

**NUTRITION KNOWLEDGE, ATTITUDE AND PRACTICE OF PROFESSIONAL
HEALTH WORKERS IN MOROGORO URBAN DISTRICT**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

Nutritional knowledge plays an important role in public health. However, there has been general concern about the state of nutritional knowledge of nurses and clinicians in many parts of the world. The aim of this study was to examine the nutrition knowledge, attitude and practice of professional health workers at Morogoro Urban district. This was a descriptive cross sectional study whereby one hundred and fifty five health workers (100 nurses and 55 clinicians) completed a self administered questionnaire. The response rate was 58%. In addition, 40 health workers were interviewed and focus group discussion was done to a group of nurses and a group of clinicians separately. The overall performance of the respondents on the nutrition knowledge, attitude and practice was poor. Overall nutrition knowledge scores were graded as poor. Clinician's had a mean score of 42% and nurses a mean score of 42%. Clinicians had higher scores (22%) with good and very good nutrition scores than nurses (5%). The nutrition knowledge of most clinicians recruited for this study was poor (53%) and mediocre in 38% of them, however, nutrition knowledge of most nurses was mediocre (56%) and poor (40%). Respondents had concern on the adequacy of their nutrition information as most of them rated their knowledge as moderate. Furthermore respondents had a negative impression over the extent of over nutrition in Tanzania. Although health workers regarded nutritional care as an important component of their health delivery responsibility in nutrition counselling, only 17% always provided nutrition counselling to patients. Barriers to nutrition counselling included lack of time, equipment and human resources. This study indicates that there are gaps in the nutrition knowledge of the nurses and clinicians and most of them may not have the expertise to properly advise their patients or clients on the important aspects of nutrition.

DECLARATION

I, Happy Moses hereby declare to Senate of the Sokoine University of Agriculture that, this dissertation is my own original work and it has neither been submitted nor being concurrently submitted for degree award in any other institution.

Happy Moses
(Msc. Candidate)

Date

The above declaration is confirmed

Prof. Joyce Kinabo
(Supervisor)

Date

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DEDICATION

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LIST OF ABBREVIATIONS

AIDS	-	Acquired Immune Deficiency Syndrome
AMO	-	Assistant Medical Officer
ARI	-	Acute Respiratory Infections
ASCN	-	American Society for Clinical Nutrition
BMI	-	Body Mass Index
BTC	-	Belgian Technical Cooperation
CHMT	-	Council Health Management Team
CO	-	Clinical Officer
CSPD	-	Child Survival Protection and Development
CTC	-	Care and Treatment Centre
EN	-	Enrolled Nurse
FANTA	-	Food and Nutrition Technical Assistance
FoN	-	Faculty of Nursing
GP	-	General Practitioner
HDL	-	High Density Lipoprotein (Cholesterol)
HIV	-	Human Immune Deficiency Virus
IMCI	-	Integrated Management of Childhood Illness
IMR	-	Infant Mortality Rate
IPD	-	In Patient Department
KCM	-	Kilimanjaro Christian Medical
MDP	-	Morogoro Development Plan
MICO	-	Musdadifa Islamic Charitable Organization
MMR	-	Maternal Mortality Rate
MO	-	Medical Officers

MoH	-	Ministry of Health
MoHSW	-	Ministry of Health and Social Welfare
MSc	-	Masters in Science
MUAC	-	Mid Upper Arm Circumference
MUCHS	-	Muhimbili University College of Health Sciences
NACP	-	National AIDS Control Program
NAS	-	National Academy of Sciences
NBS	-	National Bureau of Statistics
NSGRP	-	National Strategy for Growth and Reduction of Poverty
NTA	-	National Technical Awards
OPD	-	Out Patient Department
PLWHA	-	People Living With HIV/AIDS
RCHC	-	Reproductive and Child Health Clinic
RN	-	Registered Nurse
SDA	-	Seventh Day Adventist
SJUT	-	St John University of Tanzania
SPSS	-	Statistical Package for Social Sciences
STI	-	Sexual Transmitted Infection
SUA	-	Sokoine University of Agriculture
TACAIDS	-	Tanzania Commission for AIDS
TB	-	Tuberculosis
TDHS	-	Tanzania Demographic Health Survey
UN	-	United Nations
URT	-	United Republic of Tanzania
WHO	-	World Health Organization

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Nutrition is a crucial component of health promotion and disease prevention, for all diseases and more for some diseases for example, diabetes, and hypertension. Extra attention about nutrition is needed at different stages of life: pregnancy, lactation, infancy, adolescence, menopause, and old age. The general practitioner has to be able to give nutrition advice in all situations, and some patients expect advice or an opinion from their doctor on whether their usual diet conforms to current research and public health advice (Truswell *et al.*, 2003).

Many developing countries are currently affected by high rates of overweight that in some cases surpass underweight as a public health nutrition problem. In the urban Africa, recent analyses of national data on body mass index (BMI; in kg/m²) from women showed that the prevalence of BMI greater than 25 exceeded that of BMI less than 18.5 in 17 of 19 countries (Mendez *et al.*, 2005). In a study done to women attending prenatal clinic in Dar es Salaam Tanzania, the prevalence of obesity rose steadily and progressively from 4% in 1995 to 9% in 2004 while underweight showed only a modest decline from 3% in 1995 to 2.6% in 2004 (Villamor *et al.*, 2006).

Infection causes negative balances of nitrogen, zinc, iron, potassium, phosphates, magnesium, and sulphates as well as plasma amino acids (Myrvik, 1994). For example, bacterial diarrhoea is associated with mal-absorption and possible nutrient deficiencies. Infection also can cause anorexia, which can result in under-nutrition or, in some

instances, an unexplainable temporary resistance to infection. Malnourished populations have impaired resistance to certain infections. Accordingly, it is understandable how anorexia and negative nitrogen balance brought on by infection could aggravate even a moderate state of malnutrition. Single amino acid deficiencies such as tryptophan also could exaggerate a marginal protein-calorie deficiency (Myrvik, 1994).

1.2 Problem Statement and Justification

It is estimated that around 800 million adults, and close to 150 million children under-five years of age are currently underweight worldwide, whereas 180 million children are stunted (Uauy, 2006). Obesity has reached epidemic proportions globally, with more than 1 billion adults overweight, at least 300 million of them are clinically obese a major contributor to the global burden of chronic disease and disability (WHO, 2008).

The Tanzania National Strategy for Growth and Reduction of Poverty (NSGRP) targeted to reduce infant mortality from 95 in 2002 to 50 per 1000 live births, and child under-five mortality from 154 to 79 per 1000 live births. The NSGRP also target to reducing prevalence of stunting in under-five children from 44% to 20% in 2010, and reducing prevalence of wasting in under-five children from 5% to 2% in 2010 (URT, 2005a). There is no significant nutritional status improvement for the children below five years of age or for women. According to 2004-05 Tanzania Demographic Health Survey (TDHS), under-five mortality rate was 112 per 1000 live births and infant mortality rate was 68 per 1000 live births (URT, 2005b). The prevalence of stunting, underweight and wasting of under-five children in Morogoro was 36%, 16% and 2% respectively. Furthermore prevalence of low BMI of women in Morogoro was 5.4%; moreover prevalence of

overweight and obesity was 24%. In addition, the prevalence of anaemia in the region was still high for children (77%) and pregnant women 56% (URT, 2005b).

Several efforts have been launched to deal and manage malnutrition in Morogoro Urban district. Nutrition implementation services in all the 19 wards in the Morogoro Urban district have the Child Survival, Protection and Development programme (CSPD) yet Maseta *et al.* (2008) observed that the prevalence of stunting in Mwembesongo and Mjimpya was still high (39.7%) and (27.5%) respectively.

Health care providers have a vital role in helping families access, choose, prepare and share healthy diets. Less ill health in the community reduces morbidity and mortality rates, reduces health worker's workload and national finances spent on health services (Burgess and Glasauer, 2005).

Nutritional care is often neglected in clinical practice, despite a huge increase in the triple burden of over nutrition, under nutrition, HIV/AIDS and related complication (Imoberdorf *et al.*, 2009).

Despite many nutritional studies that have been conducted in Tanzania, little is known about the health workers knowledge, attitude and nutrition practice in their daily duties as health care providers. More importantly, there is no documentation on the nutrition knowledge, attitude and practice of nurses and clinicians in Morogoro Urban district. This study, therefore, was intended to examine the nutrition knowledge, attitude and practice of nurses and clinicians at different health facilities in Morogoro Urban district.

1.3 Objectives

1.3.1 Overall objective

To examine the nutrition knowledge, attitude and practice of health workers at different health facilities in Morogoro Urban district.

1.3.2 Specific objectives

- i. To assess the nutritional knowledge, and attitude of health workers.
- ii. To assess the nutritional practice of health workers.
- iii. To assess needs of health workers on nutrition knowledge and skills.
- iv. To identify appropriate nutritional knowledge and skills package for health workers.

CHAPTER TWO

2.0 LITERATURE REVIEW

Health workers have the role to promote good nutrition and healthy lifestyles by planning and implementing, with the community and colleagues from other sectors a communication strategy for priority nutrition information. Health workers may monitor the health, growth and nutrition of vulnerable people especially women, young children and People Living with HIV/AIDS (PLWHA) so they can target additional resources to high risk group/areas. They may also implement special action to supplement routine services and prevent infections that might contribute to under-nutrition and monitor the feeding of hospital patients to prevent and treat malnutrition (Burgess and Glasauer, 2005).

2.1 Nutrition Care in Health Facility

Nutritional care is often neglected in clinical practice, despite a huge increase in the prevalence of obesity and under-nutrition as well as a growing awareness of the hazards of both over and under nutrition during the past two decades. In a study done in Pretoria, out of the 200 interviewed subjects, 48.5% and 49.6% indicated that they had received nutrition information from a health professional or from posters in clinics respectively. The sources of nutrition information were received from three different types of health professional, namely doctors (49%), nurses (33.2%) and dieticians 17% (Charlton *et al.*, 2004). Many patients in Canada frequently asked their physicians about nutrition, however only 37% frequently provided advice about nutrition (Aghdassi *et al.*, 2009). In a study done in Morogoro rural and urban area Shirima *et al.* (2001), observed that out of the women who delivered in health facilities only 17% and 41% from rural and urban

respectively were given information about breast feeding on discharge. Of those who attended Reproductive and Child Health clinic at least once, one in five was given information at the clinic about breast feeding.

2.2 Dietary Advice: A Public Perspective

There is a mismatch between the needs and expectations of patients regarding health promotion and dietary advice and an apparent reluctance on behalf of General Practitioners (GPs) to fulfil this role. The General Practitioner has to be able to give nutritional advice in all situations, and some patients expect advice or an opinion from their doctor on whether their usual diet conforms to current research and public health advice (Truswell *et al.*, 2003).

In an international survey in five countries, patients who reported receiving advice from their family doctors on weight, nutrition and exercise, were (28%) Britain, (52%) the United States of America, (45%) Canada, (38%) Australia and (33%) New Zealand (Schoen *et al.*, 2004).

Health professionals are often perceived as credible sources of dietary advice, because of their expertise and trustworthiness. Although less frequently consulted, health professionals are considered, by far, to be the most credible source of nutrition information by South African women (Charlton *et al.*, 2004).

2.3 Dietary Advice: The Perspective of Health Professionals

Nurses are trusted. Their function is to help those who consult them to get healthy and stay healthy (Schaller [and James](#), 2005). Dutch family doctors generally agreed that

nutrition is important in clinical practice and they should provide nutrition information to patients, but they do not provide nutrition information to a great degree (Van-Dillen *et al.*, 2004). In Kenya, although medical practitioner gave patients advice on diet and exercise, they were not confident and did not have enough knowledge on obesity and overweight management (Ojwang, 2005).

2.4 Source of Nutritional Information

Despite the growing interest in quality health care provision in developing countries, in most cases consumers of health care services are not better informed about how to manage their health. In a study done at Morogoro Urban district it was found that posters, radio and oral communication were the most commonly used source of information. Reproductive and Child Health (RCH) clinics and nutritional education session were an important aspect in disseminating nutrition information to mothers however, these sessions were seldom conducted and attendance of mothers to these session was poor (Chilimo and Lwoga, 2004).

The main sources of information for pregnant women during pregnancy from a study done in Romania were the family doctor (73%), the nurse assisting the family doctor (50.7%), relatives/acquaintances (18%) and the obstetrician (11.1%) (Rusescu, 2005). Although there was far too small commitment of the gynaecologist-obstetrician doctor, Rusescu (2005) thought these specialist are more often than not the most important point of reference for a pregnant woman, particularly in the urban area.

