PREVALENCE, DETECTION AND MANAGEMENT OF MALNUTRITION AMONG MEDICAL WARDS ADULT IN-PATIENTS OF RIFT VALLEY PROVINCIAL GENERAL HOSPITAL, NAKURU COUNTY, KENYA

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DECLARATION

The thesis here in is my original work and has not been presented for the award of a degree in any university.

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We confirm that the work reported in this thesis was carried out by the candidate and was submitted with our approval as University Supervisors.

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DEDICATION

I dedicate this to my uncle the late John Ng’ang’a. Your sacrifices to our family education cannot go unnoticed.

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ABSTRACT

Malnutrition in patients has been associated with reduction in function of every part of the body organs. In hospitalized patients malnutrition contributes to high treatment costs, increased length of stay, secondary infections and deaths**.** Failure to follow nutrition guidelines and poor documentation by dietician, nurses and other healthcare professionals may contribute to malnutrition and related complications. This study assessed prevalence and management of adult malnutrition among in-patients in general medical wards of Rift Valley Provincial General Hospital, Nakuru County. The study employed a cross sectional study design with both quantitative and qualitative techniques targeting adult patients in the general medical wards and health care workers. Primary data was gathered using researcher administered questionnaires, 24 hour dietary recall, observation checklist/guides and Malnutrition Universal Screening Tools (MUST). Patients' records were used to gather secondary data on implementation of Standard Operating Procedures (SOPs) in nutrition management**.** Key informant interviews were used to gather qualitative data. **S**tatistical analysis was performed using Statistical Package for Social Science (SPSS version 20). Descriptive statistics were used to describe continuous variables such as age, weight and height. The 24hr dietary recall was analyzed using Nutri-survey software to get nutrient intake. Association between categorical and independent variables (risk factors, nutrient intake and SOPs) and the dependent variable (hospital malnutrition prevalence) were tested using Chi-squire test. All significant differences and associations were tested at $p<0.05$. Qualitative data was transcribed verbatim and organized into themes. The sample size comprised of 80 patients, proportionately sampled, with 42.5% being male and 57.5% female. A significant proportion of the respondents (55%) were age between 20-49 years. The mean age of the respondents was 47.9 (SD ±19.08) years with the youngest patient aged 19 and oldest 96 years. According to WHO BMI classification, 34 (42.5%) of the respondents were of normal weight 26 (32.5%) were underweight while 20 (25%) were overweight / obese. The prevalence of malnutrition according to MUST classification was 73.8% (High risk 60.0% and moderate risk 13.8%) while 26.25 of the respondents had low risk of malnutrition. The study also observed that age especially for male respondents was significantly associated to the risk of malnutrition ($\chi^2 = 14.190$; $P = 0.028$, $p<.05$), while food intake (protein $\chi^2 = 0.527$, $P = 0.726$) fat ($\chi 2 = 4.697$, $p = 0.320$) and carbohydrates ($\chi^2 = 1.093$, $P = 0.895$) was not. Diseases such as hypertension and congestive cardiac failure (31.8%), gastro enteritis (16.5%), HIV/AIDS (15%), Pulmonary Tuberculosis (13.8%), diabetes mellitus (13.8%), Peptic Ulcer Disease (17.1%) and Anemia (11.3%) were found to be common among study respondents with high risk of malnutrition in the medical wards. It was also evident that mean energy intake by respondents was much lower (1351.65 kcal/day) compared to the recommended daily allowances (RDA) (1955.18 kcal/day). Finally, study revealed that compliance to the various SOPs concerning the nutrition care process and management in the hospital was generally poor. Consequently, the study recommendations: a multidisciplinary care approach using SOPs for every patient at the point of admission and avail anthropometric tools.

ABBREVIATIONS/ACRONYMS

ACI:	Agency for Clinical Innovations (Australia)
AIDS:	Acquired Immune Deficiency Syndrome
BAPEN:	British Association of Parenteral and Enteral Nutrition
BMI:	Body Mass Index
CDC:	Center for Disease Control
DAA:	Dietetics Association of Australia
HIV:	Human Immunodeficiency Virus
M and E:	Monitoring and Evaluation
MUAC:	Mid Upper Arm Circumference
MUST:	Malnutrition Universal Screening Tool
NICE:	National Institute for Health and Care Excellence (UK)
RDA:	Recommended Daily Allowance
RVPGH:	Rift Valley Provincial General Hospital
SOPs:	Standard Operating Procedures
UNICEF:	United Nations Children's Fund
WHO:	World Health Organization

OPERATIONAL DEFINITION OF TERMS

General Medical Ward- Wards where both adult male and female patients suffering from all medical conditions (e.g. diabetes, hypertension, malaria, pulmonary TB, meningitis, HIV, poisoning, diarrhea diseases, alcohol intoxication etc) are admitted from 16 years and above. These are adult inpatient wards that deal with treatment of multiple illnesses that present in undifferentiated way at an early stage that requires an urgent intervention.

Prevalence of malnutrition - Proportion of patients who are malnourished or at risk of under nutrition using the MUST tool.

Management of malnutrition - Screening(detecting), assessing, diagnosing and treating malnutrition cases in relation to the level of malnutrition risk that involves good food, assistance with feeding, texture modification, dietary advice to maximize nutritional intake, and nutrition support (Enteral or parenteral nutrition).

Risk factors of Hospital malnutrition (under-nutrition) - Characteristics, attributes, features or exposures of a patients that increases the chances of developing under nutrition

Nutrition Standard Operating Procedures. Written instructions that are very detailed and meant to give direction that will ensure uniformity in performing of a specific nutrition function (MOMS, 2010).

Usual body weight: Body weight value that is used to compare a person's own current weight with his/her own baseline weight

Hospital malnutrition: interaction between sickness, infection related metabolic modifications and the diminished nutrient accessibility

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CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Malnutrition (bad nutrition) is the condition that develops from excessive consumption of nutrients (over-nutrition) that is majorly found in countries that are developed, to insufficient consumption or absorption of nutrients (under nutrition) that is documented in countries that are still developing (Baker et al., 2011). Consequently, Nutrition Care Process (NCP) is a systematic/step by step approach that provides nutrition care of highest quality with four distinct steps that are interrelated. They include: *nutrition assessment, nutrition diagnosis, nutrition intervention and nutrition monitoring and evaluation* (MOMS, 2010). The Nutrition Standard Operating Procedures (SOP) can also be defined as detailed instructions written with an intention to a achieve uniformity in performance of nutrition care to patients (MOMS, 2010).

In 1859, during the Crimea war, Florence Nightingale indicated that hospitalized soldiers were starving amongst plenty of food (Nightingale, 1859). She noted that there was food but thousands of patients (solders) were annually experiencing severe calorie deficiency intake, since they required care to the ways that would have made it possible for them to eat or consume food. Later, in 1974, Butterworth Junior, with a focus to call attention to the unrecognized and untreated malnutrition found in US hospitals, used a phrase “the skeleton in the hospital closet” (Butterworth, 1974). Years later, malnutrition is still a debilitating and is still a commonly condition found in hospitals and also in other healthcare settings (Barker et al., 2011).

Malnutrition contributes to the increased cost of treatment, length of stay in the hospital, infections and mortality (Cawood et al., 2010; MOMS, 2010). However it remains inadequately recognized and officially reported with numerous patients not referred for nutrition intervention (Baker et al., 2011; Gout, et al 2009). To reduce and eliminate hospital malnutrition, systematic recognition of patients that are malnourished or those that are at risk of malnutrition and provision of prompt intervention is very important (Tappenden et al., 2013). In the United Kingdom, the Netherlands, United States and some parts of Denmark, it is a must to do nutrition screening of patients on admission, which is a requirement for accreditation for hospitals compliance (Agency for Clinical Innovations (ACI), 2011; Kondrup et al., 2003; Meijers et al., 2009). The causes of malnutrition in hospital are several and are associated with factors identifying with a patient's ailment, treatment, and the hospital routine (ACI, 2011).

Information on adult in-patient malnutrition is limited and is required as this will aid in proper nutrition management of patients at health facilities to prevent and manage malnutrition. Several studies have found that malnutrition was present in 18-55% of the admitted patients in 7 Swiss hospitals (Imoberdorf et al., 2009. Studies in UK, Latin America, Sweden, Australia and Brazil report prevalence of hospital malnutrition to between 20%-55% (Russell, 2009; Correia and Campos, 2003; Westgren et al., 2009; Muscaritoli et al., 2012). In developed and some developing countries, hospital malnutrition is prevalent (Kim et al., 2010). For example, the prevalence of hospital malnutrition in most of the European countries is estimated at 37% (Kondrup & Sorensen, 2009).

Despite the high rates of malnutrition documented in hospitals (20-60%), close to 80% of malnourished inpatients remain unidentified (Ben-Ishva et al., 2011). Lack of

identification of malnourished patients in hospitals can lead to patients not receiving appropriate nutrition interventions. Their conditions may thus deteriorate while in hospitals. Most of the statistics on prevalence of malnutrition are derived from studies conducted in developed countries (Huong et al., (2014). However regardless of the country's economic status hospital malnutrition is a common problem. Several patients will have more than expected nutrient needs because of their age, illness state and/or the effect of treatment (ACI 2011)

Evidence from countries similar to Kenya also indicates high prevalence of hospital malnutrition in the sub-Saharan context. A study conducted in Ghana (Blaauw, et al., 2017). indicated very high hospital malnutrition prevalence of 71.4% where 62.5% were found in the cardiothoracic wards and in the general medicine department the prevalence was 81.2%. In another similar study in Africa (South Africa, Kenya, and Ghana) 75.1% (1288/1714) of adult in patient were at risk of malnutrition (NRS $\geq$ 3), Blaauw, R., et al (2019).

A recent study conducted in regional hospitals in Ethiopia, Africa, revealed a prevalence of 55.6% (Haile et al., 2015) with another one in Zambia reported a malnutrition prevalence of 62.0% (MUAC), 64.6%(SGA) and 36.3% (BMI) (Nyati, 2016)

With such high rates of malnutrition, basic patient's nutritional care is disregarded or not considered as an adequate and sufficient medical need (Barker et al., 2011). For example nutrition management of malnutrition has been reported to be suboptimal in Australia with authors reporting that out of 23% of malnourished patients diagnosed, only 36% were referred to a dietitian with 29% having correct documentation in their medical history by the dietitian (7 out of 24).

Studies have indicated that in some health care facilities one of the factors that might contribute to hospital malnutrition include inadequate food intake (Agarwal et al., 2012). Evidence indicates that nutrition disorders among surgical patients develop due to reduced food intake associated with surgical precautions or anorexia in combination with metabolic stress of injury (Jensen et al., 2006). It means that malnutrition in hospital may result from interplay of disease condition, depressed nutrient intake, anorexia and hospital procedures.

Malnutrition in hospitals may also be associated with poor quality of hospital food and food services (Abdelahafez et al., 2012). Patients including those with orthopedic injuries who are not satisfied with hospital food may eat less because they do not like it or find the food unacceptable or source food from elsewhere such as outside the hospital. A study in a tertiary hospital in Spain on nutritional control revealed that the nutrition status of patients with hip and knee prosthesis deteriorated while in hospital (Garcia et al., 2008).

In Kenya however, there has been renewed commitment to issues relating to nutrition as expressed in the Food and Nutrition Security Policy (FNSP) and also the Kenya Health Strategic Plan (NHSSP). In this regard, the Ministry of Health has developed the Kenya National Nutrition Action Plan (MOPHs, 2012) that gives direction to the implementation of the commitments to nutrition to the people of Kenya. One of its strategic objectives is to improve access to quality curative nutrition services. The Ministry of Health has also developed the Kenya National Clinical Nutrition and Dietetics Manual with clinical guidelines for nutritional care in hospitals and all healthcare facilities in Kenya (MOMs, 2010). It guides in hospital nutrition operations and details the Standard Operational Procedures (SOPs) in screening, assessing and managing malnutrition in hospital settings in Kenya.

However much of the available malnutrition information in Kenya is on children under five years.

1.2 Problem statement

Malnutrition in hospitalized patients has been associated with increased costs, length of stay, infections, morbidity and mortality (MOMS, 2010). Malnutrition interferes with health treatment benefits and it influences every part of their well-being, thus impacting on their quality of life (Dietitians Association of Australia (DAA), 2012). As much as high prevalence of malnutrition has been recorded in hospitals (20-60%), close to 80% of malnourished patients remain unidentified (Ben-Ishay et al., 2011). Lack of malnutrition identification of the patients in hospitals can lead to lack of appropriate nutrition interventions. This may lead to deterioration of their conditions while in hospital. Most of the statistics on prevalence of hospital malnutrition are derived from studies conducted in developed countries (Huong et al., (2014), however it is noted that regardless of the country's' economic status, hospital malnutrition is a common problem. Evidence from countries similar to Kenya also indicates high prevalence of Hospital malnutrition in the sub-Saharan context. In a recent study conducted in regional hospitals in Ethiopia, Africa, the prevalence of malnutrition was 55.6% (Haile et al., 2015). And in another study conducted in three South African hospitals, 72.3% were malnourished using MUST (48.2% high danger and 24.1% medium danger), while 45.4% were diagnosed to be malnourished by use of MUAC. (Tonde e., Gardner, i., Cressey, s.,Tydeman., Edwards, r & Gerber, k., 2018).

According to the Kenya National Nutrition Action Plan, the triple burden of under nutrition, over nutrition and micronutrient deficiencies in Kenya remains a big public health problem (MOPHS, 2012) with stunting rates of 26% and a rise in NCDs (diet-

related non-communicable diseases) for example diabetes, liver disease, different cancers and kidney disease (Mwangi et al., 2014). Furthermore, the high burden of malnutrition in Kenya isn't just a danger to accomplishing Sustainable Development Goals (SDGs) and the Kenya Vision 2030 but also to the realization of human rights (MOPHS, 2012). With half of Kenyan families being food insecure because of poverty and deficient food production and high burden of morbidity, most people seeking services from health facilities are probably going to be under nourished and may require nutrition treatment and support (MOMS, 2010). Further, hospital diets may not be adequate to meeting the nutritional needs of patients and this may deteriorate their nutritional status further. Identification of malnutrition in hospital settings is therefore an important aspect of patient's medical management. There is limited literature published on the prevalence and management of malnutrition among adult in-patients in Kenya and in particular at Rift Valley Provincial General Hospital.

1.3 Purpose of the study

To determine the prevalence, detection and management of malnutrition among adult in-patients in general medical wards at Rift Valley Provincial General Hospital, (RVPHG) in Nakuru County.

1.4 Objective of the study

1. To determine demographic and social economic characteristics among adult in-patients in general medical wards at RVPGH.
2. To determine the prevalence of malnutrition in general medical wards at RVPGH.
3. To determine the nutrient intake and adequacy among adult inpatient in general medical wards at RVPGH

4. To identify the risk factors associated with hospital malnutrition among adult in-patients in general medical wards at RVPGH.
5. To assess the Nutrition Care Process used in the detection and management of malnutrition among adult in-patients in general medical wards at RVPGH.

1.5 Research Hypothesis

Ho_1: There is no significant association between social economic characteristics and hospital malnutrition among adult patients in RVPGH.

Ho_2: There is no significant association between the nutrient intake and malnutrition among adult in-patient in RVPGH.

1.6 Significant of the study

The study findings may be relevant and useful to the Ministry of Health at the National and at the County level, the health facility management, the patients and the community. It has provided empirical data on nutrition management, nutrient intake and also the malnutrition prevalence among hospitalized in-patients. By identifying gaps in the SOPs of the nutrition care process, it is anticipated that this information may lead to better and prompt interventions in patients at risk of malnutrition and those malnourished. The information will also benefit other researchers.

1.7 Delimitation of the study

The study covered RVPGH in Nakuru Count, focusing on adult (18 years and above) in-patients in the general medical wards. The results of the study can therefore be generalized to areas and patients of the same characteristics only.

1.8 Limitations

The study was cross sectional and therefore did not provide information on variations in nutrient intake and nutritional status by time and by nature and by the severity of disease.

1.9 Conceptual framework

This study used a conceptual framework (Figure 1.1) adopted and modified from UNICEF Conceptual framework of child survival (UNICEF, 1998). It recognizes hospital malnutrition as the dependent variable that may result from inadequate nutrient intake, malnutrition risk factors both individual and organizational and poor implementation of nutrition guidelines. Nutrition status of patients may be affected by demographic and social economic characteristics of clients like age, occupation and gender. Nutrient intake and adequacy may also affect the nutritional status of the patients especially macronutrient that include protein, carbohydrates and fats. It may also be affected by organizational risk factors such as inadequate food, staffing levels poor work documentation and lack of necessary guidelines in the respective areas. It may also be affected by the way nutrition standard operating procedures are curried out e.g. nutrition screening assessment diagnosis and monitoring.

