NUTRITIONAL ASSESSMENT PRACTICES AMONG HEALTH CARE WORKERS AT THE PAEDIATRIC EMERGENCY UNIT AT KENYATTA NATIONAL HOSPITAL, NAIROBI COUNTY, KENYA

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Nutritional assessment practices among health care workers at the paediatric emergency unit at kenyatta national hospital, nairobi county, kenya

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DECLARATION

I declare that this is my original work and has not been presented for any degree in any university.

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This thesis is submitted for examination with our approval as the university supervisors;

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DEDICATION

I dedicate this thesis to my loving family for their support, love and inspiration. I will be forever grateful.

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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
BMI	Body Mass Index
HFA	Height For Age
HIV	Human Immunodeficiency Virus
KNH	Kenyatta National Hospital
MUAC	Mid upper Arm Circumference
PEU	Pediatric Emergency Unit
PYMS	Pediatric Yorkhill Malnutrition Score
SGA	Subjective Global Assessment
SNA	Subjective Nutritional Assessment
STAMP	Screening Tool for the Assessment of Malnutrition in Pediatrics
STRONGkid	Screening Tool for Risk on Nutritional Status and Growth
UNAIDS	United Nations Programme on HIV and AIDS
UNICEF	The United Nations Children's Fund
WFH	Weight For Height
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Nutritional assessment The process of evaluation of a patient's nutritional status and the extent of any malnutrition using detailed clinical (history taking and physical examination), anthropometric, biochemical and dietary assessment

Anthropometric measurements The measurement of the dimensions of bone, muscle and adipose (fat) tissue in the human body

Mid-Upper Arm Circumference (MUAC) The circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow (olecranon process and the acromium) used in nutritional assessment of children

Healthcare workers Pediatric consultants, doctors, clinical officers and nurses

Caregivers Parents and guardians who take care of children

ABSTRACT

Assessment of nutritional status in the pediatric population is useful in estimating growth patterns and identifying signs and symptoms associated with malnutrition. However, it has become increasingly apparent that pediatric nutritional assessment is not adequately performed and therefore children with nutritional needs are missed out. The main objective of this study was to determine the health care workers' practices of nutritional assessment of sick children at the Pediatric Emergency Unit (PEU) at Kenyatta National Hospital. Specifically, the study aimed at establishing the frequency of performance of various nutritional assessment parameters among healthcare workers, determining the challenges associated with nutritional assessment at the Pediatric Emergency and determining the health care workers' knowledge and perceptions on nutritional assessment. This was a descriptive cross-sectional study carried out at the PEU at Kenyatta National Hospital (KNH) among 49 healthcare workers. The study participants were selected based on the quota sampling technique. Data was collected using self-administered questionnaire and observation checklist. The quantitative data was entered into an excel spread sheet and exported to STATA for statistical analysis. The results were presented in frequency and percentages in tables and graphs. Greenhouse Geisser (G-G) and fisher statistical test were used to test associations of the frequency of performance, challenges and knowledge among different cadres on nutritional assessment practices. The study established that 29.52 % of the health care workers had knowledge that weight loss was a critical indicator of patient nutritional status. As the results showed, 38.64% of the health workers had some training on assessment of nutrition status of HIV/AIDS children. The study results revealed that 90.3% of the Nurses had attempted two of the required four observations for the first, second and third patients respectively. A total of 9.7% and 3.2% of the Nurses made only one observation out of the required 4 observations for patient 1 and patient 3 respectively. Half of the clinicians didn't attempt any of the listed 16 observations required for patient1 while 78.6% didn't attempt for patient 2 and 57.1% not attempting any for the third patient. Heavy workload and inadequate equipment were reported by 23.19% and 18.84% of the respondents respectively as the biggest challenge to good nutritional assessment. Despite all the challenges, 98% of the respondents agreed that nutritional assessment for pediatric emergency patients is necessary. Study results revealed significant difference between cadre performance on nutritional assessment ($p=0.028$) where the nurses demonstrated the best performance. There was a significant association between accessibility of nutritional equipment and performance of nutritional assessment by healthcare workers ($p=0.034$) where healthcare workers with access to equipment were 7.1 times more likely to perform nutritional assessment compared to those without. The study concludes that there is inadequate and incomplete nutritional assessment due to insufficient knowledge in nutrition assessment, heavy work load and lack of adequate equipment as observed at the pediatric unit. Despite these impediments, health workers have positive attitude towards nutritional assessment. The study recommends that measures should be instigated to improve and facilitate efficient nutritional assessment of the pediatric patients.

CHAPTER ONE

INTRODUCTION

1.1 Background information

Assessment of nutritional status in the pediatric population is useful to estimate growth patterns and identify signs and symptoms associated with malnutrition. Nutritional status is determined from a nutritional assessment of anthropometric, biochemical, clinical, dietary, socioeconomic, and drug-nutrient interaction effects. Each of these components reflects a child's nutrient requirements for optimal health and nutritional status (Solavini, 2019; Malazonia *et al.,* 2021). Anthropometry includes measurements of weight, height, mid upper arm circumference (MUAC), measurement of skin fold thicknesses, and head and chest circumferences. Biochemistry involves hemoglobin level, urinary iodine, iron status, levels of different nutrients or their byproducts. Clinical assessment includes examination of skin, eyes, hairs, nails and thyroid while dietary assessment include eating habits (Solavini, 2019; Malazonia *et al.,* 2021).

Nutrition plays an important part in the etiology, management and recovery of several medical conditions (Cederholm *et al.,* 2017). Determining nutritional status can lead to early detection of nutritional deficiencies that could lead to increased child morbidity and mortality. Early nutritional support can improve nutritional status, minimizing the risk of simple treatable health problems deteriorating to complicated conditions. Nutritional assessment should be a routine procedure for people of all ages (Cederholm *et al.,* 2017).

Malnutrition is a major contributor to increased morbidity and mortality, decreased function and quality of life, increased frequency and length of hospital stay and higher health care costs. Misdiagnosis of malnutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections and contributes to delayed recovery. In addition, the interaction between under nutrition and

infection can create a potentially lethal cycle of worsening illness and deteriorating nutritional status (UNICEF, 2013).

Malnutrition continues to be a major public health problem globally. In 2010, 7.6 million children across the world died before reaching their fifth birthday, while in 2011 an estimated 165 million children under the age of five were stunted (low height for age) and 101 million were underweight (UNICEF, 2018). Malnutrition causes children to be more susceptible to illness, and results in long-term effects on children's development and health (Trehan *et al.,* 2013). It is also estimated that globally, 12 million children die from malnutrition annually with most of them coming from the developing countries (Bain *et al.*, 2013; Ahmed *et al.*, 2014; Kalu and Etim, 2018).

Malnutrition is one of the urgent global health issues, with under nutrition killing or disabling millions of children each year (UNICEF, 2013). Malnutrition also prevents millions more from reaching their full intellectual and productive potential. In children, severe malnutrition accounts for approximately 1 million deaths annually with approximately 20 million children under the age of five suffering from severe malnutrition (UNICEF, 2013). Concerns have been raised that the figures given for child malnutrition in Africa may not be portraying the real extent of the problem as there are some elements of misdiagnosis from both the clinicians and the parents of the children that are feared to be malnourished. Lack of information to the mothers ablactating and also lack of proper advice from the clinicians on how to ablactate children from breastfeeding may also be a contributor to the problem of misdiagnosing malnutrition among the children (Sommers, 2015; Kyere *et al.*, 2020; Botero-Meneses *et al.,* 2020).

It has become increasingly apparent that malnutrition remains undiagnosed, and therefore frequently untreated, in patients attending hospitals. This may be due to lack of knowledge of the clinical consequences, or the notion that nutritional assessment during hospital visits is not important (Bain *et al.,* 2013).

1.2 Problem statement

It has become progressively clear that pediatric nutritional assessment is inaccurately and inadequately performed in pediatric clinics and hospitals hence often missing out on children with severe nutritional needs especially in developing countries (Tette *et al.*, 2015; McCarthy *et al.*, 2019). This disparity leads to severe nutritional consequences on the patient such as malnutrition resulting in deleterious health outcomes such as susceptibility to infections among others (Tette *et al.*, 2015; McCarthy *et al.*, 2019). Under-nutrition results in more than one-third of child deaths globally with higher prevalence in low and lower-middle-income countries (LMICS). Adequate nutrition is essential for children's health and development. Globally, it is estimated that under nutrition is responsible, directly or indirectly, for at least 35% of deaths in children less than five years of age. Under-nutrition is also a major cause of disability preventing children who survive from reaching their full development potential. Approximatelly186 million children below five years of age in developing countries are stunted and about 55 million are wasted (WHO, 2010).

A study by Nzioka in 2009 revealed that in Kenyatta National Hospital (KNH), the mortality rate from malnutrition stood at 50 % of the children admitted with malnutrition, a problem that can be prevented. Bhan in 2003 attributed most of the deaths from the developing countries, Kenya included, to outdated and inappropriate clinical nutritional assessment for children with malnutrition. Proper nutritional information from health workers has been shown to be positively and significantly correlated with adoption of dietary behavior and reduced risk of nutrition related chronic disease (Litvin *et al.*, 2016).

It's known that malnutrition is preventable and mostly reversible if diagnosed through various nutritional assessment procedures (Burgos *et al.*, 2020; Brown *et al.*, 2020). However, it often undetected due to absence of awareness, knowledge, clinical protocols as well as equipment to diagnose and treat it (Reber *et al.*, 2019). The results of a study carried out in 25 European countries showed that routine nutritional screening was

carried out in 53% of the hospitals in the regions sampled using nonstandard methods (Reber *et al.,* 2019). In a study carried out to evaluate frequency of nutrition status assessment at Embu Level Five hospital showed that nutrition status assessment on adult patient's was hardly done at 1.6% frequency (Robert, 2014). There is no recognized information with regard to pediatric nutrition status assessment locally. This study therefore intended to highlight the status of nutritional assessment practices among health workers as a way of ensuring that malnutrition is well diagnosed and appropriate actions taken to prevent mortality from malnutrition which is a preventable problem.

1.3 Justification

Malnutrition in children results in impaired growth, development, poor health, and overall decreased wellbeing. Nutritional status assessment is essential for the management of children admitted to hospital and is directly associated with the duration of hospitalization and healthcare costs. Healthcare workers play an essential part in determining the quality of healthcare given to patients thus enhancing nutritional management. The knowledge and practices of the healthcare workers, in as far as nutritional assessment is concerned with the aid of the relevant equipment are efforts that are geared towards reducing child mortality and morbidity associated with malnutrition (Joosten, 2011).

Management and prevention of malnutrition in children relies on early identification of those at risk in order to implement early nutritional interventions (Lenters *et al.,* 2016; Mohseni *et al.,* 2019). The quality of health for children in the developing world can be improved by ensuring that their nutritional health status is assessed and monitored (Kramer and Allen, 2015). KNH is a teaching and referral hospital and the ministry of health relies on information from the hospital when developing health policies, as such the results of this research will help the hospital as it develops its own policies as well as advices the ministry of health in coming up with their policies for administration of health services in the country.

The findings of this study will provide an insight on the status of nutritional assessment practices for children at the hospital, with a view to providing a better understanding of the issues surrounding child nutrition assessments and feasible solutions. The recommendations emanating from this study are helpful to the Kenyatta National Hospital pediatric department in reviewing the existing standard operating procedures, identification of staff training needs and enhancing the training of healthcare providers at various levels. The study findings and recommendations can be replicated in other health facilities since Kenyatta National Hospital is a referral hospital. The study may be used as basis for further research in the area of nutritional assessment within the country.

1.4 Research questions

i. What is the healthcare workers' knowledge on nutritional assessment practices at the Pediatric Emergency Unit, KNH?
ii. What is the frequency of performance of the recommended nutritional assessment practices among healthcare workers at the Pediatric Emergency Unit, KNH?
iii. What are the perceptions of the health care workers on nutritional assessment of sick children at the Pediatric Emergency unit at KNH?
iv. What are the challenges associated with nutritional assessment of sick children at the Pediatric Emergency unit at KNH?

1.5 Objectives

1.5.1 Main objective

To determine nutritional assessment practices among healthcare workers at the Pediatric Emergency Unit at KNH

1.5.2 Specific objectives

i. To establish the health care workers' knowledge on nutritional assessment of children at the Pediatric Emergency Unit, KNH
ii. To determine the frequency of performance of the recommended nutritional assessment parameters among healthcare workers in the Pediatric Emergency Unit, KNH
iii. To determine the health care workers' perceptions on nutritional assessment at the Pediatric Emergency unit at KNH
iv. To determine the challenges associated with nutritional assessment at the Pediatric Emergency unit at KNH

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Nutritional assessment is a comprehensive process that combines objective measurements, a focused history, physical examination and clinical judgment to arrive at a decision regarding patients' health status. The main objective of nutritional assessment is to identify patients with poor nutritional status. Every nutritional assessment begins by taking into consideration the age specific nutritional requirements and developmental issues. Beyond that, the immediate goals and even the method of assessment can vary, depending on the clinical status of the patient and the setting in which the assessment takes place (Akugizibwe *et al.,* 2013).

Nutritional assessment is carried out in primary care centers promoting optimal health and preventing nutrition related diseases. This process places emphasis on recognizing dietary and lifestyle factors that affect health. Another key function of nutritional assessment in primary care is to determine the need for therapeutic dietary adjustments for patients with chronic diseases. For hospitalized patients the focus shifts towards identifying ways for which acute illness influences nutritional status and the impact of nutritional status on clinical outcomes. Information gathered through nutritional assessment in hospitalized patients should distinguish between the causes and consequences of malnutrition and help in selecting patients most likely to benefit from nutritional support (Jeejeebhoy, 2000).

Poor nutrition which leads to primary malnutrition is more frequent in the underdeveloped countries and is directly linked to socioeconomic status. Malnutrition is usually the pre-requisite to a variety of chronic diseases in more developed countries (WHO, 2012). In children, it results to impaired growth and development, poor health and overall decreased wellbeing and as such the detrimental effects of malnutrition on

growth, morbidity and mortality in children are often underappreciated (Soeters, 2008). A well-nourished child is one with access to adequate nutritional care and health. Such a child will have weight and height measurements that compare very well with the standard normal distribution of heights (H) and weights (W) of healthy children of the same age and sex. Thus, the best way to evaluate the nutritional status and overall health of a child is to compare the child's growth indices with the set cut-off points in the standard normal distribution of well-nourished children that are associated with adequate growth (De Onis, 2017).

2.2 Nutrition assessment

Nutritional assessment involves determining nutrition status of a person by obtaining adequate information in order to deduce nutrition needs of the person (Swan *et al.*, 2012). It involves systematic acquisition, verification and interpretation of data in order to describe the nature and the root of a nutrition related needs of an individual. Nutritional assessment is an essential element in the provision of nutritional care. It is important to provide individualized nutritional evaluation, educational plan and periodic reassessment for nutritional needs of each patient (Bush *et al.*, 2020). Additionally, the patient's progress and any changes in requirements for nutritional interventions should be frequently monitored. Generally, nutritional status assessment helps identify people at nutritional risk. It facilitates development of educational programs to advise people on improvement of their dietary habits. Information gathered from nutritional assessment could help government develop programs for food production, distribution and allocation in healthcare facilities (Eto, 2014; Bush *et al.*, 2020).

Screening and assessment approaches for nutritional have widely applied subjective global assessment (SGA). It's widely considered due to its simplicity reliability and validity in assessment (da Silva Fink *et al.*, 2015). SGA rates the nutrition status of a patient in a standardized gauge by capturing various aspects of patient's nutritional status in a single examination session. It employs the aspects of medical history such as

dietary intake, weight change and gastrointestinal symptoms and physical examination to determine nutritional status (Eto, 2014).

2.3 Indicators of nutritional status

The assessment of nutritional status is commonly summarized into various indicators such as anthropometric measurement, biochemical or laboratory tests and physical examination as detailed below (Esper, 2015).