2.5 Effect of Nutrition Counselling and Health Education

Better knowledge on nutrition is positively associated with patients' adhering to health lifestyle and reduction of nutrition related disease. Adequate and appropriate knowledge

about breastfeeding issues early in pregnancy have high rates and longer duration of exclusive breastfeeding. It is an important goal for educational programme to inform clients/patients about nutrition, and more importantly to prepare them for common problems regarding nutrition issues (Gijsbers *et al.*, 2008; Li *et al.*, 2004).

There is improvement in the feeding practice following provision of information to mothers about feeding. Shirima *et al.* (2001) reported that mothers from Morogoro Urban area who received information about breast feeding from the health service personnel at an antenatal clinic breastfed exclusively and predominantly for a longer period.

2.6 Nutrition Training

Patients routinely seek physicians' guidance about diet, and the relation of nutrition to the prevention and treatment of disease is well known. However, practicing physicians continually rate their nutrition knowledge and skills as inadequate (Darer *et al.*, 2004; Al-Zaharani and Al-Raddadi, 2009). Despite that 15% and 53% of the medical practitioners completed training on obesity and nutrition respectively however they were still not confident enough to give nutrition advice to their patients (Ojwang, 2005).

With the move to a more integrated curriculum and problem-based learning at many medical schools, a substantial portion of the total nutrition instruction is occurring outside the courses specifically dedicated to nutrition. The amount of nutrition education in medical schools remains inadequate (Jazayeri, 2003; Adams *et al.*, 2006). In America roughly 60-80% of medical schools are teaching far less nutrition than the recommended 21 hours and 44 hours of the National Academy of Sciences (NAS), (1985) and American Society for Clinical Nutrition (ASCN), (1989), cited by Adams *et al.* (2006). In addition,

nutrition education typically occurs during the first 2 years of medical school when the basic sciences are being emphasized; nutrition does not appear to get much emphasis during the clinical years when nutrition concepts and skills could be applied more directly to clinical problem-solving (Adams *et al.*, 2006).

2.6.1 Nutrition knowledge of health workers

Early intervention to provide a healthy diet may have an enormous impact in disease prevention. Disease prevention is more cost effective than treatment. In the hospitals where there are dietitians, patients can get information about nutrition and diets from them. In other hospitals where there are no dietitians, physicians inform the patients about nutrition (Ozcelyk *et al.*, 2007b). Although the health workers (physician and nurses) consider nutrition knowledge important, several studies indicate health worker have inadequate knowledge (Flynn *et al.*, 2003; Schaller [and James](#), 2005; Ozcelyk *et al.*, 2007a, b), while older nurses and physicians appear to have more knowledge than others (Schaller and James, 2005; Ozcelyk *et al.*, 2007a, b).

2.6.2 Nutrition knowledge of nurses

Screening for nutritional status is a rapid and simple process that nurses or health care teams may accomplish, whereas a nutritional assessment is a detailed examination including several measures of metabolic, nutritional or functional variables performed by an expert clinician, nutrition nurse or dietitian (Kondrup *et al.*, 2003). In a study done in Helsinki Finland, Suominen *et al.* (2009) observed that of all the institutionalized elderly patients, 56.7% who were malnourished and 40.7% at risk of malnutrition, nurses considered only (15.2%) to be malnourished. Thus, the nurses could recognize malnutrition only in one-fourth (26.7%) of the actual cases and those patients who the

nurses considered to have malnutrition had a mean weight of 45 kg and their BMI was less or equal to 17.2 kg/m².

Ozcelyk *et al.* (2007a) determined that nutrition knowledge level of more than half of the nurses in Pakistan were adequate and only 32.7% of nurses had good nutrition knowledge. The average scores of nutrition knowledge level of nurses with graduate degree were found to be higher than those of undergraduates and secondary school graduates. Schaller and James (2005); Ozcelyk *et al.* (2007a), established that the nutrition knowledge scores of nurses with a professional experience of more than 10 years are significantly higher than that of nurses who had low experience.

It is believed that increasing the number of nutrition courses in their education period and providing in-service training at certain intervals after graduation is beneficial to increase the nutrition knowledge level of nurses. Kobe (2006) agrees with the other researchers as she reported overall poor general performance of the registered nurses on the selected aspects of nutrition knowledge, attitudes and practices from Kenyatta National hospital.

2.6.3 Nutrition knowledge of clinicians

Nutritional knowledge plays an important role in public health. However, there has been general concern about the state of nutritional knowledge of physicians in many parts of the world. In Sylhet Bangladesh for example, there were serious weaknesses in nutrition knowledge among the physicians because they did not have enough nutritional knowledge to properly advice patients (Uddin *et al.*, 2008). One of the strongest reasons given for poor nutrition knowledge of physicians is the non-incorporation of nutrition as a compulsory subject for the medical sciences degree (Álvares *et al.*, 2004).

Although Al-Numair (2004) reported the mean mark of 51.7% for correctly answered nutrition questions by physicians from Saudi Arabia, approximately 75 % of the physicians described their knowledge of nutrition as “Poor.” They had poor knowledge of important topics in nutrition: like source of vitamin B₁₂; substances that raise the blood HDL-cholesterol level; the association between excess protein intake and calcium loss; the type of dietary fibre helpful in lowering the blood cholesterol level and protective nutrients against hypertension. Physicians need more education in nutrition since proper nutritional advice to the patient is akin to half treatment (Uddin *et al.*, 2008).

2.6.4 The nutrition curriculum in health colleges in Tanzania

2.6.4.1 Curriculum of nursing schools/colleges in Tanzania

Nutrition topics in nursing curriculum focus on the needs of different age groups. For nursing students, 80 hours of general nutrition is supposed to be covered, but in reality less than that is covered, and considerably less covered for certificate and diploma students (Castleman, 2003). St John University of Tanzania has applied nutrition as a core course in Bachelors of nursing degree program which introduces the students to the advanced concepts related to nutrition and the nutritional requirements to maintain health and/or correct some clinical conditions; understanding of factors influencing eating habits and their relationship to an individual’s nutritional status and health (SJUT, 2008).

Nutrition is not a core or elective subject in some nursing degree although metabolism of proteins, carbohydrates and lipids are part of the biochemistry course. In addition metabolism and excretion system is part of physiology course (FoN-KCM College, 2007). The curriculum of advanced diploma in public health does not have nutrition as a core or elective subject. However, nutrition deficiency, integrated management of

childhood illness (IMCI) and community IMCI, are part of minimum essential health intervention course. In addition, component of food and metabolism of carbohydrates, protein and lipid are part of biochemistry course (MoH, 2005).

The Muhimbili nursing school curriculum has nutrition component in the nursing diploma curriculum which introduces the student element of nutrition as related to health and wellbeing. It reflects to food groups and classification, feeding habits and requirement for various age groups, socio-cultural factors affecting nutrition, feeding patients with various nutritional needs and nutritional deficiencies. The curriculum also introduces the student to knowledge in management of malnourished patient in the medical nursing course (FoN-MUCHS, 2003).

2.6.4.2 Curriculum of medical schools/colleges in Tanzania

Nutrition courses in medical training are different according to the level of clinicians. The degree in medicine does not have a core or optional course in nutrition however; nutrition is incorporated in other courses for example; biochemistry, child health and epidemiology (Tumaini University-KCM College, 2007). During the paediatrics and child health course the Assistant Medical Officers (AMO) are taught the Essential National Interventional packages (IMCI and Malaria control) and their anticipated impact on child survival, basic nutrition including, feeding pattern and nutrient requirements in children; anthropometric measurements and assessment of nutrition status and feeding problems in children. The training also include mineral deficiencies and is based on iron, iodine fluoride and zinc deficiencies. Vitamin deficiency is reflected but only to vitamin A, B, C, D, K and niacin (URT and MoH, 2000).

The Clinical Officers (CO) curriculum have nutrition course combined with immunization. The nutrition components include under-nutrition, over-nutrition and mineral deficiency in particular iron and iodine deficiency (URT and MoH, 2001)

2.7 Attitude of Medical Personnel towards Nutritional Issues

Positive nutritional attitude is a key motivation to nutritional practice. Twenty six percent of the Registered Nurses (RN) in Kenya strongly agreed that it was the nurses' responsibility to assess the nutritional status of patients compared to 72% who strongly agreed it was the dietitians'/nutritionists' responsibility and 24% who strongly agreed it was the doctors' responsibility (Kobe, 2006).

Although 72% of the Registered Nurses reported it was important to weigh patients on admission, only 43% reported actually weighing patients, of which 59% weighed patients for medication purposes and only 18% weighed patients for nutritional status assessment. However only 28% reported nutritional issues were included in ward rounds (Kobe, 2006).

Nevertheless, only 13.6% of physicians received training in obesity management, and approximately 66% of physicians in Qatar had negative attitudes toward obese patients. Most physicians routinely offer advice to their obese patients regarding weight reduction as part of chronic diseases management. However, they rarely screen their patients for obesity (Al- Muraikhi and Al-Kuwari, 2008).

Miller *et al.* (2007) reported that most nurses acknowledge that overweight and obesity are diagnoses requiring intervention; however they do not pursue the topic with overweight and obese patients. The impact of negative attitude toward nutrition issues may lead to

negative attitude to nutrition practice and eventually increase in the number of hospital and community malnutrition.

2.8 Nutrition Practice

Nutrition counselling by health workers can improve patients' dietary behaviours and is affected by health workers nutrition practices and attitudes such as perceived relevance of nutrition practice (Spencer *et al.*, 2006; Ahmadi *et al.*, 2009).

The percentage of physicians who gave dietary recommendations to their patients in Iran was 73% though the mean scores for correctly answered questions were 26.5% in physicians and 41.8% in medical students (Hosseini *et al.*, 2008). Ninety five percent of physicians in Portugal provided written or verbal nutrition guidance however dietary counselling and assessment of the patients' nutritional status was not done systematically (Álvares *et al.*, 2004). Twenty six percent of nursing respondents use BMI to make clinical judgement of overweight and obesity (Miller *et al.*, 2007).

In a study done in northern Tanzania, the findings revealed a high level of stress and frustration among the nurse-counsellors who found themselves unable to give qualified and relevant advice to HIV-positive women on how best to feed their infants. Nursing counsellors were confused regarding the appropriateness of the feeding options they were expected to advise HIV-positive women to employ, and perceived both exclusive breastfeeding and exclusive replacement feeding as culturally and socially unsuitable (Leshabari *et al.*, 2007).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Overview

This chapter presents the description of the study area, types and data source, sample size and location, study design, sampling techniques, data analysis and analytical tools used in the study.

3.2 Description of Study Location

The study was conducted in Morogoro Urban district. Morogoro Urban district is one of the six districts making up the Morogoro administrative region.

3.2.1 Study area

Morogoro Urban is one of the six administrative districts of the Morogoro region. It is bordered to the North by the [Morogoro Rural district](#), to the East by the [Pwani region](#), to the South by the [Kilombero district](#) and to the West by the [Kilosa district](#). In 2002, the area of urban Morogoro was 260 km², which represents 0.4% of the total regional area. The Morogoro Urban district is administratively divided into one division and nineteen wards. The town has a bimodal climate, with a short rain season between November and December and a long rain season between March and May, including a relatively dry period in January and February. Morogoro Urban district is a well-watered Municipality with two rivers, the Ngerengere and the Mkundi flowing through it. These two rivers form the main source of piped water in the Municipality (URT, 2002).

3.2.2 Population and ethnicity

The current population of the Morogoro Urban district stands at 228,863 people in the ratio of 50.35% female and 49.65% male individuals (URT, 2003). The population growth is 4.6% per annum and immigration rate is increasing from 3.75 to 9.6% in 2002. The immigration is due to increase in factories, trading centres and expansion of infrastructure (MDP, 2005).

Due to urbanization the population is mixed with Waluguru being the dominant ethnic group. Some of other tribes found in the district include Wapogoro, Wandamba, Wakwere, Wakaguru, Wabena, Wachagga, Wapare and others.

3.2.3 Health situation

Malaria is the leading disease in the area in terms of mortality, and HIV/AIDS is the tenth and of great concern in the Morogoro region. By the year 2000, HIV/AIDS ranked fifth among the most common causes of mortality accounting to 9.8 % of mortality cases (URT, 2002). The HIV/AIDS and malaria indicator survey 2007-08 showed that HIV incidence in Morogoro region was 5.1% (NBS and TACAIDS, 2008).

Malaria accounts for 51% of outpatient cases for children below five years of age and 48% for the population above five years of age. Other diseases including pneumonia, Acute Respiratory Infections (ARI), diarrhoea and HIV/AIDS were among the causes of outpatient cases in the district in 2007. Malaria (56%) still was the leading cause of deaths in the year 2007. In addition pneumonia (16.4%), anaemia (15%), diarrhoea (6.7%) and malnutrition (2.4%) were among the top causes of under-five years deaths to admitted patients (CHMT, 2008).