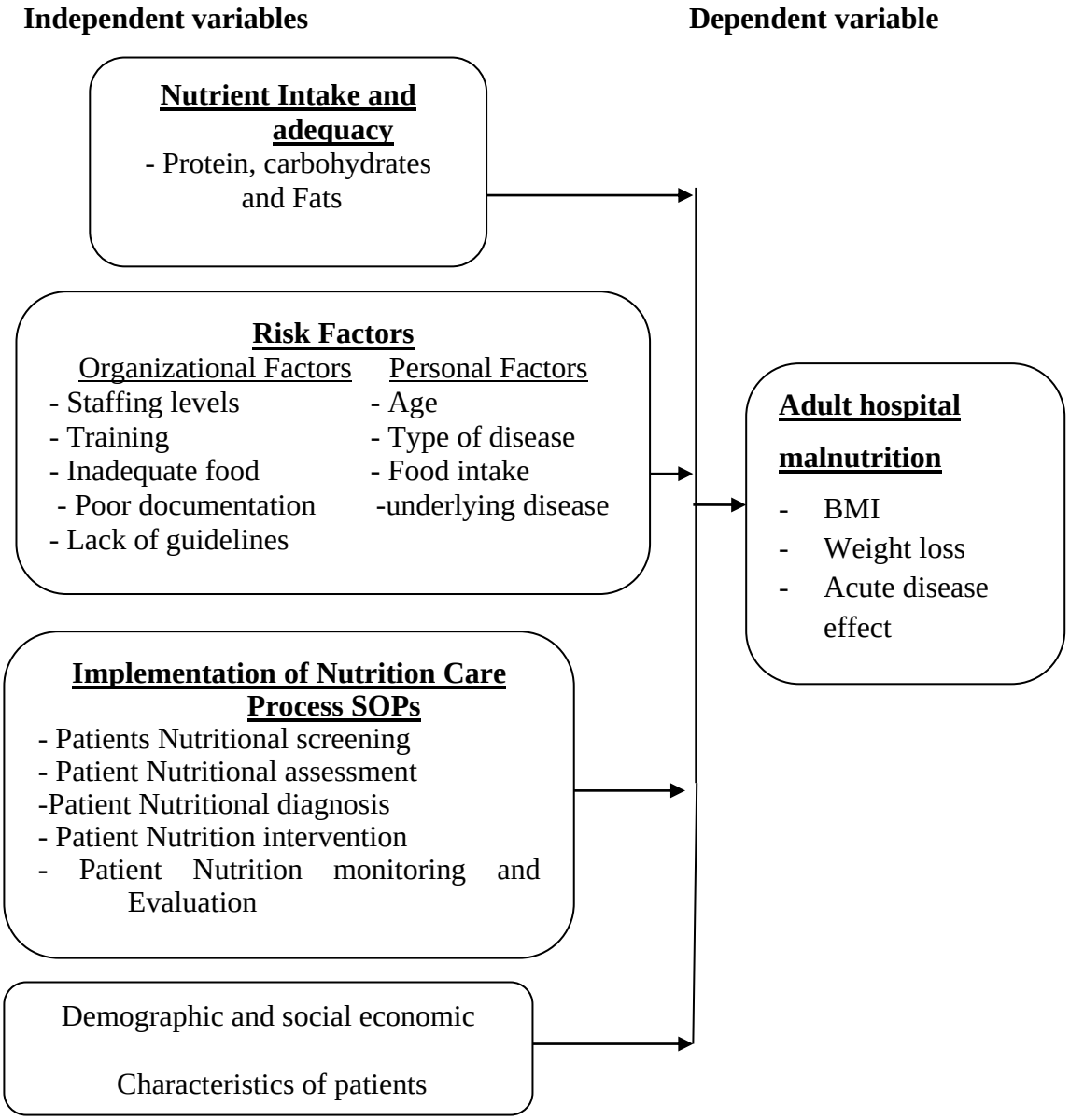


Figure 1.1: Conceptual framework for detection and causes of hospital malnutrition

Source: Modified from UNICEF (1998).

CHAPTER TWO: LITERATURE REVIEW

2.1 Hospital Malnutrition

Hospital malnutrition can be defined as the interaction between sickness, infection related metabolic modifications and the diminished nutrient accessibility of which is a mix of cachexia and malnutrition (Muscaritoli, M., Lucia, S., & Fanelli, F.R. 2012). Many patients are malnourished on admission while others get malnourished as they stay in hospital (Fessler, 2008). Malnutrition affects both the individual and the healthcare system.

2.1.1 Effects of hospital malnutrition to the individual

Undetected and untreated malnutrition may cause slow wound healing, muscle wasting and muscle weakness and increased risk of pressure areas (Charney, 2008). It also increases the risk of infections, compromises renal function, decreases nutrient absorption, alters thermoregulation and also affects physical and psychological health (Elia et al., 2005). It can also lead to dehydration, diarrhea, high adverse drug reactions and drug interactions, altered/poor mobility, impaired metabolic profiles, constipation and depression for the individual.

2.1.2 Effect of malnutrition to the health care system

Malnutrition affects health care system by increasing number of days in the hospital, rates of readmission, clinical intervention, more antibiotic use, complications and staff time per patient (Agency for Clinical Innovations (ACI), 2011). Thus there is increased use of resources to the individual and to the health system. (Cawood, Rust,Walter, Straton, & Elia, 2010).

2.2 Prevalence of malnutrition in adult in-patients

According to Baker et al (2011) prevalence of malnutrition in hospital setups has been reported to be between 20% and 50% and this depends on patient numbers and also diagnosis criteria. Several studies have documented high prevalence of malnutrition in hospitals.

In a study in Korea by Min Chang Kang et al (2018), factors that were found to be associated with malnutrition included old age (≥ 70 years), underlying oncological or pulmonary disease and those admitted for diagnostic work-up or for medical treatment with the hospital recording 22.0% malnutrition prevalence. Malnourished patients stayed longer in hospitals (SGA A = 7.63 ± 6.03 days, B = 9.02 ± 9.96 days, and C = 12.18 ± 7.24 days, $P = 0.018$) and lower 90-day survival rate (SGA A = 97.9%, B = 90.7%, and C = 58.3%, $P < 0.001$). The study presumed that under nutrition was prevalent in hospitalized patients, and brought about patients staying more days in hospitals and high mortality. It was observed that patients that were more than 70 years admitted for medical conditions, their malnutrition rate was high compared with those hospitalized for elective surgery.

In another study in the city of *Manaus*, *Amazonas*, Brazil, Flores & Fragas. (2016) found out that of the 140 (35.26%) of hospitalized patients from 397 from the three hospitals were malnourished Subjective-global-assessment (SGA), and 12 (3.02%) were severely malnourished with 128 (32.24%) being mildly or moderately malnourished.

According to Kuntrek, p. (2015), in a study of 815 hospitalized patients carried out Over a 12-month in the Department of Medicine of the University Erlangen-Nuremberg Germany two nutritional screening tools were used. On nutritional-risk

screening (NRS) the prevalence was 44.6% and using SGA scores indicated 53.6% had malnutrition.

A study by Lee, Choi, Son, & Lyu (2013) also revealed that 17.2% were malnourished with patients older than 60 years accounting for 2.6% of the malnutrition prevalence.

A survey conducted in UK by BAPEN in 2008, revealed 28% of in-patients were at risk of malnutrition whereas in Latin America the overall malnutrition prevalence rates was as high as 50.2% with severe malnutrition at 11.2% (Correia & Campos, 2003; Elia, Jones, & Russell, 2008). In another study in Sweden the risk for malnutrition in hospitalized patients varied between 6%-55% (Westgren et al., 2009). Another study in Australia the prevalence of hospital malnutrition was varying from 20-41% (Ferguson et al., 1999; Beck et al., 2001; Bauer et al., 2007; Frew et al., 2010a).

In Brazil a study found that nearly half 48.1% of inpatients admitted in the hospital wards had malnutrition while 12.5% had severe wasting (Muscaritoli et al., 2012). Further, it was found out that hospital related malnutrition increased as length of stay increased; with only in 18.8% of the medical charts having nutritional status reports for the patient, and 7.3% of the patients had been given nutritional therapy in form of enteral nutrition 6.1% and Parenteral Nutrition 1.2%. Thus they "concluded that the prevalence of malnutrition in hospitalized patients in Brazil was high, and nutrition therapy was under prescribed" (Muscaritoli et al., 2012). A recent study in Vietnam established that the prevalence of hospital malnutrition among adult patients was about 40.1% (Thu ,Lam, Nghiem, & lenders, 2014).

Studies in Africa also have indicated different prevalence of malnutrition. In a study conducted in southern African in public hospitals by (Tonder, Gardner, Cressey, Tydeman-Edwards, & Gerber, 2018) the study found out that overall malnutrition risk was 72.3% according to MUST, 48.2% were high risk, 24.1% moderate risk, with 45.4% being malnourished using Mid Upper Arm Circumference (MUAC) assessment. The study also found out that no screening for nutrition was ever conducted routinely in the wards to diagnose patients at risk of malnutrition. The study concluded that malnutrition incident and malnutrition risk among inpatients in the hospital were high in the public sector.

In another study in Ghana Nyatefe, (2017) in a total of a total of 402 patients the malnutrition prevalence was high with 62.5% in the cardiothoracic (heart and chest) unit and 81.2% in the general medicine department. The study also found out that length of stay (LOS) was significantly associated with high Nutritional risk LOS (9.70 days versus 5.95 days, $p<0.001$, $d=0.74$) and adverse clinical results during hospital stay and a month after release from hospital. During hospitalization the incidence of complications was 7.8% and mortality was 7.2% to those who were at nutritional risk ($p=0.002$) with only deaths occurring to the at-risk group 8.1%, ($p=0.002$)

In another similar study in Africa (South Africa, Kenya, and Ghana) 75.1% (1288/1714) of adult in patient were at risk of malnutrition (NRS $\geq$ 3). The research concluded that “The prevalence of under nutrition among the study respondents was high at 53.1% based on BMI and 54.1% based SGA method.” (Blaauw, et al., 2019).

There has been limited information on prevalence of hospital malnutrition in Kenya and in particular in at Rift Valley Provincial General Hospital.

2.3 Nutrient intake and adequacy for adult inpatients

Nutritional adequacy is taking in sufficient essential nutrients that are required to meet nutritional requirements for the optimal health. (Castro-Quezada et al., 2014). On the other hand malnutrition results from excess or insufficient intake of the required amount of nutrients by the body (Vikalati, 2011). A study conducted by Rita & Sonia (2011) identified variables predictive of malnutrition and dietary changes to include changes in consistency, reduced number of meals and recent dietary restrictions. Reduced dietary intake in patients due to low appetite sensation may worsen due to lack of nutritious meals provision regularly in a protected environment from routine hospital activities, and lack of help and support to feed when required.

According to Miyoba, Ogada, & Mulenga,(2018). in a cross-sectional study in adult surgical orthopedic patients that were admitted in Zambia, the mean energy (1919Cal), protein (61.67 g), calcium (160.05 mg), sodium (222.91 mg) , iron (mg, 2.55 mg), zinc (10.19), folic acid(165.98 μg,) , dietary fibre (20.09 g) and vitamin C intake (22.60 mg) were all below recommended values with only 24.4%, 8.5%, 26.7%, 5.5% and 15.2% of respondents met the Recommended Dietary Intakes (RDIs) of energy, protein, iron, vitamin C and dietary fibre respectively. The study indicated that food provided by the Hospital contributed more than 60% of the total nutrient intake of protein, folic acid, energy, and dietary fiber. There is limited literature on the nutrient intake for adult in-patients in Kenya especially for general medical wards of the two hospitals.

2.4 Risk factors associated with hospital malnutrition among adult in-patients

2.4.1 Personal factors

Several studies have identified personal risk factors for hospital malnutrition. A study in Sao Paulo found the risk of malnutrition to be recent and unplanned weight loss, loss of appetite, diarrhea and inadequate energy consumption (Aquino et al 2011). Study reviews have also indicated age as a risk factor to hospital malnutrition. (Heersink, Brown, Dimaria-Ghalili,& Locher, 2010). Aged patients have a number of factors that can put them at risk of malnutrition such as chronic diseases (heart ailments, renal failure and malignancy) that can lead to inflammation leading to loss of muscle mass (Jensen,2006). Studies have shown that patients with chronic illnesses are at risk of malnutrition as they will be in and out of hospital regularly (Ulger et al., 2010). Decreased energy intake one month before being admitted to hospital also leads to reduced nutritional status to patients compared to other patients. Patient who suffer psychosocial changes for example depression or eating alone, loss of spouse could lead to low food intake due to loneliness that may lead to malnutrition (Shilpa, Singh & Sabharwal., 2015).

Consequently, several diseases may require prescription of restricted diet that may be unpalatable or difficult to follow therefore low oral intake and malnutrition (Zeanadin, et al., 2012). Change in functional status may lower the ability to perform those activities of daily leaving like feeding oneself, cooking, bathing and shopping. Also, economic changes may impact on ability to access adequate foods (DiMaria-Ghalili et al., 2014). Dysphagia makes swallowing difficult or painful where as persistent vomiting, diarrhea and anorexia could also lead to malnutrition (Walton, 2009).

In another study to distinguish factors related with under nutrition in patients admitted in wards of public hospital in Brazil (Roberta Flores Marquezini Fragas Maria Conceição de Oliveira, 2016) the variables that were found to be associated with malnutrition were: continuous or too much change in the patients diet, presence of diarrhea and vomiting, ongoing involuntary weight reduction, weight reduction over the most recent a half year, different types of cancers, and those with 60 years and above. The study did conclude that malnutrition occurred most of the times in the hospitals settings and those factors related with it can be recognized at admission, allowing satisfactory observation as the patients stay in the hospital with a more successful presentation of screening for malnutrition and program monitoring being basic.

Another study in Germany Kuntrek, (2015), indicated that the patients prevalence under nutrition was high in patients with liver and gastrointestinal illness and those with depression. Bed rest and immobility were documented as the most important risk factors for malnutrition in this study (OR=5.88, 95% CI 2.25–15.4) with the study concluding that early malnutrition assessment and screening to patients can contribute to better nutrition care and furthermore, with satisfactory coding, improve monetary reimbursement. In conclusion studies have documented that recent and unplanned loss of weight, loss of appetite, psychosocial changes, diarrhea, inadequate calorie intake, age, chronic diseases, prescription of restricted diet, Functional status changes, changes in finances, Dysphagia, presence of gastrointestinal, bed rest and immobility, depression or dementia are all personal risk factors that could lead to malnutrition.

2.4.2 Organizational risk factors to hospital malnutrition

The organizational factors that could lead to hospital malnutrition include: malnutrition not being recognized, lack of nutrition screening or nutrition assessment, low or no nutritional training, no height and weight documentation, not recording patient intake, inadequate nutrient intake and few or no health staff to help feed the patients (Westergren et al., 2009; Persenius, Hall-Lord, Baath, Larsson, 2008; Rachel & Berenice, 2013; Baker, 2011). Other organizational factors included lack of clinical nutritional guidelines throughout all settings, poor workflows, and lack of experts to assistance in case of complicated nutritional problems (Holst & Rasmussen, 2013). Other studies indicate that effective counseling of patient and therapy can be overlooked by various hindrances associated with healthcare workers (Abdulkareem, 2014). Other challenges to patient counseling are wrong perception of the role of health workers and poor attitude by the health workers (Wilbur, Salem,& Muhammadi, 2010).

Inpatient feeding is also a key component of inpatient care, as it determines the quality and adequacy of nutrition provided to the patients. Good quality and adequate nutrition is vital for patients to achieve quick recovery as it boosts his/her immune system's ability to fight infection consequently resulting to shorter hospital stay (MOMs 2012).

According to ACI (2011) the hospital routine could likewise influence a patient's food consumption by; interferences at eating times, like specialist's rounds and tests, lack of flexibility with eating times and accessible food, for example, lack nutritious snacks between the meals dinners and lack of anyone to help in feeding the patient, absence of nutrition diagnosis and checking of patient's ongoing nutritional status.

In 2008, Naithan et al., noted that practically 50% of the patients experienced hunger in the hospital wards and recognized troubles in getting to food which included: obstructions from the hospital (for example unsatisfactory times of food serving, menus that did not address patient issues, fixed food requesting system); physical boundaries (not in an a comfortable situation to eat, food far off from patient, eating challenges with utensils or packaging); and environmental elements (for example staff interference during eating times, troublesome and loud conduct of different patients, sounds or terrible scents). Surgical and old patients and together with physically disabled patients experienced most difficulties getting to food as the study also revealed. They concluded that Hospital in-patients frequently experienced hunger and difficulties in getting to food. These issues by and large stay covered up in light of the fact that staff neglects to see and in light of the fact that patients are hesitant to ask for help. There is limited literature on risk factors for hospital malnutrition on adult in-patient in Kenya and in particular at RVPGH.

2.5 The Nutrition Care Processes SOPs in hospital malnutrition management

Nutrition Care Process is a step by step approach of providing good quality care of nutrition service and each step is followed in order and as needed.(Hamilton & Boyce, 2013). The Standard Operating Procedures(SOPs) in nutrition care are detailed written instructions for achieving consistency in service provision across board as they help standardize nutrition management in health care (MOMs, 2010). Standard operating procedures (SOPs) serve as a tool for standardization of nutritional practice, for comparability and used as reference point for monitoring and evaluation (MOMs 2010).

Hamilton and Boyce, (2013) acknowledges that to succeed in addressing hospital malnutrition, nutrition therapy selected is not enough, rather it also requires appropriate and timely use of the guidelines and procedures starting from nutrition screening during admission to care plan during discharge to the community. Sadly, standards of care in many health care institutions remain below par (Saunders & Smith, 2010).

In Norway, the implementation of the guideline improved nutrition screening performance and led to better nutritional care (Tangavik, Guttormsen, Tell, Ranhoff, 2011). In UK the NICE nutrition standard guidelines defines clinical best practice in nutrition requiring that all patients in health care settings should be screened for malnutrition using standard screening tools (NICE, 2012). Those malnourished or are at risk of malnutrition should have a well documented management care plan, and screening and nutrition support (NICE, 2012).

In an American survey data by (Patel et al., 2014) it was reported that most respondents were performing nutrition screening in accordance with The Joint Commission guidelines, however only half of them knew about the 2012 Consensus based on Academy of Nutrition and Dietetics and A.S.P.E.N. regarding adult malnutrition. The nutrition screening was mostly performed by nurses while nutrition assessment was carried out by dietitians. Although no specific nutritional assessment tool was used or International Classification of Diseases (ICD), 9th Revision code was documented as being used by health workers, the findings noted that there was compliance with accreditation standards while completing nutrition screening within 24 hours of admission, with most hospitals appearing to have a process to perform a nutrition assessment once screening was completed. This study therefore concluded

that opportunities existed to improve training on topics on nutrition screening and also on assessment to identify proper practices for nutrition processes in admitted patients in hospitals.

