ASSESSMENT OF THE QUALITY OF NUTRITION SERVICE DELIVERY IN THE CONTEXT OF PATIENT MANAGEMENT IN HEALTH FACILITIES IN TANZANIA

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ABSTRACT

Nutrition service delivery is a vital component of modern healthcare, playing a key role in disease prevention, management, and treatment. This study aimed to assess the current status of nutrition service delivery within Tanzanian health facilities, focusing on its role in patient management.

A cross-sectional survey was conducted among nutritionists, dietitians, nurses and doctors who delivering nutrition care in selected health facilities in Tanzanian. A total of 46 participants from 28 randomly selected facilities were enrolled. Data were analyzed using SPSS version 29.0.

The study revealed that nutrition services commonly provided include basic nutrition assessments such as height (98%), weight (94%), and mid-upper arm circumference (72%). However, advanced assessments such as body composition analysis were rarely conducted due to a lack of equipment and trained personnel. Staffing levels were inadequate, with more than 200 hospital beds assigned per single nutritionist in many facilities. Furthermore, clinical nutrition guidelines, job aids, and essential equipment were either limited or unavailable, affecting the quality of services. Professionals with more than four years of experience and higher academic qualifications (bachelor's or postgraduate level) were significantly associated with better nutrition service delivery ($p = 0.019$). Improving nutrition service delivery requires addressing human resource shortages, providing on-job training, and ensuring access to equipment and evidence-based guidelines. Strengthening documentation practices, integrating nutrition expertise in quality improvement, and encouraging research collaboration are critical to advancing patient outcomes and optimizing nutrition care in Tanzania's healthcare system.

DECLARATION

I, Arafa Erasto, do hereby declare to the Senate of the Nelson Mandela African Institution of the Science and Technology that dissertation is my own original work and that it has neither been submitted nor concurrently submitted for the degree or similar award in any other institution.

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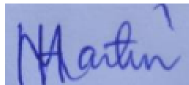
Dr. Haikael Martin		30th May, 2025
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CERTIFICATION

The undersigned certify that they have read the dissertation titled "**Assessment of the Quality of Nutrition Service Delivery in Context of Patients Management in Selected Health Facilities in Tanzania**", and recommend for examination in fulfillment of the requirements for the Master's in Human Nutrition and Dietetics specializing Clinical Nutrition of the Nelson Mandela African Institution of Science and Technology.

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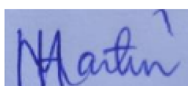
Dr. Haikael Martin		30th April,2025
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DEDICATION

To To my beloved husband Mr. Mubarak S. Masini, daughter Shaymaa and Son Arif

And

To my parents Mr Erasto E. Mkumbo and Mother Ms. Mwanaid S. Mgwao.

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LIST OF ABBREVIATIONS AND SYMBOLS

ADIME	Assessment, Diagnosis, Interventions, Monitoring and Evaluation
CPD	Continuing Professional Development
EN	Enteral nutrition
NCP	Nutrition Care Process
NCP/T	Nutrition Care Process Terminology
TPN	Total Parenteral Nutrition
PN	Parenteral Nutrition
IDNT	International Dietetics and Nutrition Terminology
HSSP	Health Sector Strategy Plan
MD	Medical Diagnosis
MoH	Ministry of Health
TFNC	Tanzania Food and Nutrition Centre
NMNAP	National Multisectoral Nutrition Action Plan
ND	Nutrition diagnosis
NPO	Nil Per Oral
TBSA	Total Burn Surface area
QIT	Quality Improvement Team

CHAPTER ONE

INTRODUCTION

1.1 Background of the Problem

Nutrition service delivery is a crucial aspect of modern healthcare, encompassing the use of specific diets and nutrients to prevent, manage, and treat diseases (KeMoH, 2010). It plays an essential role in disease prevention, patient recovery, and the overall efficiency of healthcare systems (KeMoH, 2020). Clinical nutrition practice has evolved significantly and is now recognized globally as an integral component of healthcare systems. The development of guidelines, Standard Operating Procedures (SOPs), and educational materials provides essential frameworks for nutritionists, dietitians, and healthcare professionals (Idris & Al Jannakl, 2013; MOH, 2017). The widespread acceptance of SOPs and clinical guidelines in industrialized nations underscores their role in standardizing care and ensuring quality and consistency in nutrition service delivery (Ball *et al*., 2013; Cass *et al*., 2014; Lewis *et al*., 2022) However, several gaps remain, especially in developing contexts. These include a lack of standardization, insufficient training and resources, and inadequate integration of clinical nutrition into broader healthcare systems (Ball et al., 2013; Cass *et al.,* 2014). Inconsistent nutrition care can result in poor health outcomes, increased complications, and higher healthcare costs (Handu et *al*., 2021)

In Tanzania, clinical nutrition and dietetics are relatively underdeveloped compared to community-based nutrition interventions. Routine activities such as nutrition education and counseling, vitamin A and iron/folic acid supplementation, weight and dietary assessments, and hemoglobin monitoring are primarily focused on children and pregnant women, especially in antenatal care settings (Saronga *et al*., 2022). Significant progress has been made in community-level malnutrition interventions, led by the Ministry of Health (MoH) and the Tanzania Food and Nutrition Centre (TFNC), under frameworks like the National Multisectoral Nutrition Action Plan ((NMNAP II, 2022).

Despite these advancements, nutrition service delivery in hospital settings remains a challenge. There is limited availability of clinical nutrition guidelines beyond the Integrated Management of Acute Malnutrition (IMAM). The provision of dietetic services in critical care is essential to enhance recovery and improve patient outcomes. Evidence suggests that adequate nutrition accelerates patient recovery, improves nutritional status, reduces the length of hospital stays, and lowers the risk of complications (KeMoH, 2020; Olufson *et al.,* 2022a) Conversely,

inadequate intake during hospitalization leads to undernutrition, muscle loss, impaired immunity, higher infection rates, and mortality (Frost & Baldwin, 2021; Thibault *et al*., 2021) Malnourished patients often stay hospitalized up to three days longer and are at a higher risk of readmission within 30 days (Kisighii & Raymond, 2022)

Given these challenges, there is an urgent need for improved quality of nutrition services, human resource capacity, training, and standardized tools for clinical nutrition services. This study was therefore designed to assess the status of nutrition service delivery in the context of patient management across various health facilities in Tanzania.

1.2 Problem Statement and Justification

In Tanzania, the field of human nutrition has experienced gradual growth over the years, with a stronger emphasis on community nutrition than clinical nutrition. While Nutrition graduates are increasingly being posted to health facilities, many lack essential skills in patient management. This gap is largely attributed to the absence of clinical rotations in their academic programs, as hospital-based fieldwork is not mandatory. As a result, there is a noticeable inconsistency in the quality and scope of nutrition services provided across hospitals, even those operating at the same level within the healthcare system. This variation underscores the need to better understand clinical nutrition and dietetics practices in the Tanzanian context. The study aims to explore these practices in depth, identify areas for improvement, and ultimately support the development of a more structured and effective approach to nutrition care in patient management. Findings from this research will provide valuable evidence to inform targeted on-the-job training programs, equipping nutrition professionals with the skills required to deliver high-quality clinical nutrition services. Furthermore, this study seeks to assess the strengths, weaknesses, and opportunities within the current system to enhance the delivery of nutrition care in health facilities across the country.

1.3 Rationale of the Study

This study was key to improving nutrition service delivery in health facilities. Results were expected to shed light on what is done, what was not done and what was expected of nutritionists working in health facilities. Identifying these gaps was key to devising strategies for improving patient care through enhanced nutrition management protocols. Moreover, the assessment intends to propose refinements in provision of nutrition services, addressing areas where patient needs might be unmet or processes could be improved to positively impact patient's

prognosis. The findings were expected to inform policy and guidelines related to nutrition service delivery, ensuring alignment with international best practices. Additionally, findings will assist in identifying professional development needs among nutritionist and other healthcare providers potentially leading to interventions which will enhance their practical skills and improve patient's quality of life.

1.4 Research Objectives

1.4.1 General Objective

Assessment of the quality of nutrition service delivery in health care facilities in Tanzania

1.4.2 Specific objectives

(i) To assess human resource capacity to deliver nutrition services in health facilities.
(ii) To determine the nutrition services available in the health facilities.
(iii)To assess the availability of equipment, materials and supplies for nutritional management of patients.

1.5 Research Questions

(i) What is the current human resource capacity for delivering nutrition services in health facilities?Which nutrition services are available in the health facilities?
(ii) Do health facilities have necessary equipment, materials and supplies for nutritional management of patients?

1.6 Significance of the Study

The significance of this study lies in its potential to improve patient care and health outcomes by highlighting the critical role of nutrition in patient management. By identifying strengths and weaknesses in the current system, the research provides actionable insights for policymakers, healthcare providers, and administrators to enhance the quality of nutritional services. Improved nutritional care can lead to faster recovery times, reduced hospital stays, and better management of chronic diseases, ultimately contributing to the overall efficiency and effectiveness of the healthcare system in Tanzania. Furthermore, this study contributes to the body of knowledge on health service delivery in low and middle-income countries, offering a model for similar assessments in other regions. By providing evidence-based recommendations, it help shape future health policies and training programs for healthcare professionals. The emphasis on nutrition as a fundamental aspect of patient care underscores its importance in achieving broader public health goals, such as reducing malnutrition and improving the quality of life

for patients. Ultimately, the findings of this study have the potential to drive significant improvements in healthcare delivery and patient outcomes in Tanzania.