The district has a total of 51 health facilities; three hospitals, 12 health centres, and 36 dispensaries. In the year 2000 Infant Mortality rate (IMR) was 105; and Maternal Mortality Rate (MMR) was 482 (URT, 2002). In the year 2007 health care providers at all Health facilities in the Morogoro Urban district were 246 nurses and 103 clinicians (Kasuku, T. and Nzoa, M. personal communication, 2008). The ratio of people to health facility is 7,421 to one; and there is one physician per 23,188 people (Kithakye *et al.*, 2009).

3.3 Study Design

A cross-sectional survey design was used where by qualitative and quantitative data were collected which define the nutrition knowledge; attitude and practice of health workers at the Morogoro Urban district.

3.4 Sampling Procedure

3.4.1 Study population

The survey included health workers from hospitals, health centres and dispensaries in the Morogoro Urban district. A total of 20 health facilities including two hospitals, nine health centres, and nine dispensaries were included. The health workers included nurses and clinicians who attend patients at the respective area. Nursing category included Registered Nurses (RN) and Enrolled Nurses (EN) while clinician category included Medical Specialist, Medical Officers (MO), Assistant Medical Officers (AMO), and Clinical Officers (CO).

Registered nurses are a health care professional with diploma, advanced diploma or degree in nursing. Enrolled nurses are health care professional with certificate in nursing. Medical Officers had degree in medicine and medical specialist had masters' degree in medicine

with specialization. Assistant Medical Officers are advanced medical practitioners found in Tanzania. After qualifying as [Clinical Officers](#) they undergo further training which lasts two years and are awarded Advanced Diploma in Medicine. They may undergo further two year training to specialize in [anaesthesia](#), [paediatrics](#), [radiology](#) or [surgery](#).

Clinical Officers are [health care providers](#), after three years of training they receive a diploma in clinical medicine, surgery and community health. Clinical Officers work either independently or with a Medical Officer to provide healthcare services to the populations.

3.4.2 Sampling technique

The sample was stratified according to the health workers' category (i.e. Medical specialist, Medical Officer, Clinical Officer, Assistant Medical Officer, Registered Nurse, and Enrolled nurse). Sampling of health facilities was done by allocating numbers to the list of health facilities and selecting using the random numbers and a total of 20 health facilities for self administered questionnaire and eight health facilities for in-depth interviews were selected. Sampling within the category was done by allocating numbers to the list of names and selecting respondents using random numbers.

3.4.3 Sample size

A total of 268 respondents were selected for self administered questionnaire using the Fisher *et al.* (1991) formula; $N = z^2 * p * (1-p) / d^2$ including 10 % attrition rate (Appendix 1). A total of 155 respondents (100 nurses and 55 clinicians) filled the self administered questionnaire and returned to the researcher. In-depth interview was done to 40 health workers in the paediatric ward, obstetric and gynaecology ward, Reproductive and Child Health clinic (RCH clinic), medical wards, Out Patient Department (OPD) and Care and

Treatment Clinic (CTC). Focus group discussion was conducted and involved a group of nurses, and a group of clinicians done separately.

Table 1: The number of expected and obtained respondents for self administered questionnaire

Health worker category	Morogoro regional hospital	Municipal health facility	Total expected	Total obtained
Enrolled Nurses	87	24	111	58
Registered Nurse	68	10	78	42
Clinical Officers	8	35	43	38
Assistant Medical Office.	15	3	18	11
Medical Officers	9	5	14	5
Specialist Medical Officers	3	1	4	1
Total	190	78	268	155

3.5 Data Collection

The survey was designed with three parts; self administered questionnaire (Appendices 2 and 3), in-depth interview (Appendix 4) and focus group discussion (Appendix 5). The self administered questionnaire was pretested to 10 nurses and 10 clinicians while interview guide was pretested to five nurses and five clinicians for clarity and validity of the questions. The self administered questionnaire to assess knowledge, attitudes and practice of medical personnel toward nutrition included:

Demographic survey

This included respondents' age, sex, college/university attended, year of graduation, nutrition courses during training or in-service and present working place. In-service or on job training in this study included short courses or continue education given to health workers during working period.

Attitude survey

Attitude survey included respondent's degree of agreement on the use of nutrition in their clinical practice. The attitude survey consisted of negative and positive nutrition statements with a five scale degree of agreement.

Practice survey

Respondents were asked on how they employed nutrition related techniques in patients care, barrier in practice, and self modification of diet.

Knowledge survey

To test level of understanding of nutrition knowledge, respondents were asked nutrition questions on various selected topics.

In-depth interview

In-depth interviews focused on the role of the health workers in nutrition practice and dissemination of nutrition information in their working area. An interview guide containing mostly open-ended questions was used. The interviews were audio-taped to ensure that all the responses were adequately captured. The audio-taped interviews were later transcribed.

Focus group discussion

Focus group discussion was designed to assess training needs of the health workers. The focus group discussion was done to nursing category and clinician category separately. Each group had eight respondents who were selected randomly and gave consent for participation. A checklist guide was used during the discussion but necessary questions were added as needed. The discussion was audio taped to allow concentration to the focus group discussion. The audio taped discussions were later transcribed.

3.6 Data Processing and Analysis Procedure

Quantitative data from the questionnaire were coded and analysed using the Statistical Package for Social Sciences (SPSS) (computer version 12.0 programs). Descriptive statistics was used to summarise the data into means and percentages. Attitude scores and categorical demographic variables was analysed using the student's t test. Chi-square test was used to analyze categorical data of duration since graduation, profession and knowledge scores. Analysis of variance was used to test group mean differences in knowledge and relationships between knowledge scores, age and years since graduation. Results were considered significant at $p =$ or $<$ or $>$ 0.05 level.

The qualitative data from in-depth interviews and focus group discussion were manually transcribed, then data was coded and analysed using statistical software Atlas ti 6.0. Categorical and demographical data were exported to the Excel sheet and statistical software SPSS for quantitative analysis.

3.7 Ethical Consideration

Ethical clearance for conducting the study was obtained from the Administrative Authority of the district and health facilities. Confidentiality and personal rights were observed throughout the survey. The main aim of the study was explained to the respondents and both oral and written consent was obtained from the individual health workers participating in the study (Appendices 6 and 7).

CHAPTER FOUR

4.0 RESULTS

4.1 Sample Characteristics

The bulky of the data was collected from in-depth interview, self administered questionnaire, and focus group discussion. In-depth interview was done on 40 respondents. About 58% out of the 268 respondents who were given the self administered questionnaire returned the questionnaire. The information was collected from two hospitals, nine health centres and nine dispensaries (Table 2).

Table 2: Health facilities selected for the survey of the health workers using self administered questionnaire

Name of the health facilities	Returned questionnaire	
	n	%
Morogoro regional hospital	90	58.10
Mazimbu hospital	4	2.60
Sabasaba health centre	7	4.50
Uhuru health centre	13	8.40
Mafiga health centre	2	1.30
Kingolwira health centre	3	1.90
Agakhan health centre	2	1.30
Ahamadiya health centre	1	0.65
Tumaini health centre	1	0.65
Mgolole health centre	6	3.90
SUA Health centre	5	3.20
SDA Misufini dispensary	3	1.90
Kiwanja cha ndege dispensary	3	1.90
Kilakala dispensary	4	2.60
FFU dispensary	4	2.60
Kihonda magereza dispensary	1	0.65
MICO dispensary	3	1.90
Jabalhira dispensary	1	0.65
Wami flat dispensary	2	1.30
AP Dispensary	0	0.0
Total	155	100.0

Results presented in Table 2 lists health facilities which were selected randomly to be included in the survey.

4.2 Social Demographic Information of Self Administered Respondents

Social demographic characteristics of the respondents are displayed in three categories; the entire health worker (including clinicians and nurses) respondent displayed together; the clinician respondents as individualized category; and the nurse respondents as individualized category. This was done because within the clinician and nursing category there are distinguished characteristics including different levels of professional education from those with certificate to those with degree and different working responsibility.

Table 3: Demographic characteristics of health workers (nurses and clinicians) of the Morogoro Urban district

Characteristics	n	%
Gender		
Male	42	27.1
female	113	72.9
Job title		
Nurses	100	64.5
Clinicians	55	35.5
Age (years)		
≤ 30	17	11.0
31-40	50	32.3
≥ 41	88	56.7
Experience (years)		
≤ 10	46	29.7
11-20	44	28.4
≥ 21	65	41.9
Graduation (years)		
≤ 10	94	60.6
11-20	30	19.4
≥ 21	31	20.0

Table 3 shows the results of the demographic characteristics of health workers. About 57% of the health workers were within the age category of 41 years and above. Seventy

three percent of the respondents were females and 27% were males. About 65% of the respondents were nurses and 35% were clinicians. Most of the respondents (61%) graduated in their present professional qualification within the past ten years. Nevertheless, about 42% of the respondents have been working in the medical field/profession for a period of 21 years or more.

4.2.1 Social demographic information for clinician respondents

Table 4: The social demographic information of clinician respondents

Characteristics	n	%
Gender		
Male	38	69.1
Female	17	30.9
Age (year)		
≤ 30	5	9.1
31- 40	21	38.2
≥ 41	29	52.7
Job title		
Clinical Officer	34	61.8
Assistant Medical Officer	13	23.6
Medical Officer	7	12.7
Specialist Medical Officer	1	1.8
Graduated (years)		
≤10	35	63.6
11- 20	12	21.8
≥ 21	8	14.5
Experience (years)		
≤ 10	18	32.7
11-20	15	27.3
≥ 21	22	40.0

Sixty nine percent of the clinicians were male, within the age group of 41 years and above (53%). In addition, 64% of the respondents graduated about less or equal to 10 years ago for the current job title (health workers attained a higher job title as they attend a

designated course), and 40% of them have been working in the medical field for more than 21 years and above (Table 4).

4.2.2 Social demographic characteristics of the nurses

Table 5: Social demographic information of the nursing respondents

Category	n	%
Gender		
Male	4	4.0
Female	96	96.0
Age (year)		
≤ 30	12	12.0
31- 40	29	29.0
≥ 41	59	59.0
Job title		
Enrolled Nurse	58	58.0
Registered Nurse	42	42.0
Graduated (years)		
≤10	59	59.0
11- 20	18	18.0
≥ 21	23	23.0
Professional education		
Certificate nursing	4	4.0
Certificate nurse midwifery	48	48.0
Certificate public health nurse	6	6.0
Diploma nurse midwifery	30	30.0
Diploma nursing & psychiatry	5	5.0
Advanced diploma paediatric nursing	4	4.0
Advanced diploma public health nursing	1	1.0
Degree in nursing	2	2.0
Work experience (years)		
≥ 10	27	27.0
11-20	30	30.0
≤ 21	43	43.0

Ninety six percent of the nurses who responded to the questionnaire were females (Table 5). The study group consisted of 58% enrolled nurses and 48% of them had certificate in nursing and midwifery, and 30% had a diploma in nursing and midwifery.

Fifty nine percent of the nurses who responded to the questionnaire graduated within the past 10 years and in the present job title and 43% had experience in medical field for 21 years or more. Seventy nine percent of the nurses had general nursing knowledge and specialization in midwifery.

4.3 Nutrition Training in Medical and Nursing Colleges

This question aimed at establishing the general nutrition training respondents had received during their pre-service medical and nursing training.

Table 6: Level of nutrition training of health workers

Nutrition training statement	Nurses		Clinicians	
	n	%	n	%
Nutrition training in college	79	79.0	47	85.5
Nutrition training duration				
None	21	21.0	8	14.5
Less than one week	19	19.0	9	16.4
One to two weeks	17	17.0	7	12.7
Two to four weeks	17	17.0	8	14.5
More than four weeks	26	26.0	23	41.3
Nutrition training prepared to deal with obese/overweight and underweight patients	21	21.0	24	43.6
Feel necessary to have pre-service nutrition training	93	93.0	55	100.0
In-service/on job nutrition training	53	53.0	30	54.5
Preferred in-service nutrition courses	92	92.0	52	94.5

About 86% of clinicians and 79% of nurse respondents had some nutrition training during their nursing and medical training (Table 6). Forty four percent of the clinicians were of the opinion that nutrition training prepared them adequately to deal with overweight, obese and underweight patients and 21% of nurses were the least prepared. Time spent during nutrition training varied from less than one week to more than one month for all the

health workers. Moreover, only 41% of the clinicians and 26% of nurses spent more than one month in nutrition training when undergoing pre-service medical and nursing training, respectively.