In an investigation to assess factors that affect nutrition intake and also practices related to nutrition care in hospital in patients are at risk of developing pressure ulcers Roberts (2015), with 241 respondents, found out that the nutrition screening rate was at 59% (142 patients). It was also observed that 71% of weight and 34% of height had been documented respectively and 69 patients (29%) received a dietitian evaluation and assessment. Clients who were likely to receive a referral to a dietitian included those with lower BMI and those who had stayed longer in the hospital. Patient mean consumption was 73% energy and 72% protein with patients between 22% and 38% having consumed more than 50% the food that was provided during main meals.

2.6 The Nutrition Care Process SOPS in Kenya

The Kenyan government Ministry of Health has put in place the Standard Operating Procedures (SOPs) of The Nutrition Care Process framework to guide hospital nutrition operations by health care workers. The Kenya National Clinical Nutrition and Dietetics Manual (MOMs, 2010) is a clinical guideline for nutrition care in hospital and nursing homes. It details the Standard Operational Procedures (SOPs) in screening, assessing and managing nutrition related disorders including malnutrition. Thus, the SOPs on Nutrition Care Process focus on four steps namely: *nutritional assessment, nutritional diagnosis, nutritional intervention and nutritional monitoring and evaluation* (MOMS, 2010).

Step one of NCP is Nutritional assessment that involves screening/assessing the patient within 12Hrs after admission for in-patients and within 30 minutes for out-

patients and comparing data obtained during screening and assessment with reference standards. Thus, all hospital area/wards should have nutrition screening tools, have nutrition assessment equipments, data collection tools and standard charts and also job aids available in all hospital departments. Nutrition diagnosis which is step 2 involves identifying and labeling that defines the actual occurrence, the risk of or the likelihood of developing a nutritional problem. Best practice requires that there should be a nutrition diagnosis statement that is written in Problem, Etiology, Signs and symptoms (PES) format. This should be implemented to all nutrition clients, relate to reference standards and be documented in patients' file. After diagnosis nutrition intervention with an action plan is supposed to be designed with the intention to change a client eating behavior, risk factor or aspect of health status for an individual. For best practice a nutrition intervention based on nutrition diagnosis is selected and executed. The plan of nutrition care should be should be very clearly outlined and documented and goals should be set for the patient. To implement the intervention, it needs to be communicated, carried out, and data collection and modification of care plan continued.

On the other hand nutrition Monitoring and Evaluation focuses on the how much progress, the objectives and goals are met and the desired results of nutrition care are being accomplished. Best practice includes utilization of chose result pointers that are pertinent to the patient characterized needs, nourishment objectives and illness state. The results ought to be estimated and recorded and accurate data of progress recorded. However, there is limited literature on nutrition care SOPs implementation in the management of hospital malnutrition for adult in-patients in Kenya and in particular Rift Valley Provincial General Hospital, Nakuru.

2.6 Summary of literature review

The prevalence of hospital malnutrition for adult in-patient has been shown to vary in different countries. The nutrient intake, the risk factors for hospital malnutrition and the nutrition care process in adult in-patients has been documented in other countries outside Kenya like Zambia, Australia and America and include factors such as dietary inadequacy, old age, poor appetite, and poor implementation of standard operating procedures. Other risk factors to malnutrition include not recognizing malnutrition, absence of nutritional screening or assessment, lack of nutritional training, no height and weight documentation, not recording patient intake, low nutrient intake, lack of feeding assistance and importance of nutrition unrecognized. Information on the malnutrition prevalence and implementation of nutritional care process as well as follow up on standard operating procedures has been rarely documented in Kenya and published.

Few studies have targeted malnutrition among hospitalized adult patients, without taking into consideration of the implementation of the nutrition care process (SOPs) in the health facilities. This study was therefore designed to determine the prevalence, and management of adult malnutrition among in-patients in general medical wards at a Kenyan Hospital (Rift Valley Provincial General Hospital).

CHAPTER THREE: METHODOLOGY

3.1 Research design

The study used a cross sectional descriptive study design that used qualitative and quantitative techniques to determine the prevalence and management of adult malnutrition among inpatients in general medical wards of RVPGH. The design was selected because it enabled the establishment of the association between dietary intake, malnutrition risk factors and prevalence of malnutrition. A cross-sectional study can be used to test for associations among variables (Katzenellenbogen et al, 2002), thus was appropriate for this study.

3.2 Measure of variables

The dependent variable was hospital malnutrition among adult in-patient as was determined by Malnutrition Universal Screening Tool (MUST) score (BMI/MUAC, unplanned weight loss and acute disease effect on food intake).

The independent variables were: The social economic characteristics of the patient, implementation of the Nutrition Care Process Standard Operating Procedures (SOPs), hospital malnutrition risk factors and nutrient intake. The social demographic characteristic were age, sex, marital status, and religion, while social economic characteristics were occupation, level of education and household size. The implementation of the Nutrition Care Process (Standard Operating Procedures) was assessed using observation checklist that assessed weight documentation on admission, height documentation, MUAC documentation, whether nutrition screening was done within 12 hour of admission, nutritional status documentation, nutrition diagnosis documentation and whether patients were referred for nutritional care. The information was validated by interviewing the Key Informants as outlined in the Key Informant Guide. The hospital malnutrition risk factors were categorized as personal

and organizational as determined by a researcher administered questionnaire and an observation checklist. The most common risk factors were determined depending on the proportions across these variables. The patient nutrient intake was determined using the 24 Hour Dietary Recall focusing on food eaten in the hospital and any food bought from shops. No cooked food from home was allowed in the hospital (only Milk bread and fruits was allowed.)

3.3 Study area

The study was done at Rift Valley Provincial General Hospital (RVPGH) Nakuru County. Nakuru County is the 27th county out of the country's 47 counties in Kenya. It boarders the following counties: Laikipia to the northeast, Narok to the south-west, Kajiado toward the south, Kericho toward the west. Baringo toward the north, Nyandarua towards East and Bomet toward the west. The county covers 7496.5 square kilometres. It has eleven Sub-counties namely: Nakuru Town East, Bahati, Rongai, Kuresoi North, Kuresoi South, Subukia, Gilgil, Naivasha, Njoro, Nakuru Town west and Molo. According to 2009 census, Nakuru County had a population of 1,603,325 people (male - 50.2% and female - 49.8%). Nakuru is a cosmopolitan County, with the county's population coming from every tribe of Kenya. Kikuyus and Kalenjins are the predominant tribes in Nakuru County (about 70% of the county's population). Majority of residents are Christians, a few Muslims and Hindus. Agriculture is the main economic activity in Nakuru's having condusive weather for even large-scale farming, horticulture, and dairy farming. The Rift valley Provincial General Hospital (RVPGH) was started as a military hospital in 1906. It is a Level 5 hospital located in Nakuru town, Nakuru County. It has a bed capacity of 580 and was Rift Valleys province designated referral hospital before devolution of health services

after the promulgation of the Kenyan constitution. It has 3 general medical wards. The hospital serves a population of about 3.6 million in south Rift valley plus patients coming as far as western, Nyanza, North Rift valley and Central part of Kenya.

3.4 Target population

The study targeted all adult patients admitted into the general medical wards of RVPGH.

3.4.1 Exclusion criteria

1. All participants who declined to participate in the study.
2. All health workers who have worked in the ward for less than one month.

3.4.2 Inclusion criteria

The study included all Adults of ages 18 years and above admitted in general medical wards for at least 24 hrs at RVPGH. It also included Key Informants (nutritionist in-charge of hospital and in-charge of the ward, nursing officer in-charge of hospital and ward, clinician, cateress, a cook and pharmacist.)

3.5 Sampling techniques

The study adopted a multi-stage sampling method to obtain the desired sample size. In 1st stage, purposive sampling was used to select RVPGH (level five). The 2nd stage involved purposive selection of all general medical wards since these are the wards that have more patients who could be malnourished due to their diverse medical conditions. The 3rd stage involved simple random sampling to select participants in the general medical wards using table of random numbers. The researcher obtained the list of currently admitted patients in the adult medical wards from the ward in-charges. Using this list the researcher selected the number of participants using Krejcie and Morgan tables. Simple random sampling was used to select participants.

Key informants/health workers were also purposive selected because they were working with the target population, hands-on, and available.

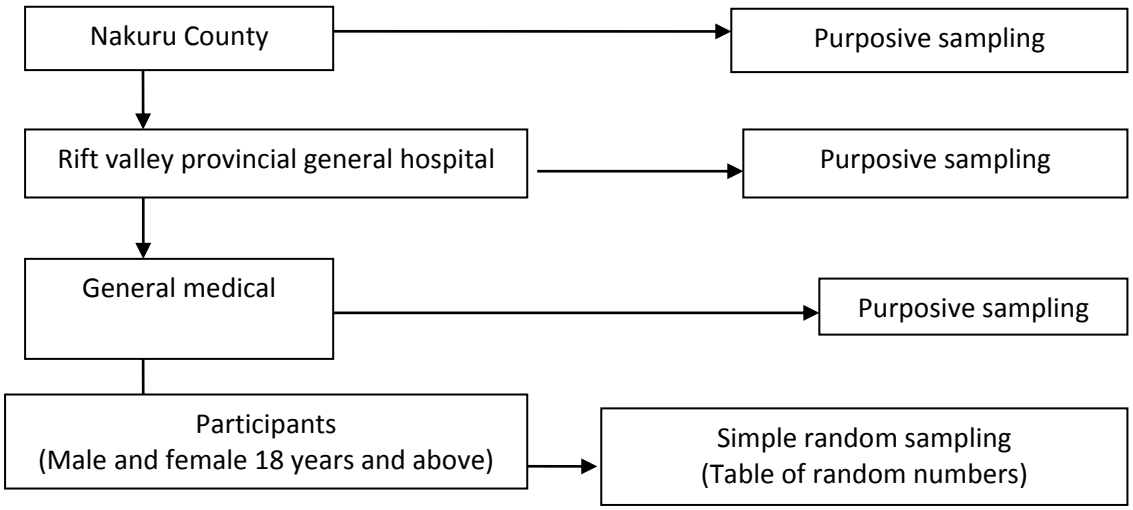


Figure 3.1: Sampling techniques (proportionate random sampling)

3.6 Sample size

The Kreijcie and Morgan table was used to get the sample size (Appendix I), (Krejcie & Morgan, 1970) that has been constructed using a formula in Appendix H. The sampling population was 96 patients, while the sample size was 80 patients. In addition 10 health care workers were interviewed as Key Informants.

3.7 Research instruments

3.7.1 Researcher-Administered Questionnaire for patients (Appendix B),

This was used to collect information on patient socio-economic characteristics (occupation, household size, education level), social demographic characteristics (sex, age, religion), patient data (e.g. weight, height, MUAC), feeding difficulties (vomiting, diarrhea, loss of appetite) and acceptability of hospital diets.

3.7.2 The 24-Hour Dietary Recall (Appendix D)

This tool collected data on nutrient intake in the previous 24 hours to enable assessment of the nutrient intake of the patient i.e. energy intake, carbohydrate, protein and fats.

3.7.3 Malnutrition Universal Screening Tool (MUST) (Appendix C)

The MUST as a validated nutrition screening tool (Anthony, 2008) was used to assess prevalence of malnutrition. The tool identifies adults who are underweight, those at risk of being malnourished and also those who are obese (British Association for Parenteral and Entreral Nutrition (BAPEN), 2011). It elicited information on Body Mass Index (BMI), unplanned weight loss and disease effect on food intake that was used to categorize malnutrition as low risk, medium risk and high risk.

3.7.4 Observation Checklist for service to the patient

An observation checklist for service to the patient (Appendix E) gathered information on the implementation of Nutrition Care Process SOPs based on the national guidelines, nutrition assessments tools, job aids and nutrition guidelines at the health facilities. The information was gathered from patient health records

3.7.5 Observation Checklist for wards (Appendix G)

This checklist collected information on availability of: functional weighing scales, Stadiometres, MUAC tapes, BMI wheels or standard reference charts, guidelines, diet requisitions sheets, and availability of hospital menu, provision of parenteral and tube feeds, nutrition screening, availability of nutrition screening tools, who performs nutrition screening, who feeds patients and availability of nutrition commodities.

3.7.6 Key Informant Interview (KII) guide (Appendix F)

This guide was used to elicit information on the availability of clinical nutritional guidelines, nutrition standard operation procedures, nutrition care process, hospital foods and staffing levels. This was administered to the nutritionist in charge of the hospital, nutritionist at the service delivery in the general medical ward, nursing officer in-charge of the hospital, nursing officer at service delivery in the general medical ward, cateress, pharmacist and the clinician in the general medical wards.

3.8 Pretesting

The researcher pre-tested the research instruments at Kitale County Referral Hospital since it has similar characteristic as RVPGH on 10% (8 patients) of the sample size. The pre-test ensured the comprehension and clarity of the research instruments and also ensured the questionnaires were well structured for face and content validity. The feedback was used to improve the questionnaire before the main study.

3.9 Validity and Reliability

3.9.1 Validity

To ensure validity, the standard Malnutrition Universal Screening Tool (MUST) and standard 24-Hour Dietary Recall were used and this are already validated.

3.9.2 Reliability

The researcher used test-retest method to check for questionnaire consistency yielding the same results. Pretesting was done twice at the Kitale County Hospital in a span of one day interval to ensure reliability of the instruments with Cronbach alpha correlation being used to determine the correlation coefficient of the research instrument at 0.7-0.8(George & Mallery, 2003)

3.10 Data collection Techniques

Interviews, anthropometric measurements and 24 dietary hour recalls were conducted with those who consented. Appointments with key informants were sought and interviews conducted to them following KII guide. Secondary data was obtained from patients' records. Observation checklists were also used.

3.10.1 Anthropometric measurements

Height Measurement: This was taken once using a height meter (Stadiometer) that was positioned correctly against the wall. The patients were asked to remove shoes and heavy clothes, stood upright, feet flat, and heels against the height stick and they looked straight ahead. The researcher lowered the head plate until it touched the top of the head gently before reading and documenting the measurement to the nearest 1.0 mm.

Weight Measurement: A digital weighing scale was used to take weight once which was regularly checked for accuracy ensuring that they read zero without the participants standing on them. Weighing was done in light clothing and without shoes to the nearest 0.1 kg and documented.

MUAC: For those clients whose weight nor height could not assessed, a likely Body Mass Index was estimated using MUAC (Mid Upper Arm Circumference). To take MUAC, the participant while standing or sitting was asked to remove clothing preferably on left arm, with the top of the shoulder and the point of the elbow located and the midpoint between the 2 points marked on the arm. With a tape measure, the circumference at the midpoint was measured to the nearest 0.1cm.

3.10.2 Observations and document review

The patients' files were used once to record the implementation of SOPs in the nutrition care, availability of menu, job aids and nutrition assessment tools.

3.10.3 Face to face interviews

One-time face to face interviews were conducted by the researcher at the wards with the adult in-patients. This was guided by patients' questionnaire (Appendix B)

3.10.4 The 24-Hour Food Recall

A FOOD RECALL KIT comprising of a cup, spoon plate was used to determine the amounts of foods consumed by the clients. Two Research assistants were trained on standard techniques of taking 24-hour recall. Before they embarked on taking the 24-hour recall they practiced taking food recalls on each other. Patient were asked to recall what they ate for the last 24 hours using a 24hour recall (Appendix D)

3.10.5 Key Informant Interviews (KIIs)

One-time face to face interviews were conducted with Key informants (Appendix F) (health workers i.e., nutritionist, nurses and clinicians, cooks, cateress, pharmacist). This was done in the wards in the tea rooms. Each interview was taking 10-15 minutes. The KII responses were recorded by note taking method. The researchers ensured that they took some time to review their notes and fill in any details left, or add important comments or that could have been points made after interviews.

3.11 Data analysis and presentation

The Statistical Package for Social Sciences (SPSS Version 20) was used for data analysis. Prior to analysis, data cleaning was done to ensure high quality of data. Descriptive statistics such as mean, median, percentages, standard deviation were used to analyze characteristic such as age, weight, height and implementation of SOPs. The nutritional status was interpreted using WHO BMI classification (WHO, 2010) as underweight, normal weight, overweight and obese, while the prevalence of hospital malnutrition was analyzed using the MUST scores that uses BMI/MUAC,

unplanned weight loss and disease effect. (*BMI score: >20 (>30 Obese) = 0, 18.5-20 = 1, <18.5 = 2*). If BMI could not be taken, MUAC cut offs were use to estimate likely BMI (*MUAC: <23.5 cm, BMI was likely to be <20 kg/m2 MUAC >32.0 cm BMI was likely to be >30kg/m*), unplanned weight loss scores, <5% = 0, 5-10% = 1, >10 %= 2 were used. For the acute disease effect score: if a patient was acutely ill and there has been or was likely to be no nutritional intake for >5 days the score was 2. All Scores were then added to calculate the overall risk of malnutrition (Score 0 Low Risk, score 1 Medium Risk, Score 2 or more High Risk), (Todorovic., & British Association for Parenteral and Enteral Nutrition. Malnutrition advisory group 2003. The dietary intake using 24 Hour Dietary Recall was analyzed using Nutri-Survey software.

To test for significant associations between the studies variables, t-test was used for continuous variables such as age weight and height. Chi-square tests for categorical variables such as gender, marital status and occupation were used. All the statistical significance was set at $p< 0.05$. The Key Informant Information was qualitatively documented and transcribed verbatim then coded and eventually organized into themes.