2.3.1 Physical parameters

Generally, preliminary observations on the patient physical appearance are made prior to in-depth nutritional assessment. Brief notes can be made on patients body fat distribution, obesity and wasting on the basis of fat and lean tissue reserves (Esper, 2015; Lewis *et al.,* 2018). Checking on muscle wasting in the temples or interosseous areas can also be carried out in physical examination. Body temperature should also be determined in preliminary physical examination during nutritional assessment (Lewis *et al.,* 2018). Fever can be indicative of metabolic responses as it raises energy consumption which affects nutritional needs. The physical appearance of the hair, eyes, nails, skin, mouth and mucosal membranes should be examined as they can be indicative of underlying nutritional conditions (Esper, 2015; Pironi *et al.,* 2020).

2.3.2 Biochemical analyses

Biochemical analysis is the quantitative chemical examination of level of nutrients and their metabolites in biological fluids such as the blood and urine (Wilson and Walker, 2010). The biochemical indicators assayed for during nutritional assessment include serum protein, minerals: iron, iodine and other trace elements; vitamins; folacin, vitamin B6, and vitamin B12, riboflavin, niacin, and vitamin C, blood lipids such as cholesterol and triglycerides, level of glucose (Loughrey *et al.,* 2013). The principles of nutritional status associates energy stores with general body fitness which is indicated by various biochemical parameters. The investigation of the nutritional status directly or indirectly

base on assessment of body energy reservoir. In fact, various studies have reported correlations between the quantity of energy reserves and survival of children and fitness against diseases (Viani *et al.*, 2020).

2.3.3 Anthropometric indicators

Nutritional anthropometry is the measurements of the changes in the physical dimensions and the gross structure of the human body at different age stages and level of nutrition (Conkle *et al.,* 2017; Brończyk-Puzoń *et al.,* 2018). Anthropometric indicators are cheap and rapidly accessed hence widely used for nutritional assessment in children (WHO, 2005). Anthropometric measurement includes determining weight, height, arm circumference and skin fold for assessment of children's nutritional needs (Conkle *et al.,* 2017; Brończyk-Puzoń *et al.*, 2018).

2.3.3.1 Weight

Human w**e**ight is comprised of body fat, protein, water and bone mineral mass. Several keys indicators can be derived from body weight. For instance, weight- for- age is an acute index for malnutrition which is widely used to determine protein-energy-malnutrition and over nutrition particularly in children (Becker *et al.,* 2014; Batool *et al.,* 2015; Lara-Pompa *et al.,* 2020). Measurement of weight in comparison with the age of the child can be used to determine whether a child is underweight or overweight. Weight measurement in children is done using a pediatric scale with pan, a suspended spring balance and weighing sling or a beam balance (Becker *et al.*, 2014; Batool *et al.*, 2015; Lara-Pompa *et al.*, 2020).

2.3.3.2 Height or Length

Body length or height in relation to age is used as an indicator of chronic nutritional condition in children. Length is measured for infants less than two years while height is measured for children above two years (Abeshu *et al.,* 2016). The measurement is significant in evaluating stunting of a child's full growth potential. Stunting is decreased

skeletal growth of a child which results in reduced linear growth (Abeshu *et al.,* 2016). It occurs after extensive periods of inadequate food intake and prolonged illness. Combination of weight and height provides a profound index for the current nutritional status. Weight-for-height and height-for-age are used to diagnose wasting and stunting respectively.

2.3.3.3 Mid-Upper Arm Circumference (MUAC)

The arm contains subcutaneous fat and muscle which makes it a designate measure of nutrient reserves in muscle and body fat. Reduction of mid-upper arm circumference may reflect decreased muscle mass and subcutaneous tissue. Mid-upper arm circumference is also suitable for diagnosis of protein-energy-malnutrition or starvation. It's an indicator of wasting in lean body mass (Briend *et al.*, 2015; Marshall, 2016). Fluctuations in mid-upper arm circumference can also be used to monitor progress during nutritional therapy with a positive correlation in weight changes. It can also be used as effective forecaster of risk of death in children aged 6 to 59 months. Arm circumference measurement is not time consuming and can be determined using readily accessible equipment. MUAC measurements are made using a flexible, non-elastic calibrated tape (Yallamraju *et al.,* 2014; Thi *et al.,* 2015).

2.4 Nutritional assessment tools

Three non-disease specific nutrition screening tools designed for paediatrics have been developed for use: Screening Tool for the Assessment of Malnutrition in Paediatrics (STAMP) (McCarthy *et al*., 2008); Screening Tool for Risk On Nutritional status and Growth (STRONGkids) (Hulst *et al*., 2010); Paediatric Yorkhill Malnutrition Score (Gerasimidis *et al*., 2010).

2.4.1 Tool for assessment of malnutrition in pediatrics

The tool consists of three assessment items namely anthropometric measures, clinical diagnosis and analysis dietary intake. The entire nutritional evaluation using this tool

consists of face-to-face interview to obtain dietary and social information. Anthropometric measurements and medical information are retrieved from case notes. Reduction in the height for age, weight loss, increased interval between weight and height percentiles and change in appetite are interrogated and nutritional risk and interpreted as present or absent (McCarthy, 2008; Imani *et al.,* 2015). The elements are scored and children with an overall score of three or above are considered at nutritional risk. This tool was validated in United Kingdom hospitals that determined nutrition risks of hospitalized children aged between 2 and 17 years (McCarthy, 2008). The tool has been found robust in nutrition assessment however time consuming (Wonoputri *et al.,* 2014).

2.4.2 Pediatric York hill Malnutrition Score

The pediatric York hill malnutrition scoring tool was developed by a multidisciplinary healthcare team from the Royal Hospital for Sick Children, Glasgow and Royal Alexandra Hospital, Paisley. The PYMS was designed to incorporate questions/measurements to address four principles namely the current nutritional status, the stability of nutritional status, the recent changes to nutritional status and the likelihood of the acute disease condition to affect the nutritional status adversely (Gerasimidis *et al.,* 2010). The principles are structured into questions that are asked and scored by the health care workers and each question earns a score of between 0 and 2. The final score determines the nutritional status of the patient. This tool was validated in United Kingdom by evaluating nutritional needs of hospitalized children in pediatric units (Gerasimidis *et al.,* 2011). It has been reviewed as an excellent tool however its use is discouraged by its complexity (Hulst *et al.,* 2010).

2.4.3 Screening Tool for Risk on Nutritional status and Growth ($STRONG_{kids}$)

$STRONG_{kids}$ recommends that upon admission a questionnaire should be performed to score the risk for malnutrition. The questionnaire to be used for nutritional risk screening consist of section A and B. Section A contains 4 items each allocated a score of 1–2

points with a maximum total score of 5 points. The items include subjective clinical assessment (1 point) which determines if the patient is in a poor nutritional status, high risk disease (2 points) which examines the presence of an underlying illness with an expected risk of malnutrition, presence of excessive diarrhoea (5 per day) and/or vomiting (>3 times/day) (1 point), reduced food intake due to pain and weight loss (1 point) (Hulst *et al.,* 2010; Teixeira *et al.,* 2016). Section B includes anthropometric measurements such as height and weight.

The protocol recommends that nutritional assessment should be done on admission and also at discharge. All anthropometric data should be translated into standard deviation scores (SD scores) including weight-for-height (WFH) and height-for-age (HFA). WFH and HFA SD score of <2 indicates acute malnutrition and chronic malnutrition respectively. Adverse malnutrition is defined by presence of acute and/or chronic malnutrition (Hulst *et al.,* 2010; Teixeira *et al.,* 2016). STRONGkids was validated in a nationwide study to determine the risk of hospitals acquired nutritional needs in the Netherlands. It was highlighted as quick and easy to apply method (Hulst *et al.,* 2010).

2.5 The process of nutritional assessment and classification

Sick children deserve special nutritional attention because of their additional needs for growth and development. This is because nutrition plays an important role in treatment of various sicknesses. Monitoring diagnostic indices for nutritional health such as Mid-upper arm circumference, length and height in children provides information with regard to a child's nutritional status (Nazmul, 2013). Notably, growth faltering and reduction in length and height often occurs in almost all infected children (Bliss *et al.,* 2018; Nowak-Szczepanska *et al.,* 2019).

In 2004, WHO commissioned a technical review of the nutritional needs of children infected with HIV as an evidence-base for the development of nutritional care guidelines (WHO, 2009). This culminated in the development and adoption of guidelines as regards nutrition in HIV infected children in 2009. The guidelines propose a standardized

assessment and classification of the nutritional status of infected children and the intervention necessary for each. In addition, the guidelines propose the early recognition of a child at risk of under nutrition. The interventions proposed are aimed at being practical and feasible in resource poor settings while offering a prospect of clinical improvement. The guidelines aim at providing a framework for integrating nutritional support in to the routine care of infected children (WHO, 2009).

The nutritional guidelines are designed such that they can be used as reference to the healthcare workers on questions to be asked and measurements to be done when evaluating an infected child and how these pieces of information should be used to assess, classify and manage children. These guideline complements the WHO standards developed in 2008 for the management of common illnesses. Contained in these guidelines is a classification system for the nutritional status of children. The locally adapted procedure for on the nutritional assessment of children recommend three step approach (WHO, 2009); The process begins with assessment of the child's nutritional needs. The nutritional needs of children for growth; development and immunological function depend on the assessment as recommended approach is as shown below in table 2.1:

Table 2.1: Recommended approach for assessment of child's nutrition needs

Ask	LOOK and FEEL
Ask mother/caregiver (or check the medical records), Has the child lost weight during the past month?, Ask all questions and complete assessment of each child, Does the child have: cough for more than 21 days?, active TB i.e. on treatment, diarrhea for more than 14 days, other chronic infections or malignancy	Look for signs of severe visible wasting, Check for presence of oedema of both feet (or sacrum), Check for the weight and height, Check the MUAC Look at the shape of the growth curve.

The second step of the process involves classification of the child nutritional needs depending on the diagnosis. The nutritional status is classified as either undernutrition or overnutrition. Under-nutrition results to significant morbidity and mortality of children below 5 years in Africa. It's endemic in Sub Saharan Africa with approximately 10 percent of children under the age of 5years having moderate and severe wasting, 40 percent diagnosed with moderate and severe stunting and 29 percent reported to be severely underweight (Kamenwa, 2014).

Under nutrition occurs when people do not eat (or absorb) enough nutrients to cover their needs for energy and growth, or to maintain a healthy immune system. Micronutrient deficiencies are a sub-category of under nutrition and occur when the body lacks one or more micronutrients (e.g. iron, iodine, zinc, vitamin A or folate). These deficiencies usually affect growth and immunity but some cause specific clinical conditions such as anemia (iron deficiency), hypothyroidism (iodine deficiency) or exophthalmia (vitamin A deficiency) (WHO, 2012).

Under nutrition is responsible for more than one-third of child deaths globally as indicated by a study done by Black in 2008, and it is more prevalent in low and lower-middle-income countries. He also indicated that poverty was the main important underlying cause of poor nutrition status among children in these regions. It has also been cited that food insecurity, low maternal education, poor access to healthcare, and burden of diseases, have contributed to poor child nutrition status which in most cases

leads to under nutrition (Bain *et al.,* 2013). It is better to identify infants and children who are at risk of under nutrition or who have poor growth before they become severely malnourished (Bain *et al.,* 2013). Therefore, if a mother reports that her child is failing to gain weight, or the child has had poor appetite recently, the child is not gaining weight and his/her growth curve is flattening, losing weight and the growth curve is dropping downwards, or there are changes in caregiver or home circumstances then the child should be examined for visible signs of malnutrition. The examined signs include very little subcutaneous fat and muscle (Particularly obvious on the upper arm, thighs and buttock sagging skin) with or without bipedal oedema. If signs of severe visible wasting are not present, the child can be given nutritional support at home with early follow up (5-7 days) and assessed for other medical problems. If present, the child should be managed as severe malnutrition (Fentahun *et al.,* 2016; Ghosh-Jerath *et al.,* 2017).

WHO has defined over nutrition to be a chronic condition where intake of food is in excess of dietary energy requirements, resulting in overweight and/or obesity. Overweight and obesity are more common in the children that live in the developed world. Childhood obesity in countries like USA is a serious public health problem. It is estimated that nearly a third of the children in USA are obese due to poor eating habits and lifestyle that lacks physical activities and exercises (Rosen *et al.,* 2014). Approximately, 22.1% of preschool children in developing countries have been reported to be overweight putting them at the risk of cardiovascular disease, dyslipidemia and type 2 diabetes (Gupta *et al.,* 2012; Popkin *et al.,* 2012).

The last and third step which follows classification of nutritional status is recommendations for interventions. Nutritional needs are best met through balanced and varied diets in adequate quantities (Macdiarmid *et al.,* 2012). When these are not available, or demands are high, then additional support may be needed. The different nutritional plans are as outlined:

a). Children that are growing well and asymptomatic or with mild symptoms only

The energy needs of these children are increased by about 10% (based on actual weight rather than expected weight for age). The child still needs appropriate energy intake according to his/her age and weight. The additional energy helps to maintain normal growth, development, and activity and body functions. The additional energy is best given via additional household foods, provided as part of a balanced, varied diet (Macdiarmid *et al.,* 2012). If there is inadequate food for the child's entire household, then Family Food Support may be required.

b). Children with conditions with increased energy needs

Children with chronic illnesse**s** may require extra 20%-30% energy each day (based on actual weight rather than expected weight for age) (Bauer *et al.,* 2013). The additional 20%-30% energy is best given through additional household foods, provided as part of a balanced, varied diet. If this is not possible, then specific nutritional supplements should be offered until the underlying causes of poor weight gain, or causes of additional energy needs are effectively managed.

c). Children with severe malnutrition

Signs include visible wasting, bilateral edema or severely impaired growth need 50 to 100% extra energy each day (based on actual weight rather than expected weight for age) for a limited period until weight is recovered (Trehan *et al.,* 2013). These children should be treated with therapeutic feeding which should continue until nutritional recovery is achieved (average ~6-10 weeks). These severely malnourished children with no medical complications can often be managed at home if they still have a good

appetite (Iannotti *et al.,* 2015). Children with a poor appetite, implying complications should be referred for inpatient care.

2.6 Determinants of effective nutritional assessment

2.6.1 Nutrition assessment knowledge

Nutritional assessment and care is based on scientific knowledge of the health workforce performing the assessment (Munuo, 2014). Nutritional knowledge is the technical ability to adequately access patients nutritional needs and produce facts or principles related to their nutrition status (El-Nmer *et al.,* 2014). It's the science which describes the relationship between the health status and dietary condition of an individual. Nutritional knowledge for health care workers is important enable adequate evaluation of nutrition conditions of a patient and provide the potential relationship between the physiological and metabolic response of the body (Munuo, 2014). Nutritional knowledge among health care workers on various facets of nutritional assessment and intervention is the core pillar for effective nutrition assessment. The skill to adequately assess the indicators of nutritional status such anthropometric aspects, biochemical aspects and correctly classify nutritional conditions of patient needs is essential for management and improvement of patient nutritional conditions (Tafese and Shele, 2015).

Adequacy of nutritional knowledge is one way to ensure that the underlying nutritional conditions can be correctly diagnosed and relevant nutritional support provided to improve deterioration of nutritional status. Without good nutrition knowledge health care workers cannot provide appropriate nutritional assessment (Crowley *et al.*, 2019). Health care workers are considered as the most reliable sources of nutrition information. However, the quality of nutritional assessment and care provided by healthcare workers depends on their level of nutritional knowledge (Munuo, 2014).

2.6.2 Perception of healthcare workers on nutritional assessment practices

Perceptions can be defined as the attitude or feeling about an issue or practice (Manuo, 2014). Healthcare worker's attitudes towards nutritional assessment are critical because they are likely to impact their willingness to carry out the process. It has been documented that if health workers have positive attitudes towards nutritional assessment, they are likely to perform adequate and detailed nutritional diagnosis of patient status (Manuo, 2014). Studies have reported that if healthcare workers consider nutritional assessment important, they will allocate the patient adequate time for assessment and advice for relevant nutritional advice (Manuo, 2014).