4.4 Knowledge

4.4.1 Nutrition knowledge of health workers

Knowledge on nutrition was assessed using a questionnaire with the same questions to both the nurses and clinicians. A total of 17 knowledge questions were marked and scored one mark for each correctly answered question. Correctly answered questions 0-6 were categorized as poor knowledge, 7-10 mediocre knowledge, 11-13 good knowledge and 14-17 was categorized as very good knowledge.

Table 7: Level of nutrition knowledge of nurses and clinicians

Category	Knowledge of the health workers								Statistics
	Very good		Good		Mediocre		Poor		
	n	%	n	%	n	%	n	%	
Gender									t=3.060
Male	2	4.8	7	16.7	19	45.2	14	33.3	df=153
Female	0	0.0	8	7.1	52	46.0	53	46.9	p=0.003
Age (years)									Chi ² =4.552
≤ 30	0	0.0	3	17.6	6	35.3	8	47.1	df=6
31-40	1	2.0	5	10.0	27	54.0	17	34.0	
≥ 41	1	1.1	7	8.0	38	43.2	42	47.7	p=0.602
Job title									t=26.354
Nurses	0	0.0	5	5.0	44	44.0	51	51.0	p=0.000
Clinicians	2	3.6	10	18.2	27	49.1	16	29.1	
Education									Chi ² =21.568
Primary	0	0.0	0	0.0	16	53.3	14	46.7	df=6
Form four	0	0.0	9	8.9	47	46.5	45	44.6	
Form six	2	8.3	6	25.0	8	33.3	8	33.3	p= 0.001
Professional education									Chi ² = 44.540
Certificate	0	0.0	0	0.0	27	46.6	31	53.4	df=9
Diploma	0	0.0	9	13.0	30	43.5	30	43.5	
Advanced Diploma	0	0.0	4	22.2	10	55.6	4	22.2	p< 0.01
Degree	2	20.0	2	20.0	4	40.0	2	20.0	
Graduation years									Chi ² = 3.222
≤ 10	1	1.1	11	11.7	44	46.8	38	40.4	df= 6
11-20	1	3.3	2	6.7	14	46.7	13	43.3	
≥ 21	0	0.0	2	6.5	13	41.9	16	51.6	p=0.780
Total	2	1.3	15	9.7	71	45.8	67	43.2	

Close to one fifth of male respondents (21.5%) scored very good and good in knowledge on nutrition than female respondents 7% (Table 7). Clinicians had more knowledge on nutrition than nurses; with 22% of the clinicians and 5% of nurses scoring very good and good in nutrition knowledge. Level of education had significant effect on the level of nutrition knowledge as 53% of the respondents with primary education had mediocre nutrition knowledge and 47% had poor nutrition knowledge (p=0.001). Moreover, the level of professional education had effect on the nutrition knowledge. Respondents with degree qualifications had very good nutrition knowledge (20%) and good nutrition knowledge (20%) and no respondents with certificate had good or very good knowledge on nutrition respectively, (p<0.01). Working duration since graduation did not have any

significant effect on the level of nutrition knowledge of the respondents. Those who graduated less than 11 years ago, 11-20 years and 21 years and above had 40%, 43%, and 52% poor knowledge of nutrition, respectively (Table 7).

Table 8: Average score of nutrition knowledge of nurses and clinicians

Variable	n	Mean ± SD	Tests	P-value
Gender				
Male	42	8.05±3.08	t=3.060	p=0.003
Female	113	6.57±2.51	df=153	
Age (years)				
≤ 30	17	7.65±2.21		p=0.229
31-40	50	7.30±2.46	F= 1.489	
≥ 41	88	6.97±2.97	df= 2	
Job title				
Nurses	100	6.38±2.54	t=26.354	p<0.001
Clinicians	55	8.04±2.81	df=154	
Education level				
Primary	30	6.77±1.96	F=3.626	p=0.029
Form four	101	6.70±2.55	df=2	
Form six	24	8.33±3.90		
Professional education				
Certificate	58	6.05±2.52	F=8.523	p=0.000
Diploma	69	7.03±2.41	df=3	
Advanced diploma	18	7.89±2.93		
Degree	10	10.20±3.26		
Total	155	6.97±2.75		

The results presented in Table 8 show the mean scores for nutrition knowledge of female and male respondents. The mean scores for male respondents were significantly higher than that of the female respondents ($p < 0.01$). The mean scores for clinicians (8.04 ± 2.81) were significantly higher than mean score for nurses (6.38 ± 2.55) ($p < 0.001$). Professional education as well as the education level of the respondent had significant effect on the nutrition knowledge of the health workers ($p < 0.001$). Respondents whose level of education was a university degree had high mean score (10.20 ± 3.26) and respondents with

certificate had the least mean score (6.05 ± 2.52) ($p < 0.001$). Similarly, respondents who have attained advanced level secondary education (form six) had a higher mean score (8.33 ± 3.9) compared to respondents whose highest level of education attainment was primary education (6.77 ± 2.0) ($p < 0.05$). Although health workers respondents with age less than or equal to 30 years had higher scores than those in age group 31-40 years and age group 41 years and above, these results were not statistically significant ($p = 0.229$). The overall mean score for nutrition knowledge was 6.97 ± 2.75 and the 95% confidence interval for mean was between 6.53 and 7.40.

Table 9: Average scores of nutrition knowledge of nurses and clinicians by nutrition training

Nutrition training	n	Mean \pm SD	Tests	P-value
Pre-service				
Yes	126	7.07 ± 2.77	F=0.957	p=0.330
No	29	6.52 ± 2.65	df=1	
Duration of pre-service nutrition course				
None	29	6.53 ± 2.65	F=0.593	p=0.668
Less than one week	28	6.93 ± 3.27	df=4	
One to two weeks	24	6.71 ± 2.66		
Two to four weeks	25	6.88 ± 2.64		
More than one month	49	7.43 ± 2.63		
Prepared to deal with obesity/underweight				
Yes	45	8.18 ± 2.26	F=13.251	p=0.000
No	110	6.47 ± 2.79		
In-service/on job courses				
Yes	83	7.00 ± 2.92	F=0.024	p=0.876
No	72	6.93 ± 2.56	df=1	
Total mean	155	6.97 ± 2.75		

Health workers who thought they were well prepared to deal with underweight, overweight and obese clients/patients had a significant higher mean score (8.18 ± 2.26) than

respondents who thought they were not well prepared (6.47 ± 2.79), ($p < 0.001$) (Table 9). Pre-service nutrition training, in-service nutrition training, and duration of pre-service courses did not have significant effect on the mean nutrition knowledge scores of the respondents.

Table 10: Knowledge questions with correct answered questions of health workers (nurses and clinicians)

No.	Question asked to the health workers- nurses and clinicians*	%
1	Adequate level of calcium for adult aged 51-70 years	36.1
2	Nutrient protective against hypertension	60.0
3	The most concentrated source of vitamin B ₁₂	16.8
4	Which of the following is not an antioxidant?	43.9
5	Excess in which nutrient may increase body calcium?	18.1
6	Which percent of daily total energy should come from fat?	26.5
7	Type of food with preventive effect on various types of cancer	87.7
8	The number of kilocalories in one gram of fat	22.6
9	The common nutrient deficient in alcoholics	54.8
10	Nutrient strongly associated with prevention of neural tubal defect	38.7
11	Nutrition status of an adult whose BMI is between 25-29.9 kg/m ²	31.0
12	Nutrient deficient in long administration of anti TB drug-isonized	46.5
13	Nutrient deficient caused by eating large amount raw egg white	33.5
14	Mineral often at risk of being deficient in an average diet	46.5
15	An ideal weight gain for a normal pregnant women	66.5
16	Importance of food groups	29.5
17	Vitamin supplement with toxic effect in high level of accumulation	34.2

* Same questions were used to assess both nurses and clinicians.

Only one of the seventeen questions was answered correctly by more than 70% of respondents, and two questions were answered correctly by less than 20% of the respondents. Four out of seventeen questions were answered correctly by more than fifty percent of respondents (Table 10). The respondents were able to respond adequately/correctly on the question, “*the food type with preventive effect of various types of cancers*” 88% (Table 10). Two items that health workers respondents had least

knowledge on are “*the association between excess protein intake and calcium loss*” (19%) and “*the most concentrated source of vitamin B₁₂*” (17%).

4.4.1.1 Confidence of health workers

A question was asked at the end of the knowledge questionnaire to establish how confident respondents were on their knowledge on nutrition.

Table 11: Confidence of health workers on their nutrition knowledge

Job title	Knowledge on nutrition						Statistics
	Poor		Moderate		Excellent		
	n	%	n	%	n	%	
Nurses	15	15.0	82	82.0	3	3.0	Chi ² =6.618 df=2 p=0.037
Clinicians	3	5.5	46	83.6	6	10.9	
Total	18	11.6	128	82.6	9	5.8	

About 84% clinicians and 82% nurses perceived that they had moderate knowledge on nutrition ($p < 0.05$) (Table 11).

4.4.2 Knowledge of clinicians and nursing respondents on nutrition

The knowledge on nutrition was assessed for each individual category (nurses and clinicians) using an additional five different questions making a total of twenty two questions. These questions aimed to disaggregate the nurses and clinicians according to their different health work category. The questions were scored one mark for a correct answer making a total of 22 scores. Scores were categorized as 0-8 poor knowledge on nutrition, 9-13 mediocre knowledge, 14-17 good knowledge and 18-22 very good knowledge on nutrition.

4.4.2.1 Nutrition knowledge of clinicians

Table 12: The correctly answered questions by the clinicians

No.	Question asked to clinician respondents	%
1	Adequate intake level of calcium for adult aged 51-70 years	23.6
2	Nutrient protective against hypertension	67.3
3	The most concentrated source of vitamin B ₁₂	29.1
4	Which of the following is not an antioxidant?	52.7
5	Excess in which nutrient may increase body calcium	14.5
6	Which percent of daily total energy should come from fat?	43.6
7	Food type with preventive effect on various types of cancer	87.3
8	The number of kilocalories in one gram of fat	29.1
9	The common nutrient deficient in alcoholics	69.1
10	Nutrient strongly associated with prevention of neural tubal defect	50.9
11	Nutrition status of an adult whose BMI is between 25-29.9 kg/m ²	50.9
12	Nutrient deficient in long administration of anti TB drug-isoniazid.	60.0
13	Nutrient deficient caused by eating large amount raw egg white	36.4
14	Mineral often at risk of being deficient in an average diet	58.2
15	An ideal weight gain for a normal pregnant women	72.7
16	Importance of food groups	30.9
17	Vitamin supplements with dangerous level of accumulation	47.3
18	Type of dietary fibre helpful in lowering blood cholesterol levels	38.2
19	Nutrient believed to help prevent thrombosis	32.7
20	Substance that raises high density lipoprotein-cholesterol levels	21.8
21	Best test for assessing nutritional status of hospitalized patients	5.5
22	Possibility for a patient with pneumonia, and history of good nutrition status if has inadequate nutrition for one week during hospitalization	21.8

Only one out of twenty two questions was answered correctly by more than 75% of the clinicians, eight questions were answered correctly by 50-75% of clinicians, and 14 questions were answered correctly by less than 50% of the clinicians (Table 12). The questions least answered correctly by most of the clinicians were “*the best test for assessing nutritional status of hospitalized patients*” (5.5%) and “*association of protein intake and increase body calcium loss*” (14.5%). The questions which are known best by

the clinicians were “*food types with preventive effect on types of cancer*” (87%) and “*ideal weight gain for normal pregnant women*” 73% (Table 12).

Table 13: Frequency distribution of nutrition knowledge by job title and work experience of the clinician

Variable	Nutrition knowledge of clinicians								Statistics
	Very good		Good		Mediocre		Poor		
	n	%	n	%	n	%	n	%	
Job title									
CO	0	0.0	4	11.8	12	35.3	18	52.9	Chi ² =57.388 df=9 p= 0.001
AMO	0	0.0	1	7.7	7	53.8	5	38.5	
MO	0	0.0	1	14.3	4	57.1	2	28.6	
Specialist MO	1	100.0	0	0.0	0	0.0	0	0.0	
Experience									
≤ 10 years	1	5.6	1	5.6	8	44.4	8	44.4	Chi ² =9.658 df=6 p= 0.140
11-20 years	0	0.0	4	26.7	3	20.0	8	53.3	
≥ 21years	0	0.0	1	4.5	12	54.5	9	40.9	
Total	1	1.8	6	10.9	23	41.8	25	45.5	

CO: Clinical Officers

AMO: Assistant Medical Officers

MO: Medical Officers

About 45% of the clinicians had poor knowledge and mediocre knowledge (42%) on nutrition (Table 13). Close to 53% of the Clinical Officers had poor knowledge but (100%) Specialist Medical Officers had very good knowledge about nutrition. About 14% of Medical Officers had good nutrition knowledge and Assistant Medical Officers had fewer (8%) respondents with good knowledge on nutrition. These results are statistically significant with p=0.001. Nevertheless, work experience had no significant effect to the clinician’s nutrition knowledge.