Table 3. 1: Data analysis matrix

Objective	**Variables**	**Nature of variables**	**Method of data collection**	**Statistical test and data presentation**
To determine demographic and social economic characteristics of patients in adult general medical wards at RVPGH.	Age, household size Sex, marital status, household size, level of education, religion, occupation	Continuous Categorical	Face to face interview	Percentages, Range, mode, means and Standard deviations,
To Determine the prevalence of malnutrition among adult in-patients in general medical wards at RVPGH.	Body Mass Index unplanned weight loss Disease effect.	Continuous Categorical	Anthropometric MUST tool Face to Face questionnaire	Percentages Bivariate analysis, and chi square
To Identifying the risk factors associated with hospital malnutrition among adult in-patients in general medical wards at RVPGH.	Age, type of disease, gender, marital status, Staffing level Food intake, implementation of nutrition care process	Continuous Categorical	face to face Secondary data KII 24 hour recall Observation checklist	Means and SD Chi square
Objective	**Variables**	**Nature of variables**	**Method of data collection**	**Statistical test and data presentation**

To determine the nutrient intake and adequacy among adult inpatient in general medical wards at RVPGH	Patients total energy intake Patients total carbohydrate intake Patients total protein intake Patients total fat intake	Continuous	24 hour recall form Nutri Survey Software Tool	Percentages means, mode Standard deviations Chi square tests
To determine the Nutrition Care Process used in the management of malnutrition among adult in-patients in general medical wards at RVPGH.	Patients nutrition patients screening/assessment Patients nutrition diagnosis Patients nutrition intervention Patients nutrition monitoring and evaluation	Categorical	Observation checklist Clients records	Percentage Means Standard deviations

3.12 Logistical and Ethical Considerations

Approval was sought from Kenyatta University graduate school (Appendix I) and ethical clearance from Kenyatta University Ethics Review Committee (KUERC) (Appendix J) and ethical review committee of RVPGH (Appendix O). Research permit was given by NACOSTI (Appendix K) County Commissioner Nakuru County (Appendix M), Ministry of Education Nakuru County (Appendix N). The researcher made a courtesy call to RVPGH before embarking on data collection with the letter of authority approving the undertaking of the study. The researcher moved to the adult general medical ward and made a courtesy call to the ward in-charges. Voluntary informed consent (Appendix A), was sought from all study participants. Participants were assured of confidentiality by using codes rather than names as identifications.

CHAPTER FOUR: FINDINGS

INTRODUCTION

The study was conducted between 13/12/17 and 14/1/ 2018. There were 80 patients admitted in the medical wards. They were all interviewed for the study achieving 100% response rate.

4.1 Demographic and social economic characteristics of the study participants

4.1.1 Social Demographic Characteristics of the study participants

According to study findings (Table 4.1), out of the total 80 study participants, 42.5% were male whereas female participants were 57.5%. Survey data indicated that 20 (20%) of the participants were aged between 30-49 years, 2(3%) aged less than 20 years, 12(15%) aged 20-29 years while 21(26%) were aged above 60 years. These findings generally suggest that a significant proportion of the respondents 12(15%) were aged between 20-49 years. The average age of the respondents was 47.9 (SD± 19.1) years with the youngest patient aged 19 and oldest 96 years. The mean age of the male respondents was generally higher, 48.6 (SD 18.6) years compared to that of the females 35.6 (SD 19.62) years. The study findings established that more than half (56.3%) of respondents were married while 18% were single, 6.3% were separated whereas 15% were widowed. Study finding, indicated that majority of the study respondents (90 percent) were Christians, 3 % were other religions whereas 5% were not affiliated to any religion.

Table 4. 1: Social demographic characteristic of participants

N=80	n	(%)	Mean ±SD
patients gender			
Male	34	42.5	48.6±18.6
Female	46	57.5	35.5±19.6
Marital status			
Married	45	56.3	
Single	18	22.5	
separated	5	6.3	
Religion			
Christian	72	90	
Other	3	3.8	
None	5	6.3	
Patient's age group			47.9±19.1
<20	2	3	
20-29	12	15	
30-39	16	20	
40-49	16	20	
50-59	13	16	
>60	21	26	

4.1.2 Social economic characteristics

According to study findings (Table 4.2), the household size ranged from 1 to a maximum of 14 members. The mean household size was found to be 4.8 SD±2.8. According to study findings 59% of the respondents had primary level of education, 24% had attained secondary education, 6.1% of the respondents had tertiary education while only 11.3% had no education. Study findings revealed that while majority of respondents (58.8%) had attained primary level of education, secondary school education (24%) tertiary (6%) while 11% had not attended school at all. Study findings also revealed that out of the total of 80 respondents, 27 percent were farmers, 24 percent had their own businesses, 20%

were casual labors, 8 per cent formally employed while 21 per cent had no employment. There were more un-employed females than male respondents.

Table 4. 2: Socio-economic characteristics of the participants

N=80	n	(%)	Mean ±SD
Highest education level			
Primary	47	59	
Secondary	19	24	
Tertiary	5	6	
None	9	11	
Occupation			
Farmers	22	27	
Business	19	24	
Casual	16	20	
Jobless	17	21	
Formal employment	6	8	
House hold size categories			4.8 ±2.8
Small (< 5 people)	52	65	
Medium (5-9people)	26	32	
Large >10 people)	2	3	

4.1.3 Patient's Referral

On the basis of the study findings (Table 4.3), 81 percent of the study respondents came from home to the hospital while 19 percent were referred from other health facilities.

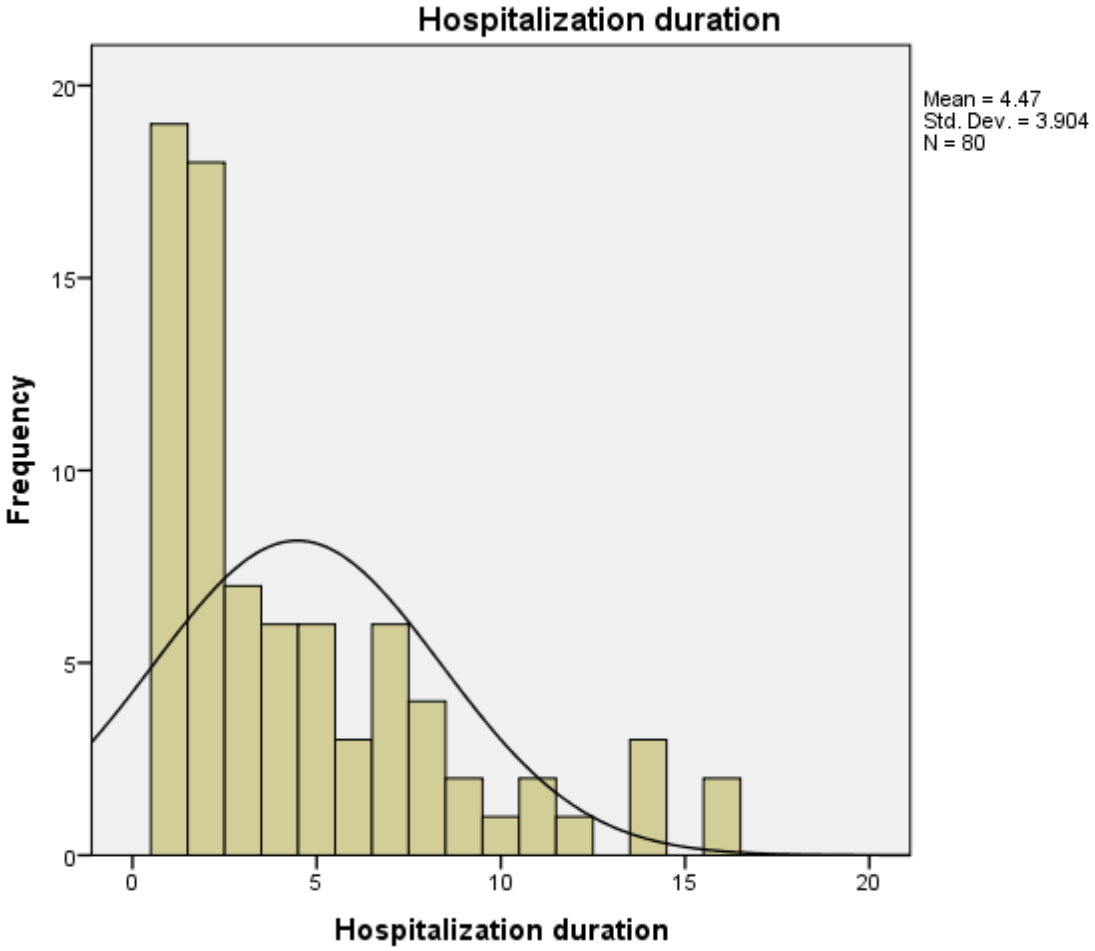
Table 4. 3: Respondent's Referral

Referral	N=80	n	(%)
	Home	65	81
	Health facility	15	19
			100

4.1.4 Duration of stay at the hospital

According to study findings (Figure 4.1), the length of stay at the ward before interview was 1 day to a maximum of 16 days. The mean length of stay at the medical wards before the time of the study was 4.5 (SD±3.9) days. Most patients (46.3%) had spent in the hospital ward 1-2 days, 23.8% had stayed between 3-5 days, 20.1% had stayed for between 6-10 days while only 10.1% had stayed for between 11-16 days before the interview. The minimum period of 1 day (24 hours) was considered sufficient for 24 hour recall dietary intake survey.

Figure 4. 1: Duration of stay at the hospital



4.1.5 Respondents' Medical characteristics

The study also sought to investigate the principle diagnosis (disease) of the surveyed patients in the medical wards. According to the study findings (Table 4.4), the most frequently observed diseases included: Hypertension / stroke and congestive cardiac failure (31.8%), Gastro Enteritis (16.5%), HIV/AIDS (15%), Pulmonary Tuberculosis (13.8%), Diabetes Mellitus (13.8%), Peptic Ulcer Disease (17.1%), Anemia and sickle cell anemia (11.3%) and Pneumonia (11.3%).

Table 4. 4: Patients' Principal Diagnosis

Disease N=80	n	%
Hypertension (HTN) stroke and congestive cardiac failure	31	38.8
Gastro Enteritis (GE)	13	16.5
HIV/AIDS (RVD)	12	15
Pulmonary Tuberculosis (PTB)	11	13.8
Diabetes Mellitus (DM)	11	13.8
Peptic Ulcer Disease (PUD) and gastro intestinal bleeding and gastritis	12	17.1
Anemia and sickle cell anemia	9	11.3
Pneumonia	9	11.3
Malaria and Meningitis	10	12.6
Prostate cancer	2	2.5
Others	26	32.5

4.1.6 Functional Capacity

Survey findings (Table 4.5), indicate that 33% of the study respondents were Bed ridden, 30% were on light activity, 20% had experienced change in function, and 15% had improved function whereas only 1.3% had no dysfunction. The findings further showed that a significant proportion of the study respondents (63%) were both on light activity and bed/chair ridden although there was no significant difference in functional capacity between male and female respondents (Chi-square = 2.847; p = 0.584, p > 0.05).

Table 4. 5: Functional Capacity

	N (80)							
	Male		Female		Totals		chi-squire	p- value
Characteristic	n	%	n	%	n	%	χ^2=2.847	0.584
No dysfunction	0	0	1	100	**1**	**1.3**		
Change in function	7	43.8	9	56.2	**16**	**20**		
Light activity	8	33.3	16	66.7	**24**	**30**		
Bed/chair ridden	12	44.4	15	55.6	**27**	**33**		
Improved function	7	58.3	5	41.7	**12**	**15**		

p=<0.05

4.2 Prevalence of Malnutrition among Adult Patients in General Medical Wards

The study in objective two set out to determine the prevalence of malnutrition among the adult patients in the general wards. To achieve this objective, the study employed the use of three nutrition assessments tools namely: The BMI index, acute disease effect; and unplanned weight loss score methods. The study also used WHO (BMI) classification

4.2.1 Prevalence of malnutrition by BMI Index using WHO Classification

Study findings (Table 4.6) indicated that 34 (42.5%) of the respondents were of normal weight, 26 (32.5%) were underweight while 20 (25%) were overweight / obese. More female patients were found to be overweight and underweight compared to male patients, even thought the differences were not statistically significant (χ^2= 1.71, p= 0.857).

Table 4. 6: Prevalence of Malnutrition by BMI index using WHO Classification

	Patient's gender							
	Male		Female		Total		χ^2	p-value
	n	%	n	%	n	%		
BMI WHO Malnutrition							1.71	0.425
Underweight (<18.5)	12	46.2	14	53.8	26	32.5		
Normal Weight (18.5 – 24.5)	16	47.1	18	52.9	34	42.5		
Overweight/obese (>25)	6	30	14	70	20	20		

p=<0.05

4.2.2 Prevalence of Malnutrition using "MUST" tool

In order to determine prevalence of malnutrition by BMI according to MUST classification, patients BMI was categorized into the following: > 20 kg/m^2 = score 0; 18.5-20 kg/m^2 = score 1 and < 18.5 kg/m^2 = score 2). Study findings (Table 4.7) indicated that 26 (32.5%) of the respondents were at higher risk of malnutrition (score= 2), 22 (27.5%) had moderate risk of malnutrition (score = 1) while 32 (40.0%) were found to be at low risk of malnutrition (score = 0). More female patients were found to be at higher risk of malnutrition by BMI MUST classification than males, even though the differences were not statistically significant (χ^2=0.308, p= 0.857**).**

To determine nutritional status of respondents by the un-planned weight loss, current weight was subtracted from the usual weight and percentage weight loss determined. The established unplanned weight loss scores, <5% = 0, 5-10% = 1, >10 %= 2, were used to determine the level of malnutrition among the patients.

Study findings (Table 4.7) indicated that 12(15.1) % of the respondents were at higher risk of malnutrition (>10% weight loss), 10(12.5%) had moderate risk of malnutrition (5-10% weight loss) while 58(72.6%) were found to be at low risk of malnutrition (< 5%

weight loss). It is evident from the findings that more male patients were found to be at high risk of malnutrition due to unplanned weight loss than female patients, even thought the differences were not statistically significant (χ^2=2.228 p-0.328).

In order to effectively assess the level of malnutrition among patients, the study applied the acute disease effect score. In this regard, the patients were asked if they were acutely ill as well as if there was or likely no nutritional intake for >5 days (score 2 – high risk) and study findings summarized in Table 4.7

Based on acute disease effect assessment, 54(67.5%) of the respondents were found to be at higher risk of malnutrition compared to 26(32.5%) who were at low risk. Moreover, although there was higher proportion of female patients with higher risk than male patients, the differences were not statistically significant. (χ^2-0.21 p-0.646)

In order to determine the overall risk of malnutrition among patients, all risk scores (BMI/MUST, unplanned weight loss and acute disease effect) were aggregated and categorized as (Score 0 = low risk, Score 1 = medium risk, Score 2 or more = high risk). A summary of the aggregation of all risk scores is shown in Table 4.7

According to study findings (Table 4.7), the overall Risk of malnutrition prevalence was 59(73.80%) (High risk 48(60.00%) and Moderate risk 11(13.75%), while 21(26.25) of the respondents had Low risk of Malnutrition.

Table 4. 7: Malnutrition prevalence using MUST tool

	Patient's gender				
	Male n (%)	Female n (%)	N=80 n (%)	χ^2	p-value
BMI score for MUST				0.308	0.875
Low risk - score 0 (BMI, >20 - >30)	16(42.1)	22(57.9)	38(47.5)		
Moderate risk - score 1 (BMI, 18.5 - 20)	6(37.5)	10(62.5)	16(20.0)		
High risk - score 2 (BMI, < 18.5)	12(46.2)	14(53.8)	26(32.5)		
Unplanned weight loss				2.228	0.0328*
>10% weight loss (score 2.0)	7 (8.8%)	5 (6.3%)	12 (15.1%)		
5-10% weight loss (score 1.0)	4 (5.0%)	6 (7.5%)	10 (12.5%)		
< 5% weight loss (score 0.0)	23 (28.8)	35 (43.8%)	58(72.6%)		
Acute disease effect				0.210	0.646
High risk (2.0)	22(40.7	32(59.3)	54(67.5)		
Low risk (0.0)	12(46.2)	14(53.8)	26(32.5)		
Overall Malnutrition Risk				0.554	0.758
High risk (score 2.0)	22(45.8)	26(54.2)	48(60)		
Moderate risk (score 1.0)	4(36.4)	7(63.6)	11(13.8)		
Low risk (score 0.)	8(38.1)	13(61.9)	21(26.2)		

p=<0.05

4.3 Nutrient Intake and Adequacy among Adult Patients in General Medical wards

4.3.1 Energy Intake among Patients

Assessment of dietary adequacy of the food eaten from the hospital and the snacks an fruits that were bought (no cooked food was allowed) was evaluated and compared with the recommendations as determined by the Modified Harris Benedict Equation (Roza et al, 1984) for both males and females and hospital menu recommendations (MoH, 2009). An upward adjustment of 10 percent was used for all the patients to cater for stress factors.

According to study findings (Table 4.8), the calculated mean energy/calories of the surveyed patients was 1351.65 kcal/day compared to recommended daily average (RDA) of 1955.18 kcal/day. On the other hand, the mean caloric contents of the diet provided by the hospital for male and female patients was 1431.12 kcal/day (RDA = 2176.47) and 1292.91 kcal/day (RDA = 2176.47), respectively. These findings reveal that the mean energy intake from the food provided by the hospital was much lower compared to the recommended daily average (RDA) among the surveyed patients in the hospital. In this hospital no cooked food was allowed to the wards apart from milk bread and fruits. Therefore clients mostly relied on hospital diet.