2.6.3 Nutritional assessment practices by healthcare workers

Effective nutritional interventions require robust nutritional assessment to dragonize cases of need. Good performance of nutritional assessment depends on the completeness of analysis of all recommended nutritional assessment parameters. An in-depth diagnosis is required to identify the various symptoms of adverse nutritional needs (Olswang & Prelock, 2015; Russell, 2015; Rabito *et al.,* 2017). Healthcare workers should enlist efforts to increase the frequency of diagnosis so as to achieve in-depth and adequate diagnosis. This will ensure that critical nutrition cases are not missed during nutrition assessment. The frequency of nutritional assessment may be hindered by lack of knowledge and negative perceptions of the healthcare workers towards the practice. Therefore, the facet of nutritional assessment is a multidimensional discipline whose effectiveness and sustainability encompasses all its determinants; completeness of assessment for recommended variables, knowledge and perception (Olswang, L. B., & Prelock, 2015; Russell, 2015; Rabito *et al.,* 2017).

2.7 Conceptual framework

Having the right knowledge, years of experience, professionalism and a positive perception on nutritional assessment is an essential component to enable healthcare

workers to use the equipment as expected and to correctly interpret the outcome. This will improve the nutritional assessment practice.

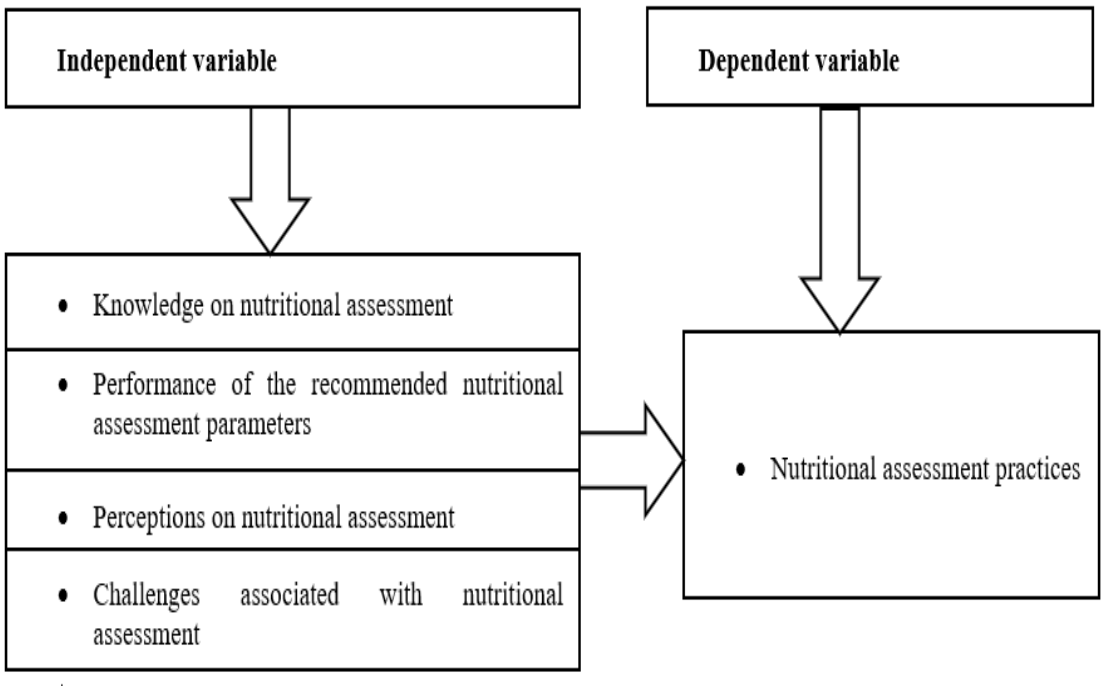

Figure 2.1: Conceptual framework: Adopted and modified from UNICEF (1987)

CHAPTER THREE

MATERIALS AND METHODS

3.1 Introduction

This chapter describes the methodologies through which the study objectives were achieved. The chapter includes the study area, study design, study populations, sampling techniques, research instruments, data collection procedure and data analysis

3.1 Study Site

This study was carried out at the Pediatric Emergency Unit (PEU) at Kenyatta National Hospital (KNH). The Hospital was built to fulfill the role of being a National Referral and Teaching Hospital, as well as to provide medical research environment. Established in 1901 with a capacity of 40 beds, KNH became a State Corporation in 1987 with a Board of Management and is at the apex of the referral system in the Health Sector in Kenya. It covers an area of 45.7 hectares and within the KNH complex are College of Health Sciences (University of Nairobi), the Kenya Medical Training College, Kenya Medical Research Institute and National Laboratory Service (Ministry of Health).

The PEU is where all children who come to Kenyatta National Hospital requiring medical care are attended. The medical team at the PEU is comprised of postgraduate students on training in pediatrics (registrars) who work with a consultant as the first on call, clinical officers and nurses. Approximately, 150 children visit PEU with 20 cases of admission daily.

3.2 Study design

This was a cross sectional descriptive study. The study used quantitative data which was collected using questionnaires issued to the study participants and observational check.

3.3 Study population

The study population consisted of the Nurses, Clinical Officers and Pediatric Consultants working at the PEU. There are 40 nurses, 17 clinical officers and 1 resident pediatric consultant.

3. 3.1 Inclusion criteria

- All healthcare workers employed on permanent basis on duty at the PEU unit.
- Those who consented to participate in the study

3. 3.2 Exclusion criteria

- The registrars at the PEU were excluded since they were not licensed practicing health care workers

3.4 Sampling procedure and sample size determination

3.4.1 Sample size determination

The study used Fishers *et al*. (1998) in determining the sample size.

$$nf = \frac{n}{1+n/N}$$

Where,

nf = the desired sample size (when population is less than 10,000)

n = the desired sample size (when population is greater than 10,000)

N = the estimate of the population size.

But to determine nf, n would have to be calculated. According to Fisher *et al*, when the population is greater than 10,000 the sample size is determined by:

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

Where,

n = the desired sample size (when the population is greater than 10,000)

z = the standard normal deviation, usually set at 1.96 which corresponds to 95 percent confidence level.

p = the proportion in the target population estimated to have a particular characteristic

q = 1.0 – p

d = degree of accuracy desired, usually set at 0.05

In this study, 73% was used as the proportion of healthcare workers who practice nutritional assessment. This was based on a study by Akugizibwe (2014) which stated that 73% of healthcare worker had knowledge on the management of malnutrition but did not put the knowledge to practice while undertaking nutritional assessment.

Therefore,

The sample size was calculated as shown below;

$$n = \frac{(1.96^2)(0.73)(0.27)}{0.05^2}$$

$$n = 302$$

The minimum sample size is therefore

$$nf = \frac{302}{1+\frac{302}{58}}$$

Thus nf = 49

The minimum sample size was 49 respondents (Table 1).

Table 3.1: Sample distribution among healthcare workers at the pediatric unit, KNH

Cadre	Number
Nurses	35
Clinical officers	13
Doctors	1
Total	**49**

3.4.2 Sampling procedures

Quota sampling was used to recruit the study participants. Quota sampling involves stratified grouping of sample subpopulation with similar features (Botev and Ridder, 2014; Etikan and Bala, 2017). It was used to get the different cadres to be included in the study from a population of 40 nurses, 17 clinical officers and 1 resident consultant pediatrician.

3.6 Study procedures

3.6.1 Questionnaire survey

Four research assistants with minimum qualification of a nursing certificate were recruited and trained on how to provide data collection tools to study participants as wells as to carry out the observational section of the study. The researcher was responsible for training them and they were required to fill in a confidentiality agreement form. The data was collected using a questionnaire issued to the health care workers, observation of practice and a review of medical records. The patients'

guardians or parents who brought the patients to the hospital were asked if they agreed for the health assessment process to be observed with a view of improving the nutritional assessment and if they agreed they filled a consent form to show that they have agreed. Names of the patients and the guardian or parent were not indicated anywhere on the data collection tools so as to ensure confidentiality.

If there was need to review any medical record, the file number was recorded and the medical records officers was requested to provide the records after the patients were through with treatment. This ensured that there was no disruption of services to the patients and caregivers within the department. There were no any photocopies made from the patients' medical records and the information abstracted from the medical records excluded any identification particulars to ensure that their information was confidential.

3.6.2 Assessment of practice: Observation of practice and review of medical records

The clinicians and nurses were observed three times each (as the caregiver attended to 3 children at different times). This was based on a study done, to consistently capture habitual classroom environments where 3 observations were required (Shih, 2013). This was guided by decisions about the specific purpose of the observation tool, as well as budget and practical considerations. The assessment of practices was done on a real time basis by assessing the necessary documentation as follows:

- Check /Observe that nutritional assessment was done
- Check /Observe the correct management was prescribed where indicated.

The investigator accompanied the patients as they received care from the various healthcare workers based on the patient flow during the routine hospital visits as shown below

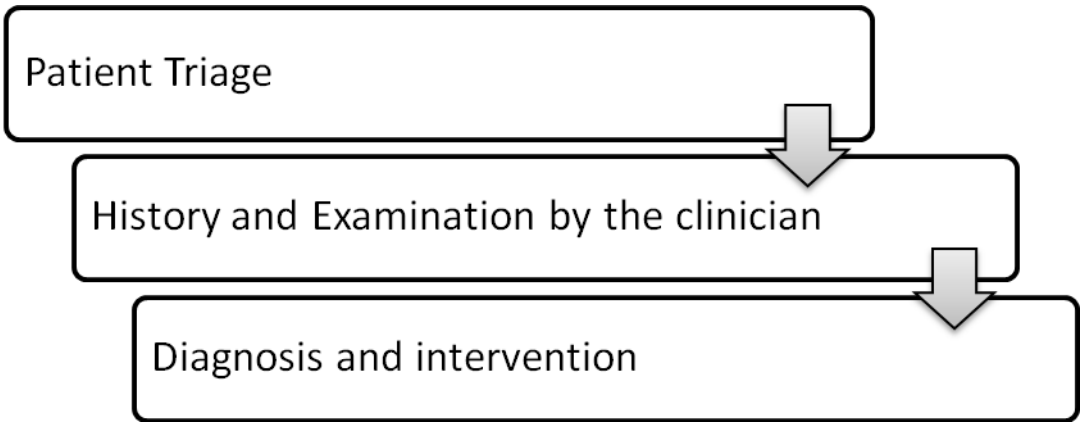

Figure 3.1: Assessment of practice: Observed and medical record review

Source: National library of medicine (NLM.J)

The research played a passive role by recording the healthcare services given to the patient. At the end of the medical consultation the investigator went through the medical record to fill in any details that may have not been observed but were recorded. Where practice was recorded the investigator perused through the files and checked the relevant information which once noted the file was returned back to the health care workers or refilled appropriately.

3.7 Data collection

The data collection was carried out by the researcher and the research assistants in the study location. A data instrument contained two sections outlined as a structured self-administered questionnaire and observation guide set of questions. The questionnaire captured the demographics, perceptions, challenges and knowledge information of the healthcare workers. After getting their consent, the questionnaire was administered to the participants. They were given time to fill them then picked at the participant's convenient time. The observation guide of questions captured data on practices of the healthcare workers through observation as the health workers attended to the patients.

3.8 Data analysis

All the quantitative data was manually entered into an excel spread sheet and then exported to STATA. Data cleaning and transformation were done. The results were expressed as frequency and percentages presented in tables and graphical. The associations between the frequency of performance of nutritional assessment practices among different cadres, challenges and knowledge of the cadre was determined by Greenhouse Geisser (G-G) (among groups) and fisher (between groups) statistical test. The association was tested at 95% confidence level.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter comprises of the study finding outlined according to the study objectives alongside with the socio-demographic and economic characteristics of study participants.

4.2 Socio-demographic characteristics of participants

A total of 49 questionnaires were issued however 45 were returned indicating a response rate of 91.00%. The total number of respondents comprised of 31 (68.89%) nurses, 13 (28.89%) clinical officers and 1 (2.22%) resident consultant. The findings indicated that 31 (68.89%) of the respondents had an experience of more than 10 years followed by 2-5 years (20.00 %) while 6.67 % had 6-10 years of experience. As the results revealed, 26 (57.70%) of the respondents were age-group of 40 years and above trailed by 18-25 years, 26-30 years and 36-40 years all at 11.11 % followed by 31-35 years at 8.89 %. The study indicated that 32 (71.11%) of the respondents were females who comprised more than two thirds of the sample. Of the respondents, 27(60.00%) had a diploma, 28.89 % had bachelor's degree, 8.89 % had certificate and those with master degree were 2. 22 % (Table 4.1).

Table 4.1: Socio-demographic characteristics of participants

Attribute	Details	n=45 Frequency	Percentage
Cadre	Clinical officer	13	28.89
	Doctor	1	2.22
	Nurse	31	68.89
Years of experience	2-5 yrs	9	20
	6-10 yrs	3	6.67
	Over 10 yrs	31	68.89
Age group	18-25	5	11.11
	26-30	5	11.11
	31-35	4	8.89
	36-40	5	11.11
	40 and above	26	57.78
Gender	Male	13	28.89
	Female	32	71.11
Education	Certificate	4	8.89
	Diploma	27	60.00
	Bachelor	13	28.89
	Masters	1	2.22

4.2 Health workers' knowledge on nutritional assessment

This study sought to determine the health practitioners' knowledge on nutritional assessment at the Pediatric Emergency Unit at KNH. The results indicated that 29.52 % of the respondents had knowledge that weight loss was an essential indicator of patient nutritional status. Up to 28.57 % of the health workers were aware that failure to gain weight followed by flattening of growth curve was a recommended parameter for nutritional assessment (Figure 4.1). The results showed that 12.38 % of the respondents had knowledge that change of caregivers and home circumstances had impact on nutritional status of a child (Figure 4.1).

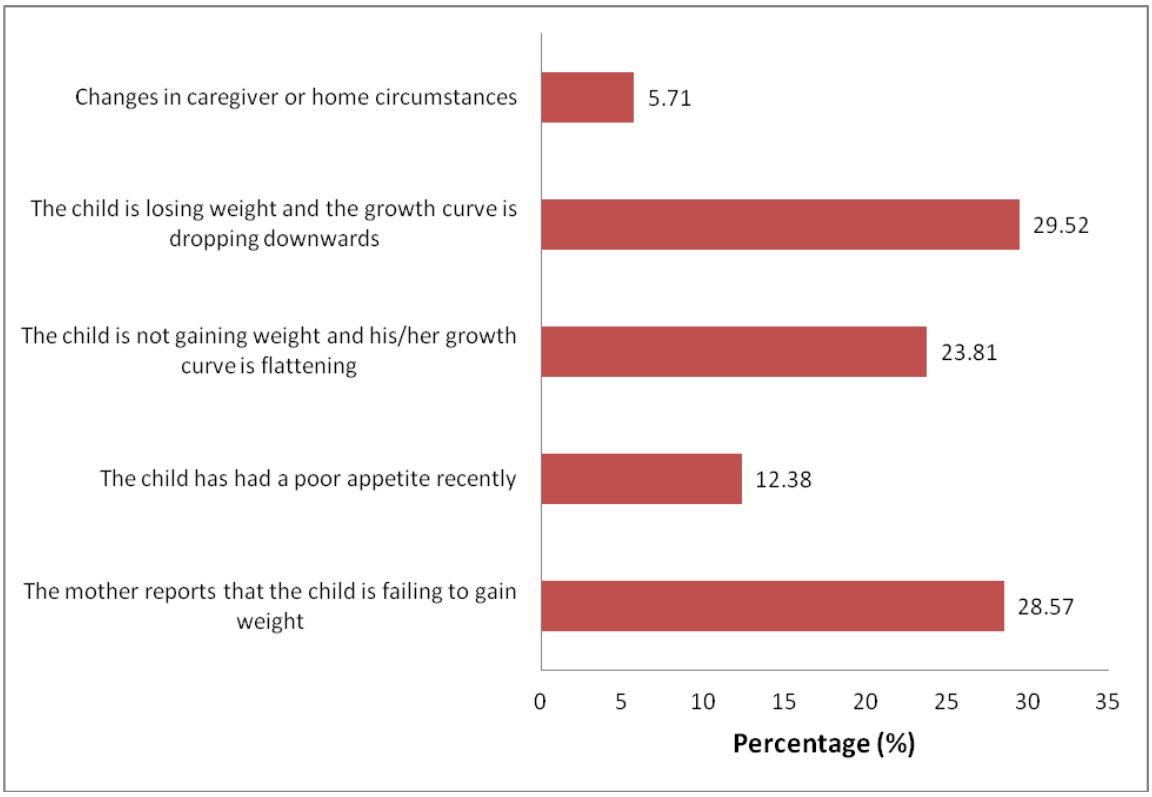

Figure 4.1: Health care workers knowledge on nutritional assessment

4.2.1 Specific training on nutritional care

Amongst those who reported to have any training on nutritional care and assessment of children's nutritional status, 35.71 % had training on infant and young child feeding while 7.14 % of the respondents had training on breastfeeding, marasmus and nutritional care for HIV children (Figure 4.2).