4.4.2.2 Nutrition knowledge of nursing respondents

Table 14: Nutrition knowledge of nursing respondent with correctly answered question

No.	Question asked to the nurse respondents	%
1	Adequate intake level of calcium for adult aged 51-70 years	43.0
2	Nutrient protective against hypertension	56.0
3	The most concentrated source of vitamin B ₁₂	10.0
4	Which of the following is not an antioxidant?	39.0
5	Excess in which nutrient may increase body calcium	20.0
6	Which percent of daily total energy should come from fat?	17.0
7	Food type with preventive effect on various types of cancer	88.0
8	The number of kilocalories in one gram of fat	19.0
9	The common nutrient deficient in alcoholics	47.0
10	Nutrient associated with the prevention of neural tubal defect	32.0
11	Nutrition status of an adult whose BMI is between 25-29.9 kg/m ²	20.0
12	Nutrient deficient in long administration of anti TB drugs-Isonized.	39.0
13	Nutrient deficient caused by eating large amount of raw egg white	32.0
14	Mineral often at risk of being deficient in an average diet	40.0
15	An ideal weight gain for a normal pregnant women	63.0
16	Importance of food groups	28.0
17	Vitamin supplements with toxic effect in high level accumulation	27.0
18	Duration of exclusive breast feeding	91.0
19	The mineral important for menopausal woman	66.0
20	Age groups at risk of malnutrition in the community	24.0
21	Importance of vitamin C	59.0
22	Food sources of calcium.	48.0

The results presented in Table 14 show that two out of the 22 questions were answered correctly by more than 75% of nurses; four questions were answered correctly by 50-75% of nurses and 16 questions were answered correctly by less than 50% of the nurses. The questions least known by most of the nurses were, “*the most concentrated source of vitamin B₁₂*” (10.0%), “*the percent daily total fat energy*” (17%), “*the energy value of fat-9 kcal/g*” (19%); “*the association between protein intake and calcium loss*” (20%) “*What is the nutrition status of an adult whose BMI is between 25.0 and 29.9 kg/m²?*” 20%.

“Nutrient strongly associated with neural tubal defect” was answered correctly by 32% of the nurses. Duration of exclusive breast feeding was the most known question by (91%) nurse respondents. However, only 63% knew the ideal weight gain for a normal pregnant woman (Table 14).

Table 15: Nutrition knowledge of nurses

Category	Very good knowledge		Good knowledge		Mediocre knowledge		Poor knowledge		Statistics
	n	%	n	%	n	%	n	%	
Job title									Chi ² =9.864
Enrolled Nurse	0	0.0	0	0.0	29	50.0	29	50.0	df=2
Registered Nurse	0	0.0	4	9.5	27	64.3	11	26.2	P=0.007
Education									Chi ² =13.032
Primary	0	0.0	0	0.0	18	62.1	11	37.9	df=4
Form four	0	0.0	2	3.1	36	56.3	26	40.6	P=0.011
Form six	0	0.0	2	28.6	2	28.6	3	42.9	
Profession									Chi ² =21.240
Certificate	0	0.0	0	0.0	29	50.0	29	50.0	df=6
Diploma	0	0.0	2	5.7	23	65.7	10	28.6	P=0.002
Advanced Diploma	0	0.0	1	20.0	3	60.0	1	20.0	
Degree	0	0.0	1	50.0	1	50.0	0	0.0	
Specialization									Chi ² =14.355
Midwives	0	0.0	3	3.8	39	49.4	37	46.8	df=8
Paediatrics	0	0.0	1	25.0	2	50.0	1	25.0	P=0.073
Psychiatry	0	0.0	0	0.0	4	80.0	1	20.0	
General nurse	0	0.0	0	0.0	3	75.0	1	25.0	
Public health	0	0.0	0	0.0	8	100.0	0	0.0	
Mean score	0	0.0	4	4.0	56	56.0	40	40.0	

About 91% of Registered Nurses (respondent) had mediocre and poor knowledge score and all the Enrolled Nurse respondents had mediocre and poor nutrition knowledge scores. All (9.5%) the nursing respondents with good knowledge on nutrition were Registered Nurses. Respondents in the Enrolled Nursing category had the highest proportion (50%) of respondents with poor knowledge on nutrition, ($p < 0.05$) (Table 15). Professional education had significant effect on the level of nutrition knowledge among the nursing respondents. Nurses with a degree in nursing had good and mediocre knowledge on nutrition (50%) each. Nursing respondents with diploma (65%) and advanced diploma

(60%) had mediocre nutrition knowledge ($p < 0.01$) (Table 15). Professional specialization among the nurses did not have any significant influence on having certain level nutrition knowledge.

4.5 Attitude

This section aimed at assessing the attitude of health workers on certain nutrition situation. It had five points assessment scale strongly agree, agree, undecided, disagree and strongly disagree. The results are presented as health worker's (nurses and clinicians) attitude to nutrition.

4.5.1 Attitude of the respondent health workers (nurses and clinicians)

Table 16: Health workers (nurses and clinicians) attitude towards nutrition

No	Statements	Agree	Neutral	Disagree
		%	%	%
1	Diet has an important role in prevention and treatment of disease	100.0	0.0	0.0
2	Nursing and medical schools should place greater emphasis on nutrition education	98.1	0.6	1.3
3	On job training should devote time to nutrition related issues	78.7	12.3	9.0
4	It is important understanding food composition and preparation to provide nutrition advice	97.4	1.9	0.6
5	In many cases medication could be reduced or eliminated if patients followed a recommended diet	81.9	11.0	7.1
6	Nurses/clinicians should spend more time exploring dietary habits during patient care	72.2	15.5	12.2
7	Most nurses/clinicians are knowledgeable about nutrition*	43.8	18.1	38.0
8	Doctors/clinicians should involve themselves in nutrition counselling	87.1	7.1	5.8
9	Nurses should involve themselves in nutrition counselling	85.8	8.4	5.8
10	Obesity is a health problem in Tanzania	65.2	12.9	21.9
11	The pleasure of eating is more important than the potential health benefits of dieting	30.3	10.3	59.3
12	Diet has no effect on prolonging life	19.4	10.3	70.3
13	Nutrition counselling should be given to obese people only	7.7	1.3	91.0
14	Dietary counselling is a waste of time because people won't change habits anyway	5.8	7.1	87.1
15	Nutrition advice is not the responsibility of nurse/clinician **	9.7	2.6	87.8
16	Nutrition advice is not important to people with HIV/AIDS	5.2	1.3	93.5
17	Adolescents are not at risk of malnutrition	21.3	8.4	70.3
18	No need of early diagnosis and treatment of obesity	5.1	3.9	91.0

*The question reads “*most clinicians are knowledgeable about nutrition*” for clinician respondents and “*most nurses are knowledgeable about nutrition*” for nursing respondent. This question aimed at testing how the responsible health worker perceives the level of nutrition knowledge of others in the same respective job title.

** The question reads “*nutrition advice is not the responsibility of the clinician*” for clinician respondents and “*nutrition advice is not the responsibility of the nurse for nursing respondent*”. This question aimed at establishing respondent's attitude on nutrition advice responsibility.

Positive attitude statements that were agreed by less than 75% of the respondents included, “nurses/clinicians should spend more time exploring dietary habits during patient care” (72%) and “obesity is a health problem in Tanzania” (65%). Negative attitude statements disagreed by less than 75% of the respondents included, “the pleasure of eating is more important than the potential health benefits of dieting” (59%). About 70% of respondents disagreed on the statements “diet has no effect on prolonging life” and “adolescents have no risk to malnutrition” (70%). The statement “most clinicians/nurses are very knowledgeable about nutrition” was agreed by less than fifty percent of health workers (44%), more than quarter (38%) disagreed and 18% were undecided on the situation (Table 16).

Table 17: Agreement or disagreement with nutritional related attitude statements of the respondents (nurses and clinicians)

Statements	% of items (number of items)
Positive statement	
Strongly agree or agree (%)*	
80-100	66.67 (6/9)
60-79	33.33 (3/9)
Negative statement	
Strongly disagree or disagree (%)*	
80-100	55.56 (5/9)
60-79	22.22 (2/9)
40-59	11.11 (1/9)
0-39	11.11 (1/9)
N=155	

* Percent by number of respondents

The results (Table 17) show that 60% or more of the respondents either agreed or strongly agreed with all the nine positive-attitude statements and 78% of the respondents either disagreed or strongly disagreed with seven of the nine negative attitude statements.

4.5.2 Nutrition attitude of clinicians

Table 18: Clinicians attitude toward nutrition

No	Statements	Agree	Neutral	Disagree
		%	%	%
1	Diet has an important role in prevention and treatment of disease	100.0	0.0	0.0
2	Nursing and medical schools should place greater emphasis on nutrition education	100.0	0.0	0.0
3	On job training should devote time to nutrition issues	70.9	16.4	12.7
4	It is important to understand food composition and preparation to provide reliable nutrition advice	98.2	0.0	1.8
5	In many cases medication can be reduced or eliminated if patients followed a recommended diet	83.6	10.9	5.5
6	Clinicians should spend more time exploring dietary habits during patient care	72.7	21.8	5.5
7	Most clinicians are knowledgeable about nutrition	34.6	27.3	38.1
8	Clinicians should involve themselves in nutrition counselling	89.1	7.3	3.6
9	Nurses should involve themselves in nutrition counselling	90.9	3.6	5.5
10	Obesity is a health problem in Tanzania	76.3	10.9	12.7
11	The pleasure of eating is more important than the potential health benefits of dieting	9.1	5.5	85.5
12	Diet has no effect on prolonging life	0.0	9.1	90.1
13	Nutrition counselling should be given to obese people only	0.0	3.6	96.4
14	Dietary counselling is a waste of time because people won't change their habits anyway	1.8	10.9	87.3
15	Nutrition advice is not the responsibility of the clinicians	3.6	1.8	94.4
16	Nutrition advice is not important to people with HIV/AIDS	0.0	1.8	98.2
17	Adolescents are not at risk of malnutrition	5.5	9.1	85.5
18	No need of early diagnosis and treatment of obesity	0.0	5.5	94.6

The positive attitude statements that were agreed by less than three quarters of the respondents included “*on job training/in-service training should devote time to nutrition related issues*” (71%) and “*clinicians should spend more time exploring dietary habits during patient care*” 73% (Table 18). The clinician respondents were divided on the negative attitude statement that “*most clinicians are knowledgeable about nutrition*” 38% disagreed, 35% agreed and 27% were undecided on the situation (Table 18).

4.5.3 Nutrition attitude of nurses

Table 19: Nurses attitude toward nutrition

No	Statement	Agree	Neutral	Disagree
		%	%	%
1	Diet has an important role in prevention and treatment of disease	100.0	0.0	0.0
2	Nursing and medical schools should place greater emphasis on nutrition education	97.0	1.0	2.0
3	On job training should devote time to nutrition related issues	83.0	10.0	7.0
4	It is important to understand food composition and preparation in order to provide reliable nutrition advice	97.0	3.0	0.0
5	In many cases medication could be reduced or eliminated if patients followed a recommended diet	81.0	11.0	8.0
6	Nurses/clinicians should spend more time exploring dietary habits during patient care	72.0	12.0	16.0
7	Most nurses are knowledgeable about nutrition	49.0	13.0	38.0
8	Doctors/clinicians should involve themselves in nutrition counselling	86.0	7.0	7.0
9	Nurses should involve themselves in nutrition counselling	83.0	11.0	6.0
10	Obesity is a health problem in Tanzania	59.0	14.0	27.0
11	The pleasure of eating is more important than the potential health benefits of dieting	42.0	13.0	45.0
12	Diet has no effect on prolonging life	30.0	11.0	59.0
13	Nutrition counselling should be given to obese people only	12.0	0.0	88.0
14	Dietary counselling is a waste of time because people won't change their habits anyway	8.0	5.0	87.0
15	Nutrition advice is not the responsibility of nurse	13.0	3.0	84.0
16	Nutrition advice is not important to people with HIV/AIDS	8.0	1.0	91.0
17	Adolescents are not at risk of malnutrition	30.0	8.0	62.0
18	There is no need of early diagnosis and treatment of obesity	8.0	3.0	89.0

The positive attitude statements that were agreed by less than three quarters of the respondents is “*Nurses/clinicians should spend more time exploring dietary habits during patient care*” (72 %) and “*obesity is a health problem in Tanzania*” (59 %). Similarly, the negative attitude statements that were disagreed by less than three quarters of the respondents and included; “*pleasure of eating is more important than the potential health benefits of dieting*” (45%). About 59% of the respondents disagreed on the statement “*diet has no effect on prolonging life*” and 62% disagreed on the statement that “*adolescent had no risk of malnutrition*”. Forty nine percent of the nurses agreed that “*most nurses are very knowledgeable about nutrition*”. However, only 38% disagreed and 13 % of the nurse respondents were undecided (Table 19).