Table 4. 8: Patients' Calculated Energy

Energy (Kcal)	Mean	S.D	RDA	Min	Max
All	1351.65	±810.92	1955.18	162.6	5307.3
Male	1431.12	±625.16	2176.47	456.3	2679
Female	1292.91	±927.12	1791.61	162.6	5307.3

RDA: Recommended daily allowance

4.3.2 Energy intake by age/ gender of patients

Study findings (Table 4.9) indicate that the mean energy intake for males aged 19 – 20 years was 2353.50 Kcal while the recommended energy for the same males was 2600 Kcal. The mean energy intake for males aged 21-40 years was 1529.95 Kcal (compared to the recommended energy of 2400 Kcal), 1473.36 Kcal for 41-55 year-old males (compared to the recommended energy of 2200 Kcal) whereas mean energy intake for males aged >55 years was 1154.64 Kcal (compared to the recommended energy of 2000 Kcal). It is clearly evident that the mean energy intake for males respondents was much

lower compared to the recommended daily average (RDA) for all age categories, with the most affected age categories being 21-40 years, >55 years and 41-55 years.

On the other hand, the mean energy intake for female patients aged 19-25 years was 1321.71Kcal (compared to the recommended energy of 2000 Kcal), 1285.54 Kcal for 26-30 year-old female patients (compared to the recommended energy of 1800 Kcal) whereas mean energy intake for females aged >30 years was 1285.51Kcal (compared to the recommended energy of 1600 Kcal). The study findings also indicated that the mean energy intake for female respondents was much lower compared to the recommended daily average (RDA) for all age categories especially those aged 19-25 years and 26-30 years. It is clearly evident that the energy intake among the surveyed patients was significantly lower than recommended daily requirements for both male and female patients in the medical wards in the hospital.

Table 4.9: Energy Intake by Age/Gender of patient

	Energy (Kcal)		
Gender/Age	**Mean**	**RDA**	**Mean Energy deficit**
Male			
18-20 years	2353.5	2600	246.5
21-40 years	1529.95	2400	871.05
41-55 years	1473.36	2200	726.64
>56 years	1154.64	2000	845.36
Female			
19-25 years	1321.71	2000	678.29
26-30 years	1285.54	1800	514.46
>31 years	1285.51	1600	314.49

RDA Recommended daily allowance

4.3.3 Nutrient intake compared to recommended daily allowance

Based on the study findings (Table 4.10), the calculated mean protein intake for the patients was 12.90% compared to recommended daily average (RDA) of 10-35%

(22.5%). Furthermore, mean fat intake for the patients was 17.06% compared to recommended daily average (RDA) of 20-35% (27.5%)., The mean carbohydrate intake for the patients was found to be 68.87% compared to recommended daily average (RDA) of 45-65% (55.0%). It is evident from these findings nutrient intake for proteins and fat provided by the hospital were significantly lower compared to the recommended daily average (RDA) among the surveyed patients in the hospital.

Table 4. 9: Food Nutrients Intake compared to Recommended Requirements

	Quantities (%)			
Food Nutrients	**Mean**	**RDA**	**Min**	**Max**
Protein	12.90%	10-35% (22.5%)	0%	28%
Fat	17.06%	20-35% (27.5%)	0%	49%
Carbohydrates	68.87%	45-65% (55.0%)	0%	100%

RDA *Recommended daily allowance*

4.3.4 Adequacy of Hospital diets in Management of Malnutrition

Assessment of dietary adequacy of the hospital diet as part of nutrition care process was evaluated. The assessment was based on aspects such as patient's ability to feed oneself, who feeds the patient, rating of hospital food, reason for hospital food rating and the unusual feeding while in hospital as presented in the section below:

4.3.4.1 Ability of Patients to Feed Oneself

With regard to patient's ability to feed oneself, study findings (Table 4.11) showed that 70% of the study respondents were able to feed themselves. However, 17.5% of the respondents were unable to feed themselves whereas 12.5% of the respondents were not able to feed themselves at all times.

Table 4. 10: Ability of Patients to Feed Oneself

Ability of Patients to Feed Oneself N=80	Response	n	%
	Yes	56	70
	No	14	17.5
	Not at all times	10	12.5

4.3.4.2 Feeding assistance and adequacy of feeding assistance

The study further investigated those who were responsible for feeding of patients without ability to feed themselves. According to the study findings (Table 4.12), 91.6% of the study respondents were fed by the relatives while 4.2% of the respondents were fed by friends and health workers, respectively.

With respect to adequacy of feeding assistance provided by those who were responsible for the feeding of patients, study findings (Table 4.12) revealed that 75% of the study participants reported that the assistance provided was adequate while 25% reported that it was not adequate.

Table 4. 11: Feeding assistance and adequacy of feeding assistance

N=80	Response	n	%
Who Feeds the Patient	Relative	22	91.6
	Health workers	1	4.2
	Friends	1	4.2
Adequacy of Feeding Assistance	Yes	18	75
	No	6	25

4.3.4.3 Rating of Hospital Food and reasons

The study respondents were asked to rate the food provided by the hospital and finding summarized in Table 4.13 According to the findings, 33.8% of the respondents rated the hospital food as 'fair', 31.1% as 'poor', 17.5% as 'good', 16.3% as 'very good' while 1.3% had no comment. The study found out that a significant patient proportion found the food provided by the hospital to be poor quality.

The study respondents were also requested to state the reason for the rating of the hospital food (Table 4.13) and finding summarized in Table 4.13. The most frequently cited reasons included: Tasteless/un-appetizing/un-palatable food (15.6%), poorly cooked or burnt food (14.3%), disliked hospital food (9.1%) and lack of alternatives/options/monotonous (7.8%). Other reasons given included dental problems (2.6%), lack of special food/diet (2.6%) and unfamiliar/foreign food (1.3%). In this study 6.5% of the respondents found the hospital food to be helpful/nutritious, 3.9% hoped the food would get better/improve while 37.7% did not give any particular reason.

Table 4. 13: Rating of Hospital Food and reasons

N=80	n (%)	%
Rating of Hospital Food		
Poor	25	31.1
Fair	27	33.8
Good	14	17.5
Very good	13	16.3
No comment	1	1.3
Reason for Hospital Food Rating		
No reason given	29	37.7
Helpful/good/nutritious/better	5	6.5
Poorly cooked/burnt food	11	14.3
Dental problems	2	2.6
Dislike for hospital food	7	9.1
No alternatives/options/monotonous	6	7.8
Tasteless/Not appetizing/un-palatable	12	15.6
Lack of special food/diet	2	2.6
Not worth/for sake of it	1	1.3
Not used to/foreign food	2	2.6
Can get better/improve	3	3.9

4.4 Risk Factors associated with Hospital Malnutrition

4.4.1 Personal Risk Factors

The study sought to identify personal risk factors associated with hospital malnutrition among the adult inpatients in the general wards. The personal factors identified included: Patients' feeding difficulties, principal diagnosed disease, age and food intake.

4.4.1.1 Patients' Feeding Difficulties

The most frequently observed feeding difficulties among the surveyed patients included: Fatigue/weakness (73.8%), reduced appetite (63.8%), not able to self-feed (49.7%), bloating (43.8%) and vomiting (42.5%). Other notable feeding difficulties included: Nausea, depression, esophageal reflux, taste/smell changes, constipation, flatulence,

chewing difficult, diarrhea, food allergies, mouth sores, medication and sore throat. The difficulties were summarized in Table 4.14

Table 4. 12: Patient feeding difficulties

Characteristic N=80	n	%
Fatigue	59	73.8
Reduced appetite	51	63.8
Not able to feed oneself	39	49.7
Bloating	35	43.8
Vomiting	34	42.5
Nausea	31	38.8
Depression	25	31.3
Esophageal reflux	24	30.3
Taste/smell changes	24	30
Constipation	18	22.5
Flatulence	18	22.5
Difficulty in chewing	15	18.8
Diarrhea	15	18.8
Food allergies	11	13.8
Mouth sores	10	12.5
Difficulty in swallowing	10	12.5
Medication interfering with food intake	8	10
Sore throat	7	8.8

4.4.2 Organizational Risk Factors

The study sought to identify organizational factors associated with hospital malnutrition among the adult patients in the general wards. This was achieved through face to face key informants interviews of health workers that is, nutritionist, nurses, pharmacists, clinicians/doctors and cateress). The organizational factors identified included: Staffing levels, training, adequacy of food/diet, nutritional guidelines and documentation as discussed in the section below:

4.4.2.1 Staffing Levels and Training

According to one KI, there were a total of 8 nutritionists in the hospital as oppose to 22 nutritionist required as per Kenya norms and standards for human resource in such a facility (Human recourses for health norms and standards guideline for health sector 2014). The medical wards had only one nutritionist. The general medical wards had three (3) wards.

4.4.2.2 Adequacy, Preparation and Quality of Food

The KIs indicated that the food/diet provided by the hospital to patients in the general medical wards was generally considered to be inadequate. It was evident that the inadequacy of the food provision was characterized by frequent shortages of food stuffs, lack of special food/diet for critically ill patients as well as stock outs of nutritional products such as FBF, F75, F100 for malnourished patients. According to one respondent "*hospital food was inadequate and patients were not allowed to bring in food into hospital wards (KI 2017)"*.

With regard to food preparation, it was noted that meals prepared as per the hospital menu was based on bed returns rather than diet sheets. Furthermore, the key informants also reported that some efforts were made to provide special food/diet such as salt-free, sugar-free, blended and mashed foods, milk, eggs. Nevertheless, it was evident that provision of special diet/food to respondents faced with challenges such as feeding difficulties (toothless & throat problems), inadequate parental and nasal-gastric feeds. According to one respondent *"Patients needing parental feeding did not readily get them and were often asked to buy if they afforded".* With regard to availability of nutritional

products such as FBF, F75, and F100 for malnourished patients, Pharmacists observed that "*the products were not adequately stocked".* (KI 2017)

Furthermore, it was also evident that feeding of patients in the medical wards not closely monitored by nursing staff owing to their busy schedules. This often led to patients missing meals especially the critically sick or bedridden. One Key informant indicated that "*adequacy of hospital feeding is generally fair characterized by inadequate food as well as the food not meeting patients' needs*" (KI 2017)

4.4.2.3 Nutrition care and Management Practices

Nutrition assessment/screening among patients at the point of admission was hardly conducted. One Key informant indicated that *despite the availability of nutrition guides, Standard Operation Procedures (SOPs) and job aids, nutrition status assessment is obviously lacking especially in the medical wards in the hospital*. The findings also indicated that despite efforts to screen patients on malnutrition, health workers lacked basic anthropometric tools to determine height and weight of patients especially the stadiometers. According to one KI "*Patients' weight and height are rarely determined owing to lack of weighing scale and stadiometer in the wards for the last two years now*. (KI 2017)

It was also evident that the Clinicians/doctors encountered patients requiring nutrition care especially with conditions such as Diabetes Mellitus, Hypertension, HIV /AIDS whom they usually referred to the nutritionists. However, the Clinicians/Doctors had no standard tools for determination of nutritional status and often relied on patients' history as well as physical observation. With regard to management of malnutrition in medical

wards, it was noted that regular clinical audits were rarely conducted and when conducted, there was no feedback given. This was further confirmed by lack of monthly reports for the respective medical wards (not directly) but via District Health Information System records/reports. In some cases according to KI "*Clinical audits were conducted by nutritionists – during impromptu visits with feedback discussed verbally but not documented".* Furthermore, interviews with key informants revealed that referral of patients to nutritionist was done by nurses verbally/call during discharge. The KII indicated that "*Hospital food for critically ill patients was of low quality, lacking in variety and not customized to patient needs*". (KI 2017)

4.4.2.4 Risk Factors associated with malnutrition among patients

The study used a chi-square analysis to establish the risk factors that were associated with malnutrition such as the participants socio-demographic variables such as education level, gender, age, marital, occupation, household size, religion; energy and food nutrients intake and principle diagnosis (disease type).

4.4.2.5 Association between demographic, social economic and malnutritional Status

The Chi-square analysis results (Table 4.15) showed that age especially for male respondents was the only socio-demographic characteristic that was significantly associated to the malnutrition risk. (χ^2 = 14.190; P = 0.028*, p<.05). Other socio-demographic characteristics such as gender (χ^2 = 0.238; P = 0.888, p>0.05), marital status (χ^2 =2.867; P = 0.825, p>0.05), education level (χ^2 = 6.071; P =0.415, p>.05), occupation (χ^2 = 2.391; P = 0.664, p>0.05), household size (χ^2 = 14.190; P = 0.028*, p<0.05) and

religion (χ^2 = 2.476; P =0.649, p>0.05) were not statistically associated to malnutrition among study respondents.

Table 4.15: Association between demographic, social economic and malnutritional Status

Variable	N=80					
	Malnutrition Risk					
	Low	Moderate	High	Total	Chi-square	p-value
Gender:					$\chi^2 = 0.238$	p = 0.888
Male	5	2	27	34		
Female	7	4	35	46		
Age/ Male:					$\chi^2 = 14.190$	**p =0.028***
18-20 yrs	2	0	0	2		
21-40 yrs	1	1	11	13		
41-55 yrs	2	1	5	8		
>55 yrs	0	0	9	9		
Age/ Female:					$\chi^2 = 3.705$	p =0.726
19-25 yrs	0	1	7	8		
26-30 yrs	5	1	14	20		
>30 yrs	2	2	16	20		
Education level:						
None	3	0	6	9	$\chi^2 = 6.071$	p= 0.415
Primary	8	4	35	45		
Secondary	1	2	16	19		
Tertiary	0	0	5	5		
Occupation:						
Formally employed	4	2	15	21	$\chi^2 = 2.391$	p= 0.664
Self-employed	5	4	35	44		
Un-employed	3	0	12	15		
Marital status:						
Married	6	3	36	45	$\chi^2 = 2.867$	p= 0.825
Single	4	2	12	18		
Separated/divorced	0	0	5	5		
Widow/widower	2	1	9	12		
Religion:						
Christian	11	6	55	72	$\chi^2 = 2.476$	p=0.649
Other	1	0	2	3		
None	0	0	5	5		

Significant p<0.05

4.4.2.6 Association between Food/Energy intake and age and gender

The Chi-square analysis results (Table 4.16) show that energy intake among male respondents was found to be the only factor significantly associated to the risk of malnutrition (χ^2 = 14.190; P = 0.028*, p<0.05) but not among female respondents participants (χ^2 = 3.708; P = 0.448, p>0.05). On the basis of food nutrients intake, protein (χ^2= 0.527; P = 0.726, p>0.05), fat (χ^2 = 4.697; P = 0.320, p>0.05) and carbohydrates intake (χ^2 = 1.093; P = 0.895, p>0.05) were not statistically associated to malnutrition among study respondents.

Table 4. 13: Association between food/energy intake and Malnutrition

Variable	Malnutrition Risk			Total	Chi-square	P-value
	Low	Moderate	High			
Male Energy intake					$\chi^2 = 14.19$	p = 0.028
2600 kcal(18-20yrs)	2	0	0	2		
2400 kcal(21-40yrs)	1	1	11	13		
2200 kcal(41-55yrs)	2	1	5	8		
2000 kcal (>55yrs)	0	0	9	9		
Female Energy intake					$\chi^2 = 3.708$	P =0.448
2000 kcal(19-25yrs)	0	1	7	8		
1800 kcal(26-30yrs)	5	1	14	20		
1600 kcal(>30yrs)	2	2	16	20		
Protein intake					$\chi^2 = 0.527$	P =0.726
Below recommended (RDA)	1	0	5	**6**		
Recommended (RDA)	11	6	57	**74**		
Above recommended (RDA)	0	0	0	**0**		
Fat intake					$\chi^2 = 4.697$	P = 0.32
Below recommended (RDA)	0	4	38	**48**		
Recommended (RDA)	6	1	22	**29**		
Above recommended (RDA)	0	1	2	**3**		
Carbohydrate intake					$\chi^2 = 1.093$	P =0.895
Below recommended (RDA)	0	0	2	**2**		
Recommended (RDA)	4	2	15	**21**		
Above recommended (RDA)	8	4	45	**57**		

4.4.2.7 Association between Type of Disease and Malnutrition

None of the diseases tested (Hypertension, Gastritis Enteritis, HIV/AIDS, Pulmonary Tuberculosis, Anemia, Pneumonia, Diabetes Mellitus, Peptic Ulcer Disease and Congestive Cardiac Failure) were found to be associated with malnutrition. Table 4.17

Table 4. 17: Association between Disease and Malnutrition

	Risk of Malnutrition					
	Low	**Moderate**	**High**	**Totals**	**Chi-square**	**P-value**
Disease/Diagnosis						
Hypertension	2	1	13	**16**	χ^2 =0.161	p = 0.923
Pulmonary Tuberculosis	1	2	8	**11**	χ^2= 2.275	p = 0.321
HIV/AIDS	1	1	10	**12**	χ^2 = 0.493	p = 0.781
Pneumonia	0	0	9	**9**	χ^2 = 2.941	p = 0.229
Anemia	0	0	9	**9**	χ^2 = 2.944	p = 0.229
Diabetes Mellitus	0	1	7	**8**	χ^2 = 1.744	p = 0.418
Gastritis Enteritis	0	0	12	**12**	χ^2 = 4.099	p = 0.129
Pulmonary Ulcers Disease	0	1	7	**8**	χ^2 = 1.744	p = 0.418
Congestive Cardiac Failure	1	1	5	**7**	χ^2 = 0.510	p = 0.775

4.5 Nutritional Care Practices used in Management of Malnutrition

In objective five, the study sought to assess the nutrition care practices in the medical wards. In this regard, the study aimed at establishing if nutrition assessment was done to patients' at-least 12 hours upon admission. A review of the patients' medical records and responses to compliance to the various aspects of the nutrition care practices were summarized in Table 4.18

Study findings indicated that compliance to the various aspects of the nutrition care process among hospitalized patients were as follows: Weight documented in patient file within 12 hrs of admission (1.3%), height documented within 12 hrs of admission in patient file (1.3%), MUAC documented within 12 hrs of admission in patient file (1.3%), nutritional status documented (2.5%), nutritional diagnosis documented in PES format (0.0%), referral to the nutritionist done and documented in the patient file (3.8%), Patient attended by a nutritionist and documented (5.0%), nutrition care plan documented (3.8%), nutrition intervention started and documented (5.0%), nutrition review done and

documented (3.8%) and patient food intake documented (2.5%). These study findings indicated that compliance to the various standard operation procedures (SOPs) concerning the nutrition care process and management in the hospital was generally very low.