1.7 Delineation of the Study

This study assessed the quality of nutrition service delivery in the context of patient management in selected health facilities across Tanzania. It aimed to evaluate how effectively nutrition services were integrated into overall patient care. The study focused on examining the availability of nutritional resources, the competence of healthcare providers delivering nutrition care, and the use of clinical nutrition guidelines and tools. A cross-sectional design was employed, using both quantitative methods to identify existing strengths, gaps, and challenges in nutrition service delivery. Data were collected through structured questionnaires and observations. Respondents included nutritionists, dietitians, nurses and medical doctors responsible for providing nutrition care. The study explored service delivery at different levels of the healthcare system, including district, regional, and tertiary hospitals, to capture variations in practice. Key indicators such as the presence of trained staff, access to essential equipment and supplies, and the use of documentation tools were assessed. Coordination between departments involved in patient care, such as internal medicine, pediatrics, and outpatient services, was also reviewed to understand the integration of nutrition services. Patient-related outcomes and service delivery efficiency were indirectly assessed through provider responses. By focusing on health facilities where nutrition services were either developing or underutilized, the study provided valuable insights for improving clinical nutrition practices. The findings aimed to inform policy, guide resource allocation, and strengthen nutrition service delivery in Tanzanian healthcare settings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Hospital Nutrition Services

Hospitals are specialized environments where clinical obligations to patients take precedence. While the critical role of proper nutrition care in patient-centered treatment is acknowledged, it is not consistently prioritized. Merely raising awareness and educating on this matter is insufficient(Laur *et al*., 2015). Hospital processes and systems must be adapted, and robust relationships with clear communication channels established, to ensure these improvements are integrated into routine practices. Nutrition and dietetics practitioner alone cannot achieve these improvements; they must collaborate within an interdisciplinary team to effectively enhance nutrition care for all patients. The Nutrition Care Model (NCM), based on the American Dietetic Association's Nutrition Care Process (NCP), visually illustrates the role of dietitians and their interaction with patients within a broader system. Traditionally, efforts to improve nutrition care have concentrated on the patient level, particularly on assessment, diagnosis, intervention, monitoring, and evaluation (Jortberg & Fleming, 2014; Keller *et al*., 2014; Tappenden *et al*., 2013a). An article by Leggat and Dwyer on hospital performance underscored the importance of effective people management and its role in cultural transformation. This aligns with the need for strong team relationships and consideration of the organizational climate, which are essential for fostering change and innovation, although climate is a complex and often elusive concept that can be challenging to define and integrate during implementation processes. The literature reviewed revealed several organizational and environmental factors contributing to malnutrition in hospitals. For instance, poor communication between patients, staff, and food services often results in patients receiving meals they do not consume(Laur *et al*., 2017a; Olufson *et al*., 2022a). Additionally, an ethnographic study across four acute hospital trusts in England and Wales highlighted significant challenges, such as hospital designs and management practices not accommodating the varied needs of patients, making it challenging to deliver optimal care, including nutritional support. Addressing these issues requires a shift in hospital culture towards enhancing and prioritizing nutrition. Recognizing and increasing awareness of this issue, along with its effects on patient outcomes and healthcare utilization, are critical initial steps towards preparing for a cultural change in nutrition practices.

2.2 Importance of Nutrition in Patient Management

In recent years, recognized as the 'United Nations decade of action on nutrition' by the World Health Organization (2016–2025), there has been a growing acceptance of the concept of 'food as medicine (Frost & Baldwin, 2021). This has resulted in increased attention to nutrition and dietetics both within and beyond the hospital setting. However, despite the heightened awareness of the importance of nutrition, malnutrition remains prevalent among hospitalized patients, with up to 60% experiencing a decline in nutritional status post-admission (Tappenden *et al*., 2013b). Factors such as strict feeding schedules, inflexible menus, staffing shortages, and insufficient assistance for those unable to feed themselves contribute to caloric and nutrient deficiencies in patients (Frost & Baldwin, 2021). These challenges are further compounded by the psychological impact of hospitalization, leading to reduced appetite, compromised food absorption, difficulty swallowing (KeMoH, 2010), worsening cognition, and confusion, in addition to the physiological effects of the illness itself. The ability to recover from illness hinges on nutritional status, with poor status hindering or delaying recovery, while good nutritional status fosters healing and recuperation. Hence, it is crucial to assess the nutritional status of individuals undergoing medical treatment. In some cases, dietary adjustments become necessary to facilitate the body's healing process, adapt to physical limitations, prepare for diagnostic procedures, or get ready for surgeries. Nutrition therapy may encompass modifications in dietary intake, such as transitioning to liquefied or pureed foods, undergoing tube feeding (enteral formulas), or receiving intravenous (parenteral nutrition) nourishment.

2.3 Clinical Nutrition and Dietetics Guidelines and Standard Operating Procedures

In developed countries including Europe, North America, Australia, New and Zealand and some of developing country such as Kenya, South Africa and western African countries over the decade, clinical nutrition standard operating procedures, guidelines, materials and supplies have become a common part of clinical practice (Chen *et al*., 2005 ; Laur *et al*., 2016). Institutions of médicine defined clinical guidelines and SOPs as a methodically established statement to support experts to make rational conclusions about suitable health care for specific disease conditions (Laur *et al*., 2016), Chen *et al*., 2005). Guidelines and SOPs/Protocols offer brief directives on which diagnostic or screening tests to order, how to provide therapeutic nutritional supplements, enteral feeds, parenteral nutrition support, medical, and surgical services (Chen *et al*., 2005). Variation in the provision of nutrition services is assumed to be as a result of training and or lack of continuing Professional Development which result to

inappropriate and or incomplete nutrition care (Chen *et al*., 2005). In clinical Practice, clinicians see the standard operating procedure guidelines as instruments for making more consistent and efficient decisions, helping to close the gap between what clinicians do and what scientific evidence supports (Johnston *et al*.,2019; Chen *et al*., 2005).

2.4 Nutrition Care Process

The Nutrition Care Process (NCP) (figure 12), is the methodical process that includes various interconnected processes used by dietitians to provide nutrition care among patients (Thibault *et al*., 2021). The standard of practice for nutritionists/dietitians in patients nutrition care is based on the research findings, currently accepted nutrition, dietetics, and medical knowledge, as well as a systematic, holistic approach to the nutrition care process application (Daigle *et al*., 2021). First step of NCP is Nutritional assessments terminologies such as Anthropometric Measurements include, for instance, height, weight, body mass index (BMI), growth rate, and rate of weight change. Biochemical Data include laboratory data, for example, electrolytes, glucose, hemoglobin A1C, thyroid, and lipid panel. Nutrition-Focused Physical Examination includes oral health, general physical appearance, muscle and subcutaneous fat wasting, and affect. Food and Nutrition History consists of four areas: Food consumption, nutrition and health awareness and management, physical activity and exercise, and food availability. Food consumption may include factors such as, food and nutrient intake, meal and snack patterns, environmental cues to eating, and current diets and/or food modifications. Nutrition and health awareness and management includes, for example, knowledge and beliefs about nutrition recommendations, self-monitoring/management practices, and past nutrition counseling and education. Physical activity and exercise consist of activity patterns, amount of sedentary time (e.g., TV, phone, computer), and exercise intensity, frequency, and duration. Food availability encompasses factors such as, food planning, purchasing, preparation abilities and limitations, food safety practices, food/nutrition program utilization, and food insecurity. Client History consists of four areas: Medication and supplement history, social history, medical/health history, and personal history. Medication and supplement history includes, for instance, prescription and over the counter drugs, herbal and dietary supplements, and illegal drugs. Social history may include such items as socioeconomic status, social and medical support, cultural and religious beliefs, housing situation, and social isolation/connection. Medical/health history includes chief nutrition complaint, present/past illness, disease or complication risk, family medical history, mental/emotional health, and cognitive abilities. Personal history consists of

factors including age, occupation, role in family, and education level (ADA, 2006; Lövestam *et al*., 2019; Ookalkar *et al*., 2020).

The second stage of the nutrition care process involves Nutrition Diagnosis, which serves as a crucial bridge between assessment and intervention. It enables interventions to be precisely targeted towards addressing either the root causes or the observable symptoms of the specific nutrition problem identified. Utilizing a standardized terminology for identifying these nutrition problems not only makes a key aspect of dietetics professionals' critical thinking visible to other professionals but also facilitates clear communication within the dietetics field. The successful adoption of this initiative depends on implementing a standard language across the profession, supported by tools to aid practitioners. Continuous input during the development of standardized language is essential to ensure a solid foundation for its future implementation. INTAKE DOMAIN such as Caloric Energy Balance example Inadequate energy intake (problem) related to lack of financial resources to purchase sufficient food (etiology) as evidenced by weight loss 6kg in the last 3months (sign). CLINICAL DOMAIN such as Functional Balance example Swallowing difficulty (problem) related to stroke (etiology) as evidenced by coughing following eating and/or drinking food and/or liquids. BEHAVIORAL-ENVIRONMENTAL DOMAIN such as Knowledge and Beliefs example Not ready for diet/lifestyle change evidenced by Lack of perceived value of nutrition-related care benefits compared to consequences or effort required to making the change; inconsistencies with other value structure/purpose; antecedent to behavior change (ADA, 2006; Kim & Baek, 2013). Nutritional intervention is the third step of NCP/T directed to the etiology (E) of the nutrition problem (P) with the goal of resolving the problems by improving the signs and symptoms (S). The optimal approach to determine the best intervention is to use the nutrition diagnosis and the etiology as guides. The optimal approach to determine the best intervention is to use the nutrition diagnosis and the etiology as guides. The goal of nutrition intervention is to change intake, clinical condition, knowledge, or behavior (categories of the nutrition diagnosis). Nutrition intervention involves a plan and an implementation. The plan should be evidence-based and patient-focused. The implementation should clearly communicate the care plan and how the plan will be carried out. As with assessment and diagnosis, there are categories associated with nutrition intervention. There are four: (1) food and/or nutrient delivery, (2) nutrition education, (3) nutrition counseling, and (4) coordination of nutrition care (ADA, 2006). Important aspects of this step in the NCP include setting goals, identifying and clearly describing a plan,

coordinating care, providing a timeline, and connecting intervention strategies to the nutrition problem and its etiology. There is also standardized terminology for this step of the NCP.

An example of a nutrition prescription for a critically ill patient with 65kg, height 166cm, BMI 23.59kg/m2 requires a standard diet (50%:20%:30%) with macronutrients distribution Energy 1652 kcal, carbohydrates 207g, protein 83g, and fat 55g and fluid 2000mls. It might be expanded to include specific amounts of vitamins, minerals and bioactive substances. Ideally, the nutrition prescription is based on the latest evidence-based standards, but where data are lacking, the nutritionist/dietician applies clinical judgment and institutional tradition to the nutrition prescription. Nutrition support dietitians are strongly identified with enteral and parenteral nutrition, which they individualize to meet the nutrition prescription by operating formula volume and composition. Nutrition support dietitians may also prescribe medical food supplements (ADA, 2006). The purpose of the nutrition intervention ultimately is to correct the nutrition diagnosis, remove the etiology, or reduce the signs and/ or symptoms.

Monitoring and Evaluation involve three interconnected processes: Monitoring progress, assessing patient/client/group comprehension and adherence to the plan, and determining if interventions are being executed as intended. It also involves providing evidence regarding whether the plan/intervention strategy is effectively altering patient/client/group behavior or condition, identifying additional positive or negative outcomes, collecting information on reasons for lack of progress, and substantiating conclusions with evidence (Kim & Baek, 2013). When measuring outcomes, select indicators that are pertinent to the nutrition diagnosis or related signs/symptoms, nutrition goals, medical diagnosis, and quality management objectives. Utilizing standardized indicators enhances the accuracy and reliability of measuring changes and facilitates electronic documentation, coding, and outcome measurement. Lastly, evaluating outcomes involves comparing current findings with previous status, intervention objectives, and/or established standards.

A study by Alkhaldy et al., (2020) in Saudi Arabia showed that dieticians know the NCP but rarely used. Results also indicated that for most dieticians the documentation of NCP was difficult. The same study showed that inadequate number of dietitians, a lack of experience, and conflicts within the hospital's nutrition care system as reasons why hospitals do not adhere to the NCP. Other barriers to proper dietetics practices in different health facilities include, little or no support from health facility management or coworkers It is reported that, for nutritionists/dietitians to be able to use the NCP/NCPT and work effectively, they need a good

leadership style or management support. (Lövestam, E., Boström, A. M., & Orrevall, Y. (2017). Such support includes and it is not limited to, provision of consultation rooms, equipment, working aid and tools, clinical nutrition SOP guidelines, information systems and cooperation from other health professionals (*Patel et al.*, (2014).