4.6 Nutrition Practice

The purpose of this section was to establish the nutrition practice of the respondents.

4.6.1 Place of practice

This question was aimed to establish the respondent's working area/department at the health facility.

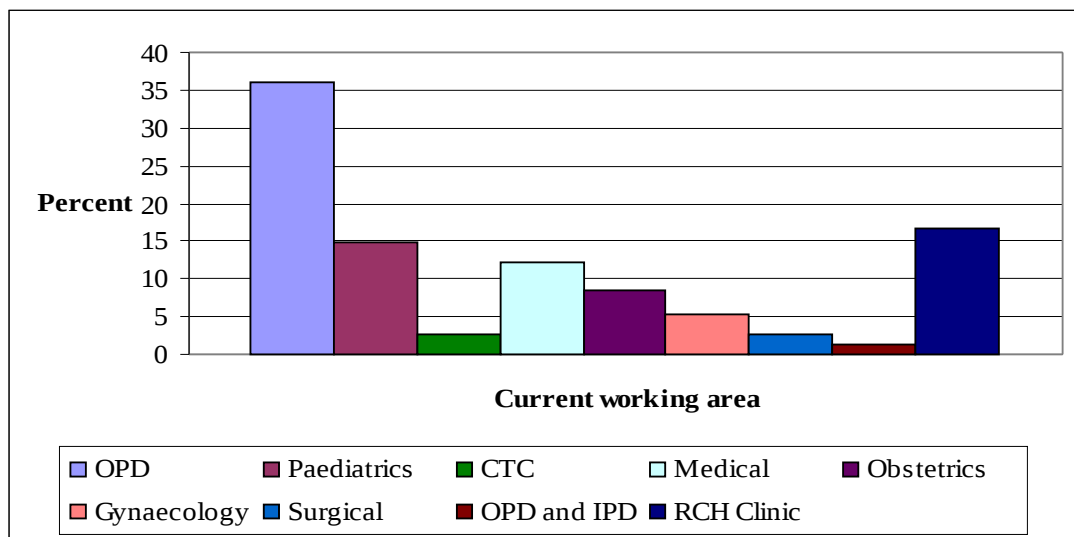


Figure 1: Respondent's area of work

Self administered questionnaires were filled by respondents from different work areas (Fig. 1). About 33 % of the respondents were working in paediatrics ward and RCH clinics with children under-five years of age. About 30% of the respondents worked in departments dealing with pregnant and non pregnant women. The respondents (36%) from the outpatient department (OPD) attended patients of all ages with various health problems.

4.6.2 Frequency of nutrition practice

These questions were aimed at establishing nutrition practice of the respondents.

Table 20: Frequency distribution on nutrition practices of the health workers

Statement	n	%
Respondent provide nutrition advice to patients/clients		
Always	27	17.4
Most of the time	43	27.7
Sometimes	82	52.9
Never	3	1.9
Patients asked for nutrition advice		
Never	14	9.0
Less than 25% of patients	61	39.4
25-50% of patients	47	30.3
50-75% of patients	24	15.5
More than 75% of patients	9	5.8
Respondents changed own dietary pattern		
Yes	99	63.9
No	56	36.1
Reason for changing dietary pattern		
Clinicians/doctors advice	25	16.1
Health problem	50	32.3
Stay health	24	15.5
Did not change dietary pattern	56	36.1

Ninety one percent of the patients asked for nutrition advice to the health workers in the past six months, however, nutrition advice was always provided by only 17% of the respondents. For most of the time nutrition advice was provided by only 28% of the respondents and for sometimes nutrition advice was provided by 53% of the respondents. The health workers that had ever changed their dietary pattern were 64% of all the respondents; and the reasons for changing their dietary pattern were health problems (32%), clinicians advice (16%) and some (15.5%) of them changed to stay health (Table 20).

Table 21: Factors contributing to nutrition practice of the health workers

Variable		Provided nutrition advice to patients/clients								Statistics	
		Always		Most of the time		Sometimes		Never			Chi square
		n	%	n	%	n	%	n	%		
Nutrition training prepared to deal with over and under nutrition	Yes	12	26.7	16	35.6	16	35.6	1	2.2	df=3 p =0.043	
	No	15	13.6	27	24.5	66	60.0	2	1.8		
Time spent during nutrition training	None	6	20.7	6	20.7	16	55.2	1	3.6	df=12 p =0.733	
	< 1 week	3	10.7	7	25.0	17	60.7	1	3.6		
	1-2 weeks	2	8.3	8	33.3	14	58.3	0	0.0		
	2-4 weeks	4	16.0	6	24.0	15	60.0	0	0.0		
	> 1 month	12	24.5	16	32.7	20	40.8	1	1.0		
Work area	OPD	11	19.6	16	28.6	28	50.0	1	1.8	df=24 p =0.725	
	Paediatrics	4	17.4	9	39.1	10	43.5	0	0.0		
	CTC	1	25.0	1	25.0	2	50.0	0	0.0		
	Medical	2	10.5	4	21.1	13	68.4	0	0.0		
	Obstetrics	2	15.4	1	7.7	10	76.9	0	0.0		
	Gynaecology	0	0.0	4	50.0	4	50.0	0	0.0		
	Surgical	0	0.0	1	25.0	3	75.0	0	0.0		
	OPD & IPD	0	0.0	1	50.0	1	50.0	0	0.0		
RCH clinic	7	26.9	6	23.1	11	42.3	2	7.7			
Job title	Nurses	16	16.0	26	26.0	56	56.0	2	2.0	df=3 p= 0.765	
	Clinicians	11	20.0	17	30.9	26	47.3	1	1.8		
How often patients/clients asked for nutrition advice	Never	2	14.3	4	28.6	6	42.9	2	14.3	df= 12 p <0.001	
	<25%	8	13.1	8	13.1	45	73.8	0	0.0		
	25-50%	5	10.6	17	36.2	24	51.1	1	2.1		
	50-75%	6	25.0	13	54.2	5	20.8	0	0.0		
Type of health facility	>75%	6	66.7	1	11.1	2	22.2	0	0.0	df 6 P =0.033	
	Hospital	12	12.8	29	30.9	53	56.4	0	0.0		
	Health centre	10	25.0	10	25.0	17	42.5	3	7.5		
Dispensary	5	23.8	4	19.0	12	57.1	0	0.0	df=3 P=0.182		
	Changed own dietary pattern	Yes	21	21.2	25	25.3	50	50.5		3	3.0
	No	6	10.7	18	32.1	32	57.1	0	0.0		

The results in Table 21, show that health workers who thought training prepared them well to deal with over nutrition and under nutrition always (27%) and most of the time (36%) provided nutrition advice to the patients ($p < 0.05$). Health workers who were asked for nutrition advice by more than 75% of patients always advised (66%) patients on nutrition

$p < 0.001$. Health workers (25%) from health centre always provided nutrition advice to patients ($p < 0.033$).

4.6.3 Nutrition assessment tool/resources

The purpose of this question was to determine what assessment tools are available and how frequent the available tools are used by health workers in the respective health facilities.

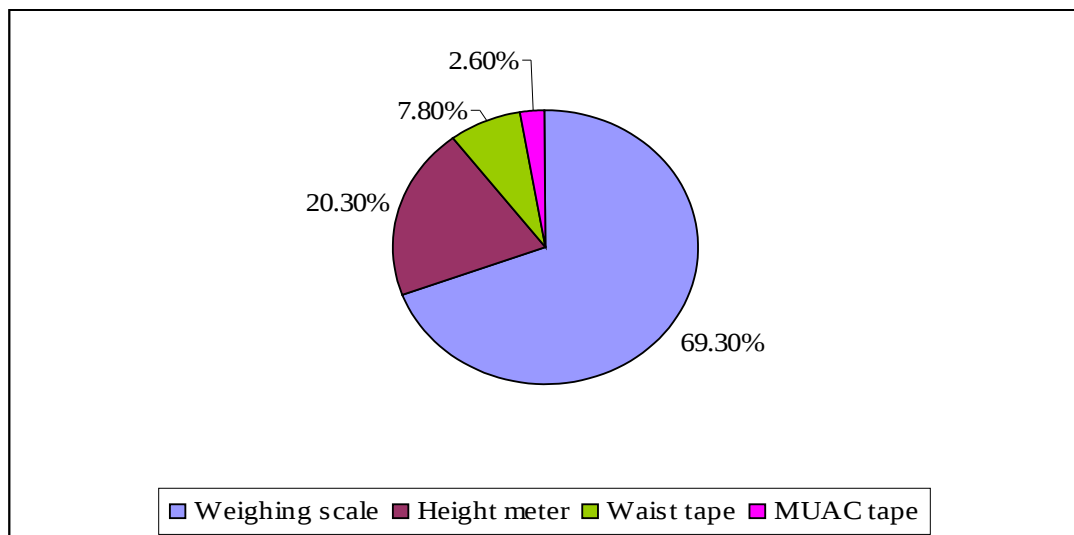


Figure 2: Proportion of available assessment tools

Weighing scale was the assessment tool mostly (69%) available (Fig. 2), height meter or stadiometer, waist and Mid Upper Arm Circumference (MUAC) tapes were available to 20%, 8% and 3% of the respondents, respectively.

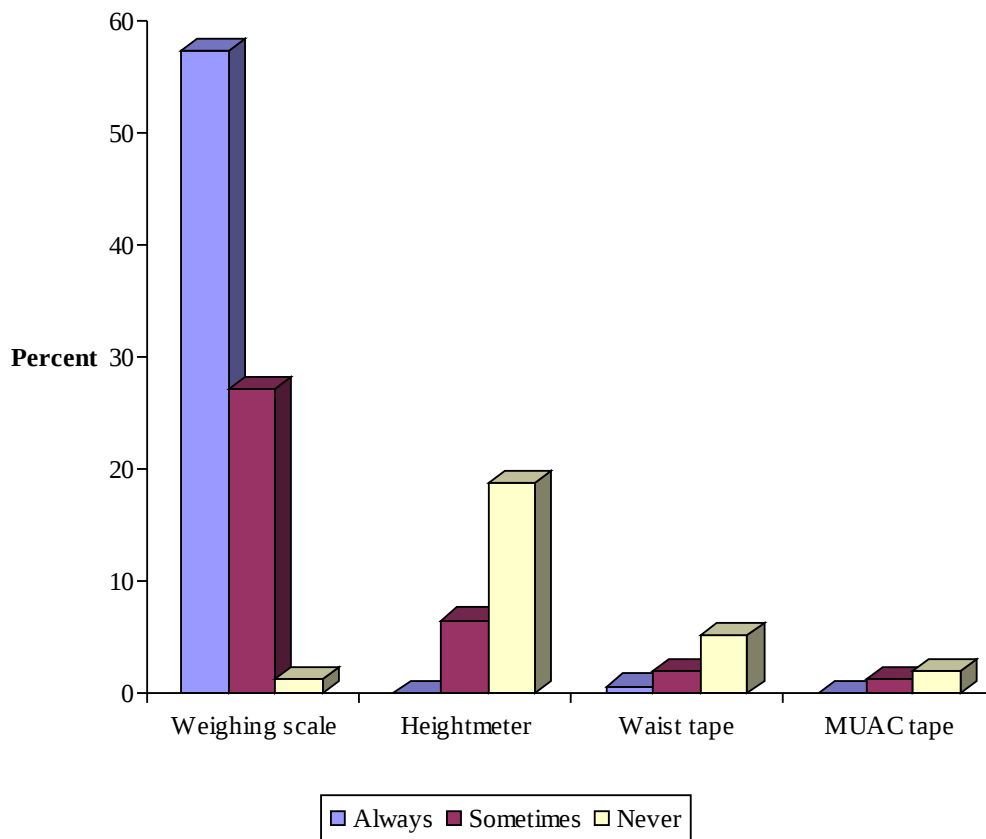


Figure 3: Proportion of usage of assessment tool by health workers

About 57% of the respondents always used the weighing scale, and only 0.6% always used waist tape (Fig. 3).