Table 4. 18: Nutrition Care Process & Malnutrition Management

	% Response	
Nutrition care process	**Yes**	**No**
Weight documented within 12 hours of admission in patient file	1.3	98.7
Height documented within 12 hours of admission in patient file	1.3	98.7
MUAC documented within 12 hours of admission in patient file	1.3	98.7
Nutritional status documented	2.5	97.5
Nutritional diagnosis documented in PES format	0	100
Referral to the nutritionist done and documented in the patient file	3.8	96.2
Patient attended by a nutritionist and documented	5	95
Nutrition care plan documented	3.8	96.2
Nutrition intervention started and documented	5	95
Nutrition review done and documented	3.8	96.2
Patient food intake documented	2.5	97.5

CHAPTER FIVE: DISCUSSION

According to recommendation by Ministry of Health, a team of multi-disciplinary health professionals (Nurse, Clinicians, medical social workers and surgeons) are supposed to assess patients within 12hrs since admission for in patients and 30 minutes for outpatient (MOMs, 2010). Nutritional care process involves assessment, diagnosis, intervention and monitoring & evaluation. Nevertheless, it is apparent that nutrition care management process among patients at the point of admission is hardly done.

5.1 Introduction.

The purpose of this study was to determine the prevalence, detection and management of malnutrition among adult in-patients in general medical wards at Rift Valley Provincial General Hospital, (RVPHG) in Nakuru County. The specific objectives included to: *Determine demographic* and social economic characteristics of patients; *determine the prevalence of malnutrition* among adult in-patients; *determine the nutrient intake* and adequacy among adult inpatients; *identify the risk factors associated with* hospital malnutrition among adult in-patients; and *determine the nutrition* care process used in the management of malnutrition among adult in-patients in general medical wards at RVPGH. The study addressed the study objectives from data analysis (descriptive and inferential statistics).

5.2. Demographic and Socio-economic Characteristics of Study Respondents

Objective one of the study sought to determine demographic and social economic characteristics of patients. Study findings indicate that more than half of respondents

(57.5%) were females. This study finding is similar to research by (Blaauw et al., 2019) that had 52% of participants being female. The study is also in contrast with a study in Zambia (Miyoba et al., 2016) where majority of the participants were male (63.3%). Survey data indicated that 32(40%) of the respondents aged between 30-49 years, 2(2.5%) aged less than 20 years, 12(15%) aged 20-29 years while 21(26.5%) were aged above 60 years. These findings generally suggest that a significant proportion of the respondents 44(55%) were age between 20-49 years. The respondents mean age was 47.9 (SD 19.08) years with the youngest patient aged 19 and oldest 96 yrs. The mean age of the male respondents was generally higher, 48.58 (SD 18.60) years compared to that of the females 47 (SD 19.62) years. Also, more than half (56.3%) of respondents were married while 18% were single, 6.3% were separated whereas 15% were widowed.

On the basis of education Study findings discovered that most respondents (58.8%) had attained primary level of education, secondary school education (23.8%), tertiary education (6.3%) while 11.3% had not attended school at all. These findings are similar to (Miyoba et al 2016) where majority were of primary education (45.9%). The mean household size was found to be 4.78 (SD = ± 2.87) with a significant number of the study respondents (65%) having smaller households. With regard to occupation, more than half of the study respondents (55%) were self-employed, 26.3% were formally employed while only 18.7% were un-employed. Although, there was no significant difference between male and female respondents in formal and self-employment but there were more un-employed females than male respondents.

The study also found out most of the study respondents (90 percent) were Christians, 3% were other religions whereas 5% were not affiliated to any religion. In this study 81.3%

of patients were referred from home to the hospital while 18.8 percent were referred from other health facilities. Majority of the respondents (46.3%) had stayed in the hospital ward for at least 1-2 days, 23.8% had stayed between 3-5 days, 20.1% had stayed for between 6-10 days while only 10.1% had stayed for between 11-16 days before the interview. The minimum period of 1 day (24 hours) was considered sufficient for 24 hour recall dietary intake survey.

The most frequently observed diseases included: Hypertension (20%), Gastro Enteritis (15%), HIV/AIDS (15%), Pulmonary Tuberculosis (13.8%), Anemia (11.3%), Pneumonia (11.3%), Diabetes Mellitus (10%), and Peptic Ulcer Disease (10%). Finally, study findings showed that a significant proportion of the study respondents (63%) were both on light activity and Bed/chair ridden although there was no significant difference in functional capacity between male and female respondents

5.3 Prevalence of Malnutrition among Adult Patients

To get the malnutrition prevalence the study employed the use of Malnutrition Universal Screening Tool (MUST) that uses: The acute effect of disease, the BMI and weight loss score methods. On the basis of acute disease effect assessment, study findings revealed that majority of the respondents (71.3%) were found to be at higher risk of malnutrition compared to 28.7% who were at low risk. Study findings also indicated that although there was higher proportion of female patients with higher risk than male patients, the differences were not statistically significant.

The prevalence of malnutrition on the basis of WHO- BMI index indicated that 32.5% of the respondents were underweight, 42.5% had normal weight while 25% were overweight/obese. More female patients were found to be overweight, normal weight and

underweight, respectively even thought the differences were not statistically significant**.** Study findings on malnutrition due to unplanned weight loss reveal that 44.5% of the patients were at higher risk of malnutrition, 10% had moderate risk of malnutrition while 18.5% were found to be at low risk of malnutrition.

Study findings further show that more female patients were at high risk of malnutrition due to unplanned weight loss than male patients, even thought the differences were not statistically significant**.** With regard to the overall level of malnutrition, study findings indicate that 73.8% were malnourished (60% high risk, 13.8% moderate risk) while only 7.5% were found to be at low risk.

The prevalence finding is close to a study conducted in three south African public hospitals (Tonder, Gardner, Cressey, Tydeman-Edwards, & Gerber, 2018) that indicated the prevalence of malnutrition according to MUST was as high as 72.3% (48.2% high risk and 24.1% medium risk). In another similar study in Africa (South Africa, Kenya, and Ghana) indicated that 75.1% of adult in patient were at risk of malnutrition (NRS ≥ 3), (Blaauw, et al., 2019). In another study in Ghana (Blaauw, 2017) in a total of a total of 402 patients the malnutrition prevalence was high with malnutrition of 62.5% being found in the cardiothoracic unit to 81.2% in general medicine department.

In Germany however the prevalence was low compared to the current study. According to Lee, Choi, Son, & Lyu (2013) in the study on Malnutrition rates and their contributing factors in Hospitalized Patients in German found out that on average 17.2% were malnourished with patients 60 years and above accounting for 2.6% of the prevalence. In the current study however the patients over 60 years old accounted 21.25% of malnutrition prevalence. Out of the 21 respondents aged 60 years and above 17(80%)

were malnourished (66% high risk and 14% moderate risk). This means that most of the elderly respondents were malnourished. Another study in a study in Vietnam the prevalence of malnutrition was lower than of the current study with the prevalence of hospital malnutrition among adult patients being 40.1% (Thu,Lam, Nghiem, & lenders, 2014). The study concluded that malnutrition was still high in hospitalized patients and the prevalence seemed to be higher in African hospitals than in developed countries.

5.4 Nutrient intake and adequacy among Adult Patients in medical wards

Objective four of the study sought to determine the nutrient intake and adequacy among adult inpatient in general medical wards. Study findings reveal that the mean energy intake of the diet provided by the hospital was much lower compared to the recommended daily average (RDA) among the surveyed patients in the hospital. It is clearly evident that the mean energy intake for males respondents was much lower compared to the recommended daily average (RDA) for all age categories, with the most affected age categories being 21-40 years, >55 years and 41-55 years. Also, the mean energy intake for female respondents was much lower compared to the recommended daily average (RDA) for all age categories especially those aged 19-25 years and 26-30 years.

The study further established that the nutrient intakes for proteins and fat provided by the hospital were significantly were much lower compared to the recommended daily average (RDA) among the surveyed patients in the hospital. This agrees with a study in Zambia that indicated that indicated that only 24.4%, 8.5%, 26.7%, 5.5% and 15.2% of the participants met the Recommended Dietary Intakes of energy, protein, iron, vitamin C

and dietary fiber respectively. The hospital food in that study contributed to more than 60% of the total nutrient intake of energy, protein, folic acid and dietary fiber.

In a study by (Sattler, et al., 2019) established that small increases in energy, protein (red meat), and also an increase in vegetable intake resulted in nutritional status improvement in hospitals.

With regard to patient's ability to feed oneself, study findings show that majority of the study respondents (82.5%) were able to feed themselves most of the times, with only a few respondents unable to feed themselves at all. According to the study findings, 91.6% of the study respondents were fed by the relatives while 4.2% of the respondents were each fed by friends and health workers, respectively. With respect adequacy of feeding assistance provided by those who were responsible for the feeding of patients, study findings reveal that majority of the study respondents (75%) found the assistance provided adequate while 25% did not. It is evident that a significant proportion of the patients found the food provided by the hospital food to be poor quality with the most frequently cited reasons as tasteless/un-appetizing/un-palatable food, poorly cooked or burnt food, disliked hospital food and lack of alternatives/options/monotonous.

5.5 Risk Factors associated with Hospital Malnutrition

The study sought to determine both personal and organizational factors associated with malnutrition. Study findings reveal that the most frequently observed feeding difficulties among the study respondents include: Fatigue (72.8%), reduced appetite (63.8%), self-feeding (51.3%), bloating (43.8%) and vomiting (42.5%). Other notable feeding difficulties included: Others Nausea, depression, esophageal reflux, taste/smell changes, constipation, flatulence, chewing difficult, diarrhea, food allergies, mouth sores,

medication and sore throat. The study further indicate that majority of the study respondents (90%) had lower to moderate risk owing to feeding difficulties in the hospital. This is in agreement with a systematic review of literature study by (Tamura, Bell, Masaki, & Amella, 2013) where depression, poor oral intake, swallowing issues, and eating/chewing dependency as risk factors.

The Chi-square analysis results show that age especially for male respondents was the only socio-demographic characteristic that was found to be significantly associated to the risk of malnutrition (χ^2 = 14.190; P = .028, p<.05). Study findings also indicate that energy intake especially for male respondents was found to be significantly associated to the risk of malnutrition (χ^2 = 14.190; P = .028, p<.05) whereas it was not significant for female respondents' gender (χ^2 = 3.708; P = .448, p>.05). On the basis of food nutrients intake, protein (χ^2 = 0.527; P = .726, p>.05), fat (χ^2 = 4.697; P = .320, p>.05) and carbohydrates intake (χ^2 = 1.093; P = .895, p>.05) were not statistically associated to malnutrition among study respondents.

The Chi-square analysis results indicated that although the association between the diagnosed diseases was not found to be statistically significant, there was a larger proportion of the study respondent in the high risk to malnutrition category compared to the moderate and low risk categories. The study established that the following diseases predisposed study respondents to risk of malnutrition in the order of magnitude: Hypertension, Gastritis Enteritis, HIV/AIDS, Pneumonia, Anemia, Pulmonary Tuberculosis, Pulmonary Ulcers Disease and Congestive Cardiac Failure.

Study findings from qualitative data (key informant interviews) established that there were eight(8) nutritionist in the hospital against the 22 required number as per the human resource for health norms and standards guideline for health sector (2014)

The KIs indicated that the food/diet provided by the hospital to patients in the general medical wards was generally considered to be inadequate, characterized by frequent shortages of food stuffs, lack of special food/diet for critically ill patients and stock outs of nutritional products such as FBF, F75, F100. One KI (2017) "*hospital food was inadequate f and patients were not allowed to bring in food into hospital wards"*

On food preparation, meals were prepared as per the hospital menu even though no diet sheets were filled. Preparation was based on bed returns rather than diet sheets. It was also reported that some efforts were made to provide special food/diet such as salt-free, sugar-free, blended and mashed foods, milk, eggs. It was evident that provision of special diet/food to respondents faced with challenges such as feeding difficulties (toothless & throat problems), inadequate parental and nasal-gastric feeds. According to one respondent *"Patients needing parental feeding did not readily get them and were often asked to buy if they afforded".* With regard to availability of nutritional products such as FBF, F75, F100 for malnourished patients, KI (2017) observed that "*the products were not adequately stocked".*

Feeding of patients in the medical wards was not closely monitored by health care staff. This often led to patients missing meals especially the critically sick or bedridden. One Key informant indicated that "*Adequacy of hospital feeding is generally fair characterized by inadequate food as well as the food not meeting patients' needs*"

5.6 Nutritional Care Process used in Management of Malnutrition

In objective five, the study assessed the nutrition care practices. The study sought to find out if nutrition status assessment during admission was done to patients' at-least 48 hours upon admission. Study findings indicate that compliance to the various standard operation procedures (SOPs) concerning the nutrition care process and management in the hospital was generally very low and rarely undertaken among patients in the hospital. 89(98.7 %) of the clients Weight, Height, or MUAC was not document, within the 12 hours of admission as recommended by the Kenya Ministry of Health clinical nutrition guidelines. Nutrition status documentation was only done to 2(2.5%) of the participants. Despite the high malnutrition prevalence of 73.8% 0nly 3(3.8%) of the participants were referred for nutrition review with only 4(5%) of the participants being attended by a nutritionist. This mirrors a study by (Blaauw, et al., 2019) that indicated that despite majority of patients being at risk of malnutrition during admission to the hospital, only 8.09% of the inpatients a had referral for nutritional review within the first 48 h since admission. Only 2(2.5%) of clients' records was food intake documented. Consequently only (3.8) of the records had nutrition care plan documented

A similar study in Australia (Roberts, 2015) observed that 59% (142 patients) of the patients had been screened for malnutrition 71% weight documented while 34% had their height documented. Sixty-nine patients (29%) had been referred for dietitian review with reasons for getting a referral to a dietitian included lower BMI and having stayed for a long time in the hospital.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions of the Study

The study arrived at certain conclusions: a significant proportion of the study respondents were youthful (26-45 years), married, and of basic level of education, self-employed, with a majority of Christian faith. With regard to hospitalization, majority were referred from home, had stayed in the hospital ward and were either on light activity or Bed/chair ridden, diagnosed mostly with Hypertension, Gastritis Enteritis, HIV/AIDS, Pulmonary Tuberculosis, Anemia, Pneumonia, Diabetes Mellitus and Pulmonary Ulcers.

With regard to overall prevalence of malnutrition (combined acute disease effect, unplanned weight loss and BMI index), a majority of the study respondents 73.8% were malnourished (high risk 60.00% and moderate risk 13.8) In addition, more female study participants were found to be overweight and underweight, respectively even thought the differences were not statistically significant**.**

Regarding the risk factors that were associated with hospital malnutrition, the study concludes that fatigue, reduced appetite, not able to self-feed, bloating and vomiting were the most frequently experienced feeding difficulties among the study respondents, even though they only accounted for a lower to moderate risk of malnutrition. Age especially for male respondents was the only socio-demographic characteristic that was found to be significantly associated to the risk of malnutrition. The study concluded that energy intake especially for a male respondent was found to be significantly associated to the risk of malnutrition while food intake (protein, fat and carbohydrates) was not. Furthermore, it was also evident that although the association between the diagnosed diseases was not found to be statistically significant, diseases such as Hypertension,

Gastritis Enteritis, HIV/AIDS, were found to be common among study respondents with high risk of malnutrition in the medical wards.

The mean caloric intake of the diet that the hospital provided was much lower compared to the recommended daily average (RDA). This affected mostly male patients (aged 21-40, 41-55 and >55 years) and females (aged 19-25 and 26-30 years), respectively. Majority of the study respondents were able to feed themselves most of the times, those unable to feed were assisted by the relatives, friends and health workers. In addition, a significant proportion found the food provided by the hospital of poor quality,

The study sought to assess the nutrition care practices among hospitalized patients In this respect, the study concludes that compliance to the various standard operation procedures (SOPs) concerning the nutrition care process and management in the hospital was generally very low.

6.2 Recommendations

6.2.1 Recommendations for policy

Recruit more nutritionists/dieticians by the national and county governments to increase nutrition services among patients.

6.2.2 Recommendations for practice

1. Standard operating procedures for nutrition screening to be adhered to for every patient at the point of admission by nutritionists/dieticians as guided by clinical nutrition manual.

2. Multidisciplinary care approach by Hospital Management Team (HMT) towards the nutrition management to improve on nutrition care advocacy among other health workers.

3. Procure anthropometric equipment like weighing scale and nutrition commodities by the hospital management.

6.2.3 Recommendations for further research

A prospective survey to be conducted in different health facilities of different levels to determine whether malnourished patient had the condition before admission or during hospitalization and differentiate the development of malnutrition while in the hospital and hospital dietary intake

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APPENDICES

APPENDIX A: INFORMED CONSENT

Informed Consent

My name is Lydia Kimani. I am a master's student from Kenyatta University. I am conducting a study on "**Malnutrition Prevalence, Detection And Management, Among Adult In-Patients In General Medical Wards of Rift Valley Provincial Referral Hospital, Nakuru County, Kenya**" The information will be used by the Ministry of health to strengthen systems in improved nutrition care in detecting and managing malnutrition for adult in-patients in hospital as well as in other health facilities in Kenya.

Procedures to be followed

Participation in this study will require that I ask you some questions about yourself and the foods you eat. I will also take your weight and height or mid upper arm circumference. I will record the information from you in a questionnaire.