In the Nutrition Care process there are terminologies (NCP/T) that are used, dieticians are expected to know these and use them as they document the NCP. Some of these terminologies include; Nutritional assessments terminologies such as Anthropometric Measurements**,** Biochemical Data Nutrition-Focused Physical Examination, Food and Nutrition History and Client History (Kim & Baek, 2013; Lewis et al., 2022; O'Sullivan et al., 2019). Nutritional diagnosis terminologies such as Hypermetabolism (Increased energy needs), Inadequate energy intake, Excessive energy intake, Inadequate intake from enteral/parenteral nutrition infusion, Excessive intake from enteral/parenteral nutrition, Breastfeeding difficulty, Altered GI function, Underweight, Involuntary weight loss, Overweight/obesity, Involuntary weight gain (ADA, 2006). Lack of agreement on the terminology and definitions used for concepts and activities related to nutrition restrains the development of clinical nutrition and dietetics practices and research (Cederholm *et al*., 2017). To allow our current nutritionist to be competent to deliver dietetics services in health facilities, a bridging course is key to familiarize them with key concepts of the NCP and terminologies used.

According to a study of hospital dietitians, nurses, and doctors in the United States, compliance with national criteria requiring a nutrition screen to be completed within 24 hours after hospital admission has been confirmed(Patel et al., 2014). The task is typically performed by a licensed nutritionist dietician, a practitioner with the highest level of expertise in nutrition assessment and monitoring. It's feasible that improved performance of this vital role will result from increased dietitian access to resources (Patel *et al.*, 2014). The outcomes also show that evaluations are taking into account a variety of factors, including the patient's medical history, physical examination findings including edema and skin integrity, and particular laboratory tests (Patel *et al*., 2014). Inadequate staff, funding, and expertise were the most typical impediments to completing nutrition assessments that were found in this study. These findings imply that there are potential for medical facilities and professional organizations to assist in mobilizing the resources, personnel, equipment, and knowledge (Patel *et al*., 2014).

2.5 Integrations of Quality Nutrition Care in Health Facilities

Integrating quality nutrition care within health facilities involves a comprehensive approach that spans various facets of healthcare delivery. This integration encompasses several key elements (Kahn, 2006): initial training and education of healthcare professionals to identify and address nutritional needs (Idris and Jannakl, 2013); standardized screening protocols to identify at-risk patients; interdisciplinary collaboration among specialists to develop personalized nutrition care plans (Olufson et al., 2022b); access to qualified nutrition professionals for specialized guidance (Idris and Jannakl, 2013); provision of well-balanced, therapeutic diet (Jortberg & Fleming, 2014); patient and caregiver education on the significance of nutrition in recovery; integration of nutrition data into electronic health records for streamlined care; continuous quality improvement initiatives; community partnerships for ongoing support beyond the facility; policy advocacy for prioritizing nutrition care; and fostering research for innovative approaches (Keller et al., 2014). This holistic strategy ensures that patients receive optimal nutritional support throughout their healthcare journey, improving outcomes and overall well-being.

This research initiative is crucial in advancing our comprehension of clinical nutrition practices, allowing for the pinpointing of areas needing improvement, and promoting a standardized and efficient approach to patient care within Tanzanian health facilities.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Quantitative Study Aspects

3.1.1 Study Area

The study was conducted among nutritionist, dieticians and other health professional offering nutrition care working in twenty-eight (28) different government health facilities in Tanzania. The levels of the facilities differ, for instance Muhimbili National Hospital (MNH), Specialized hospital like Jakaya Kikwete Cardiac Institute (JKCI), Muhimbili National Hospital-Mloganzila, Muhimbili Orthopedics Institute (MOI), zonal hospital like Bugando Medical Center (BMC), Benjamen Mkapa Hospital (BMH), regional referral hospital like Iringa, Mbeya, Mount Meru, Simiyu, Tabora, Morogoro, Singida and Mwananyamala, Lugira, Tumbi, referral hospital like Ndanda, district hospitals like Ilemela, chato, Ludewa, Makete, Ushetu, Wanging'ombe, Dinyecha, health centers like Karume, Makete, Africa healthcare network and Aga Khan Hospital. To be included in the study, a health facility was to have a nutritionist, dietitian, nurse or doctor responsible in providing nutrition care.

3.1.2 Study Design

The study used a quantitative design. Data were collected from September-December 2023 using a structured questionnaire with three main sections. The first section asked about the participant's demographic information and details about their workplace. The second section focused on the types of nutrition services provided in the health facility. The third section asked about the availability of equipment, guidelines, materials, and supplies needed to support quality nutrition service delivery. The questions were adapted from the Uganda Health Facility Nutrition Service Delivery Assessment Tool of 2015, with some modifications to fit the Tanzanian context. The questionnaire was pre-tested with nutritionists from Bugando Medical Center, Muhimbili National Hospital and Mount Meru regional hospital and necessary corrections and improvements were made. To assess the availability of human resources for nutrition services, secondary data were collected from the Ministry of Health the list of nutritionist's allocation in different health facilities and hospital websites for information on hospital bed capacity.

3.1.3 Study Population

The study was conducted among nutritionists, dietitians, and healthcare providers i.e. nurses and doctors involved in delivering nutrition services in selected health facilities where no nutritionists were officially allocated.

3.2 Inclusion and Exclusion Criteria

3.2.1 Inclusion criteria

i. Nutritionists, dietitians, or nurses or medical doctors who were responsible for delivering nutrition services in health facilities.

ii. Adult18 years and above

iii. Provided informed consent to participate in the study.

3.2.2 Exclusion Criteria

i. Nutritionists, dietitians, nurse or medical doctor who were not involved in the delivery of nutrition services in health facilities.

ii. They were unavailable during the data collection period.

iii. They declined to participate or did not provide informed consent.

3.3 Sampling Procedures

Convenient sampling was employed in which every nutritionist, dietician and health provider i.e. nurse or doctor involved in nutritional management of patient was invited to participate in the study. From the list of nutritionists provided by the Ministry of health employed in Health facilities in Tanzania mainland. These nutritionists were informed about the study by telephone and those willing to participate in the research study were contacted and interview appointment was sought. Although some expected participants where not reachable when called and were not willing to be part of the study. Since the study were for voluntary participation some of expected participant did not volunteer to be part of study.

3.4 Sample size

Sample size was calculated using the formula for single proportion: The sample size will be computed using statistical formula (Kirkwood & Sterne 2003) as shown below.

$N = Z^2P(1-P)/d^2$

Where:

N= sample size

Z= standard normal deviate, (a constant set at 1.96 on the basis of using the 95% Confidence interval for estimation).

P= 11 (61%) estimated proportion of previous study (Saronga *et al* (2022)

d= margin of error (10%)

For this study, the value of the 95% spread limit that will be used Z=1.96, this value is the more preferred level of confidence for scientific comparison.

$$N = \frac{1.96^2 \times 0.61 \times (1-0.61)}{(0.1)2}$$

N=91

Therefore, the estimated sample size for this study is 91

However, the actual population of nutritionists working in health facilities in Tanzania at the time of the study was 53, as reported by the Ministry of Health. Since the study population is less than 10,000, the Finite Population Correction (FPC) was applied to adjust the sample size.

After applying the finite population correction, the minimum adjusted sample size required was approximately 34 participants. However, in order to enhance the robustness of the study findings and reduce the margin of error, all 53 nutritionists working in selected health facilities were invited to participate. A total of 46 potential participants expressed interest in participating in the study, resulting in a high response rate of 86.8%.

3.5 Data Analysis

The data was analyzed using Statistical Package for the Social science (SPSS) Version 29.0 Statistical software. Descriptive statistical analysis in terms of frequencies was done to depict the profiles of the respondents and health facilities. Descriptive analysis was done to analyze the state of nutrition equipment, materials and supplies. Also were analyses using descriptive statistics. Provision on good or average nutrition services provided to the patients' management were rated according to Uganda nutrition services delivery assessment tool in which (Nutrition Service Delivery Assessment Tool 2015a). According nutrition service delivery assessment tool, nutrition experts to be considered providing good nutrition services they should

provide more than 12 items/services and provision less than 12 items/service was considered as average provision of nutrition services. Examples of nutrition services included were nutritional assessments such as measuring weight, height, MUAC, head circumferences etc., in body composition analysis i.e. abdominal fat, total body fat, visceral fat etc., nutrition focused physical findings (NFPF) i.e. skin, hair color and texture, mouth, eyes etc., biochemical data i.e. albumin serum, blood glucose, electrolytes, lipid panel, creatinine e.tc, Food and Nutrition related history i.e. food allergy, quality, quantity etc., nutrition diagnosis terminologies i.e. inadequate intake, evident protein deficiency, decreased nutrients needs etc. nutrition intervention such as prescriptions of therapeutic diets i.e. high protein diet, renal diet, high energy diet etc., enteral and parenteral nutrition support, oral nutritional supplements, nutritional education and counselling then the association between nutrition care process and management with factors such as level of education, professionals, level of health facility, bed capacity, patients attended per day and years of experience were done by using regression analysis.

3.6 Ethical Consideration

Ethical clearance was obtained from National Institute for Medical Research (NIMR) with reference no. NIMR/HQ/R.8a/Vol.IX/4381. The study aims and objectives were explained to prospective participants then they were asked to sign an informed consent form if they were ready to participate. Confidentiality of information collected was ensured by using special code number for participants. Participation was voluntary and participants had the right to withdrawal from the study any time.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Results

4.1.1 Sociodemographic Characteristics of Participants and Health Facilities

The present study had a total of forty-six (46) participants, of which 26% were male and 74% were female. Moreover, the majority of the study participants were nutritionist (85%) as compared to other professionals in twenty-eight (28) different health facilities as categorized by the ministry of health as shown in Table 1.

Table 1: Characteristics of participants, health facility and provision of nutrition services

Variable	Healthy facility level					Total N (%)
	National	Specialized	Zonal	Regional	District	
Professionals						
Nutritionists	5	10	7	13	4	39 (85%)
Dieticians	2	0	0	1	1	4 (9%)
Nurse	0	0	0	0	1	1 (2%)
Medical Doctor	0	0	0	0	2	2 (4%)
Education level						
Postgraduate	1	2	1	7	0	10 (22%)
Degree	6	8	6	8	6	34 (74%)
Diploma	0	0	0	0	2	2 (4%)
Working experience						
≤1	0	0	1	2	6	9 (19%)
2-3	0	4	3	2	0	9 (19%)
≥4	7	6	3	10	2	28 (61%)
Provision of nutrition services						
Good	7	9	4	9	4	33(72%)
Average	0	1	3	5	4	13 (28%)
Total N (%)	7 (15%)	10 (22%)	7 (15%)	14 (30%)	8 (17%)	46 (100%)

4.1.2 Capacity of Health Facilities to Offer Nutrition Services

The table 2 below show among 28 health facility involved in this study ninety-six percent (96%) of health facilities reported to have established quality improvement teams (QIT) but fifty-nine percent (59%) does not include nutritionist as part of QIT. Ninety-three percent (93%) of health facilities have general presentation medical continues education and sixty-two

percent (62%) includes nutrition topics. About supportive supervision six-five percent (65%) of health facilities reported to receive having feedback of supportive supervision (Table 2).