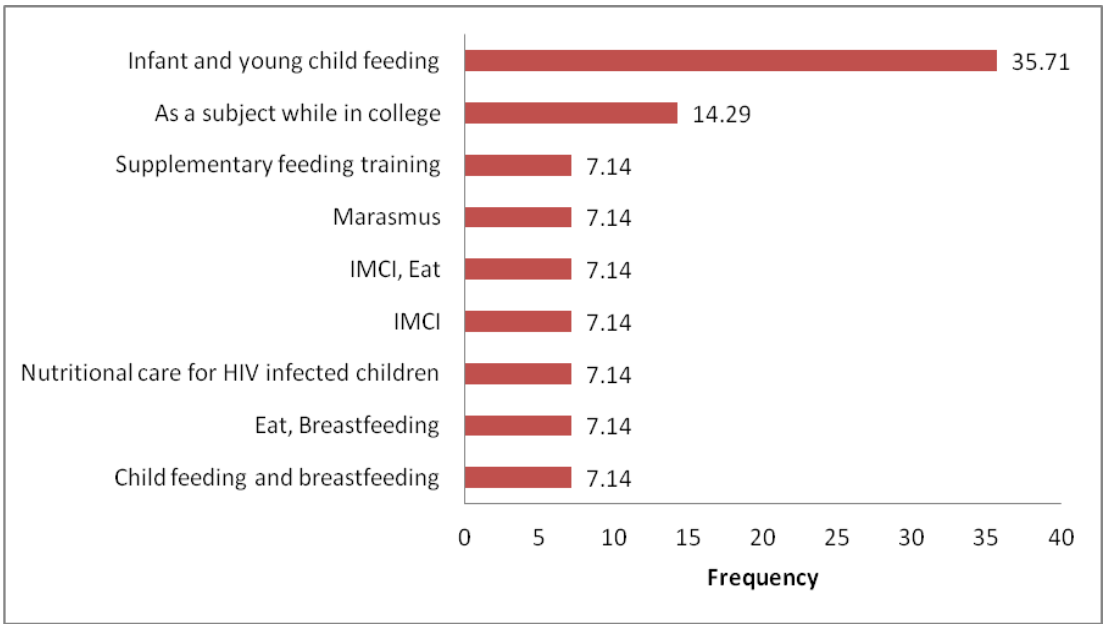

Figure 4.2: Specific training on nutritional care

The study revealed that 61.36% of the respondents had not undergone any training on nutritional care of HIV infected children whereas 38.64 % had a training on nutritional care (Figure 4.3).

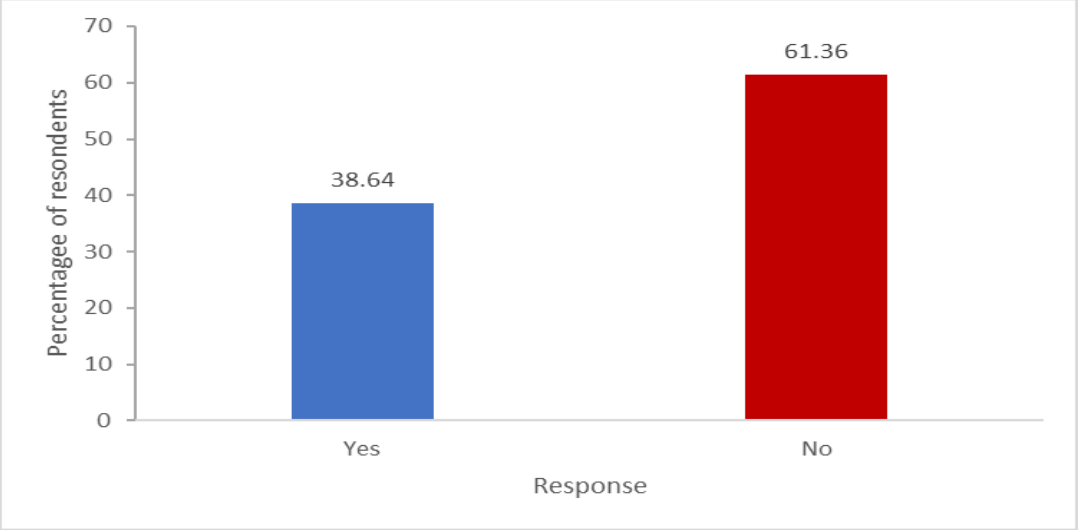

Figure 4.3: Training on nutritional care of HIV infected children

4.2.4 Classification of nutritional status of sick children

The knowledge on classification of nutritional status was assessed among the health care workers. Severe malnutrition was used by 56.06% of the respondents as the indicator for classification of children with high nutritional needs. Poor weight was used by 15.15 % of the health workers to classify children with high nutritional status. Z score, wasting, and height, weight and age were used by 1.52 % of the health workers. A total of 9.09 % of the health workers did not know how to classify nutritional status of the children (Figure 4.4).

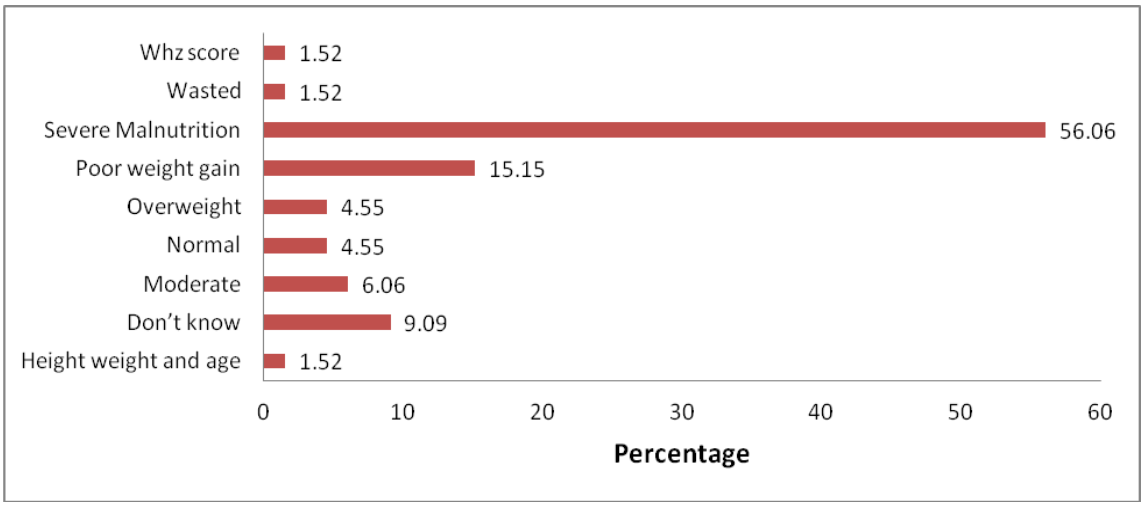

Figure 4.4: Classification of nutritional status

4.3 Frequency of performance of the recommended nutritional assessment parameters among healthcare workers

The checklist for the nutritional assessment included various parameters including child's age, MUAC, length, height, weight, presence of edema on feet, severe pallor, birth weight, immunization history among others. The results indicated that 25.44% of the respondents reported that they check weight while performing nutritional assessment and 22.81 % of respondent reported that they usually check MUAC. The head circumference and anemia were the least checked for parameters by 0.88 % of the health workers (Figure 4.5).

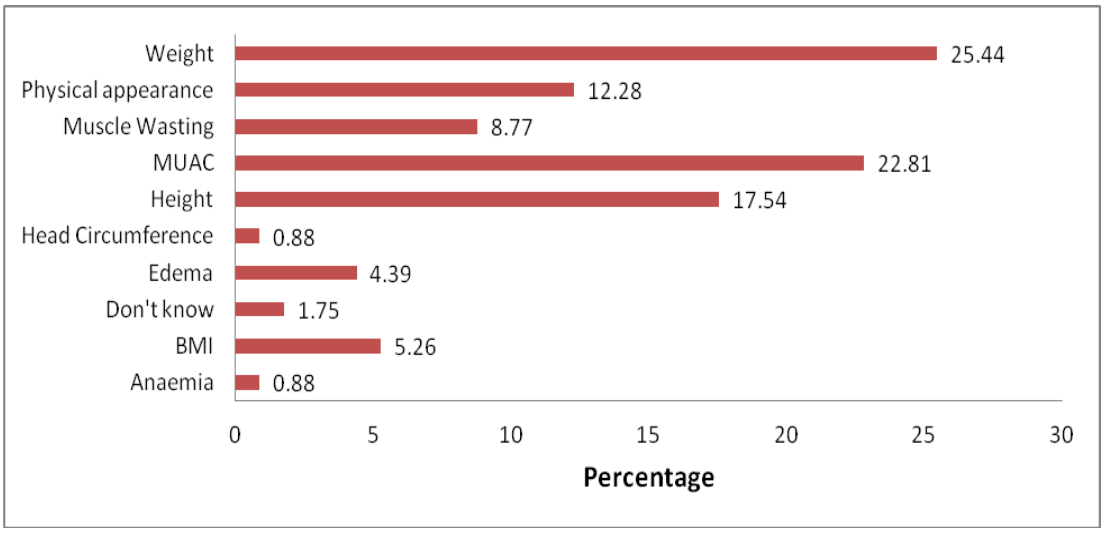

Figure 4.5: Physical parameters checked for during nutritional assessment

4.3.1 Number of nutritional assessment parameters made by nurses

Nurses were observed while assessing three children separately. The study results revealed that 90.30%, 100.00 % and 96.80 % of the nurses attempted two of the required 4 observations for the first, second and third patients respectively. The results indicated that 9.70 % and 3.20 % of the nurses made only one observation out of the required 4 observations for patient 1 and patient 3 respectively (Table 4.2). Greenhouse Geisser (G-G) test indicated no statistical difference between the frequency of observations made by nurses for all the patients (P-value of 0.1103; Table 4.2). Therefore, the number of observations made by nurses for patient 1, 2 and 3 did not differ.

Table 4.2: Number of observations made by nurses

	n=31		
Number of observations made	**Patient1, n (%)**	**Patient2, n (%)**	**Patient3, n (%)**
0	0(0.00)	0(0.00)	0(0.00)
1	3(9.70)	0(0.00)	1(3.20)
2	28(90.30)	31(100.00)	30(96.80)
Total	31(100.00)	31(100.00)	31(100.00)
P		0.1103	

4.3.2 Number of observations made by clinician

Clinicians were also observed while assessing three children separately. The results revealed that 50.00% of the clinicians did not attempt any of the listed 16 parameters required for this study for patient 1 while 78.60 % did not attempt for patient 2 and 57.10 % did not carry out assessment for the third patient. Results showed that 14.30 % managed to observe six criteria of the listed 16 as expected under this study for the third patient only (Table 4.3). The p value for the observations made by clinicians test is 0.0177 using G-G test (Table 4.3). Therefore, there was a difference in number of observations made by clinicians to patient 1, 2 and 3.

Table 4.3: Number of observations made by clinician

	n=14		
Number of observations made	**Patient1, n (%)**	**Patient2, n (%)**	**Patient3, n (%)**
0	7(50.00)	11(78.60)	8(57.10)
1	4(28.60)	1(7.10)	3(21.40)
2	2(14.30)	1(7.10)	1(7.10)
3	1(7.10)	1(7.10)	0(0.00)
6	0(0.00)	0(0.00)	2(14.30)
Total	14(100.00)	14(100.00)	14(100.00)
P value		0.0177	

4.3.3: Nurse observations

It was evident that nurses did not measure at all the MUAC and length/height of the sick children at the triage area. The results showed that 96.80 % of the nurses enquired and recorded the age for first patient and did the same for all the subsequent patients. Also, the nursing staff measured and recorded weight in 93.50 %, 100.00 % and 96.80 % for first, second and third patients respectively. Nurses measured and recorded age of the child in 96.80 %, 100.00 % and 100.00 % for patient 1, 2 and 3 respectively (Table 4.4).

Table 4.4: Nurse observation checklist

Checklist	n=31	n=31	n=31
	Patient 1, n(%)	**Patient 2, n(%)**	**Patient 3, n(%)**
Checked and recorded age of the child	30(96.8)	31(100)	31(100)
Took and recorded MUAC	0(0)	0(0)	0(0)
Took and recorded LENGTH/HEIGHT	0(0)	0(0)	0(0)
Took and recorded WEIGHT	29(93.5)	31(100)	30(96.8)

4.3.5 Clinician observation checklist

The results indicated that 35.70 %, 21.40 % and 35.70 % of the staff checked and examined for severe pallor for first, second and third patient respectively. Shape of the growth curve was checked by 14.30 %, 7.10 % and 7.10 % of the staff in the first, second and third patient, respectively. Presence of edema on both feet and/or sacrum were never checked for the first patient but checked by 7.10 % and 14.30% clinicians in the second and third patient respectively. As shown, the 14.30 % and 21.40 % of the clinicians asked the caregiver or checked the medical records for breastfeeding history, duration and frequency of diarrhea and vomiting of the first and third patients but none checked the second patient. From the observations, 7.10 % clinicians only asked the mother/caregiver or checked medical records for third patient for hair distribution, color and texture, birth weight and immunization history in the third patients however no examination for these parameters was done for the first and the second patients.

The results revealed that clinicians did not ask the caregiver at all if the patient had contact with people with measles or tuberculosis nor for any death siblings and loss of weight during the past month. They also did not measure the MUAC, weight and length or height, corneal lesions in the eye in all the patients. None of the clinician asked for usual diet before current episode of illness in all the patients (Table 4.5).

Table 4.5: Table on clinician observation checklist

Did the clinician Ask mother/caregiver or check the medical records for:	n=14 Patient 1	n=14 Patient 2	n=14 Patient 3
Breastfeeding history	2(14.30)	0(0.00)	1(7.10)
Usual diet before current episode of illness	0(0.00)	1(7.10)	2(14.30)
Duration and frequency of diarrhea and vomiting	2(14.30)	0(0.00)	3(21.40)
Contact with people with measles or tuberculosis	0(0.00)	0(0.00)	0(0.00)
Any deaths of siblings	0(0.00)	0(0.00)	0(0.00)
Birth weight	0(0.00)	0(0.00)	1(7.1)
Immunizations history	0(0.00)	0(0.00)	1(7.1)
Has the child lost weight during the past month	0(0.00)	0(0.00)	0(0.00)
Did the clinician LOOK and FEEL for:			
Weight and length or height	0(0.00)	0(0.00)	0(0.00)
Hair distribution, color and texture	0(0.00)	0(0.00)	1(7.10)
Severe pallor	5(35.7)	3(21.4)	5(35.70)
Eyes: corneal lesion indicative vitamin A deficiency	0(0.00)	0(0.00)	0(0.00)
Signs of severe visible wasting	0(0.00)	0(0.00)	0(0.00)
Presence of edema of both feet (and/or sacrum)	0(0.00)	1(7.1)	2(14.3)
MUAC	0(0.00)	0(0.00)	0(0.00)
Shape of the growth curve	2(14.30)	1(7.10)	1(7.10)

Fishers exact test was performed to assess association between health care cadre and performance of nutritional assessment. Study results revealed significant difference between cadre performance of nutritional assessment (p=0.028; Table 4.6). This suggests that there is a difference in performance of nutritional assessment by clinicians and nurses.

Table 4.6: Assessment of association between health care cadre and performance of nutritional assessment

Cadre	perform nutritional assessment		Total
	No	Yes	
Clinical officer	0	13	13
Pediatrician	0	1	1
Nurse	7	24	31
Total	7	38	45
P Value		0.028	

4.3.6 Inquiry on who feeds the child

The results showed that 44.44 % of the respondents always inquired on who feeds the child while 15.56 % rarely and 40.00 % often inquired on feeding care of the children (Figure 4.5).