You have the right to refuse participation in this study. You will get the same care and medical treatment whether you agree to join the study or not and your decision will not change the care you will receive from the ward today or that you will get from any other clinic at any other time.

Please remember the participation in this study is voluntarily. You may ask questions related to the study at any time.

You may refuse to respond to any questions and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from this ward or any other organization now or in the future.

Discomfort and Risks

There are no risks involved in this study. However you do not have to answer any question or take part in the study if you feel the questions are too personal or if talking about them makes you feel uncomfortable. The interview may add approximately half an hour to the time you wait before you receive your routine services.

Benefits

There will be no direct benefit to you, but your participation is likely to help us understand how to improve nutrition care to hospitalized adult in-patients. If your nutritional status requires management you will be referred appropriately.

Reward

There will be no direct reward in participating in this study.

Confidentiality

The interviews and examinations will be conducted in a private setting within the ward. Your name will not be recorded on the questionnaire. The questionnaires will be kept in a locked cabinet for safe keeping at Kenyatta University. All information and records related to you and any other information given will be confidential and will only be used for the purpose of this research.

Contact information

If you have any questions you may contact Professor Judith Kimiywe Supervisor 1. on 0722915459 or Dr. Irene Ogada Supervisor 2. on 0723955456 or the Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke, secretary.kuerc@ku.ac.ke,secretariat.kuerc@ku.ac.ke

Participants Statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care that I will receive from the ward today or that I will get from any other clinic at any other time.

Name of Participant……

_____ _____

Signature or Thumbprint Date

Investigators statement

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved

Name of Interviewer……

_____ _____

Signature or Thumbprint Date

APPENDIX B: QUESTIONAIRE FOR PATIENTS

Study title: Malnutrition Prevalence, Detection And Management, Among Adult In Patients In General Medical Wards Of Rift Valley Provincial Referral Hospital, Nakuru County, Kenya

Questionnaire no…….	County…….
Name of hospital…….	Name of interviewee……
Name of the ward…….	Patient Ip No……..
DOA…….	Date of interview…….
Principal diagnosis	Refered from…….
Nutritional diagnosis……..	

Socio-demographic and economic data

1. Sex: male ( ) female ( ) Age……yrs.
2. Marital status 1) married ( ) 2) single ( ) 3) separated ( ) 4) Divorced ( ) 5) widow/ widower ( )
3. Household size…….Occupation…….

a) Respondents level of education? Primary ( ) b) secondary ( ) c) tertiary ( ) d) none ( )

4. Religion…a) Christian, ( ) b) Muslim( ) c) Hindu ( ) **any other specify……..**

Personal risk factors information

5. Do you experience any of the following feeding difficulties?

Problem	**yes**	**no**
Difficult chewing	( )	( )
Difficulty swallowing	( )	( )
Food allergies	( )	( )
Nausea	( )	( )
Vomiting	( )	( )
Diarrhea	( )	( )
Feeding your self	( )	( )
Any medication interfering with food intake	( )	( )
Esophageal reflux	( )	( )
mouth sores	( )	( )
sore throat	( )	( )
constipation,	( )	( )
Bloating	( )	( )
Fatigue	( )	( )
Taste /smell changes	( )	( )
Flatulence	( )	( )
Reduced appetite	( )	( )
depression	( )	( )
Any other ……		

6. Are you able to feed yourself?

   Yes…… ( ) no…. ( )

7. If yes in 6 above, who does it? ...a) relative b) health worker c) none.....

8. Is the feeding assistance adequate?

A) yes …… ( ) b) no…… ( )

9. How would you rate the hospital food?

a) Very good ( ) b) Good ( ) c) Fair ( ) d) poor ( )

   9.1 Please give the reason your answer above

   ……

10. Interviewer's assessment of diet:

    a) appropriate ( ) b) Not appropriate ( )

11. If not appropriate, state why

    a) not balanced( ) b) lacks variety ( ) c) not of right consistency/modification d) Others specify)……

12. Functional capacity of the respondent

a. No dysfunction ( )

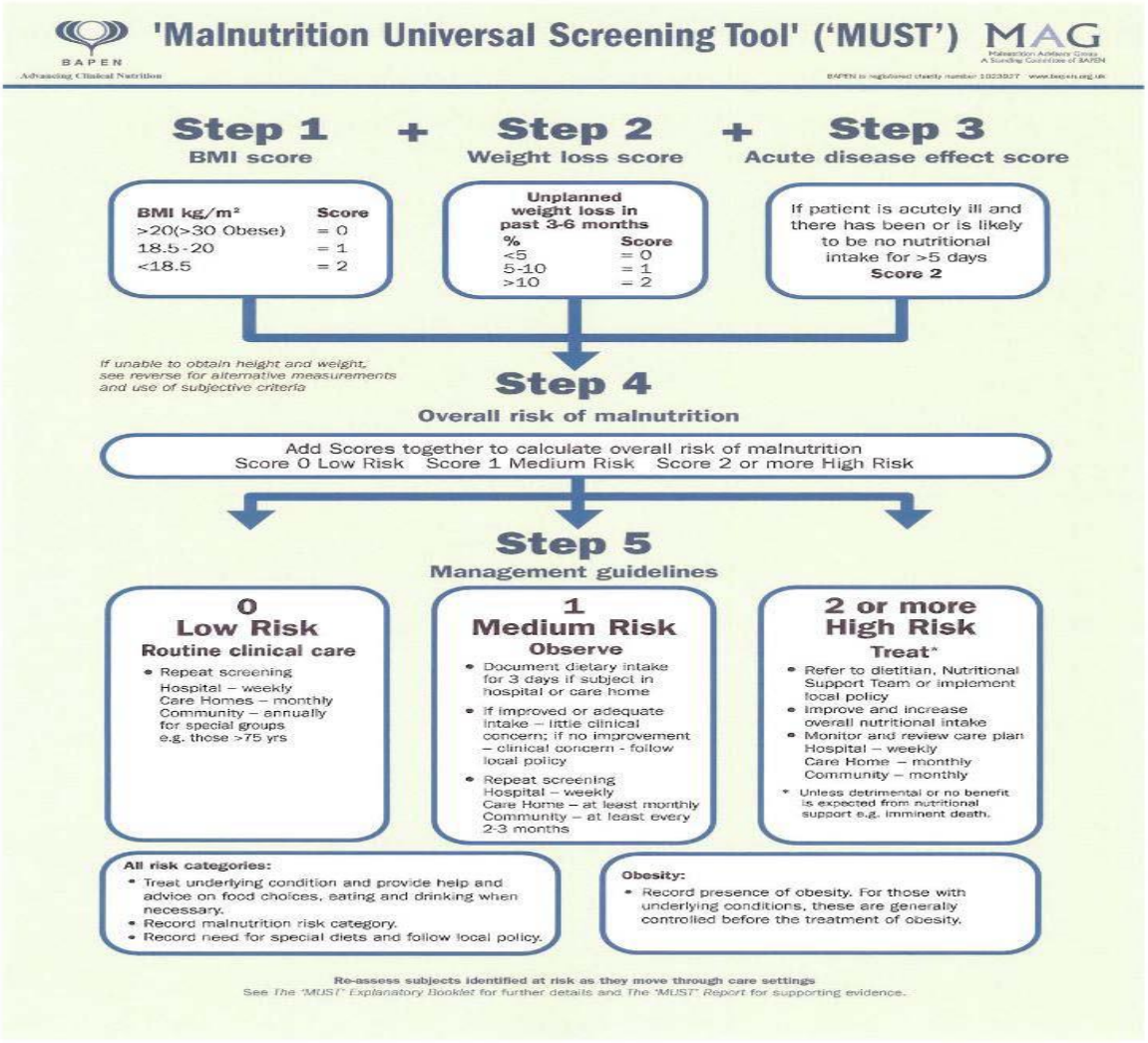
b. Change in function ( )

c. Light activity ( )

d. Bedridden/ chair ridden ( )

e. Improved in function ( )

APPENDIX C: MALNUTRITION UNIVERSAL SCREENING TOOL (MUST)



APPENDIX D: 24 HOUR RECALL DIETARY INTAKE

24hr recall no…….	County…….
Name of hospital…….	Name of interviewee……
Name of the ward…….	Patient Ip No……..
DOA……	Mode of feeding……..
Date of interview…….	

1. What day was yesterday? (Tick correct one)

Mon	**Tue**	**Wed**	**Thurs**	**Fri**	**Sat**	**Sun**

Starting from morning to evening yesterday, please name all foods and drinks you consumed and the ingredients that were used

1. What amount of food and drink did you consume and how were they prepared

Time/meal	Name of dish/food(list all foods and beverages for every meal an snack during 24hour period including water coffee or tea vitamins and minerals	Ingredients used	Amount aken e.g. cup, plate	Amount (g)	Amount taken(g)
Break fast					
Morning snack					
Lunch					
Afternoon snack					
supper					

2. Is this your usual feeding while in the hospital?

   a. yes ( ) b. no ( )

3. If no indicate how it is from your usual intake?

APPENDIX E: OBSERVATION CHECKLIST FOR SERVICE

1	**Service to the patient**		
	Weight documented on admission		
	Height documented		
	MUAC documented		
	Nutrition screening done and documented within 12hrs of admission		
	Nutritional status documented		
	Nutritional diagnosis documented and in PES format		
	Referral to the nutritionist done and documented in the patient file		
	Patient attended by a nutritionist and documented		
	Nutrition care plan documented		
	Nutrition intervention started and documented		
	Nutrition review done and documented		
	Patient food intake documented		

APPENDIX F: KEY INFORMANT INTERVIEW GUIDE FOR HEALTHCARE PROFESSIONALS

Study title: Malnutrition Prevalence, Detection And Management, Among Adult In Patients In General Medical Wards Of Rift Valley Provincial Refferal Hospital, Nakuru County, Kenya.

Nutritionists in the adult General Medical Wards

1. Nutritionist No……
2. How long have you worked in this ward……years……..months
3. How many nutritionist work in this ward ……
4. Do you have clinical nutrition guidelines in this ward for management of diseases?
   a) yes ( ) b) no ( )
5. If yes in 1 above how many do you have? .....
6. Do you have standard operating procedure for nutrition care in this ward?
   Yes…… ( ) No…… ( ) (if yes researcher to have a copy)
7. Are patients in this ward screened for malnutrition?
   Yes…….. ( ) no…… ( )
8. When are patients screened for malnutrition
   a. Do you have a tool for screening malnutrition?
   Yes…….. ( ) no…….( )
9. If yes in 5 above On what proportion of patients in this ward do you carry out nutrition screening
   a. 100% of all the patients 50%-90% b) Less than 50% c) None

10. Do you keep a nutrition register. A) yes ( ) b) no ( )
11. Where do you keep the registers……
12. Are they being used?.....
13. If yes check for completeness what is captured in the registers……
14. If no in 15 , what do they use to register nutrition services……..
15. Who reports on malnutrition in this ward……
16. How often do you report on malnutrition……
17. Are patients in this ward weighed on admission? A) Yes B) No
18. If yes, why are they weighed?.....
19. Are patients in this ward taken height? A) Yes B) No
20. Which of the following anthropometric tools do you use in this ward?
    a. Weight scale b) Height meter /stadiometre c) Waist circumference d)Others … specify
21. What is nutrition care process? .....
22. Do you have nutrition screening/assessment forms in this ward?
23. Are Clinical nutrition audits conducted in the wards? A) Yes B) No
24. If yes in 13 above how often?
    a) Monthly b) quarterly c) bi annually d) Annually
25. Do you have feedback reports?
26. Do you have national clinical nutrition guidelines (confirm)
27. Do you have enough nutrition assessment equipments?
28. How would you rate the Appropriateness and adequacy of nutrition support in this medical ward in relation to malnutrition?

a. Excellent b. good c. fair d. poor

29. Give reasons for your answer……..
30. Do you have patients in this ward who require nasal gastric tube feeding A) Yes B) No
31. If yes in 14 above where do they get their feeds from
    a) locally made from the hospital b) locally made from home C) commercial feeds provided by hospital d) commercial feed bought outside hospital by client or relatives
32. Do you have patients in this ward who require parenteral feeds A) Yes B) No
33. Do they get them……
34. If yes in 17 above Where do they get them

    a. Who is responsible for nutrition screening?

    b. Who is responsible for nutrition assessment?

    c. Who is responsible for feeding patients who cannot feed themselves?

35. Have you been trained on nutrition care process

36. What would you want done to improve malnutrition detection and management in this ward

37. What problems do you face with malnutrition management in this ward?

(B) Nursing Officer In-charge

1. In the nursing care process is nutrition part of the care
2. What type of nutrition care is a nurse at the medical ward supposed to perform

   ……

3. Is nutrition assessment and screening part of nursing care process
4. Who's responsibility is to feeds patients who cannot feed themselves in the general medical wards

A) nurse ( ) b) nutritionist ( ) c casual ( ) d) care takers

5. Do you think patients admitted in general medical ward receive adequate nutrition care

   a) Yes …… ( ) no…….. ( )

5. Who is responsible for nutrition screening? ……..
6. Who is responsible for nutrition assessment? .....
7. Who is responsible for feeding patients who cannot feed themselves?

a) Nurse b) Nutritionist c) Casual d) caretaker

8. Who record patients' food intake?

a) Nurse b) Nutritionist c) Doctor d) None

9. Who notes and reports patients who miss meals?

a) Nurse b) Nutritionist c) Casual

10. To whom does he report to?

a) Kitchen b)To casual c)To the care taker

a) Is any action taken to ensure those who miss meals are given? Yes b) no

a) Do malnourished patients receive special diet from hospital kitchen? Yes … ( ) b) no…. ( )

11. How would you rate the hospital food in relation to feeding patients in this ward
a. Excellent ( ) b. good ( ) c. fair( ) d. poor( )
12. Give reasons for your answer

……

13. Are there patients who come to hospital and start losing weight during their hospital stay A) yes B) No

14. Do you normally get patients on NG tube feeding in this ward? A) yes B) No

18. If yes, what are patients on NG tube feed fed on in this ward?

a) Soup b) Porridge C) Mashed fluid foods d) Commercial NG tube formulars

15. Where do they get their foods from?

a) From hospital kitchen
b) From relative
c) They buy for themselves

16. Do you get patients on parenteral feeds? A) yes B) No

17. Where do they get the feeds from? .....

a) Do They buy for themselves? ……..

18. If so what attention has it been given by the multidisciplinary team…….

19. Do you discus patient malnutrition in ward rounds……

23. If yes for the malnourished patient in this ward do you think they get good attention?

(c) Pharmacists

1. Do you stock the following nutrition supplies

a. Rutf yes…… ( ) no …….. ( )

b. Rusf yes…… ( ) no …….. ( )

c. Parenteral feeds yes…… ( ) no …….. ( )

d. Nasal gastric tube feeds

e. F75

f. F100

2. Do you experience any stock outs

yes……..( ) no ……...( )

3. If yes above of which feeds and how often…….

Chairperson for Quality Assurance

1. **In** hospital audit, is nutrition care in general medical wards part of the audit

Yes…… ( ) no…… ( )

2. If yes, what do you check for in nutrition? .....
3. Do you have a checklist for nutrition care? Yes ( ) no…… ( )
4. Do you give feedback to the nutrition department……yes ( ) no…… ( )
5. If yes in 4 above can we see any documentation for feedback to the department? A (checklist available) b.) checklist not available

APPENDIX G: FORMULAR USED TO CONSTRUCT KREJCIE AND MORGAN TABLE FOR SAMPLE SIZE DETERMINATION.

Formula for determining sample size

$$s = X^2NP(1-P) \div d^2(N-1) + X^2P(1-P)$$

s = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size.

P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (.05).

Source: Krejcie & Morgan, 1970

APPENDIX H: KREJCIE AND MORGAN TABLE

Table for Determining Sample Size for a Finite Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

APPENDIX I: GRADUATE SCHOOL AUTHORIZATION LETTER.

KENYATTA UNIVERSITY
GRADUATE SCHOOL

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

Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: H60/CE/21044/2012

DATE: 8th November, 2016

Director General,
National Commission for Science, Technology
& Innovation
P.O. Box 30623-00100,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR LYDIA WAMBUI KIMANI – REG. NO. H60/CE/21044/2012

I write to introduce Ms. Lydia Wambui Kimani who is a Postgraduate Student of this University. She is registered for M.Sc. degree programme in the Department of Food, Nutrition and Dietetics.

Ms. Kimani intends to conduct research for an M.Sc. Proposal entitled, "Malnutrition Prevalence, Detection and Management, among Adult in Patients in General Medical Wards of Rift Valley Provincial Refferal Hospital, Nakuru County, Kenya".

Any assistance given will be highly appreciated.

Yours faithfully,

KENYATTA UNIVERSITY OFFICE OF DEAN
-7 DEC 2016
GRADUATE SCHOOL P.O. Box 43844-00100 NAIROBI

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

GK/rwm

APPENDIX J: KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE APPROVAL

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: kuerc.chairman@ku.ac.ke
kuerc.secretary@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844,
Nairobi, 00100
Tel: 8710901/12

Our Ref: **KU/ERC/APPROVAL/VOL.1** (40) Date: 20th April 2017

Lydia Wambui Kimani
Kenyatta University,
P.O Box 43844,
Nairobi

Dear Lydia

APPLICATION NUMBER, PKU/629/I712 TITLE "Malnutrition Prevalence, Detection and Management, among Adult In-Patients in General Medical Wards of Rift Valley Provincial Refferal Hospital, Nakuru County, Kenya**"**

1. **IDENTIFICATION OF PROTOCOL**

The application before the committee is with a research topic application Number, **PKU/629/I712 TITLE "**Malnutrition Prevalence, Detection and Management, among Adult In-Patients in General Medical Wards of Rift Valley Provincial Refferal Hospital, Nakuru County, Kenya," Received on 10th January 2017 and discussed on11th April 2017

2. **APPLICANT**

Lydia Wambui Kimani

3. **SITE**

Nakuru County, Kenya

4. **DECISION**

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (Section 7.2.1.3) and the Kenyatta University Review Committee Guidelines **AND APPROVED that the research may proceed for a period of ONE year from 20th April, 2017.**

ADVICE/CONDITIONS

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

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space Provided below and return to KU-ERC a copy of the letter.