Table 2: Health facility Capacity to offer nutrition services

Variables	Per Health facility N (%)
Established QIT	
No	1 (4 %)
Yes	27 (96 %)
Composition of QIT	
With nutritionist	11(41%)
Without Nutritionist	16 (59%)
Continue Medical Education	
No	2(7%)
Yes	26(93%)
Nutrition topics	
No	10 (38%)
Yes	16 (62%)
Nutrition Budget	
No	4(14%)
Yes	24(76%)
Supportive supervision	
No	11(35%)
Yes	17(65%)
Feedback on supportive supervision	
No	6 (35%)
Yes	11(65%)

Secondary data obtained from the Ministry of Health on the total number of nutritionists employed per health facility and bed capacity per health facility were obtained from website of respective health facility as shown in (table 3).

Table 3: Nutritionists to hospital bed capacity ratio

Health facility	No. of Nutritionists	Hospital bed capacity	Ratio	Stand-ard ratio	Standard no of Nutritionists
MNH- Upanga	7	1,500	1:214	1:30	50
MNH- Mloganzila	4	608	1:152	1:30	20
MOI	3	362	1:121	1:30	12
BMC	5	950	1:190	1:30	32
JKCI	2	150	1:75	1:30	5
ORCI	0	270	N/A	1:30	9
BMH	3	400	1:133	1:30	13
KCMC	5	640	1:128	1:30	21
ZH[a]	2	553*	1:277	1:30	18
RRH[b]	2	400*	1:200	1:30	13
DH[c]	1	255*	1:255	1:30	9

* Estimated hospital capacity

[a]Represent Zonal Hospitals

[b]Represent Regional Referral Hospitals

[c]Represent District Hospitals

N/A- Not Applicable

4.1.3 Nutrition Services

(i) Nutrition Assessment

The assessment of food and nutrition-related history were done using different tools such as 24hrs dietary recall, Food frequency questionnaire (FFQ), Diet Diversity, and Food records and Weigh method as shown in (figure 4). Others assess social economic status, episodes of vomiting or diarrhea, allergy, drugs, nutritional supplement and herbal usage. On biochemical indicators of nutrition status, in which most practitioner reported to check on patients' blood glucose (81%) for diabetes mellitus suspect, and albumin (64%) for malnutrition at risk patients and other nutrition biomarkers (figure 3). Others assess HbAIc, vitamin D, thiamine, eGFR, uric acid, urea, sodium, chloride, Hemoglobin level, total protein and white blood cells. Anthropometric measurements (figure 1), most especially anthropometric measurement almost

every expert reported to take were weight 93% and height 97%, but some of the least practiced measurement like head circumference only 2%, body composition analysis (body fat, abdominal fat, muscle mass, fat mass and visceral fat) for dietary related non-communicable diseases such as some cardiovascular diseases, overweight and obesity and lipidemia due to lack of equipment's and knowledge and skills how to operate it. Other anthropometric assessment done was hand grasp for muscle tone. Fourth, Nutrition-focused physical examination (figure 2) in which most assessed were Musculoskeletal 74%, followed by edema sites 72%, skin 54% and abdominal 50%.

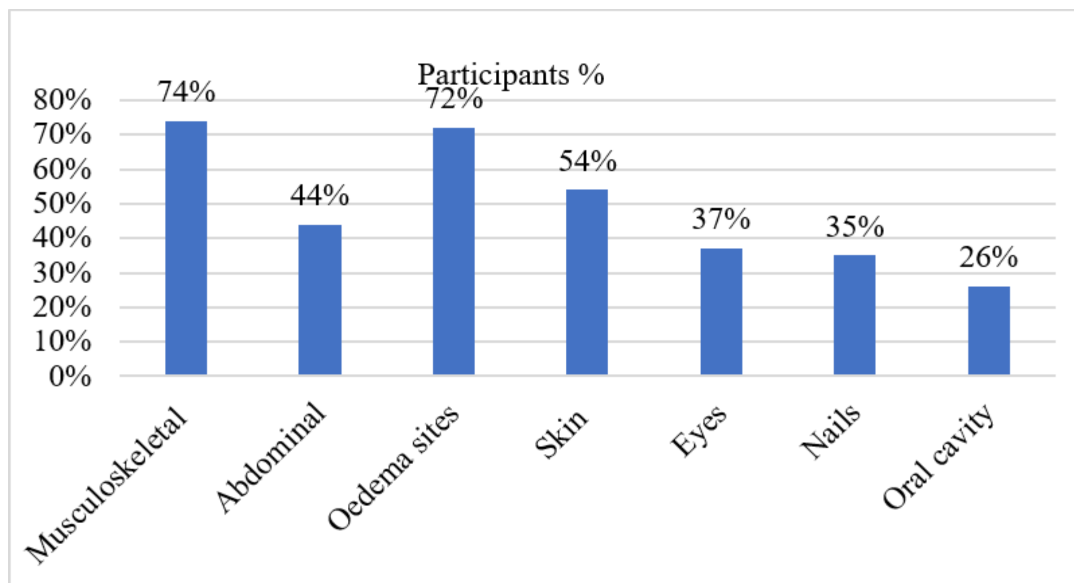

Figure 1: Proportion of participants who conduct nutrition focused physical examination (NFPE)

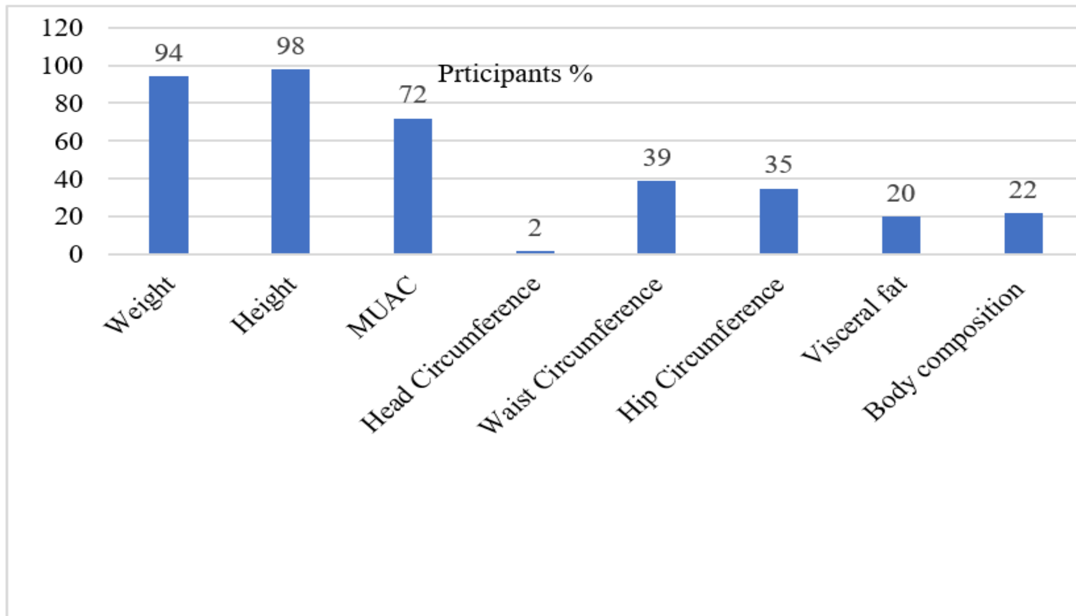

Figure 2: Proportion of participants who conduct anthropometric assessments

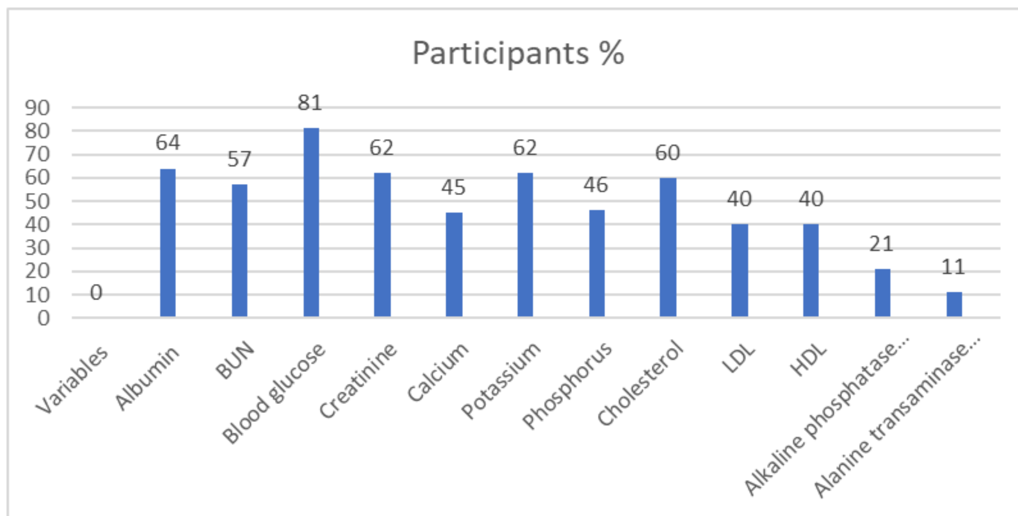

Figure 3: Proportion of participants who conduct biochemical assessments

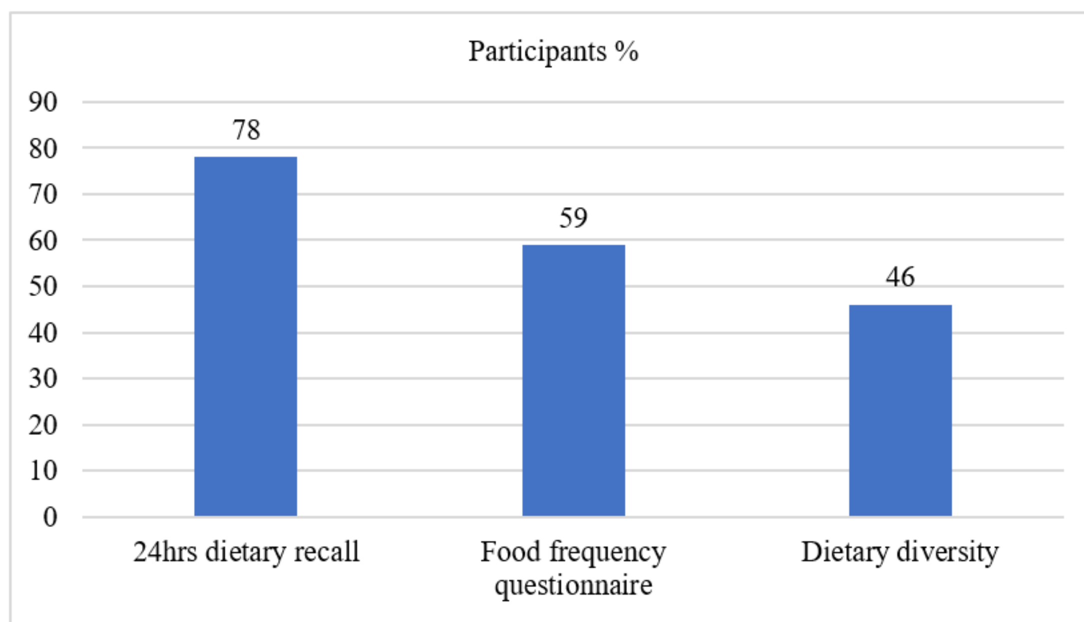

Figure 4: Proportion of participants who conduct dietary intake assessment

(ii) Nutritional Diagnosis

Results showed that most participants are not able to write the nutrition diagnosis in PES and this impairs the intervention designed for the patients. The study showed only eleven (11%) of participant are aware of what nutrition diagnosis is and know how to come up with a PES statement which means nutrition problem (P), Etiology/cause (E) and Signs and symptoms (S). Most participants write medical diagnoses or problem (P) instead of nutrition diagnosis in PES.