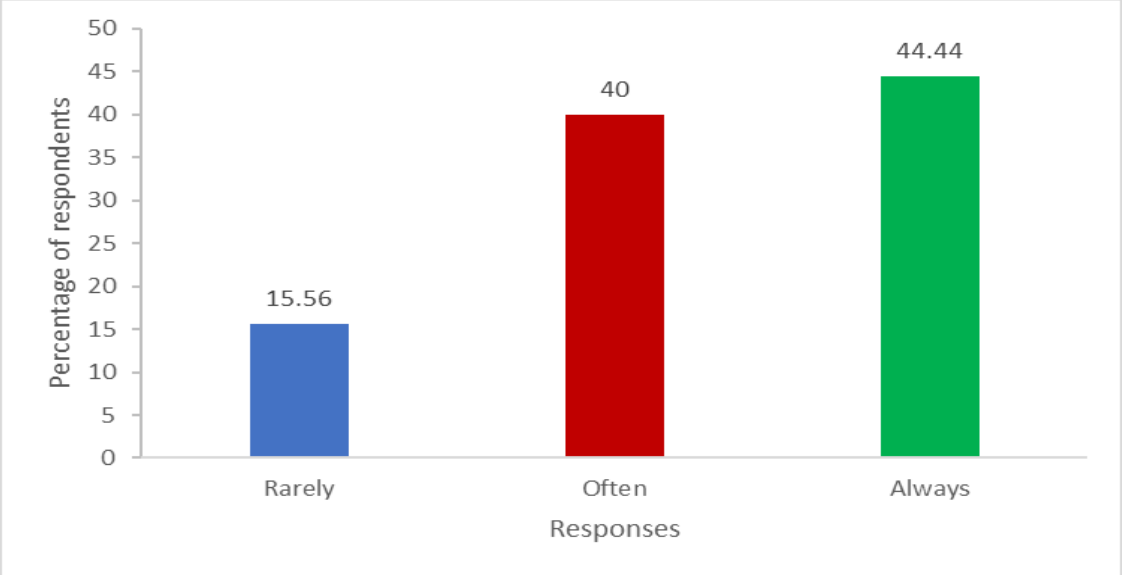

Figure 4.6: The frequency of inquiry by the health care worker on who feeds the child

4.3.7 Provision of counsel to caregivers by the health care workers

The results showed that 47.73 % of the respondents often counseled care-givers with regard to nutrition care of sick children while 40.91 % always counseled the caregiver but 11.36 % rarely did (Figure 4.7).

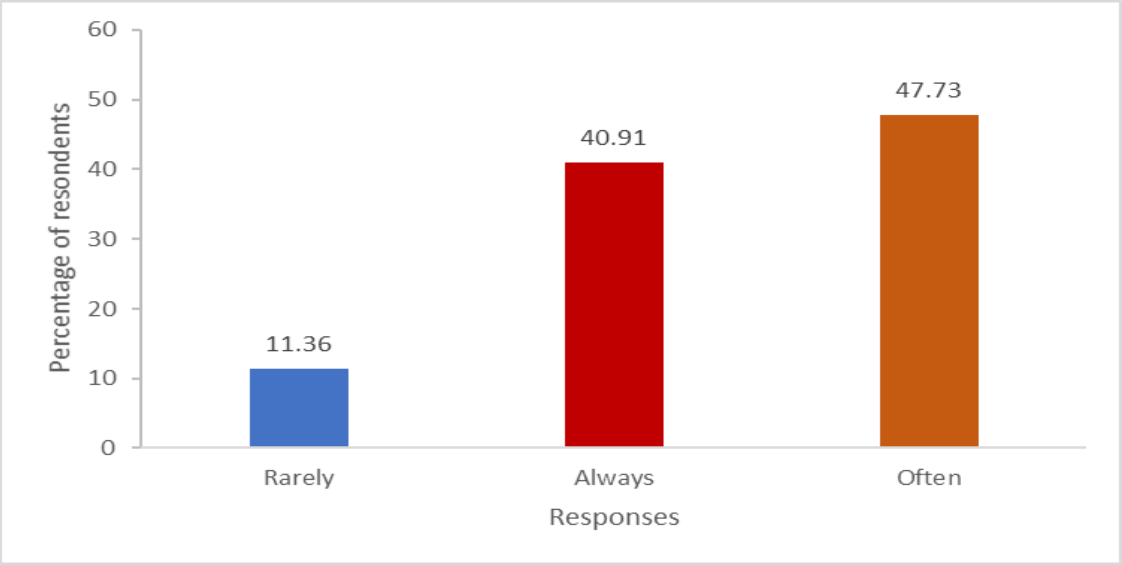

Figure 4.7: Counsel caregivers as regards nutrition in sick children

4.4 Perceptions of the health care workers on nutritional assessment of children at the Pediatric Emergency unit at KNH

4.4.1 Importance of nutritional assessment to pediatric emergency patients

The results showed that 98.00 % of the respondents agreed that nutritional assessment for pediatric emergency patients is important however 2.00 % dissented (Figure 4.8).

4.4.2 Benefits of nutritional assessment

As shown by the results, 40.00 %, 34.50 % and 34.00 % of the respondents reported that nutrition assessment is beneficial for early detection, proper children nutrition and

management of nutritional needs respectively. Further, 1.82 % of the respondents agreed that nutritional assessment guides on the type of drug to be administered (Figure 4.9).

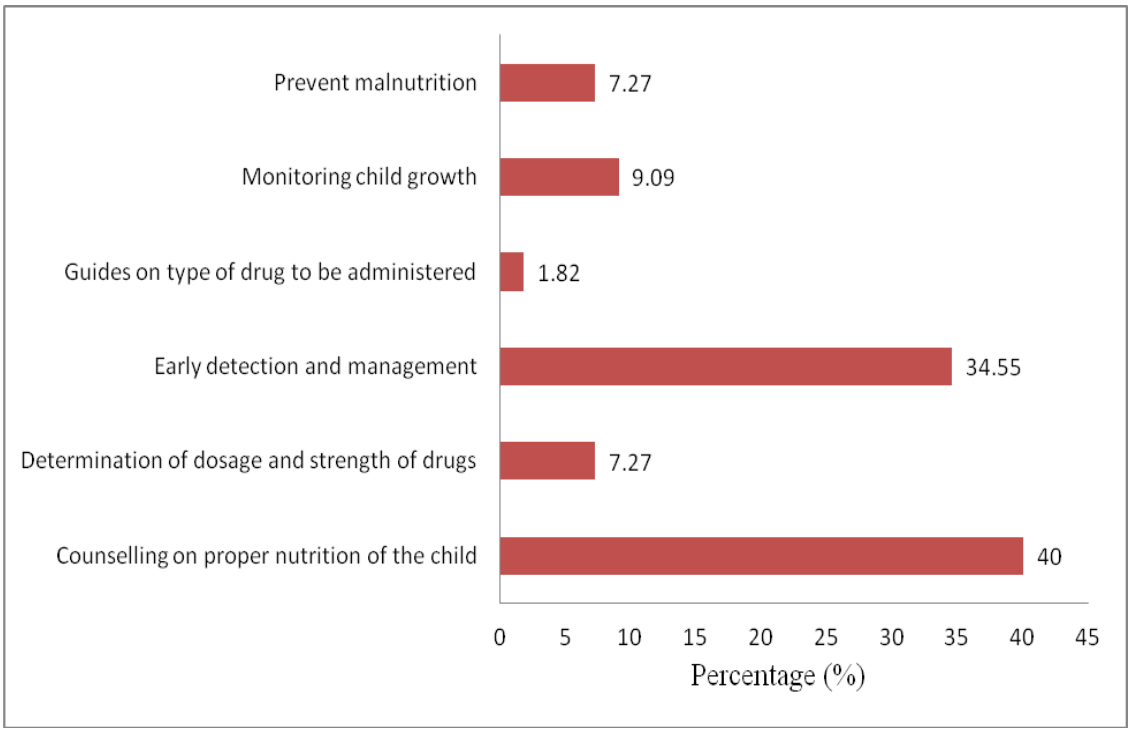

Figure 4.8: Benefits of nutritional assessment

Fishers exact test was performed to assess association between perception on importance of nutritional assessment and performance of nutritional assessment by healthcare workers. Study results showed no association between perception of importance of nutritional assessment and frequency of nutritional assessment by healthcare workers (p=0.844; Table 4.7). This suggests that the health workers perceived nutritional assessment important however this was not correlated with the poor performance observed.

Table 4.7: Test the associations of perceptions of the health care workers on nutritional assessment with the performance of nutritional assessment practices by healthcare workers

Nutritional assessment important	Perform nutritional assessment		Total
	No	Yes	
No	0	1	1
Yes	7	37	44
Total	7	38	45
P=Value	0.844		

4.5 Challenges associated with nutritional assessment at Pediatric Emergency Unit at KNH

4.5.1 Barriers to nutritional assessment at the Pediatric Emergency Unit at KNH

Heavy workload was reported by 23.19 % of the respondents as an obstacle to good nutritional assessment of sick children, followed by inadequate equipment and inadequate training of staff on nutritional assessment at 18.84 %. Non-functional equipment, language barrier and cultural practice were reported as barriers of nutrition assessment by 1.40% of the respondents (Figure 4.10).

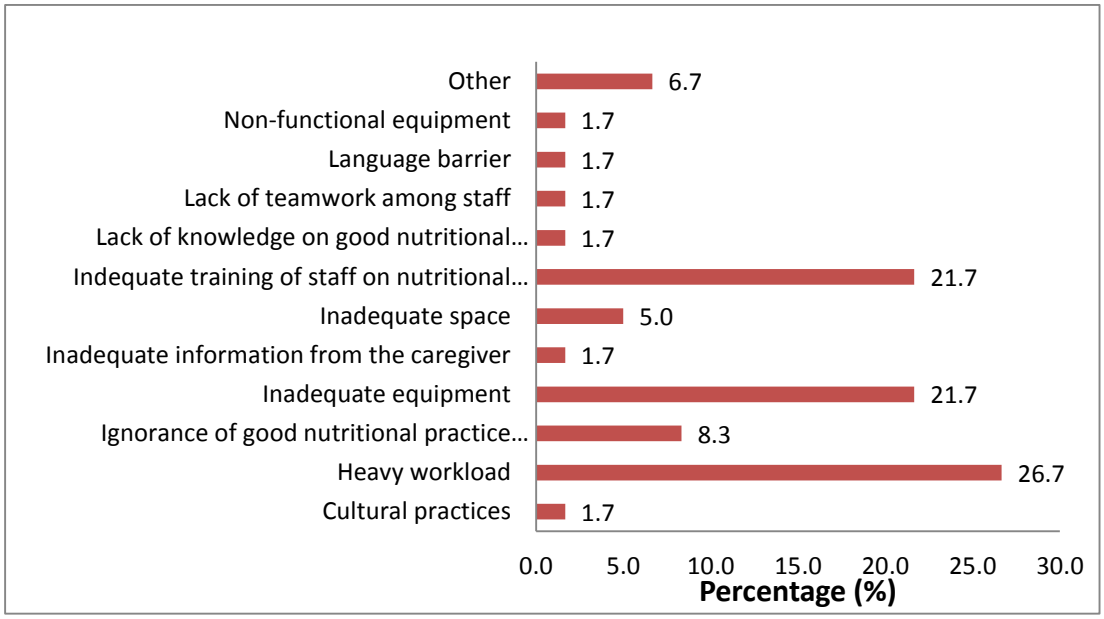

Figure 4.9: Barriers to good nutritional assessment

4.5.1.1 Availability of specific nutritional equipment

As indicated by the results 35.19 % and 33.33 % of the respondents had access to MUAC tape and weight scale respectively (Figure 4.12).

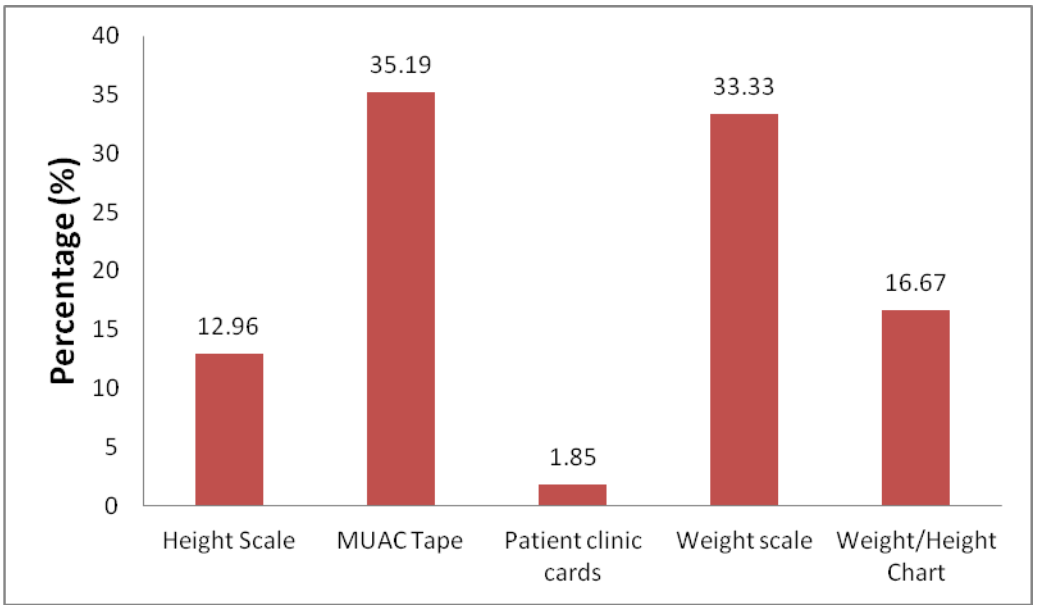

Figure 4.10: Availability of specific nutritional assessment equipment

4.5.1.2 Adequacy of nutritional assessment equipment

The results showed that 61.00 % of respondents reported that nutritional assessment equipment were not adequate (Figure 4.13).

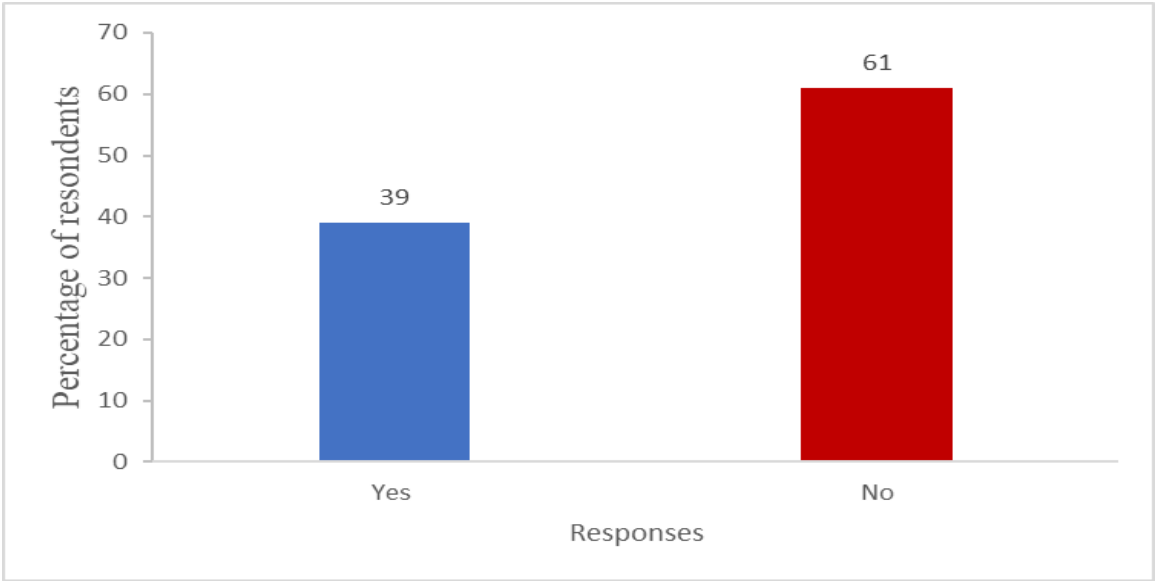

Figure 4.11: Adequacy of nutritional assessment equipment

Fishers exact test at 95% confidence interval was performed to assess association between accessibility of nutritional equipment and performance of nutritional assessment by healthcare workers. The results reveal an association between accessibility of nutritional equipment and performance of nutritional assessment by healthcare workers (p=0.034; Table 4.8).