28 APR 2017

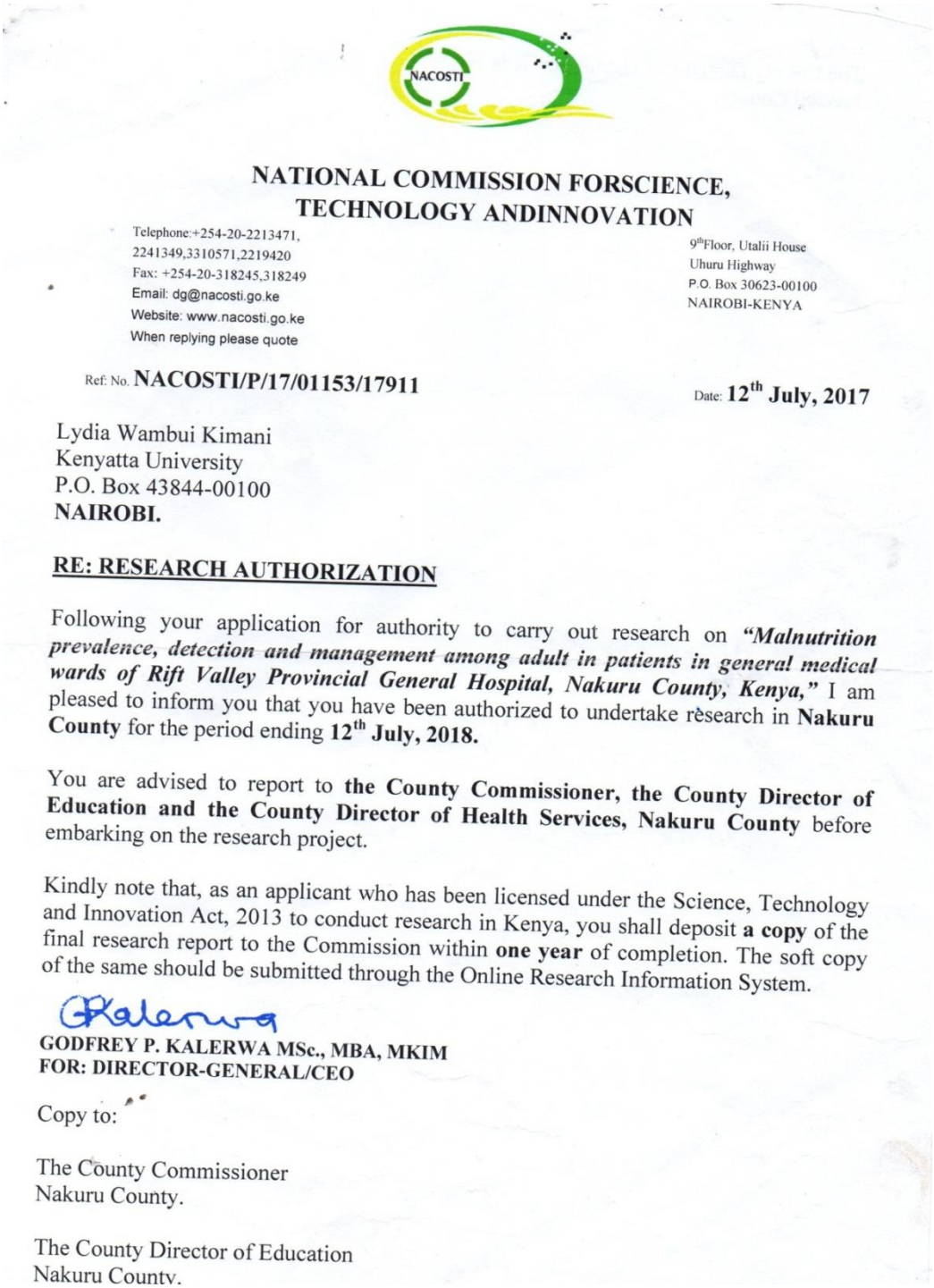
DR. TITUS KAHIGA.
CHAIRMAN ETHICS REVIEW COMMITTEE

I ..... LYDIA K. MAAI ..... accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of... 28/4/17 .....2017.

cc.
DVC: Research Innovation and Outreach

APPENDIX K: RESEARCH AUTHORIZATION (NATIONAL COMMISSION FOR SCIENCE TECHNOLOGY AND INNOVATION



NATIONAL COMMISSION FORSCIENCE, TECHNOLOGY ANDINNOVATION

Telephone:+254-20-2213471, 2241349,3310571,2219420
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/17/01153/17911**

Date: **12th July, 2017**

Lydia Wambui Kimani
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Malnutrition prevalence, detection and management among adult in patients in general medical wards of Rift Valley Provincial General Hospital, Nakuru County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for the period ending **12th July, 2018.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Director of Health Services, Nakuru County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nakuru County.

The County Director of Education
Nakuru County.

APPENDIX L: RESEARCH PERMIT (NATIONAL COMMISSION FOR SCIENCE TECHNOLOGY AND INNOVATION

CONDITIONS

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A 14883

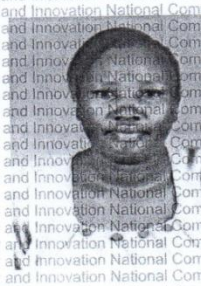
CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MS. LYDIA WAMBUI KIMANI
of KENYATTA UNIVERSITY, 98-30200 KITALE,has been permitted to conduct research in *Nakuru County*

on the topic: *MALNUTRITION PREVALENCE, DETECTION AND MANAGEMENT AMONG ADULT IN PATIENTS IN GENERAL MEDICAL WARDS OF RIFT VALLEY PROVINCIAL GENERAL HOSPITAL, NAKURU COUNTY, KENYA.*

for the period ending:
12th July,2018

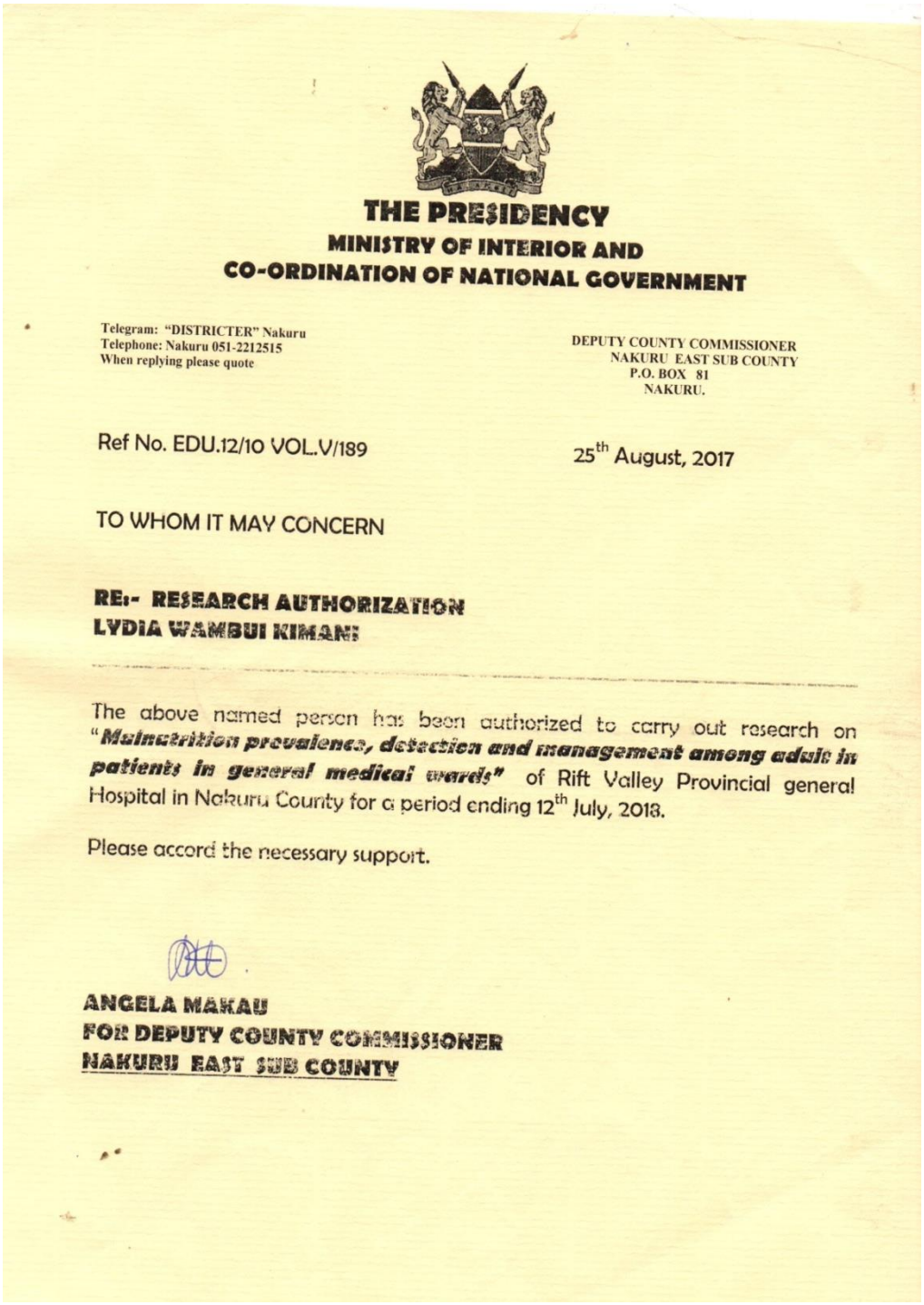
Permit No : NACOSTI/P/17/01153/17911
Date Of Issue : 12th July,2017
Fee Recieved :Ksh 1000



.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

APPENDIX M: RESEARCH AUTHORIZATION (MINISTRY OF INTERIOR AND CO-ORDINATION OF NATIONAL GOVERNMENT



THE PRESIDENCY
MINISTRY OF INTERIOR AND
CO-ORDINATION OF NATIONAL GOVERNMENT

Telegram: "DISTRICTER" Nakuru
Telephone: Nakuru 051-2212515
When replying please quote

DEPUTY COUNTY COMMISSIONER
NAKURU EAST SUB COUNTY
P.O. BOX 81
NAKURU.

Ref No. EDU.12/10 VOL.V/189

25th August, 2017

TO WHOM IT MAY CONCERN

RE:- RESEARCH AUTHORIZATION
LYDIA WAMBUI KIMANI

The above named person has been authorized to carry out research on ***"Malnutrition prevalence, detection and management among adult in patients in general medical wards"*** of Rift Valley Provincial general Hospital in Nakuru County for a period ending 12th July, 2018.

Please accord the necessary support.

ANGELA MAKAU
FOR DEPUTY COUNTY COMMISSIONER
NAKURU EAST SUB COUNTY

APPENDIX N: RESEARCH AUTHORIZATION (MINISTRY OF EDUCATION STATE DEPARTMENT OF BASIC EDUCATION)

MINISTRY OF EDUCATION
State Department of Basic Education

Telegrams: "EDUCATION",
Telephone: 051-2216917
Fax: 051-2217308
Email: cdenakurucounty@yahoo.com
When replying please quote
Ref. NO.
CDE/NKU/GEN/4/1/21/VOL.V/4

COUNTY DIRECTOR OF EDUCATION
NAKURU COUNTY
P. O. BOX 259,
NAKURU.

24th August, 2017

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION – LYDIA WAMBUI KIMANI
PERMIT NO. NACOSTI/P/17/701153/17911

Reference is made to letter NACOSTI/P/17/701153/17911 dated 12th July, 2017.

Authority is hereby granted to the above named to carry out research on **"Malnutrition prevalence, detection and management among adult ion patients in general medical wards of Rift Valley Provincial General Hospital, Nakuru County Kenya,"** for a period ending 12th July, 2018.

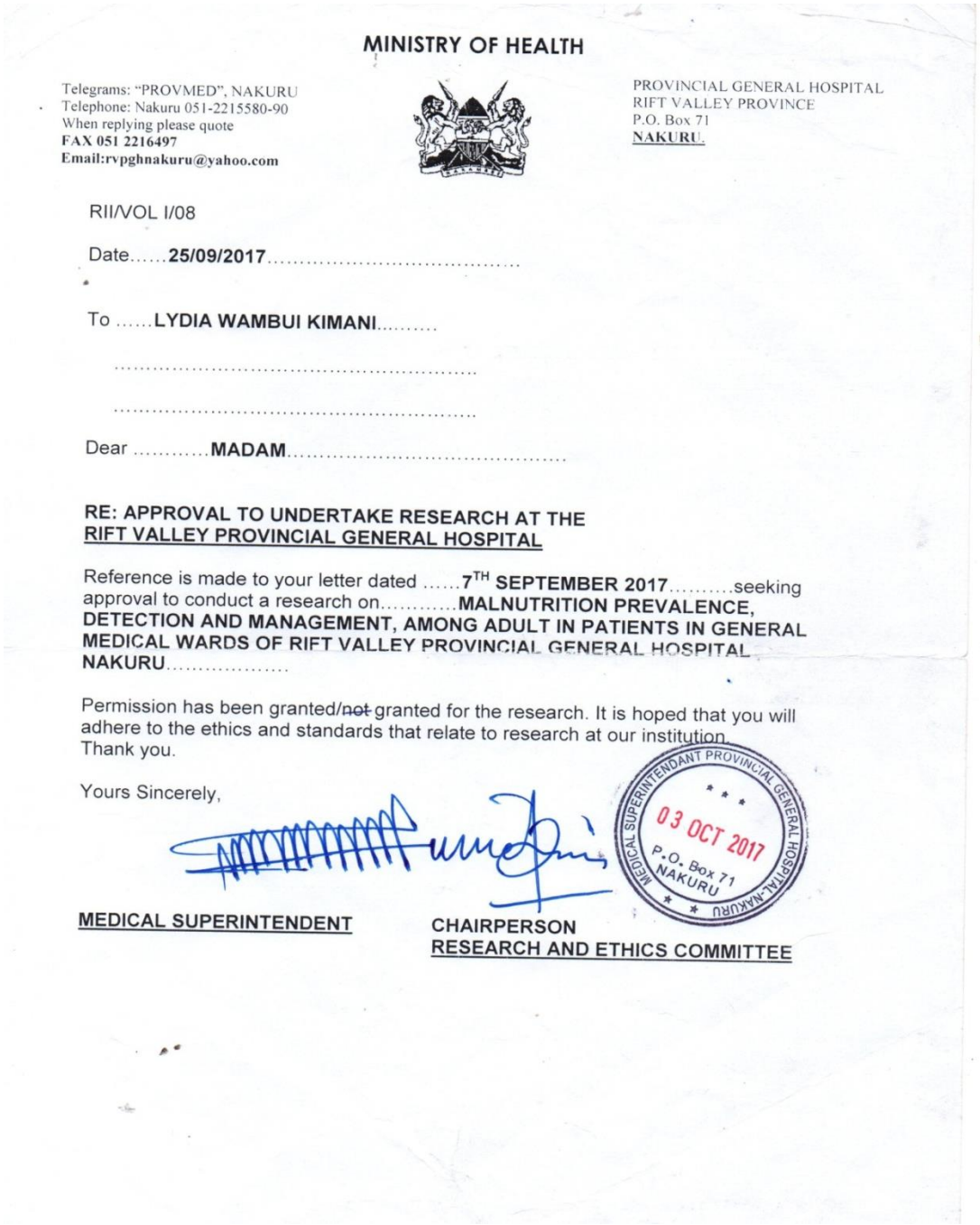
Kindly accord her the necessary assistance.

AKOKO OKAYO
FOR: COUNTY DIRECTOR OF EDUCATION
NAKURU COUNTY

Copy to:

Kenyatta University
P. O. Box 43844 - 00100
NAIROBI

APPENDIX O: RESEARCH AUTHORIZATION (MINISTRY OF HEALTH PROVINCIAL GENERAL HOSPITAL NAKURU)



MINISTRY OF HEALTH

Telegrams: "PROVMED", NAKURU
Telephone: Nakuru 051-2215580-90
When replying please quote
FAX 051 2216497
Email:rvpghnakuru@yahoo.com

PROVINCIAL GENERAL HOSPITAL
RIFT VALLEY PROVINCE
P.O. Box 71
NAKURU

RII/VOL I/08

Date.....25/09/2017.....

To .....LYDIA WAMBUI KIMANI.....

.....

.....

Dear .....MADAM.....

RE: APPROVAL TO UNDERTAKE RESEARCH AT THE RIFT VALLEY PROVINCIAL GENERAL HOSPITAL

Reference is made to your letter dated .....7TH SEPTEMBER 2017.....seeking approval to conduct a research on.....MALNUTRITION PREVALENCE, DETECTION AND MANAGEMENT, AMONG ADULT IN PATIENTS IN GENERAL MEDICAL WARDS OF RIFT VALLEY PROVINCIAL GENERAL HOSPITAL NAKURU.....

Permission has been granted/~~not~~ granted for the research. It is hoped that you will adhere to the ethics and standards that relate to research at our institution.
Thank you.

Yours Sincerely,

MEDICAL SUPERINTENDANT PROVINCIAL GENERAL HOSPITAL-NAKURU
03 OCT 2017
P.O. Box 71 NAKURU

MEDICAL SUPERINTENDENT

CHAIRPERSON
RESEARCH AND ETHICS COMMITTEE