(iii) Nutrition Intervention

Results showed that most nutrition interventions done were as follows;

a) Prescription of therapeutic diets

Results showed that the most commonly prescribed therapeutic diet is a high protein, low sodium and Diet Approach to Stop Hypertension (DASH). Other therapeutic diet mentioned was liquid diet for post-surgery and patients under tube feeding and neutropenic diet for patients undergoing bone marrow transplants.

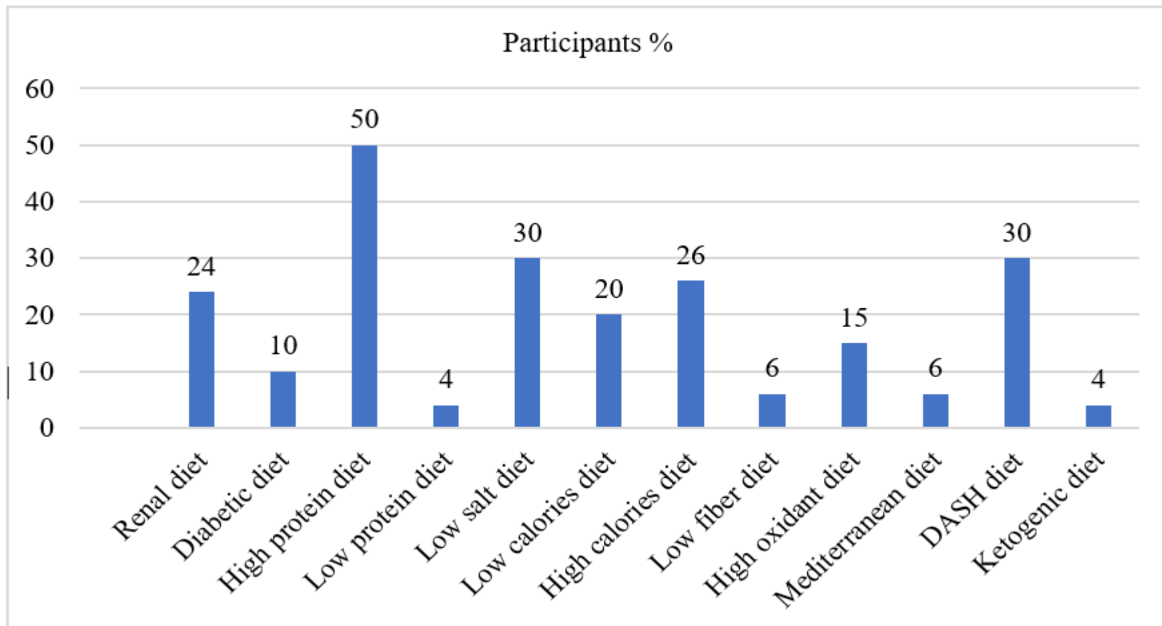

Figure 5: Proportion of participants who prescribes therapeutic diet in nutrition care

b) Enteral and parenteral nutrition support

Study shows that 14 (34%) of participants reported to prescribe provision of high energy high protein enteral feeds to patients with increased nutrients needs for enteral nutrition mostly tube feedings and about 10 (22%) of participants are able to prescribe parenteral nutrition support for patients with indication of parenteral nutrition support.

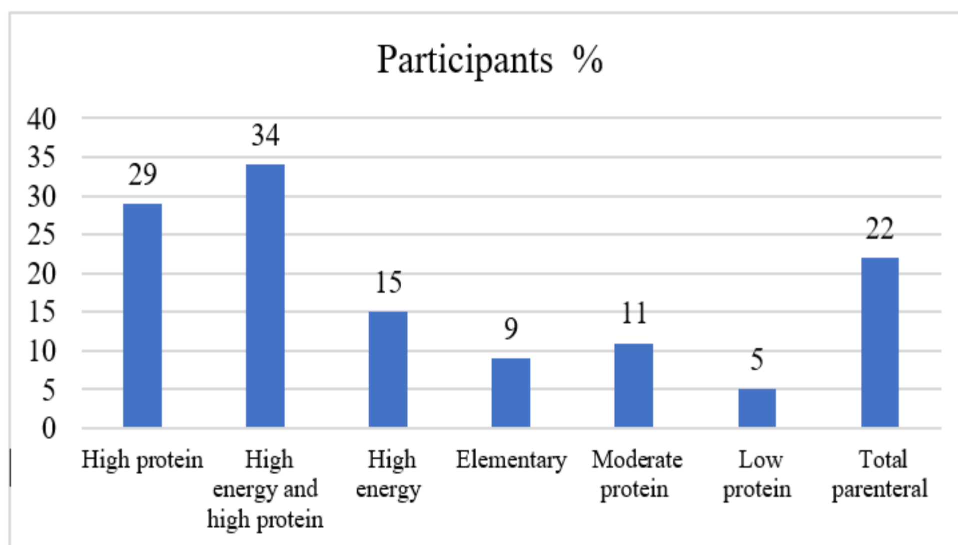

Figure 6: Proportion of participants prescribes enteral and parenteral nutrition support

c) Nutrition Education and Counselling

Nutrition education and Counselling is the number one nutrition intervention done in health facility in Tanzania. The topic which are included were Family education 91%, encouragement of physical activity 89%, avoid excessive alcohol intake and cease smoking as are risk factors for non-communicable diseases.

d) Nutrition Supplementation

The commonly oral nutritional supplements prescribed were Multivitamins 27 (61%) and a combination of minerals and vitamins (CMV) 20(46%), Zinc 45%, FeFOL and Vitamin A. Other mentioned ONS were carofit tablets, omega 3, vitamin B complex, and vitamin D.

(iv) Monitoring and Evaluation

About 46% of participants reported to conduct monitoring and evaluation of interventions designed for the patients every day. For outpatients, it was noted that the follow up is done monthly or after every three months. Moreover, for critically ill patients monitoring is done every 2hours. On documentation 89% document NCP in note book, registers and counter books. On communication of nutrition care plan were done to caregivers 96%, nurses 75% and more see (Table 4).

(v) Documentations

Most of participants reported to document nutrition care (89%) regardless of the chosen format either nutrition assessment and interventions or interventions only. Some nutrition experts document on information health system 71% and forms/file 59% (table 4) all of these documentation does not include compete NCP. Some participants mentioned that they document on note book and 4% they don't document rather they communicate to patients/caregiver and nurse or doctor.

Table 4: Documentations, communication and evaluation of nutrition care

Variables	Per Participants N (%)	Per Health facility N (%)
Documents in medical records		
Yes	41 (89%)	23 (82%)
No	5 (11%)	5 (18%)
Health information system		

Yes	29 (71%)	18 (64%)
No	12 (29%)	10 (36%)
Forms/files		
Yes	24 (59%)	13 (46%)
No	17 (42%)	15 (56%)
Communicate nutrition care		
Patients	41 (89%)	25 (89%)
Caregiver	45 (98%)	27 (96%)
Nurse	39 (85%)	21 (75%)
Doctor	37 (80%)	23 (82%)
Follow-up		
24hrs (every day)	21 (46%)	15 (54%)
72hrs (3days)	13 (28%)	11 (39%)

4.1.4 Nutrition equipment, materials and supplies available in health facilities.

a) Available Nutrition Guidelines in Tanzania

Results showed that health facility with available nutrition guideline as follows 36% have Integrated Management of Acute Malnutrition guideline of 2018, 64% have guidelines for PLHIV/AIDS, 25% have guideline of Non-Communicable Diseases (Ulaji unaofaa kwa magonjwa yasiyo ya kuamukiza), 57% have Tanzania Food Composition Table, alongside 11% have internal Standard Operating Procedures (SOPs) that aid practitioner in patient management tasks (Table 5).

Table 5: Currents guidelines and standard operating guide in health facility

Variables	N (%)
Integrated Management of Acute Malnutrition (IMAM) Guidelines	10 (36%)
Tanzania food composition table	16 (57%)
Nutrition Care and Support for People Living with HIV/AIDS	18 (64%)
Non-Communicable Diseases Guidelines	7 (25%)
Standard operating procedure for nutrition practice	3 (11%)

b) Counselling cards and job aids

The job aids available include counselling cards, reported by 32% of respondents, and Infant and Young Child Feeding, National Counselling Cards for Health Workers, acknowledged by only 29% (Table 6). Among other available aids, food demonstration kits and related job aids are accessible to 21% of respondents, while local audio-visual or media materials focused on nutrition are available to 43%. Demonstration gardens or open spaces was least present job aids within health facilities 6 (21%).

Table 6: Counselling cards and job aids

Variables	N (%)
General nutrition (e.g., food groups, balanced diet)	9 (32%)
Infant and Young Child Feeding National Counselling Cards	8(29%)
Availability of food demonstration kits and job aids	6 (21%)
Local audio visual/media materials on nutrition	12 (43%)
Demonstration garden/ or open space	6 (21%)
Nutrition care process form	4 (14%)
24-hour feed intake charts/form	14 (50%)
Ready-to-use therapeutic food (RUTF) appetite test reference card	18(64%)
Critical care pathway (clinical monitoring form)	11(39%)

The job aids available encompass special documentation forms such as nutrition care process form, reported by 14% of respondents, usually patients/clients' nutrition management are written, and 24hrs feeding charts, acknowledged by only 50% (table 6). Among other available aids, Ready-to-use therapeutic food (RUTF) appetite test reference card and related job aids are accessible to 64% of respondents (table 7).

c) Nutrition status indicator reference charts/growth monitoring and promotion charts

The essential reference charts utilized in nutrition care encompass various tools vital for assessment. Leading among these is the Body Mass Index (BMI) chart for adults, utilized by 10 (36%) of respondents, serving as a fundamental tool to identify individuals at risk. Additionally, the BMI-for-age z-score chart for children aged 5-19 years is employed by 79% of participants, and also MUAC-for-age tables used by 14 (50%). Further, the Weight-for-height z-

score is utilized by 50%, while height-for-age charts are used by 2 (7%) for identifying diverse forms of malnutrition.