Table 4.8: Test the association of availability of nutritional equipment with the performance of nutritional assessment practices by healthcare workers

Equipment access	Perform nutritional assessment		Total
	No	Yes	
No	4	6	10
Yes	3	32	35
Total	7	38	45
P Value	0.034		

Regression analysis was performed to understand the kind of relationship. Holding all other factors constant, healthcare workers who had access to equipment were 7.1 times more likely to perform nutritional assessment compared to healthcare workers who reported not having access to nutritional assessment equipment (Table 4.9). This is an indication that availability of the nutrition assessment equipment affects the performance of the assessment.

Table 4.9: Test the association of availability of nutritional equipment with the performance of nutritional assessment practices by healthcare workers

Nutritional assessment	Odds Ratio	Std. Err.	Z	P>z	[95% Conf. Interval]	
Access to equipment	7.111111	6.285394	2.22	0.026	1.257693	40.20689
_cons	1.5	0.968246	0.63	0.53	0.423295	5.315443

4.5.1.3.1 Adequacy of specific materials for nutritional assessment

For those who reported having access to material/guidelines on nutritional care of sick children, 34.62 % reported that the basic pediatric guidelines booklets were adequate whereas 3.85 % reported that IYCF handout-online were available. Among the respondents, 23.08 % reported that they had charts and books were adequate while 15.38 % reported that nutritional booklets and weighing machines were adequate (Figure 4.15).

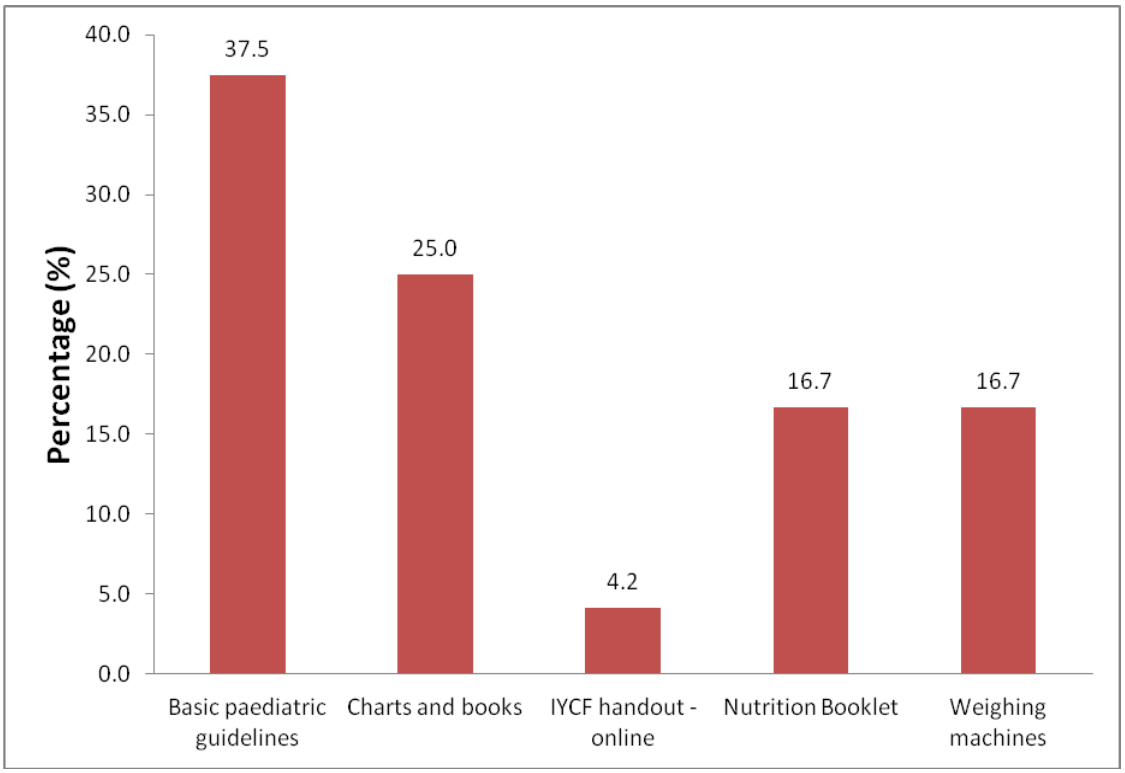

Figure 4.12: Adequacy of specific materials for nutritional care

4.5.1.4 Patient load at the PEU

The result indicated that, 48.00 % of respondents regarded patient load in the PEU as high while 41.00 % reported as very high and 9.00 % reported an average workload. Further, 2.00 % of the respondents reported that the patient load as fluctuating (Figure 4.16).

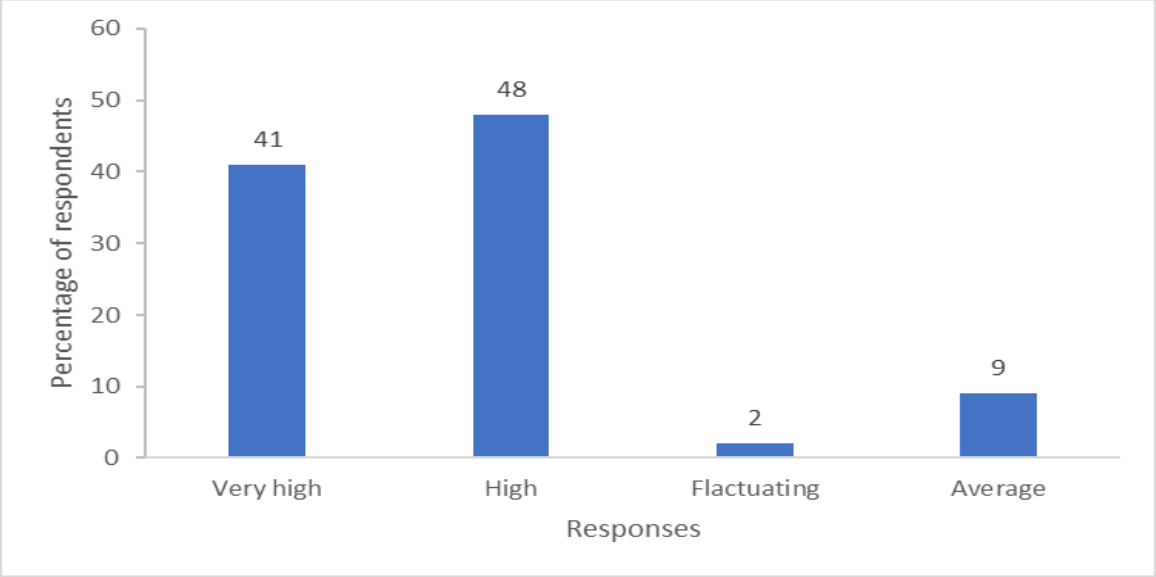

Figure 4.13: Patient load in Pediatric Emergency Unit

4.5.1.4.1: Effect of patient load on health workers' practice

Highest proportion of respondents, 71.74 % reported that patient load in the emergency unit reduce time spent per patient. Incomplete nutritional assessment 10.87 % was second most reported consequence of patient load (Figure 4.17).

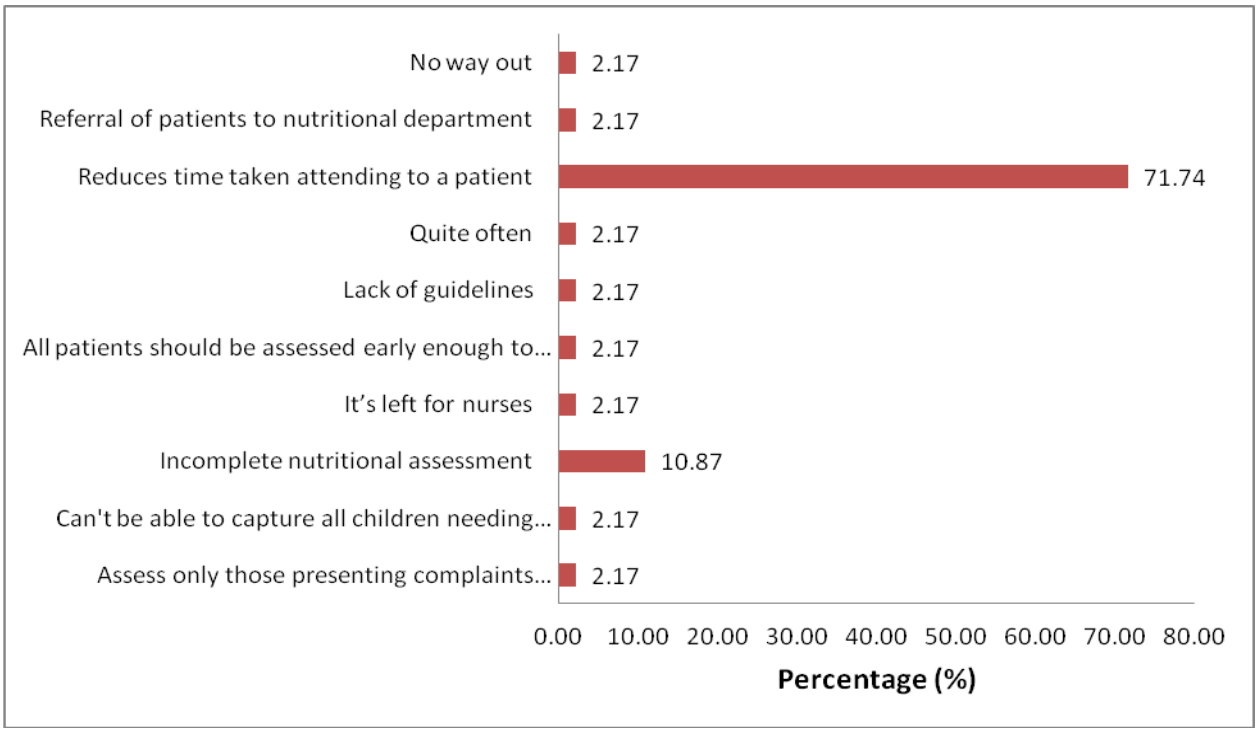

Figure 4.14: Effect of patient load on health workers' practice

Fishers exact test were performed to assess association between patient load and performance of nutritional assessment by healthcare workers. Study results reveal an association between patient load and performance of nutritional assessment by healthcare workers (p=0.004; Table 10). This is an indication that the health workers could be overwhelmed by the high work load at the unit.

Table 4.10: Test the association of Patient load at the PEU with the performance of nutritional assessment practices by healthcare workers

Patient load	perform nutritional assessment		Total
	No	Yes	
Moderate	1	6	7
High	6	32	38
Total	7	38	45
P			0.004

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The discussion was based on the data collected and analyzed from the respondents' in the pediatric emergency unit of Kenyatta national hospital. The conclusion and recommendations were made based on the findings from the study and previous studies that were reviewed.

5.2 Discussion

5.2.1 Health care workers' knowledge on nutritional assessment in the Pediatric Emergency Unit at KNH

There was significantly low level of knowledge on nutritional parameters to be evaluated during nutritional assessment among the health workers. Only 29.52 %, of the respondents had knowledge that weight loss and growth curve dropping downwards was an essential indicator for nutritional needs while 28.57 % of the health workers had knowledge that children failure to gain weight followed by flattening of growth curve indicated adverse nutritional needs. In this study, 12.38 % of the respondent had knowledge that change of caregivers and home circumstances had impact on nutritional status of a child. Such low levels of knowledge on nutritional assessment practices among health care workers have been reported previously. A study in Denmark observed that health workers including physicians and nurses had insufficient knowledge on nutritional assessment in pediatric clinics and Denmark (Mowe *et al.,* 2008). A study in Ghana, pediatric unit highlighted that the nurses knowledge on nutritional assessment was significantly low at 36.00 % (Mogre *et al.,* 2017). Further, a study conducted in Turkey observed that healthcare workers generally had low knowledge in assessment of nutritional. Many previous studies conducted worldwide colloborates the findings of this

study that health care practitioners have insufficient knowledge on nutritional assessment often lead to misdiagnosis (Yalcin *et al.,* 2013).

From the study findings, 35.71 % of the respondents had specific training on nutritional assessment of infant and young child feeding habits. Further, 7.14 % of the respondent had special training on various nutritional conditions such as marasmus, eating and breast feeding. It was highlighted that only 14 % of the respondents had indicated that they had college training on nutritional assessment. Previous studies have emphasized that medical schools do not provide sufficient training for health care workers in their curriculum (Yalcin *et al.,* 2013). In a study carried out in hospitals, health centres and dispensaries in Morogoro Urban district, Tanzania 53 % of the health workers had poor knowledge on nutritional assessment of children attending the hospitals (Moses, 2010). In a study conducted by Yalcin *et al.* (2013) in Ghana, only 0.3 % of the health practitioners had receive training through a workshop programme on pediatric nutrition assessment. On the other hand, 6.0 % of the practitioners explained that they had received their knowledge through reading academic journals (Yalcin *et al.,* 2013). In some studies health care workers have attested that nutrition assessment education was not taken serious in the medical schools (Yalcin *et al.,* 2013). Poor insufficient training regarding nutrition assessment is the core cause of poor identification of nutritional requirements for the patients. Health care practitioners working at pediatric unit have the primary role in nutritional assessment (Mowe *et al.,* 2008; Yalcin *et al.,* 2013). Therefore, adequate thorough training should be provided to the medical practitioners for effective assessment (Mowe *et al.,* 2008; Eide *et al.,* 2015).

A study conducted in Ethiopia highlighted that lack of training as major bottleneck for nutrition assessment of children (MOH, 2011). This may largely be attributed to lack of in-service training on the launch of the current guidelines and poor medical school training on nutritional assessment (Kamenwa, 2014; Badake, 2014). This highlights the importance of periodic training of the health care workers on nutritional assessment.

The knowledge on classification of nutritional status was assessed among the health care workers. Severe malnutrition was the most used indicator at 56.06 % followed by weight 15.15 % to classify children nutritional needs. Previous studies have also highlighted malnutrition as the main indicator of nutritional needs of children. A study carried out in Hawassa, Ethiopia indicated that 86 % of the health care workers used malnutrition chat to classify nutritional status of the children (Tafese and Shele, 2015). In Mbeere South Sub-County, Kenya, it was reported that malnutrition followed by height-for-age and weight-for-height was most frequently used parameter for classification of nutritional status of children (Badake, 2014). In Ntungamo district hospital, weight, MUAC and Height at 31 %, 18 % and 3 % respectively, were the most used indicators for most for nutritional classification (Nekatebeb *et al.,* 2013). In current study, 1.52 % of the respondents used wasting, height, weight and age for nutritional classification. However, a previous study has reported that about 88 % and 81 % health workers used weight and height/length respectively for assessment nutrition status (Kamenwa, 2014). The most used parameter for nutrition assessment in Kisoro District hospitals, Uganda included MUAC, Edema, pallor and weight at 100 % while height was the least used factor at 55 % (Nekatebeb *et al.,* 2013). In the health centers having pediatric units in the Southwestern Uganda, pallor was the most assessed at 100 % followed by edema, 96 % and weight, 93 % while length and MUAC at 32 % and 25 % respectively (Nekatebeb *et al.,* 2013).

Assessment of length or height in combination with weight provides the most accurate means of determining children nutritional status (UNAIDS, 2006). Well nourished children should gain weight and length/height parallel to the standard growth curve (UNAIDS, 2006). Flattening of growth curve that is not in parallel to chart line of the standard growth curve indicates that children have nutritional needs and require nutritional interventions. Therefore, ignoring these parameters would essentially mean that some of the children requiring nutritional inventions will missed in diagnosis (UNAIDS, 2006). Therefore, the pediatrics should be sensitized on the importance of analysis of all parameters required for pediatric nutritional assessment.

5.2.2 The frequency of performance of various nutritional assessment practices among healthcare workers

There was a high frequency in assessment of nutritional needs of the children by the nurses. The finding of the current study showed that 90.3 % of the nurses, 100 % and 96.8 % attempted two of the required 4 observations for the both first, second and third patients respectively as listed in the checklist. The current findings showed that 3.2 % of the nurses made only one observation out of the required 4 observations for all the patients. The high practice in performance of nutritional assessment indicated that despite the lack of knowledge among the health workers, there was willingness and acceptability of the nurses to perform their duties.

