastfeeding practices**

    1.   Was the child breastfeed? Yes _____   No_____

      If No, Why?   _____

    2. How is your child's appetite?

      a. Good   b. Fair   c. Poor   d.

Very good

    3. How soon after delivery was the child breastfed, and why? (rhetrospective)

      _____

      _____

4. How many times per day did you use to breastfeed your child?(rhetrospective)

    _____

5. To   what   age   was   the   child   breastfed?   (rhetrospective)

    _____

6. How long was the child exclusively breastfed (fed to breast milk alone)?:
    _____(rhetrospective)

7. At what age did you stop breastfeeding the child? _____

8. If the child was not breastfed, what was she/he fed with? (rhetrospective)

    _____

    _____

9. At what age was the child introduced with foods including water other than
    breast milk?

Please mention these foods:

_____

10. What type of weaning food do you give to your child?

    _____

5. Cultural and social issues

1. When is it culturally acceptable to start breastfeeding your child?

    _____

    _____

2. What else is fed to the child during this time? Why?

    _____

    _____

3. According to your culture, when should most children start to be fed other foods
    in addition to breast milk?

    _____

    _____

4. Which are the culturally accepted good foods to feed the child during the time mentioned above?

_____

_____

_____

5. How often should the child be fed these complementary meals you have named above?

_____

_____

_____

6. Are there specific times of the day/ night that a child should eat specific foods?

_____

_____

_____

7. Do girls and boys have different foods? If yes Why?

_____

_____

_____

8. a) Are there certain foods that are culturally not allowed for the child to eat?

_____

_____

b) If yes, please name them and give the reasons as to why they are culturally forbidden.

_____

_____

_____

9. Are there any foods that the child is culturally entitled to eat on certain occasions? i.e.

Immediately   after   birth   _____   When   sick

_____

Any other occasion (specify) _____

10. Where do you get food for the child?

a. By cooking myself   b. By buying   c. From relatives

d. Others (specify): _____

11. How do you perceive the cost of preparing the food?

a. Affordable   b. cheap   c. High   d. Too expensive

12. Who provides money or food to be prepared?

a. Myself   b. My husband   c. Husband's relatives   d. My relatives

13. Do you have any other taboos with regards to foods Yes ( ) No ( )

If yes state them

_____

_____

6. Anthropometry (information about the child)

Gender (M/F): _____

Birth weight: _____Kg

Current weight: _____ Kg

Height: _____Cm

MUAC: _____mm

7. 24-Hour inventory on Childs food consumption

(The interviewers should establish whether the previous day was usual or normal for the household. If unusual-feasts, funerals or most members absent, then another day should be selected or alternatively choose on another household).

Q. What did you feed your child yesterday?

Food Groups   examples   what did your child eat?

Cereals: rice,   chapatti,   mandazi,   anjeera,   pasta,   others   (specify)

_____

Vegetables;   cabbage,   tomatoes,   kales,   onions,   spinach,   others   (specify)

_____

Meat: camel, goat, sheep, beef

_____

Milk: camel, goat, cow

_____

Fish

_____

Chicken

_____

Eggs

_____

Fruits: pawpaw, melon, mangoes, bananas, others (specify)

_____

Oils and fats: cowboy, camel fat, elianto, others (specify)

_____

Roots and tubers;   potatoes, arrow roots, others (specify)

_____

1. Starting from yesterday the time your baby woke up till bed time, what did she/he eat? (Please indicate amounts and frequency of feeding).

Time of Meal	Place	Meal	Description of food Composition/ Ingredients	Measuring device	Quantity
e.g. 6.30A.m	Home	Porridge	Maize flour, milk and water.	cup	1 cup

8. Other general questions

   1. Hygiene practices:

What are the possible reasons that could make you wash your hands? _____

Where do you get the water used to prepare food for the child? _____

   2. Food preparation methods

Is the child food prepared separately from the rest of the family's food?

   Yes _____   No _____

What are the reasons as to why the child's food could/ could not be separately prepared?