Table 7: Nutrition status indicator reference charts/growth monitoring and promotion chart

Variables	N (%)
BMI cut-offs for adults	10 (36%)
BMI-for-age z-score chart for children from 5–19 years (colored)	22(79%)
MUAC-for-age tables	14 (50%)
Weight-for-height z-score tables for children under 5 years	14 (50%)
Weight-for-age tables/child health growth charts	14 (50%)
Height-for-age tables	2 (7%)

d) Kitchen equipment/supplies

The findings reveal that 6 (21%) of health facilities have kitchens. However, the absence of therapeutic kitchens tailored for preparing specialized diets based on patients' needs is evident. Some kitchens have basic equipment such as utensils, refrigerators are found in 15 (54%) of the studied health facilities. Additionally, 18 (64%) use electric blenders to prepare enteral feeds for patients requiring liquid or soft diets, and 21 (46%) have measuring cylinders a crucial tool for ingredient and left overs measurement. It was also noted that 12 (43%) of studied health facilities has food weighing scales.

Table 8: Kitchen equipment

Variables	N (%)
Kitchen	6 (21%)
Utensils (feeding cups, saucers, spoons, plates, bowls, sauce pans)	16 (57%)
Fridge	15 (54%)
Source of fuel (gas, charcoal, firewood, electricity)	6 (21%)

Manual whisk or electric blender	18 (64%)
Jugs (1 liters or 2 liters)	21 (46%)
Large containers for mixing/cooking food for the ward	14 (50%)
Measuring cylinders (measuring ingredients and left overs)	13 (46%)
weighing scale (5 g+)	12(43%)

e) Availability of Ready to Use Therapeutic Foods

Locally made F75 and F 100 was produced in nearly all levels of health facilities included in the survey involved in this study. However, in some cases these may differ slightly depending on the availability of materials for the production. The ingredients used mostly used are dried skimmed milk, whole dried milk, fresh whole milk, or long-life milk, accessible to 75% of participants, alongside sugar (79%) and vegetable oil (68%), among others (table 9). In conjunction with this activity, other essential supplies are also available: 68% have access to soap for handwashing, 68% have running water, and 57% have proper waste disposal mechanisms.

Table 9: Ingredients for making alternatives to F75 and F100

Variables	N (%)
Dried skimmed milk, whole dried milk, fresh whole milk	21 (75%)
Sugar	22 (79%)
Vegetable oil	19 (68%)
Safe drinking water	22 (79%)
Soap for handwashing	19 (68%)
Running water	19 (68%)
Waste disposal facilities	16 (57%)
Locally available foods (for teaching/use in transition to home foods)	12 (43%)

f) Monitoring and Evaluation of Nutrition Services

The study highlights that the collection of nutrition data in health facilities stands at a commendable 86% (table 10). However, the compilation of nutrition data within health facility was at 9 (32%), and 7 (25%) of facilities analyze the nutrition data for consumption.

Table 10: Monitoring and Evaluation of nutrition services

Variables	N (%)
Health facility has a designated person for HMIS data	24 (86%)
Register and report clients receiving nutrition services	22 (79%)
Does the health facility collect data on nutrition	19 (68%)
Does the health facility HMIS person compile data on nutrition?	9 (32%)
Does the health facility analyze and display data on nutrition?	7 (25%)

4.1.5 Factors Associated with Provision of Good Nutrition Services

Overall nutrition services provided to patients/clients among participants from different levels of health facilities were scored as follow average below 57% and good above 57%. According to Uganda nutrition service delivery assessment tool provision of nutrition services less than 12 terms as average and greater than 12 as good. In the adjusted odds ratios, we found participants with more than four years of experience 8.17 (95% CI: 1.41,47.2, p = 0.019) were eight times more likely to provide good nutrition care compared to those with less than four years' experience (table 11). Other factors, including education level, the type of healthcare facility, professional category, continuous nutrition education, and, were hypothesized to affect the provision of nutrition services but did not show significant associations.

Table 11: Factors associated with provision of good nutrition services

Variables	COR (95% CI)	*P*-value	AOR (95% CI)	*P*-value
Level of facility				
District	1			

Regional	4.2(0.66-26.29)	0.13		
Zonal	2.2(0.30-17.63)	0.45		
Specialized	3.3(0.46-24.44)	0.24		
National	1.7(0.22-12.22)	0.62		
Education level				
Undergraduate	1			
Postgraduate	3.6(0.67-19.24)	0.14		
Professional categories				
Others (dietician, nurse, doctor)	1			
Nutritionist	0.5(0.09-3.00)	0.32		
Years of experience				
0-1	1			
2-3	4.67(0.53-40.88)	0.16	22.69(0.54-949)	0.10
4 and above	8.17(1.41-47.2)	0.019	48.70(1.32-1801.50)	0.035
Continue nutrition education				
No	1			
Yes	1.45(0.43-4.89)	0.545		

4.2 DISCUSSION

4.2.1 Capacity to offer Nutrition services

a) Health facilities

The study shows different level of health facilities in Tanzania has made some progress to address clinical nutrition services. We see ninety-six percent (96%) of health facilities have established quality improvement teams (QIT) but only fifty-nine percent (41%) includes nutritionist as part of Quality Improvement Team. Ninety-three percent (93%) of health facilities have Medical Continues Education with CPD point for other health professionals but nutritionist no, due to lack of council to regulate and provide CPD point to them. This makes nutrition professional less active to participate of continues education. About supportive supervision six-five percent (65%) of health facilities reported to have received feedback of supportive supervision. Not giving feedback of supportive supervision may compromise improving of nutrition

services delivery in health facilities. According to the Uganda (2015) nutrition services delivery assessment tool, for health facilities with nutrition services termed as fair, health facility with nutrition services and at least two of the following; nutritionist, in charge of nutrition, Quality Improvement team and functional Quality Improvement team was termed as good. For the health facility to be considered as providing excellent nutrition services they must have; nutrition and dietetics experts, in charge of nutrition and at least two (2) of the following; functional quality improvement team including nutrition and dietetics expert in the team, scheduled Continue Professional Development Continues Medical Education with nutrition topics, nutrition budget and work plan and inventory equipment's (Uganda (2015). Also, another study done in United States says good leadership and management is key for quality nutrition services provision (Patel et al., 2014). From an extensive literature review on nutrition care and management and clinical nutrition rotation done by researcher at Kenyatta national hospital, Nairobi, Kenya, (from 1st May 2023 to 30th May 2023 a duration of 4weeks) a summary of findings is provided in figure 7 which illustrates the components recommended for quality Nutrition Services Delivery (NSD) in Health Facilities in Tanzania.

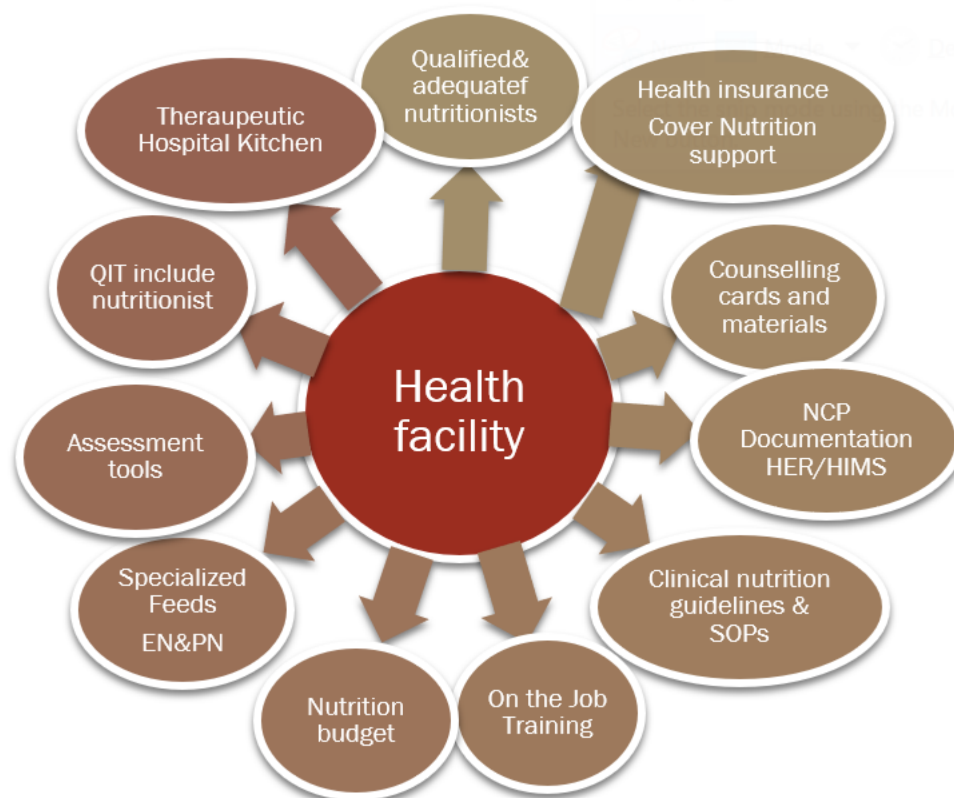

Figure 7: Components for quality Nutrition Services Delivery (NSD) in Health Facilities

b) Human Resource

The study shows that nutrition care is provided to patients by mostly nutritionists and/ or dietitians and in some cases nurses and doctors where nutritionists or dieticians are not available. Results showed evidently that the number of employed nutritionists in health facilities in Tanzania is small compared to the number of patients they are expected to serve. The patient's ratio to hospital bed capacity indicates there the existing big difference between number of nutrition staff and hospital bed capacity see table 3 shows in average one (1) nutritionist saves more than two hundred (200) patients (1:>200) (table 3). This scarcity of professionals creates high work load, inconsistence of nutrition services and lack of specialization. The shortage of nutritionist in hospital settings suggests potential challenges in ensuring comprehensive and dedicated essential nutritional care for patients (Patel et al., 2014) . This warrants further investigation on the capacity and resource allocation strategies to address the imbalance. The reasons behind this scarcity, could be budget constraints, limited awareness of the importance of nutritionists in healthcare, or a lack of prioritization for nutrition-related services when allocating health care workers in hospitals. Another study done in US saw the same challenge, shortage of nutrition professionals in hospitals might signify an existing gap in comprehensive patient care (Patel et al., 2014). Nutritionists play a crucial role in patient recovery, shortening hospital stay and reduce costs as well as improved patients' quality of life and well-being (Laur et al., 2017b). There should be a hospital nutrition policy changes or increased advocacy for integrating nutritionists into hospital teams. This also calls for increased funding or incentives to attract more professionals to this field. A study done at King Khalid Hospital (2013) show that nutrition practitioners' important roles in hospital yet staffing fall short on ratio of dieticians and hospital capacity1:75 (Idris & Al Jannakl, 2013). A study done in Brazil 2012 in 37 hospitals the recommended a maximum ratio nutritionists/dieticians and hospital bed capacity at 1:30. Health facility having fair nutrition experts per bed capacity allows provision of quality and compressive of nutrition services which including nutrition screening, assessments, diagnosis, counseling and education, calculation of macronutrients, documentation also provides opportunity for specialization in nutrition care for example renal, research, neonatal nutritionist, organ transplants, weight managements etc. and recognition or consistent of nutrition services. On other hand nutrition practitioners still face some challenges such as lack of collaboration from healthcare work team or patients/caregiver unfollow the prescribed diet and work load as shortage highlighted early. Healthcare professionals can work together to optimize

patient care, incorporating nutritionists into multidisciplinary teams and training (Idris & Al Jannakl, 2013; Kahn, 2006).