However, the frequency of performance of nutritional assessment by clinician was low. More than half of the clinicians did not attempt the listed 16 observations in this study. A higher number of 78.6 % did not attempt for the second patient and 57.1 % not attempting any for the third patient. In the current study, 14.3 % managed to observe six criteria of the listed 16 as expected under this study for the third patient only. This observation concurs with the finding of a research conducted in NuLife hospitals, Uganda which observed that nurses performed nutrition assessment at higher rate that clinician at the frequency of 83 % and 77 % respectively (Nekatebeb *et al.,* 2013). This infrequency of assessment in clinicians is alarming and could lead some of the patients being insufficiently diagnosed or not diagnosed at all. The findings of this study are agreeable with the observation of Moses (2010) who conducted a similar study at Morogoro urban district in Tanzania. The study found that nurses had a high frequency of 75 % in nutritional examination of children than the clinicians at 50 % (Moses, 2010). This infrequency of assessment is alarming and could lead some of the patients being insufficiently diagnosis. Clinician at the pediatric unit should be should be adequately sensitized to ensure thorough complete nutrition assessment of the children visiting the hospital.

During interviews, 25.44 % of the respondents reported that they checked weight while performing nutritional assessment, followed by MUAC at 22.81 % and height at 17 %. The head circumference and anemia were reported to be less frequently checked by 0.88 % of the health workers. However, this was not correlated in practice since it was evident from the patient records that nurses and clinicians did not check for MUAC and length/height. Shape of the growth curve was checked by 14.3 % of the clinicians. Presence of edema on both feet and/or sacrum was never checked for the first patient, was barely observed by 14 % of the clinicians. On the contrary, to a higher level, the health workers at the pediatric units in Southwestern Uganda, measured and recorded Height, weight and MUAC the frequency of 79.4 %, 73.5 % and 61.8 % respectively for all the patients examined (Nekatebeb *et al.,* 2013) compared to this study.

From the checklist, 7.1 % of the clinicians inquired from the mother/caregiver or checked for hair distribution, color and texture, birth weight and immunization history. The results showed that 96.8 % and 93.5 % of the nurses recorded the age and the weight respectively for the children. It is worth to note that frequency of checking the nutritional parameters such as shape of growth curve, odema and birth weight of children was very low among the health workers. The health workers never inquired the caregiver at if the children had any contact with people with measles or tuberculosis nor for any death siblings and loss of weight. Additionally, they did not check MUAC, weight and length or height, corneal lesions in the eye which are indicative of vitamin A deficiency among the children. Factors such as weight and height should be always checked since fluctuation in weight levels could be indicative of obesity or under-nutrition (Akugizibwe *et al.,* 2013; Kamenwa, 2014).

The findings of this study on the infrequency and insufficient nutrition assessment of children by health workers have been correlated elsewhere. A study carried out in Wakiso District in Uganda revealed that health workers did not weigh 24.9 % of the children, 86 % children had no height taken and 14.2 % had mid upper arm circumference measured (Akugizibwe *et al.*, 2013). The weight for height of 99.2 % and weight for age of 93 % children was not recorded. In this, 16.89 % and 17.78 % of the

health workers examined edema and muscle wasting respectively (Akugizibwe *et al.,* 2013).

Studies have highlighted that weight and height are excellent parameters to assessment of nutritional need of children. Weight and height should be determined routinely because in combination it provides the most accurate way of assessing child's nutritional status (Akugizibwe *et al.,* 2013). A study conducted in Nairobi County, Kenya, among the participants 88 %, 81 % and 60 % reported that weight, height/length and MUAC are essential indicators of nutritional status and should be regularly (Kamenwa, 2014). The study reported that despite the respondents stating that it essential to check MUAC only 7 % of the children had MUAC taken (Kamenwa, 2014). Measure of the mid-upper arm circumference is an essential way of screening children for malnutrition and facilitates identification children at high risk of mortality (Bliss *et al.,* 2018; Nowak-Szczepanska *et al.,* 2019). When children become undernourished they lose muscle, lose fat reserves. Severe growth failure and high loss of muscle in children indicates high risk of mortality (Bliss *et al.,* 2018; Nowak-Szczepanska *et al.,* 2019).

In the current study, 44.44 % of the respondents always inquired on who feeds the child as the caregiver while a 15.56 % rarely and 40 % often inquired. A different study carried out at Kenyatta National Hospital indicted that 60 % of the health workers did not always inquire from the caregivers who feeds the children hence they did not view it as important (Kamenwa, 2014). However, changes in care givers can significantly affect nutritional status of a child. Children depend on other people to provide food and feed them. Therefore, it is important to identify the change in caregiver in assessment of children with the risk of nutrition needs. When the primary person feeding the child is identified he/she can be provided with the relevant nutritional advice hence benefiting the child's feeding regimen (Dak, 2010; Kamenwa, 2014).

The results of this study indicated that 47.73 % of the respondents often gave nutritional advice to care-givers while 40.91 % always and 11.36 % rarely did. However, a study conducted at Morogoro Urban District Hospital in Tanzania by Moses (2010) reported

lower number of respondents providing nutrition advice. In the study, 17 % of the respondents always gave nutritional advice while only 28 % of the respondents often and 53 % rarely gave nutritional advice to the caregivers (Moses, 2010). A study conducted to determine infant feeding practices, among Somali mothers living in Oslo indicated that the health workers rarely provided nutritional counseling to the mothers and when it was provided it was poor and unhelpful (Lyngstad, 2014). Additionally, a study conducted in antenatal care in Norway, health care workers rarely provided nutrition-related information to the mothers visiting the clinic (Garnweidner *et al.*, 2013). Performance of nutritional counseling at health care centers in Southwestern Uganda was also reported to be generally low with over 75 % of the health workers not providing advice (Nekatebeb *et al.,* 2013).

Health care workers at the pediatric unit are considered the most reliable source of information for nutritional advice to children caregivers. Nutrition counseling has been linked to positive nutritional outcomes of sick children with nutritional needs (Beldon and Crozier, 2005; Lee *et al.*, 2012; Lyngstad, 2014). In spite of this awareness, the provision of nutritional advice is a neglected practice by health care workers (Arrish *et al.,* 2016). Therefore, health care providers should discuss and offer nutritional advice base on the nutritional status of the child at every opportunity during nutrition assessments. Normally low performance of nutritional counseling is usually associated with shortage of time, inadequate training, lack of awareness, low availability the tools and lack of interest or willingness to provide counsel (Nekatebeb *et al.,* 2013; Mogre *et al.,* 2015). Therefore, it's essential to organize for ongoing mentoring and coaching services for the health workers so as to improve the quality of nutrition counseling.

5.2.3 Perceptions of the health care workers on nutritional assessment of children at the Pediatric Emergency unit at KNH

The current study findings showed that 98.00 % of respondents agreed that nutritional assessment for pediatric emergency patients is important but 2.00 % dissented. This result is similar to the findings of a study conducted in Hawassa, Ethiopia, which

reported that 86 % of the study participants believed nutritional assessment for children attending the pediatric clinics was important. In the same study, 65 % of the respondents reported that every child should undergo nutritional assessment every time they are being attended to by the health workers **(**Tafese and Shele, 2015). In the current study, it was observed that 40 % and 34.5 % of the respondents pointed out that nutrition assessment is beneficial for early detection and proper children nutrition, respectively, while 34% reported that nutritional assessment is important for management of nutritional needs. Tafese and Shele (2015) reported that 59 % of the respondents believed that early assessment and prioritization for management of children with nutritional need was critical to achieving good health outcomes. However, some studies have reported that some respondents (55 %) did not believe that it's a routine to check the nutritional status of every child at the pediatric clinic (Tafese and Shele, 2015). Elsewhere, it has been reported that some health care workers are not interested in carrying out nutritional assessment of children because they perceived it not important (Eide *et al.,* 2015), however, in the current study most of health care workers considered nutritional assessment of children to be important. It is worth to note that early detection and appropriate management of nutritional problems among children so as to provide quality health care is essential (Hoque *et al.,* 2012).

5.2.4 Challenges associated with the health care workers on nutritional assessment at Pediatric Emergency Unit at KNH

In the present study, 77.27 % had access to equipment for performing pediatric nutritional assessment while 22.73 % did not have access. On the contrary a study conducted in Wakiso District hospital, Uganda reported that only 40 % of the respondents had access to nutritional assessment tools (Akugizibwe *et al.,* 2013). In the present study 35.19 %, 33.33 %, 16.67 % and 12.96 % of the respondents noted that they had access to MUAC tape, weight scale, height scale and height chart, respectively. In a study carried out in Morogoro District hospital, Tanzania, weighing scale was the most accessible tool at 69 %while height meter and Mid Upper Arm Circumference (MUAC) tapes were available to 20 % and 3 % of the respondents, respectively (Moses, 2010).

On the other hand, in Wakiso district, Uganda 60 % of the respondents had access to mid upper arm circumference (MUAC) tapes and height boards (Akugizibwe *et al.,* 2013).

Despite accessibility of the nutritional assessment equipment, 61.00 % of respondents reported that they were not adequate. In the present study, 18.00 % of the respondents reported that inadequacy of the equipment hindered effective nutritional assessment. It has previously been noted that inadequacy of equipment hampers proper complete nutritional assessment (Akugizibwe *et al.,* 2013). This could be the reason for the infrequency of the nutritional assessment practice observed in the study.

In the current study, 58.00 % of the health worker did not have access to reference guidelines for nutritional assessment however 42.00 % reported having access to IYCF handout-outline, chats and nutritional information booklets. However, the study carried out in Wakiso district, Uganda reported all the pediatric units under the study did not have the nutritional assessment guidelines **(**Akugizibwe *et al.,* 2013). The health workers reported that they had no access any reference materials to guide them during nutritional assessment and counseling (Akugizibwe *et al.,* 2013). It was noted that availability of nutrition guidelines and references materials was also below 50.00 % in pediatric units at pediatric units in Ntungamo and Kisoro districts, Uganda (Nekatebeb *et al.,* 2013). This low level of nutritional reference material leads to poor knowledge on nutritional assessment and obviously poor and lack of nutritional counseling to children care givers (Mogre *et al.,* 2015).

Heavy workload (23.19 %) was identified as the biggest challenge to effective nutritional assessment, followed by inadequate equipment and inadequate training of staff on nutritional assessment at 18.84%. A higher population of respondents (39 %) felt that they lacked enough training for nutrition assessment (Moses, 2010). Further, it was observed by 71.74 % of the respondents that heavy patient load reduced time spent per patients during nutritional assessment which ultimately led to insufficient and incomplete diagnosis. This has been observed elsewhere. In Morogoro, Tanzania, 45 %

of the respondents reported that time was not enough to carry out sufficient nutrition assessment per patient due to high work load (Moses, 2010). Heavy work load has been highlighted as major reason for incomplete and misdiagnosis. This can be attributed to low workforce that is a characteristic of many of health care units globally, especially in third world (Moses, 2010; Akugizibwe *et al.,* 2014).

5.3 Conclusion

The study concludes that:

1. Healthcare providers have insufficient knowledge on nutritional assessment at PEU, KNH.
2. There is inadequate and incomplete nutritional assessment of children attending the pediatric unit at Kenyatta National Hospital. There is also low-level availability of reference and guide materials for nutritional assessment. The study also concluded that the health care workers are not giving nutritional counsel to the children caregivers.
3. Despite the lack of knowledge, inadequacy of equipment and challenges of heavy work load the health workers had positive attitude towards nutritional assessment.
4. Key challenges hindering effective nutritional assessment include heavy work load and lack of adequate equipment as observed at the pediatric unit.

5.4 Recommendations from the study

From the findings of this study, its following interventions are recommended to the stakeholders; Ministry of Health and Management of Pediatric Unit, Kenyatta National Hospital;

1. To improve knowledge of health care workers on nutrition and techniques of nutritional assessment, continuous medical education programme should be conducted.

2. To improve the frequency of performance of nutritional assessment, periodic sensitization of the health workers should be carried out to emphasize on importance of adequate and complete nutritional assessment.
3. Health worker should be continuously encouraged on carrying out nutritional assessment so as to maintain and improve their perceptions.
4. To alleviate the challenges experienced at the unit, additional equipment are required to improve on the adequacy hence increased practice and complete assessment. Additionally, boosting of health work force by hiring more human resource could help reduce the work load at the pediatric unit.

5.5 Recommendation for further research

It is recommended that further research can be done to ascertain the quality of nutritional assessment given to the patients attending the Pediatric Emergency Unit of other health facilities in Kenya

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APPENDICES

Appendix I: Test for practices by nurses and clinicians

```
                    Number of obs =      93     R-squared     =  0.5169
                    Root MSE      = .175569     Adj R-squared =  0.2592
```

Source	Partial SS	df	MS	F	Prob > F
Model	1.97849462	32	.061827957	2.01	0.0100
Serial_no	1.82795699	30	.0609319	1.98	0.0125
serial	.150537634	2	.075268817	2.44	0.0956
Residual	1.84946237	60	.030824373		
Total	3.82795699	92	.041608228		

```
Between-subjects error term:  Serial_no
                     Levels:  31        (30 df)
     Lowest b.s.e. variable:  Serial_no

Repeated variable: serial
                                    Huynh-Feldt epsilon        =  0.8055
                                    Greenhouse-Geisser epsilon =  0.7717
                                    Box's conservative epsilon =  0.5000
```

			Prob > F			
Source	df	F	Regular	H-F	G-G	Box
serial	2	2.44	0.0956	0.1080	0.1103	0.1286
Residual	60					

Appendix II: Test for independent samples-clinicians for the patients

```
                    Number of obs =      42     R-squared     =  0.6184
                    Root MSE      =  1.1266     Adj R-squared =  0.3982
```

Source	Partial SS	df	MS	F	Prob > F
Model	53.4761905	15	3.56507937	2.81	0.0101
Serial_no	49.1428571	13	3.78021978	2.98	0.0086
serial	4.33333333	2	2.16666667	1.71	0.2011
Residual	33	26	1.26923077		
Total	86.4761905	41	2.10917538		

```
Between-subjects error term:  Serial_no
                     Levels:  14        (13 df)
     Lowest b.s.e. variable:  Serial_no

Repeated variable: serial
                                    Huynh-Feldt epsilon        =  0.9136
                                    Greenhouse-Geisser epsilon =  0.8136
                                    Box's conservative epsilon =  0.5000
```

			Prob > F			
Source	df	F	Regular	H-F	G-G	Box
serial	2	1.71	0.2011	0.2043	0.2077	0.2140
Residual	26					

Appendix III: Questionnaire to be issued to healthcare workers

Nutritional assessment practices among health care workers at the pediatric emergency unit, Kenyatta national hospital.

Principal Investigator: Nelly Temoi Ndiema

MSc Public Health Student

Jomo Kenyatta University of Agriculture and Technology

Mobile No.: 0721 789145

Instructions: Kindly tick or write down the appropriate answers on the space provided

QUESTIONNAIRE TO BE ISSUED TO HEALTHCARE WORKERS

Date: ---------- **Serial no.----------**

Title: Nutritional assessment practices among health care workers at the paediatric emergency unit, Kenyatta national hospital.

Principal Investigator: Nelly Temoi Ndiema

MSc Public Health Student

Jomo Kenyatta University of Agriculture and Technology

Instructions: Kindly tick or write down the appropriate answers on the space provided

Section A: Socio-demographic

1. What is your age

18 – 25 [ ]

26 – 30 [ ]

31 – 35 [ ]

36 – 40 [ ]

40 and above [ ]

2. What is your sex

Male [ ] Female [ ]

3. Education level

Certificate [ ] Diploma [ ] Degree [ ] Masters [ ]

PHD [ ]

4. Cadre …….. ……..
5. Designation …….
6. Which year did you finish your basic training ……

Section B: Knowledge

7. What physical parameters do you look for when performing nutritional assessment on sick children?

……

8. What is the classification of nutritional status of sick children?

a. Severe malnutrition b. Poor weight gain c. Growing appropriately d. I don't' know

9. As regards increased nutritional needs, the following are/is true:

a) Mother reports that her child is failing to gain weight.
b) The child has had a poor appetite recently.
c) The child is not gaining weight and his/her growth curve is flattening.
d) The child is losing weight and the growth curve is dropping downwards.
e) Changes in caregiver or home circumstances.