4.6.4 Barrier for nutrition assessment and counselling

Respondents of self administered questionnaire reflected several barriers or constraints which hinder provision of nutrition service to patients or clients. This question aimed at establishing barrier/constraints hindering nutrition services to patients or clients.

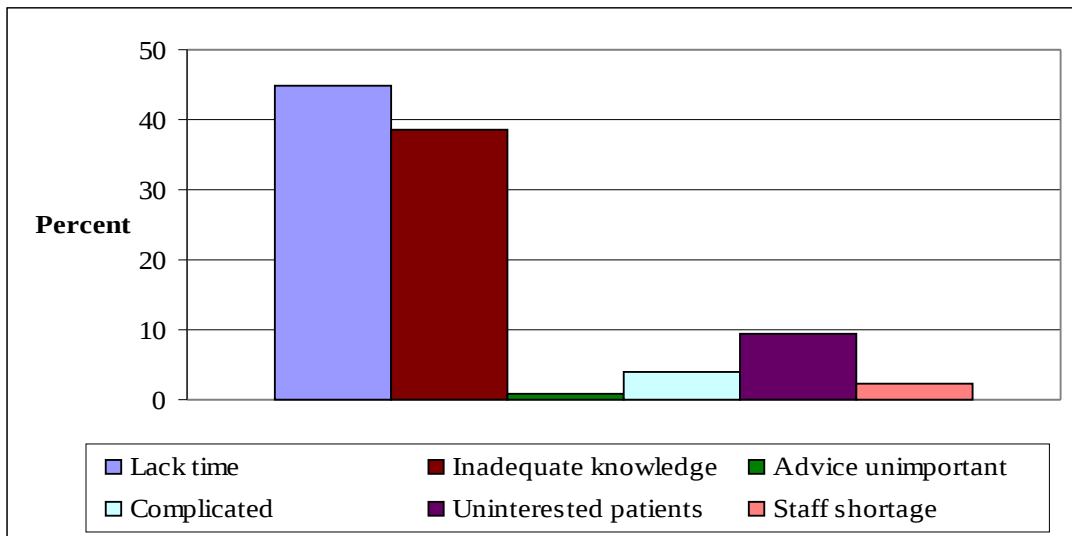


Figure 4: Barrier for nutrition assessment and counselling

Forty five percent (45%) of the respondents felt that time was not enough to do nutrition assessment and counselling, 39% felt that they lacked enough information and 9% reported that patients were not interested. Moreover, the least reported barriers included, the complicated dietary counselling (4%), staff shortage (2%) and provision of nutrition advice that was not important 1% (Fig. 4).

4.6.5 Nutrition resources

When faced with difficulties in providing nutrition advice respondents consulted other resources for help. This question was aimed at establishing resources used by the respondents to seek help.

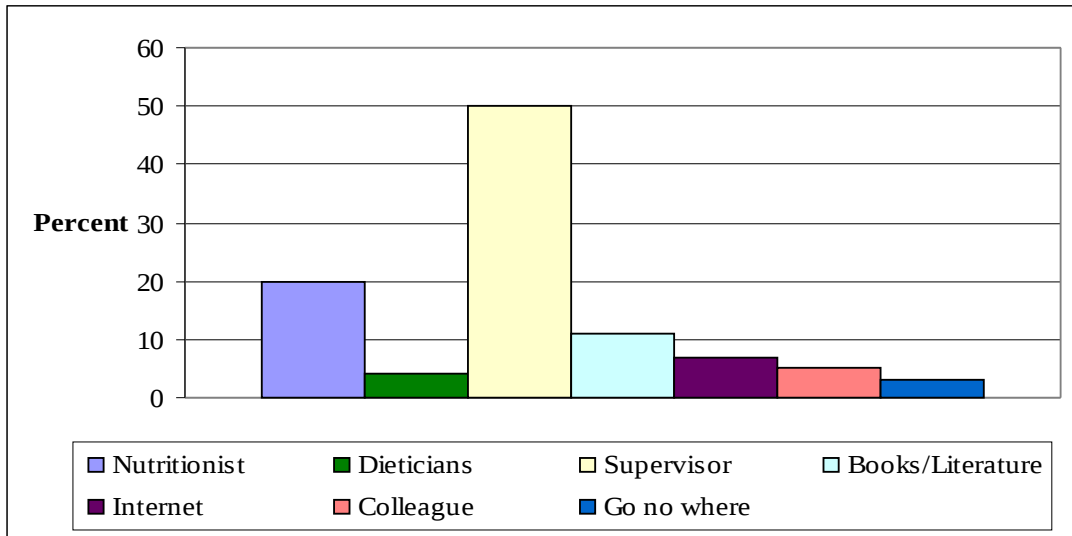


Figure 5: Health workers frequency of consulting nutrition resources

The survey observed that about 50% of the health workers preferred consulting their supervisors or superiors when they encountered problems that needed nutrition counselling. However, 20% preferred to consult the nutritionist, and 11% referred to books and other literature resources. Furthermore, very few of the health workers preferred consulting the internet (7%), colleague (5%) and the dietician (4%). Surprisingly 3% do not go anywhere for help when they encountered nutrition problems in their practice (Fig. 5).

4.6.6 In-service nutrition training

This part was aimed at assessing on the job training received by respondents during working period.

Table 22: In-service training received by health workers

In-service/on job training received	Clinicians		Nurses	
	n	%	n	%
Respondents who had in-service courses	30	54.5	53	53.0
Management of severe acute malnutrition	6	10.9	5	5.0
Infection prevention	3	5.5	27	27.0
Breast feeding	1	1.8	4	4.0
Total parental nutrition	2	3.6	0	0.0
Diabetes, non communicable diseases	3	5.5	0	0.0
Malaria control	8	14.5	3	3.0
Community nutrition	1	1.8	0	0.0
Integrated Management of Childhood Illnesses (IMCI)	13	23.6	9	9.0
Drug abuse	2	3.6	5	5.0
Sexual transmitted diseases and HIV	11	20.0	0	0.0
Obesity and underweight	1	1.8	0	0.0
Tuberculosis, leprosy and HIV	8	14.5	1	1.0
Youth friendly service	2	3.6	4	4.0
Counselling for HIV/AIDS, Sexual Transmitted Infection (STI)	4	7.3	13	13.0
Health eating under normal condition	3	5.5	0	0.0
Food hygiene and preparation	0	0.0	2	2.0
Focus antenatal care, vaccination and insecticide treated nets	0	0.0	15	15.0

About half of the health workers respondents had some sort of in-service/on job training (Table 22). However, fewer respondents received some nutrition related training. The type of nutrition training offered to respondents included Integrated Management of Childhood Illness (IMCI), nutritional diseases, nutrition and disease, management of acute malnutrition, breast feeding, eating under normal conditions, food hygiene and preparation and community nutrition.

Table 23: In-service nutrition courses needed by health workers

Desire to receive in service courses on nutrition	Clinicians		Nurses	
	n	%	n	%
Needs in-service courses on nutrition	52	94.5	92	92.0
Breast feeding	10	18.2	14	14.0
Nutrition for special group pregnant women, children, adolescent and elderly	26	47.3	50	50.0
Nutrition for patients with HIV/AIDS	19	34.5	19	19.0
Nutritional diseases	16	29.1	42	42.0
Management of obesity and under nutrition	22	40.0	48	48.0
General knowledge on nutrition	13	23.6	18	18.0
Nutrition/dietary counselling, and assessment	7	12.7	17	17.0
Food composition and nutrient content	11	20.0	29	29.0
Nutrition in acute and chronic communicable diseases	7	12.7	12	12.0
Nutrition in elderly people	8	14.5	12	12.0
Management of severe acute malnutrition	9	16.4	14	14.0
Nutrition and diseases	6	10.9	4	4.0
Policy making and health workers	3	5.5	0	0.0
Monitoring and evaluation of nutrition in the community and health centre	9	16.4	4	4.0
Drug and food interaction	2	3.6	1	1.0

It clearly shows that the clinicians (94.5%) and nurses (92%) needed to have in-service/on job training courses on nutrition (Table 23). In-service/on job courses identified included those addressing nutrition for special groups, monitoring of nutrition in community and health facilities, nutrition counselling, food composition and nutrient content.

4.7 In-depth Interview

The results here present issues on characteristics of the interviewee, nutrition training, nutrition practice and knowledge.

4.7.1 Demographic information of the interviewed respondents

The social demographic information of the interviewed respondents in terms of gender, job title, professional qualification, education level, experience, facilities, area of work in the facility and responsibilities are displayed in Table 24.

Table 24: Characteristics of the interviewed respondents

Characteristics	n	%
Job title		
Nurse	24	60.0
Clinician	16	40.0
Gender		
Male	13	32.5
Female	27	67.5
Professional education		
Certificate	13	32.5
Diploma	20	50.0
Advanced diploma	4	10.0
Degree	4	7.5
Experience (years)		
≤10	16	40.0
11-20	10	25.0
≥ 21	14	35.0
Area of Work		
Obstetrics and gynaecology	7	17.5
OPD	14	35.0
Paediatrics	5	12.5
RCH clinics	10	25.0
Medical	4	10.0

Sixty percent of the respondents were nurses and 40% were clinicians. Fifty percent of the respondents had a diploma in clinical medicine or nursing course. The interviewed respondents work in different departments including Out Patient Department (OPD), Reproductive and Child Health (RCH) clinic, obstetrics and gynaecology, paediatrics and Care and Treatment Clinics (CTC) for HIV/AIDS (Table 24).

Table 25: Distribution of health facilities and interviewed respondents

Healthy facility	Nurses		Clinicians		Total	
	n	%	n	%	n	%
Morogoro regional hospital	10	25.0	7	17.5	17	42.5
Mazimbu hospital	2	5.0	1	2.5	3	7.5
Uhuru health centre	2	5.0	1	2.5	3	7.5
Sabasaba health centre	2	5.0	1	2.5	3	7.5
Mafiga health centre	1	2.5	1	2.5	2	5.0
Kingolwira health centre	2	5.0	1	2.5	3	7.5
Kiwanja cha ndege dispensary	1	2.5	1	2.5	2	5.0
MICO dispensary	2	5.0	1	2.5	3	7.5
SDA dispensary	2	5.0	1	2.5	3	7.5
Kihonda magereza dispensary	0	0.0	1	2.5	1	2.5

The respondents were from two hospitals, four health centres, and four dispensaries (Table 25).

4.7.2 Nutrition training for interviewed respondents

This section includes pre-service and in-service/on job nutrition training attended by the interviewed respondents.

Table 26: Nutrition training description of the interviewed respondents

Nutrition training Description	Nurses		Clinicians	
	n	%	n	%
Pre-service training				
Special module	7	29.2	3	18.75
Integration in other courses	17	70.8	13	81.25
Training adequacy				
Perceived adequate	7	29.2	3	18.75
Perceived not adequate	17	70.8	13	81.25
Nutrition trainers				
Medical doctors/professors	1	4.2	14	87.5
Nurse tutors	22	91.7	2	12.5
Nutritionists	1	4.2	0	0.0
In-service training				
Attended training	5	20.8	5	31.25
No training	19	79.2	11	68.75
Total	24	100.0	16	100.0

About 71% of the nurses and 81% of clinicians had nutrition training but integrated in other courses during training. However, 71% of nurses and 81% of the clinicians perceived that nutrition training was inadequate. Pre-service nutrition courses were offered by nurse tutors 92% and medical doctors 93% (Table 26).

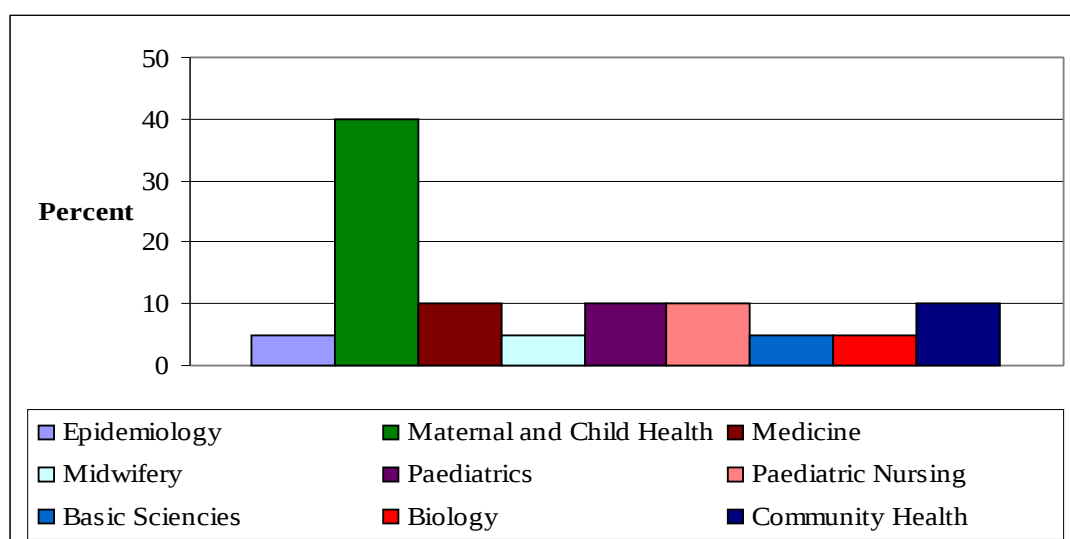


Figure 6: Courses integrated with nutrition

Nutrition courses were integrated in other courses during nursing and medical pre-service courses as part of the main course. The most mentioned course in which nutrition was integrated was maternal and child health, medicine, paediatrics, paediatric nursing and midwifery (Fig. 6).