4.2.2 Nutrition Services

The Nutrition Care Process (NCP) shown in figure 4 tells the overall nutrition care and management of patients. NCP is a systematic approach used by nutrition professionals to provide high-quality care to individuals and groups. It involves four main components assessment, diagnose, interventions and monitor and evaluation of nutrition care, figure 4 shows NCP, including Nutrition Screening and referrals as important components which triggers the following steps. Our research reveals that professionals with more experience provide superior nutritional services in hospitals p-value 0.019 compared to those with fewer years of experience, particularly those with less than three years (table 2). This suggests that increased experience leads to greater adaptability and enhanced service delivery. Notably, most experienced professionals possessed a bachelor's or postgraduate education (table 1). This trend aligns with findings from other studies, such as a study by (Saronga et al., 2022), which showed nutritionists with experiences and postgraduates qualifications deliver superior demonstrating similar patterns. We hypothesized several factors that could influence the quality of healthcare provided. Several other factors also showed no significant association. Several reasons may explain these findings. Firstly, most participants were nutritionists, making the group relatively homogeneous and limiting observable statistical differences. For example, (table 1) we had third nine nutritionists, two doctors, four dietitians, and one nurse. Further exploration and consideration of these factors could provide valuable insights into enhancing nutrition care in health facilities.

Nutrition assessment is the first process of gathering and interpreting data to pinpoint nutrition-related issues to manage the patient/client (Ookalkar *et al*., 2020). Within the Nutrition Care Process (figure 8), the data from nutrition assessment are categorized into five groups: Firstly, Anthropometric measurements, the common indices checked were weight, height and MUAC but some of the least practiced measurements were head circumference only 2%, body composition analysis (body fat, abdominal fat, muscle mass, fat mass and visceral fat) which is usefully biomarkers for dietary related non-communicable diseases such as some cardiovascular diseases, overweight and obesity and lipidemia. Although body composition analysis is important indices were not common due to lack of equipment's and knowledge and skills how to operate it for example body composition analyzer was only available in national hospital level. Secondly, Biochemical indicators of nutrition status, in which most practitioner reported to

check on patients' blood glucose (81%) this implies that diabetes mellitus suspect, followed by albumin (64%) for malnutrition at risk patients and other nutrition biomarkers (figure 1). Thirdly, Nutrition-focused physical observations in which most assessed were Muscle wasting, pallor, spoon shaped nails, and edema these indices are good indicator for micronutrients deficient. Fourth, Food and nutrition-related history in which nutrition experts check on patients' 24hrs dietary recall, Food Frequency questioner (FFQ), Diet diversity, Food record and weighing. Client history is routinely done as part of patients' characteristics. Employing these categories as a framework encourages practitioners to systematically collect data (Monge-Rojas *et al*., 2005).

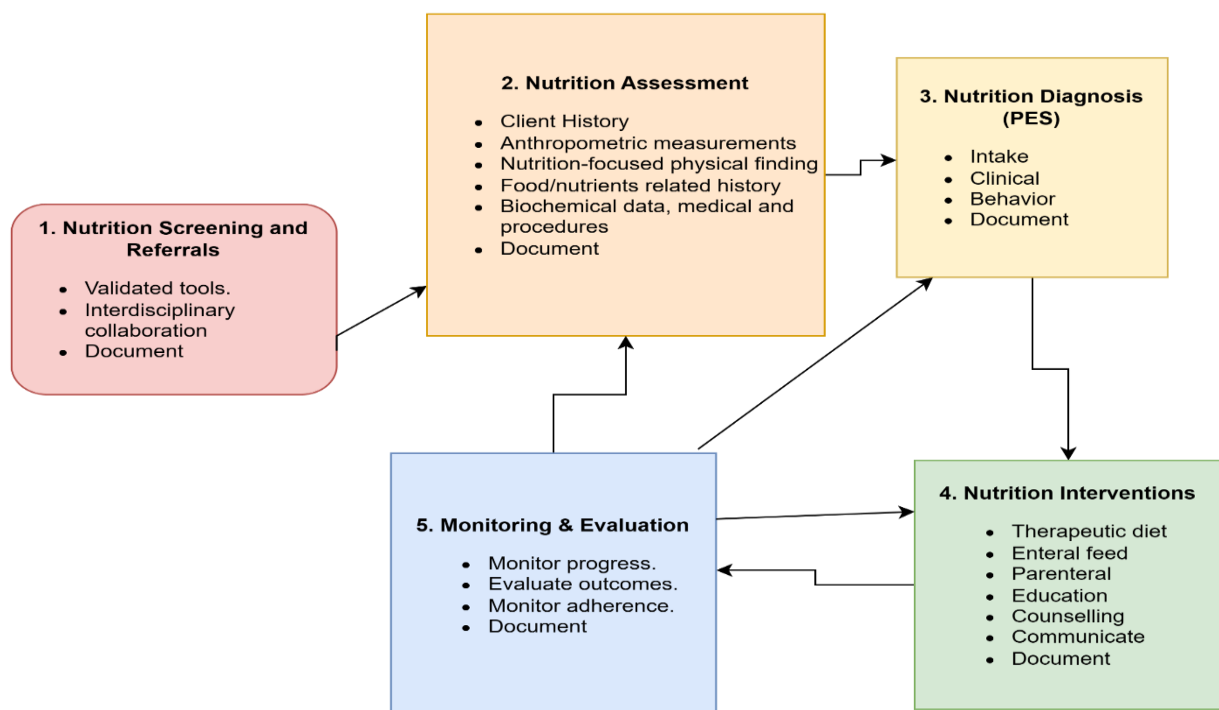

Figure 8: Steps of the Nutrition Care Process

Nutrition Diagnosis (ND) serves the purpose of identifying a nutrition-related issue (such as inappropriate fat intake) and is distinct from a medical diagnosis (for example, cardiovascular disease) (Hakel-Smith & Lewis, 2004). The nutrition diagnosis is determined by analyzing the data obtained through the nutrition assessment. It is categorized into three main groups: Firstly, intake which evaluates the quantity of food or nutrients consumed in comparison to actual or estimated requirements. Secondly, clinical, which pertains to medical or physical conditions. Thirdly, behavioral-environmental, which addresses factors like knowledge, beliefs, and the physical surroundings. Meanwhile it is uncommon for practitioner to formulate the nutrition diagnosis with complete PES statement only 5 (11%) of participants gets it right, in most cases

it was confused with medical diagnosis. The anticipated cause is that lack of on job training on NCP, time consuming and practical knowledge and poor NCP documentation style such as consideration of nutrition assessment and intervention only and leaving other NCP steps of nutrition diagnosis and monitoring and evaluation. To document the nutrition diagnosis, the term "PES" statement is used. In this statement, the nutrition problem is connected to the etiology using the phrase "related to," and the etiology is linked to the signs and symptoms using the phrase "as evidenced by." For instance, an example of a PES statement could be: "*Inappropriate fat intake related to a knowledge deficit about foods high in saturated fat as evidenced by an elevated LDL level and diet history information''* (Hoffinger *et al*., 2003)(ADA, 2006).

Nutrition interventions such as prescription of therapeutic diet recommendations primarily emphasized high-protein diets, with less emphasis on other specialized diets. High protein diet is characterized by adequate protein carbohydrates ratio of (2:1). The diet should provide i.e.35-40kcal/kg body weight/day 1.5-2.0g/kg body weight/day. The diet is prescribed to uphold a positive nitrogen balance, support normal osmotic pressure, facilitate body tissue repair, mitigate excessive muscle atrophy in chronic diseases, after operation/surgery and reconstruct or rehabilitate worn-out tissues in severely malnourished individuals. A least prescribed diet is ketogenic diet at 4%. Indication for ketogenic diets includes epilepsy treatments, weight loss, metabolic syndrome (insulin resistances, type 2 diabetes) and neurological disorders (Alzheimer's diseases and Parkison's diseases). It is characterized by high fat 75%, carbohydrates 5-10% and moderates' protein 15-30% of total energy intake. This is a reflection that majority of practitioners usually provide general nutrition education food groups/balanced diet where patients/clients were at risk to eat meals that does not meets nutrition requirements per indications which may affect patients' quality of life.

Enteral Nutrition this is the delivering of food and or nutrients by tube in to the stomach or intestine (A Reference Manual for Nutrition and Dietetics Professionals, 2020). EN is considered in patients who are malnourished, or have not been able to tolerate oral feedings within 5 to 7 days. Unfortunately, were less prescribed and most done in national, specialized, zonal, regional and district hospitals respectively. Parenteral nutrition is the provision of nutrients intravenously in form of amino acids, glucose, lipids, electrolytes, vitamins and trace elements which may be single or combined (Services, 2010; Thibault *et al*., 2021). It is used if the gastrointestinal tract is not functional or if normal feeding is not adequate for the client's needs. PN can be categorized as: Partial parenteral nutrition which supplies part of daily nutritional

requirements, supplementing oral intake. Total parenteral nutrition (TPN) which supplies all daily nutritional requirements (KeMoH, 2010).

Both enteral and parenteral nutrition supports were rarely prescribed 34% and 22% respectively (figure 2) in most healthcare facilities possibly due to a scarcity of nutrition products supplies and limitations in understanding how to administer nutritional support. The lack of coverage by health insurance, coupled with practitioners' occasional deficiency in knowledge and skills regarding the usage, indications, and recommendations for these services, may contribute to their infrequent utilization. The primary nutrition intervention conducted in health facilities is nutrition education and counseling. This intervention covers topics such as family education, promoting physical activity, advising against excessive alcohol consumption, and encouraging individuals to quit smoking, all of which are identified as risk factors for non-communicable diseases.