   3. Child feeding methods

Who feeds the child? _____

Where is the child fed? _____

What utensils do you use to feed the child? (Cup, bottle, spoon)

How is the child's food stored? _____

   4. Child health

Is your child health card up to date (verify card): Yes _____   No _____

Has your child ever been given food supplementation from health facilities?

   Yes _____   No _____

If yes, when? _____

Appendix 5: Focus Group Discussion Guide
Thematic Focus Group Discussion Guide

District: _____ Location/ Village: _____ Date: _____

Person Leading the FGD_____ No. of Group members: _____

<u>**Introduction**</u>

[Narrative on introduction, welcoming participants, describing reasons for discussion, and setting up the general ground rules for the session]

Ground rules of the discussion

During the discussions, there are a few rules to be observed.

1. All the views that you give are very important since these are your children and you know them better than anyone else so what we would like to ask is when one is speaking please let us give her/him time to speak until when she is finished then another one can speak.

2. Please feel free to speak your opinion. I will not point out anyone to speak since you are all adults just feel free to speak we will all give you the time. This is not a competition and we don't all have to agree but need to respect each other's opinion during the discussion.

3. Since this is a discussion, we would like it if all of us can participate and speak. We would like to have the opinions of everyone so for the sake of this discussion, we are all equal, and no one knows more than the other.

4. During this discussion, as indicated in the consent form, we will not be using anyone's name for anything. We however need to identify what every one of us says.

5. As it is indicated in the consent form, we would like to inform you that tape recorder will be used to record the discussions. As you can see, one of us will be writing down the proceedings/discussions but as the discussions become hotter, the hand becomes tired. All the views are very important to us so that is why we would like to record. We will only use the tape to fill in the blanks that the note taker will have left. We will not

be sharing the tapes with anyone who is not involved in this study. After wards, all the tapes shall be erased.

Discussion

1. Can you tell me the importance of breastfeeding? What do women in your village do with the colostrum? When does a mother start breast-feeding after delivery and how many times per day should a woman breastfed?

2. In this community when do you stop a child from breastfeeding and how do you do it and why? At what age are babies given foods other than breast milk for the first time in this community (food is any solid or liquid such as animal milk, water, juice, glucose, porridge etc. which is not breast milk)? Probe the type of food given and how many times a day do young children get fed (meals and snacks)?

3. How do you prepare meals for children? Do you prepare separate foods? At what stage do you stop preparing separate meals for children? What kinds of foods are appropriate for children that have stopped breast-feeding?

4. What makes a child malnourished? How do you identify children with signs of not getting good food? What problems do you have feeding your young children? Who decides what the child can or cannot eat in the household? Why?

5. Do you have enough food to feed your children? If not what do you do? Describe how you often feed your child? Can you give examples of foods that can be referred as:

   - Body-building foods:
   - Foods that can protect children from getting sick easily.
   - Foods that give energy.

6. What are the food taboos for children in this community? Probe on child feeding practices and social food norms on feeding of children?

7. When a child is sick, whom do you seek for help first? When your children have diarrhea, what do you do? How often are young children bathed? Hands washed? What do you feed the child when he/she is sick?
8. In your opinion are vaccinations good for the child? Why?
9. What do you think for the main causes of under-five malnutrition in this community? What do you think should be done at the community level to address this problem among mothers and the children?

Conclusion

We are very grateful that you agreed to come over for this discussion. Does any one of you have a question before we officially close the discussion? *(Allow time for questions of any sort)*.

Appendix 6: Map of Garissa Subcounty

Appendix 7: Scientific steering committee Approval letter

KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org   info@kemri.org   Website:www.kemri.org

ESACIPAC/SSC/102011   30th August, 2013

Maryam Abdulrahim

Thro'
        Director, CPHR
        NAIROBI

REF: SSC No. 2623 (Revised) – Socio-cultural determinants of
        malnutrition among children aged 0 to 59 months: A case of
        Garissa District

I am pleased to inform you that the above mentioned proposal, in
which you are the PI, was discussed by the KEMRI Scientific
Steering Committee (SSC), during its **205th** meeting held on **6th
August, 2013** and has since been approved for implementation by
the SSC.

Kindly submit 4 copies of the revised protocol to SSC within 2
weeks from the date of this letter, i.e, 13th September, 2013.