10. What are the physical parameters useful in assessing the Nutritional Status of an infected Child?
11. Have you had any training on the nutritional care of infected children?
    a. Yes
    b. No
12. If yes, Specify ----------
13. How often do you classify infected children based on nutritional status?
    a. Always[ ]
    b. Often [ ]
    c. Rarely [ ]

Section C: Practices

14. Do you ever do nutritional assessments for patients you attend to in the clinic?

Yes [ ] No [ ]

15. If yes, how often do you do the assessments …….
16. If no, why don't you do the nutritional assessment ……
17. How often do you inquire on who feeds the child?

    a) Always [ ]

b) Often [ ]
c) Rarely [ ]

18. How often do you counsel care givers as regards nutrition in sick children?

a) Always [ ]
b) Often [ ]
c) Rarely [ ]

Section D: Factors associated with nutritional assessment practices

19. Do you have access to any material/guidelines in the nutritional care of sick children?

Yes [ ] No [ ]

If Yes, specify……

20. Do you have access to any equipment used for performing pediatric nutritional assessment?

Yes [ ] No [ ]

If Yes specify…….

21. Do you think the equipmentare enough to enable you do the nutritional assessment?

Yes [ ] No [ ]

22. Do you think the nutritional assessment is important for the pediatric emergency patients?

Yes [ ] No [ ]

23. If yes, what do you think are the benefits of nutritional assessment

……

24. What are the barriers to good nutritional assessment of sick children?

……

25. What challenges do you encounter when performing pediatric nutritional assessment……
……?
26. How is the patient load in the pediatric emergency unit?

---

27. How does it affect your nutritional assessment practice?

THE END

THANK YOU

Appendix IV: Observation checklist

Nutritional assessment practices among health care workers at the paediatric emergency unit, Kenyatta national hospital.

Principal Investigator: Nelly Temoi Ndiema

MSc Public Health Student

Jomo Kenyatta University of Agriculture and Technology

Mobile No.: 0721 789145

This checklist is to be filled by the principal investigator as she watches the health workers when they are treating the patients.

Date:

SECTION 1: TRIAGE

Observe/ Check through the medical records for the following:

1. Was the age of the child recorded?

Yes [ ] No [ ]

2. Was the MUAC taken/ recorded?

Yes [ ] No [ ]

3. Was the LENGTH/HEIGHT taken/ recorded?

Yes [ ] No [ ]

4. Was the WEIGHT taken/recorded?

Yes [ ] No [ ]

5. Any immediate action?

Yes [ ] No [ ]

If yes, what was the action taken?.....

.....

.....

.....

SECTION 2: CLINICIAN ASSESSMENT

A: Did the clinician Ask mother/caregiver (or check the medical records) for the following:

1. Breastfeeding history?

Yes [ ] No [ ]

2. Usual diet before current episode of illness?

Yes [ ] No [ ]

3. Duration and frequency of diarrhea and vomiting?

Yes [ ] No [ ]

4. Contact with people with measles or tuberculosis?

Yes [ ] No [ ]

5. Any deaths of siblings?

Yes [ ] No [ ]

6. Birth weight?

Yes [ ] No [ ]

7. Immunizations history?

Yes [ ] No [ ]

8. Has the child lost weight during the past month?

Yes [ ] No [ ]

B: Did the clinician LOOK and FEEL for the following:

1. Weight and length or height

Yes [ ] No [ ]

If Yes what was the comment.....

.....

.....

.....

2. Hair distribution, color and texture

Yes [ ] No [ ]

3. Severe pallor

Yes [ ] No [ ]

4. Eyes: corneal lesion indicative vitamin A deficiency

Yes [ ] No [ ]

5. Signs of severe visible wasting (loss of muscle bulk, sagging skin/buttocks)

Yes [ ] No [ ]

If yes, what was the comment? .....

.....

.....

.....

6. Presence of oedema of both feet (and/or sacrum)

Yes [ ] No [ ]

If yes, what was the comment? .....

.....

.....

.....

7. MUAC

Yes [ ] No [ ]

If yes, what was the comment? .....

.....

.....

.....

8. Shape of the growth curve

Yes [ ] No [ ]

If yes, what was the comment?

Appendix V: Healthcare worker informed consent form

Nutritional assessment practices among health care workers at the paediatric emergency unit, Kenyatta national hospital.

Principal Investigator: Nelly TemoiNdiema

MSc Public Health Student

Jomo Kenyatta University of Agriculture and Technology

Mobile No.: 0721 789145

I am Ms. Nelly TemoiNdiema and am doing a postgraduate degree in public health. I am undertaking a study titled 'Nutritional assessment practices among healthcare workers at the paediatric emergency unit, Kenyatta National Hospital,' as partial fulfillment for the award of masters of public health degree.

What you should know about this research study:

We give you this consent so that you may read about the purpose, risks and benefits of this research study. The main goal of research studies is to gain knowledge that may help future healthcare works and policy makers to come up with evidence based strategies to improve on nutritional assessment at the Kenyatta National Hospital.

Please review this consent form carefully.

We want you to ask as many questions as you like before you make a decision. Your participation is voluntary.

This study has been approved by the Kenyatta National Hospital Research and Ethical Committee and complies with the international Good Clinical Practice Guideline.

PURPOSE

You are being asked to participate in a research study that will identify the practices of health workers on nutritional assessment. The purpose of the study is to measure the gaps in service delivery so that the needs of the children can be better met. You were selected as a possible participant in this study because you are involved in providing treatment to children and we need your help in measuring the extent to which nutritional assessment is being done in your organization.

PROCEDURE AND DURATION

The data will be collected using a questionnaire issued to the health care workers, observation of practice and a review of medical records.

If you decide to participate, you will undergo completion of one time 3 page questionnaire, which will take approximately 10 minutes.

RISKS AND DISCOMFORTS

No risks or discomforts are anticipated in completing this questionnaire except for the time needed to complete the document, which may interfere with your other planned schedules.

BENEFIT AND/OR COMPENSATION

It is envisioned that this study will benefit the children and the health workers as it offers an opportunity to identify and document the gaps in nutritional assessment by the health workers. No compensation is available for participation in this study nor are there any charges to participation. I will be happy to provide you with a copy of the results of this research on your request.

CONFIDENTIALITY

If you are willing to participate in this study by signing this document, we plan to disclose only aggregate results to the Jomo Kenyatta University, Kenyatta National Hospital research and ethics committee, Institutional research review bodies, conference presentations and to publish the results in a peer-review journal.

PLEASENOTE: Your name will not appear neither in the aggregate results going to the above, institutions nor in the peer review journal mentioned above.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you decide to participate and wish to withdraw from the study, you are allowed to do so at any point of the study without any consequences whatsoever.

OFFER TO ANSWER QUESTIONS

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think over. Any queries about the study can be directed to principal investigator.

AUTHORIZATION

You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered and have decided to participate.

ETHICAL REVIEW

Please contact Kenyatta National Hospital Research and Ethical Committee for any human right and ethics queries. KNH/UON Ethics Committee, P.O. Box 20723 – 00202 Nairobi, Tel: 020725272.

I confirm that:

Having read and been explained about this study, I am happy to voluntarily participate in this study and have my practice observed by the principal investigator.

Sign: _____ Date _____/_____/_____

Signature of person taking consent

Sign: _____ Date ____/_____/_____

Signature of investigator

INVESTIGATOR'S

NAME: NELLY TEMOI NDIEMA

MOBILE NO: 0721789145

YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP

Appendix VI: Guardian/parent informed consent form

Nutritional assessment practices among health care workers at the paediatric emergency unit, Kenyatta national hospital.

Principal Investigator: Nelly Temoi Ndiema

MSc Public Health Student

Jomo Kenyatta University of Agriculture and Technology

Mobile No.: 0721 789145

Researcher statement

Infection and malnutrition are interlinked both epidemiologically and psychologically. The synergistic effects of malnutrition and infection occur in a vicious cycle leading to a decrease in immunity. Malnutrition increases susceptability to infections which later leads to more malnutrition. As a result, there has been a development and implementation of national guidelines on how best to offer nutritional assessment and care to sick children.

Purpose of the study

The purpose of this study is to evaluate the practices of healthcare workers regarding the nutritional assessment of sick children at the paediatric emergency unit, Kenyatta National Hospital. Given that the prevalence of malnutrition remains relatively unchanged in sick children despite implementation of these guidelines.

Risks and benefits

There are no known risks to your child. The benefits that may arise from the study will translate to better quality of health care as any deficient aspects will be highlighted.

If you have any question regarding the study, you can contact the above named persons or the Kenyatta National Hospital Ethics and Scientific committee Tel 2726300

Declaration

I,_____of_____has understood the study aim and procedures and do hereby give permission for my child to participate in this study.

Signed_____Date_____

Relationship to child (Parent/Guardian)_____

Signed(Witnesses)_____

Appendix VII: Kibali na kielelezo kwa wazazi kushiriki katika utafiti

SWALA KUU LA UTAFITI

Kuchunguza ujuzi nautendaji kazi wa wauguzi katika Hospitali Kuuya Kenyatta kuhusu uchunguzi wa lishe bora ya watoto wanaoletwa hospitali wakiuguwa.

Mpelelezimkuu: Nelly TemoiNdiema

Mwanafunzikatikachuokikuu cha Kilimo

Ujumbemfupikutokamchunguzimkuu

Kuzorotakwaafyakunauhusianowakaribunautapiamlohivyobasikupunguzakingayamwili. Vilevile, afyaduniinachangiakatikakupunguzauwezowamwilikupambananamagonjwa. Kwasababuhii, nimuhimukuhakikishakuwaswala la lishe bora linapataumuhimuwakatimtotoyeyoteanayeuguaanapopewamatibabu. Kwaminajiliyakuhakikishakwambamaswalayalishe bora nauchunguzi wake yanazingatiwa, vielelezokwawauguzivimechapishwakuhakikishamaswalahayayanazingatiwakilamtotoa napohudumiwahospitali.

Umuhimu

Umuhimuwautafitihuunikuwezakutambuaujuziambaowauguzikatikahospitalikuuya Kenyatta walionaokuhusulishe bora kwawatotowanaouguawa.

Madharayamanufaayakushiriki

Hakunamadharayoyoteambayoyatatokananautafitihuukwaafyayamtotowako. UmuhimuwautafitihuunikuimarishamatibabuyanayopatikanakatikaHospitaliKuuya Kenyatta.

Baadayautafitihakunamalipoutakayopatabalishukranikwakukubalikushirikikatikautafitihuu.

Mimi,_____ nimeelewamaananajinsiutafitihuuutakavyofanywananimepatianaidhiniyamtotowangu/mtotoninayemsimamiakushiriki.

Sahihi_____ Tarehe_____

Sahihi (Shahidi)_____

Appendix VIII: Research assistant confidentiality form

Nutritional assessment practices among health care workers at the paediatric emergency unit, Kenyatta national hospital.

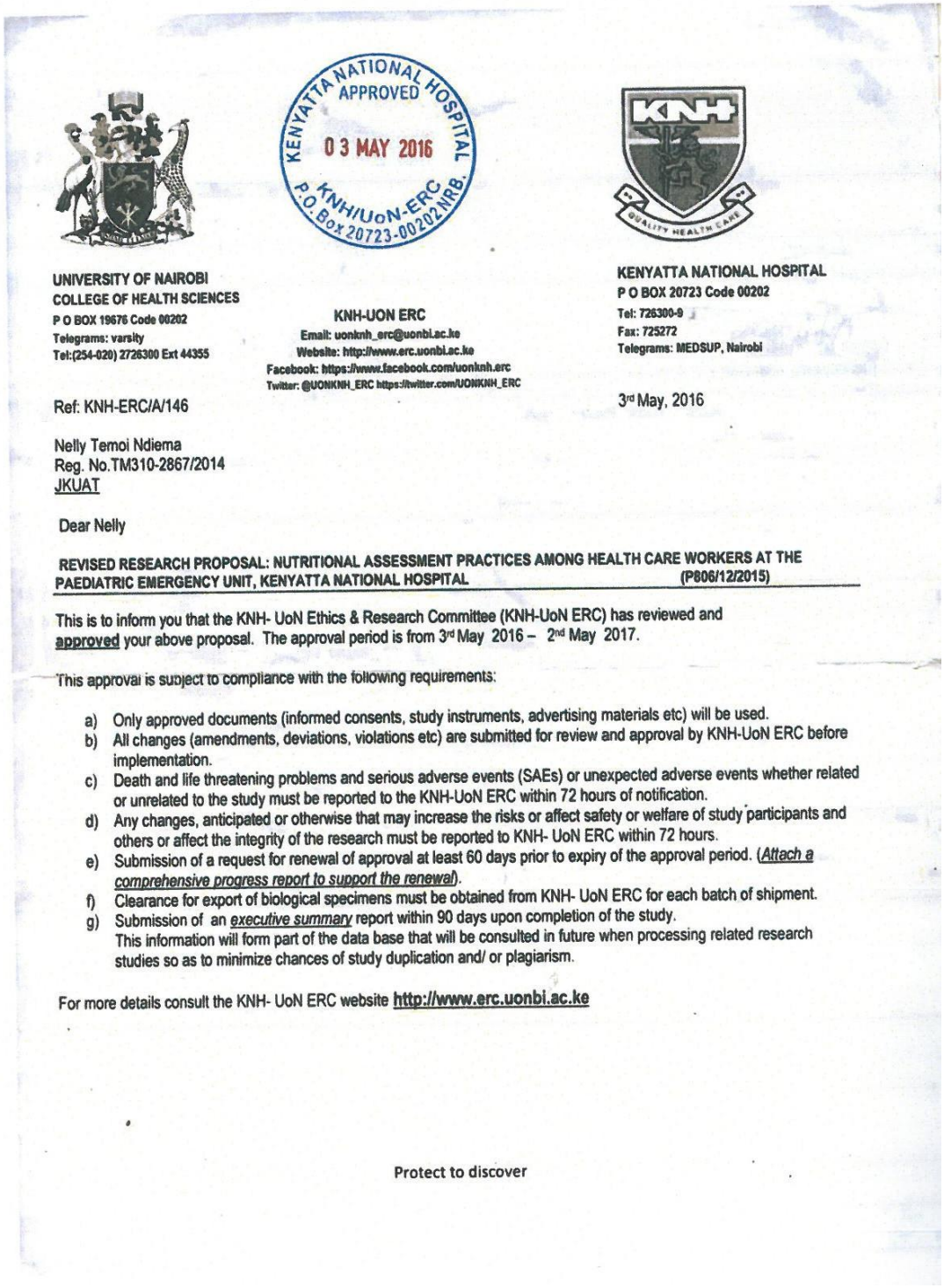
Principal Investigator: Nelly Temoi Ndiema

MSc Public Health Student

Jomo Kenyatta University of Agriculture and Technology

Mobile No.: 0721 789145

Appendix IX: Approval from ethics and research committee



KENYATTA NATIONAL HOSPITAL APPROVED 03 MAY 2016 KNH/UoN-ERC P.O. Box 20723-00202 NRB.

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Ref: KNH-ERC/A/146

3rd May, 2016

Nelly Temoi Ndiema
Reg. No.TM310-2867/2014
JKUAT

Dear Nelly

REVISED RESEARCH PROPOSAL: NUTRITIONAL ASSESSMENT PRACTICES AMONG HEALTH CARE WORKERS AT THE PAEDIATRIC EMERGENCY UNIT, KENYATTA NATIONAL HOSPITAL (P806/12/2015)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH-UoN ERC) has reviewed and approved your above proposal. The approval period is from 3rd May 2016 – 2nd May 2017.

This approval is subject to compliance with the following requirements:

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

For more details consult the KNH- UoN ERC website **http://www.erc.uonbi.ac.ke**

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Yours sincerely,

PROF M.L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Deputy Director, CS, KNH
The Assistant Director, Health Information, KNH
The Chair, KNH- UoN ERC
Supervisors: Dr.Drusilla Makworo, Dr.Joseph Mutai

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