Oral nutrition supplementation stands as a pivotal nutrition intervention implemented within health facilities in Tanzania. Locally made F-75 and F-100 represent the primary supplements used in management of severe acute malnutrition (TFNC, 2018), accompanied by essential additions of Multivitamins and a combination of minerals and vitamins (CMV). Additionally, Zinc, FeFOL, and Vitamin A are key components integrated into these nutritional supplements. Fortifier supplement remains relatively lesser-known and underused within this context. These serve a critical function in enhancing the nutritional content of breast milk or specialized formulas to meet the increased nutritional needs of premature or low birth weight infants (WHO and UNICEF, 2021). These fortifiers are formulated with essential nutrients, such as vitamins, minerals (like calcium and phosphorus), and sometimes additional proteins or calories, to augment the nutritional value of the infant's diet. The primary function of fortifiers is to provide additional nutrients that might be lacking in breast milk or standard infant formulas, especially for premature babies who have higher nutrient requirements for optimal growth and development (Feeding, 2013). Fortifiers aid in promoting healthy weight gain, supporting bone and muscle development, enhancing the immune system, and ensuring overall healthy growth in these vulnerable infants (UNICEF & WHO, 2018). Recognizing its significance, increased awareness and utilization of Fortifier could significantly benefit the nutritional support provided to preterm infants in Tanzania's health facilities.

The Monitoring and Evaluation phase serves as the final stage of the Nutrition Care Process (NCP) figure 4. Nutrition practitioners reported conducting monitoring and evaluation for

inpatients on a daily basis (46%), with some doing so during meal times and others every three days (28%). For outpatients, it was noted that follow-ups mostly occur on a monthly or quarterly basis. However, some patients face challenges attending nutrition clinics due to socioeconomic constraints, as nutrition services are not covered by health insurance. integration of nutrition data into electronic health records for streamlined care; continuous quality improvement initiatives; community partnerships for ongoing support beyond the facility; policy advocacy for prioritizing nutrition care; and fostering research for innovative approaches (Keller *et al*., 2014). Essential elements of this process involve using appropriate reference standards for comparative analysis and identifying factors that may influence the patient or client's progress.

Most of participants reported to document nutrition care (89%) regardless of the chosen format either nutrition assessment and interventions or interventions only. However, none of these documentation methods encompassed the complete Nutrition Care Process (figure 4). Nutrition care process should be integrated in electronic health information systems and health records forms to easily data assembly, compilation and display to the poll of all health facilities for better communication among professionals (KeMoH, 2010; Lewis *et al*., 2022). Some nutrition experts document on information health system 71% and forms/file 59% all of these documentation does not include compete NCP (figure 4). Surprising some participants mentioned that they document on note book and few they don't document rather they communicate to patients/caregiver and nurse or doctor and these cause huge loss of nutrition care data. Documentations of NCP by using the International Dietetics and Nutrition Terminology (IDNT) for documenting nutrition care offers a standardized means of describing the nutrition services delivered by nutritionists and dietitians professionals (Lövestam *et al*., 2019). This not only streamlines the transition to electronic medical records but also establishes a common vocabulary for all nutritionists and dietitians, enhancing the clarity of nutrition care and means of communication among health professionals (Heffernan et al., 2004; Lövestam *et al*., 2017). When documenting, practitioners may opt to follow the NCP (figure 1) steps Assessment, Diagnosis, Intervention, Monitoring, and Evaluation (ADIME) (Hoffinger *et al*., 2003).

4.2.3 Nutrition Equipment, Materials and Supplies

Nutrition assessment equipment like weight measuring scale, height and MUAC tape measure are prominent in many health facilities while skin fold, body composition analyzer for investigation of fat mass, muscle mass, visceral fat, abdominal fat to identify patients/clients at risk of some of heart diseases, overweight/obesity, hypertension and type diabetes mellitus are not

available in many hospitals. These are very important for early detection of many of dietary related non communicable diseases like cardiovascular diseases, overweight and obesity and lipidemia. Materials such as guidelines play a crucial role, particularly in the management of children's malnutrition and providing nutritional support for people living with HIV/AIDS. However, clinical nutrition guideline on diseases management is not available, health professionals use international guidelines such as ESPEN, ASPEN, Kenya clinical nutrition guideline through google search which sometimes does not support the local settings. This diversity of guideline utilization provides a wide range of application to nutrition care among professional which complicates similarities of data collection and utilization for improvement and research. A consensus emerged among most participants who strongly advocated for the establishment of contextualized comprehensive clinical nutrition guidelines to be readily accessible and implemented within the country.

with regards to Job aids such as counselling cards on general nutrition (e.g. food groups, balanced diet), 32% of health facility had some job aid available which is good to facilitate easy understanding of nutrition concepts during nutrition education and counselling. However, job aids like demonstration kits (food teaching aids, dolls, utensils), demonstration garden/ or open space and local were rarely available. Furthermore, job aid like clinical monitoring form (critical care pathway, RUTF appetite reference card, 24hrs feeding intake form and nutrition care process form were also practiced in low rate (table 6). These tools are particularly importance in the intensive care units, where closely monitoring patient intake is vital to prevent further deterioration and other complications. The scarcity of these essential job aids within health facilities directly contributes to insufficient nutrition service delivery, thereby underscoring the significance of their availability and utilization in enhancing patient care and outcomes.

Nutrition status indictors reference charts colored such as BMI cut-off for adults 36% and BMI for age-Z score chart for children 5-19 years 32% were prominent for most participants compare to height for age tables. The presence of these tools in nutrition and dietetics offices or consultation rooms significantly streamlines and enhances the efficiency of nutrition screening and assessment processes.

Twenty-one percent (21%) of health facilities possess kitchens which is good; however, this kitchen is just normal kitchen to providing meals for patients facing socio-economic challenges to satisfy hunger are not meant for therapeutic kitchens for preparing specialized diets based on patients' nutrition requirements. The kitchen has basic equipment such as utensils 57%,

refrigerator 54% for storing food and beverages. 64% utilize electric blenders to prepare enteral feeds for patients requiring liquid or soft diets, and 46% have measuring cylinders a crucial tool for ingredient measurement and management of leftovers. Notably, one of a least available equipment items in many health facilities is the dietary weighing scale, present in only 43% (table 9). Even within health facilities equipped with kitchens, the meals provided to patients primarily aim to alleviate hunger rather than ensure complete nutritional value. Consequently, many patients resort to consuming food from home or nearby vendors, a practice that can compromise both their safety and nutritional requirements. This situation ultimately leads to suboptimal medical outcomes for patients.

Locally made therapeutic foods are used for managing severe acute malnutrition especially among children. Nearly all levels of health facilities included in the survey have ever produced a local alternative for management of severe acute malnutrition. However, in some cases these may differ slightly depending on the availability of materials for the production. The ingredients used mostly used are dried skimmed milk, whole dried milk, fresh whole milk, or long-life milk, accessible to 75% of participants, alongside sugar (79%) and vegetable oil (68%), among others (table 9). In conjunction with this activity, other essential supplies are also available: 68% have access to soap for handwashing, 68% have running water, and 57% have proper waste disposal mechanisms. Although supplies and materials for F-75/F-100 are readily accessible, there remains room for improvement, especially considering that malnutrition remains a significant challenge among children under the age of five. Continuous enhancements in these resources could further aid in addressing this prevailing issue.

The collection of nutrition data in health facilities stands 86% (table 10) which is good. However, the compilation of nutrition data within health facility management information systems is lower at 57%, and a mere 25% of facilities analyze and display this data on nutrition. These figures suggest that while nutrition data is somewhat available across many health facilities, its full potential remains underutilized. To enhance the value of nutrition services, it is crucial that finalized data undergoes thorough analysis and independent display. This ensures its usability in making informed decisions regarding nutrition services for instant financial projection and advancement of prevention and management strategy of patients/clients. The effective utilization of this data can significantly contribute to improving the quality of healthcare services provided and billing/charges on nutrition services.

4.3 Study Limitation

The limitations of this study were the inclusion of various levels of health facilities with different characteristics and/ or levels. This opens opportunities for future research to includes hospitals with similar characteristics and levels, aiming to understand the specific nutrition services as presented in that level of health facilities and to provide recommendations for policy and practice.

4.4 Summary of findings

- All chosen healthcare institutions possess nutrition services of satisfactory quality, with the majority also having Quality Improvement Teams (QIT) and ongoing professional development programs, with a focus on nutrition topics, representing 62%, indicating a positive state.
- The nutritionist's patient's ratio 1:>200. For example, a hospital with a bed capacity of 1500 only has 7 nutritionists.
- The nutrition services provided were nutritional assessment example anthropometrics measurements; weight 98%, body composition analysis 22%), Biomedical tests; blood glucose 81%, LDL 40%, Dietary assessment; 24hrs dietary recall 78% dietary diversity 46%, Prescriptions of therapeutic diet; High protein diet 50%, Ketogenic diet 4%, Prescriptions of commercial enteral feeding 34%, Parenteral nutrition support 22%, and availability of Nutrition guidelines 36% and SOP 11%. A notable observation is that only a small fraction, approximately 11% of participants, accurately referenced the Nutrition Diagnosis in PES statement.
- Nutritional resources such as job aids, materials, and supplies accessible within healthcare facilities are just fair, yet the availability of more specialized items such as therapeutic kitchen equipment's, counseling cards, advanced nutritional assessment tools, Nutrition care process forms, demonstration kits, and outdoor spaces/gardens are limited.

CHAPTER FIVE
CONCLUSION AND RECCOMENDATIONS

5.1 Conclusion

The study highlighted low number of nutritionists and dietitians compared to the bed capacity of selected health care facilities in offering quality nutrition services. Nutrition services commonly offered were basic assessments and nutrition education. Limited nutrition supplements, enteral, parenteral nutrition support and advanced nutritional assessments tools, lack of SOPs, job aids and nutritional guidelines. Enhancing nutritional care, strengthening human resource capacity, investing in essential equipment/ supplies and fostering research collaborations will contribute to optimizing nutrition services and improving patient outcomes across Tanzania.

5.2 Recommendations

Addressing the following recommendations can contribute to enhancing the quality and effectiveness of nutrition services in Tanzanian health facilities, thereby improving patient outcomes and overall healthcare delivery.

1) Ministry of Health and health facilities to address the shortage of nutritionists in health facilities.
2) Ministry of Health, academic institutions, national and specialized health facilities to support on the job training for nutritionists working in health facilities
3) On the job training for nutritionists to keep updated
4) Ministry of Health and stockholders to support development of and accessibility of clinical nutrition guidelines and job aids to guide nutritionists effectively.

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RESEARCH OUTPUTS

Publication

Mkumbo *et al*., (2024). Assessment of scope and quality of nutrition services in patient management in selected health facilities in Tanzania. East African Journal of Science, Technology and Innovation 6(1)

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Presentations

a) Scientific Conference, National Institute of Medical Research (NIMR), Dar Es Salaam, Tanzania on 14th June, 2024

b) Annual General Meeting and Scientific Conference, Tanzania Nutrition and Dietetics Association (TNDA), Dar Es salaam, Tanzania on 27th February, 2025