We advise that work on this project can only start when ERC
approval is received.

Sammy Njenga, PhD
SECRETARY, SSC

In Search of Better Health

Appendix 8: Ethical Review committee Approval letter

KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org   info@kemri.org   Website:www.kemri.org

KEMRI/RES/7/3/1   December 17, 2013

TO: MARYAM A. ABDULRAHIM,
             PRINCIPAL INVESTIGATOR

THRO':   DR. CHARLES MBAKAYA,
             **ACTING DIRECTOR, CPHR,
             NAIROBI**

Forwarded to
18/12/2013

Dear Madam,

RE: **SSC PROTOCOL NO. 2623 (*RESUBMISSION 1*): SOCIO-CULTURAL
      DETERMINANTS OF MALNUTRITION AMONG CHILDREN AGED 0-59 MONTHS:
      A CASE OF GARISSA DISTRICT; GARISSA COUNTY, KENYA**

Reference is made to your letter dated November 22, 2013. The ERC Secretariat
acknowledges receipt of the revised proposal on December 16, 2013.

This is to inform you that the Ethics Review Committee (ERC) reviewed the documents
submitted and is satisfied that the issues raised at the 220th B ERC meeting have been
adequately addressed.

The study is granted approval for implementation effective this **December 17, 2013**.
Please note that authorization to conduct this study will automatically expire on
December 16, 2014. If you plan to continue with data collection or analysis beyond
this date, please submit an application for continuing approval to the ERC Secretariat by
November 4, 2014.

Any unanticipated problems resulting from the implementation of this protocol should be
brought to the attention of the ERC. You are also required to submit any proposed
changes to this protocol to the ERC prior to initiation and advise the ERC when the study
is completed or discontinued.

You may embark on the study.

Yours faithfully,

**DR. ELIZABETH BUKUSI,
ACTING SECRETARY,
KEMRI/ETHICS REVIEW COMMITTEE**

In Search of Better Health

Appendix 9: Abstract of published Article

Prevalence of Underweight and Its Determinant Factors among Children Aged 0-59 Months: A Case of Garissa Sub-county

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ABSTRACT

Background: Malnutrition remains a chronic public health problem among under-five children in the developing world and it highly contributes to child mortality in Kenya, yet information on specific determinants has not been vastly studied.

Objectives: The objective of this study was to assess the prevalence of underweight and its determinant factors among children below five years in Garissa sub county, Kenya.

Methods: A cross-sectional study was employed using mixed methods. A sample of 365 children under five years was selected using systematic sampling method. Pre-tested questionnaire and FGDs were used to collect data. Pearson's chi-square test and odds ratio with corresponding 95% confidence interval were used to establish the association between the dependent variable and independent variables. The level of statistical significance was set at P-value <0.05. Binary logistic regression analysis was performed to determine the independent factors associated with underweight.

Results: The findings of the study reveal that 31% of the children were found to be underweight. At multivariate analysis, factors that were independently associated with occurrence of underweight were: low birth weight (<2.5kgs) [AOR=3.16; 95%CI=1.90-5.27; P=<0.001];child's gender (female) [AOR=1.86; 95%CI=1.12-3.08; P=0.017]; recent illness [AOR=1.76; 95%CI=1.07- 2.91; P0.027] and households income [AOR=3.11; 95%CI=1.19-8.12; P=0.021].

Conclusion: The prevalence of underweight among the under five children was high, indicating that the nutrition situation in study area is very critical. Program planners, policy makers in the Ministry of Health and other stakeholders should strengthen collaboration and coordination of nutritional programs that aim to alleviate nutritional deficiencies by addressing the above significant factors.

Key words: children, determinant factors, prevalence, underweight.

INTRODUCTION

Malnutrition as a general term refers to a number of diseases, each with a specific cause related to one or more nutrients and each characterized by a cellular imbalance between the supply of nutrient and energy and the body's demand for them to ensure growth, maintenance and specific functions. [1] This may lead to either under nutrition or over-nutrition. Worldwide there are about 60 million children with moderate acute malnutrition and 13 million with severe acute malnutrition. [2] Malnutrition is consequently the most important risk factor