4.7.3 Nutrition practice for interviewed respondents

This section includes the nutrition practice and nutrition messages given to the patients/clients by the interviewed health workers.

Table 27: Category of feeding frequencies recommended by interviewees

Category	Feeding frequency	n	%
Pregnant women	4 times a day	4	10.0
Pregnant women	5 times a day	2	5.0
Breastfeeding women	5 times a day	1	2.5
Breastfeeding women	4 times a day	1	2.5
Adult/family	3 times a day	2	5.0
Adult	2 times a day	4	10.0
Sick adult	4 times a day	1	2.5
Under five years old children	6 times a day	1	2.5
Under five years old children	5 times a day	11	27.5
Under five years old children	4 times a day	3	7.5
Under five years old children	3 times a day	5	12.5
6-12 months old children	6 times a day	1	2.5
6-12 months old children	2 times a day	1	2.5
Vegetable frequency	3 times a day	1	2.5
Vegetable frequency	Once a day	2	5.0
Total		40	100.0

Comments on counselling patients or clients about children or their own feeding frequencies were different for different respondents (Table 27). Twenty seven percent of the respondents recommended feeding frequency of five times to children below five years of age. About 12.5% and 7.5% of the respondents recommended feeding frequency of three and four times to children below five years of age, respectively.

Table 28: Constraints encountered hindering counselling and management of nutrition of interviewed respondents

Constraints	n	%
Taboos	1	2.5
No nutritionists	2	5.0
Resources, tools, job aids	22	55.0
Health workers attitude	4	10.0
Patient's attitude	9	22.5
Un-motivated health workers	2	5.0
Projects donor dependent	1	2.5
Health workers nutrition knowledge	9	22.5
Lack of enough time for counselling	8	20.0
Patient's nutrition ignorance	11	27.5
Patient's poverty	9	22.5
Policy makers priority	1	2.5
Nutrition literature/references	16	40.0
Space for counselling not available	40	100.0
Workload	23	57.5

All respondents observed that lack of space, (58%) workload, (55%) unavailable tools and resources, (40%) unavailable nutrition literature and pamphlets/posters (32.5%) were obstacles/barriers, which hindered them from managing nutrition problems of the patients or clients (Table 28). Other identified barriers included patients' ignorance on nutrition, poverty, attitude of patients (unwillingness of the patients to be advised), health worker inadequate nutrition knowledge, lack of time to counsel and health workers attitude.

4.8 Focus Group Discussion

Focus group discussions were aimed at assessing training needs of health workers.

The results are presented as in-service/on job nutrition courses needs and recommendation for future plan of nutrition courses.

4.8.1 In-service nutrition courses needs

Table 29: In service nutrition courses needed by respondents during focus group discussions

Course needed	n	%
Nutrition and diabetes	6	20.7
Nutrients and drugs interaction	3	20.3
Nutrition in general	2	6.9
Nutrition and diseases	11	37.9
Source of nutrients	1	3.5
Nutrition function	3	10.3
Nutrition and hypertension	1	3.4
HIV/AIDS nutrition	1	3.4
Food groups	1	3.4

During focus group discussions, respondents proposed nutrition topics needed for in-service/on job training, which included topics from general nutrition to nutrition and diseases (Table 29). About 38% of the respondents needed courses on nutrition and diseases.

Table 30: Recommendations for future plan

Content	%
Community nutrition through media (radio and television)	10.7
Community involvement and community education	14.3
Health worker's involvement in nutrition activities	3.6
Emphasize in-service/on job nutrition courses	14.3
Increase duration of in service and pre service courses	3.6
On job/in service nutrition training on HIV courses	3.6
Appropriate nutrition knowledge dissemination to health workers	3.6
Needs nutrition department	7.1
Need for nutritionists	10.7
Development of elaborate nutrition plans for nutritionist in community	3.6
Involve nutritionist in planning, implementation and evaluation of nutrition activity in health facilities	7.1
Prepare nutrition package for in service/ on job training	3.6
Improve nutrition curriculum package	10.7
Suggestions that nutritionist be involved in nutrition training	3.6

As to what should happen in the future the, respondents recommended that there should be community involvement in nutrition activities through planning and implementation of nutrition interventions. The nutritionists should be involved in planning, implementation and evaluation of nutrition activities in health facilities. Nutrition education and sensitization of the community should be done through media. Respondents also recommended that nutrition courses in medical and nursing college/schools should be taught by nutritionists. There was also a concern of increasing and improving nutrition package in terms of duration and content during pre-service, in-service/on job medical and nursing training (Table 30).

CHAPTER FIVE

5.0 DISCUSSION

Nutrition knowledge plays an important role in public health. However, there has been general concern about the state of nutrition knowledge of clinicians and nurses in many parts of the world (Kobe, 2006; Ozcelyk *et al.*, 2007a, b; Uddin *et al.*, 2008). This study set out to establish the level of nutrition knowledge, attitude and practice of health workers in health facilities located within the Morogoro Urban district. The main method used in the present study was a survey method using a self completed questionnaire, in-depth interview and focus group discussion. The questionnaire was sent to the respondents in person and followed up in person to collect the filled in questionnaire. The response rate was low, only about 58% of the questionnaires were returned. Although respondents were followed in person, some could not complete and return the questionnaire in four weeks. The low response rate may be due to the shortage of staff, workload and busy schedule of the health workers at the health facilities. This current study involved nurses and clinicians of different levels of health profession, while the study done by Kobe (2006) involved Registered Nurses only and the survey done by Flynn *et al.* (2003), Al Numair (2004) and Uddin *et al.* (2007) involved physician respondents only. Method of disseminating questionnaire was by mail for the study done to the physician respondents only. Questionnaires in the study done by Kobe (2006) were distributed by the head nurse of the department. Flynn *et al.* (2003) did not send a second reminder for non responded questionnaires.

The low response rate observation in this study is similar to what was observed by Al Numair (2004) (56 %), Kobe (2006) (63%) and Uddin *et al.* (2007) (60 %), but higher than what was observed by Flynn *et al.* (2003) (16%).

5.1 Nutrition Knowledge of Health Workers

The current study shows that the level of nutrition knowledge of health workers was low despite the fact that both groups i.e. nurses and clinicians with various levels of qualifications (certificate to masters degree) were included in the study. Most likely the difference in their level of understanding is related to exposure in different training curricula. The level of nutrition knowledge of health workers was lower than what has been reported by Al Numair (2004), Schaller and James (2005), Ozcelyk *et al.* (2007a, b) and Uddin *et al.* (2008). Respondents from the Schaller and James (2005) and Ozcelyk *et al.* (2007a) survey were nurses and respondent from the survey done by Al Numair (2004), Ozcelyk *et al.* (2007b) and Uddin *et al.* (2008) were physicians.

5.1.1 Level of education and nutrition knowledge

The level of education of health workers had a significant effect ($p=0.001$) on the level of nutrition knowledge. Respondents whose highest level of education was primary education had mediocre and poor scores on nutrition knowledge. During primary education there is limited content of nutrition in the curriculum, as reflected in the focus group discussion “*There was some content of nutrition during primary school syllabus where foods containing carbohydrate, protein and vitamin were taught*”. At this level pupils learn about the food groups and probably few nutritional disorders. In addition, the teachers in primary schools do not have a background of nutrition and therefore they are not adequately prepared to teach the subject. Nevertheless, for those who continue to ordinary level secondary education learn a bit more nutrition knowledge as a component in biology/nutrition and chemistry subjects. Certainly the ones who go through to the advanced level secondary education science based combinations are exposed to the more advanced science subject in biology/nutrition and chemistry. However, this depends

mainly on the subject combination, which the pupil opt to pursue. But again there aren't many teachers with nutrition background in secondary schools. Therefore delivery of nutrition topics is usually not adequate. The education system of Tanzania, as it is the case with many other education systems in the world, compels medical professionals to go through a long education process from primary education, ordinary level secondary education and advanced level secondary education before going for four, five or seven years of diploma or degree training in nursing or medicine. In all these years of studying, it is possible that medical professionals do not get exposed adequately to nutrition knowledge despite the fact that their profession deals mainly with human subjects as supported by what is observed in their training curriculum. The amount of nutrition education in medical schools remains inadequate (Adams *et al.*, 2006). For example, In America roughly 60-80% of medical schools are teaching far less nutrition than 21 hours and 44 hours recommended by the National Academy of Sciences (1985) and the American Society for Clinical Nutrition (1989), respectively cited by Adams *et al.* (2006).

5.1.2 Level of professional education and nutrition knowledge

Clinicians and nurse degree graduates scored very good and good in nutrition knowledge. Fewer respondents with diploma and advanced diploma scored good in nutrition knowledge. Moreover, none of respondents with certificate level of training had good or very good scores in nutrition knowledge ($p < 0.01$).

Respondents who had certificate are mostly those who completed primary education and fewer who completed ordinary level education and thereafter go for a certificate course. Respondents who had diploma and advanced diploma are those who had ordinary level secondary education and advanced level secondary education. Health workers who had

certificate and diploma may go for further professional courses to obtain a diploma and advanced diploma respectively. The process and level of primary and secondary education had impact on the health workers nutrition score. Furthermore, the lower professional education being certificate level has less advantage than those with diploma, advanced diploma and degree because of the content of their training curriculum. Curriculum at different levels of profession training differs with different level of health profession.

5.1.2.1 Professional education of clinicians

Level of profession education had significant effect on the level of nutrition knowledge scores of the clinicians ($p=0.001$). Specialist Medical Officers scored 'very good' on nutrition knowledge while Medical Officers had least respondents with mediocre and poor scores compared to Assistant Medical Officers, and Clinical Officers. The Specialist Medical Officer, Medical Officers and Assistant Medical Officers had masters' degree, degree and advanced diploma, respectively. In addition, this group has an added advantage of having more years in secondary school and years in professional education. Clinicians with diploma are those with ordinary level secondary education or advanced level secondary education. Clinicians with diploma may attend training for two-years in medicine to obtain an advanced diploma in medicine giving them more opportunity to be exposed to courses in nutrition. The lower mean nutrition knowledge score could be due to inadequate nutrition content of medical pre-service curriculum in Tanzanian and fewer respondents having in-service/on job nutrition training courses. In the current study age of the respondents, years since graduation to the present job title and experience did not have significant effect on the nutrition scores. Ozcelyk *et al.* (2007b) observed that physicians with highest good nutrition knowledge were those who are specialized; with more than 41 years of age.

5.1.2.2 Professional education of nurses

Respondents with good nutrition knowledge were from the Registered Nursing category and more Enrolled Nursing respondents had poor nutrition knowledge score ($p < 0.05$). In Tanzania Registered Nurses are those with diploma, advanced diploma and degree qualifications. Nurses attend a four-years nursing course after completing ordinary and/or advanced level secondary education to obtain a diploma. Moreover, nurses with a diploma qualification attend a two years course and obtain an advanced diploma in nursing specialization. This might be an added advantage in the higher nutrition scores. In addition, nurses with a degree qualification have an ordinary level and advanced level secondary education, before attending a four years degree programme in nursing course. In this regard, they are more likely to be exposed to lessons related to nutrition than the other groups or categories of nurses.

Enrolled Nurses are those with a certificate qualification in nursing with highest level of primary education or ordinary level secondary education and attend 4 years nursing training. Until the mid 2000 Enrolled Nurses attended a two years nursing training to obtain a diploma in nursing without upgrading their level of secondary education. However, in recent years Enrolled Nurses are required to have an ordinary level secondary education certificate in either art or science subjects to be admitted for diploma in nursing training. This does not give an advantage to those nurses who had not opted for science subjects, because they lack some introductory course in nutrition (biology and/or nutrition and chemistry). All these factors could have contributed to low acquisition of nutrition knowledge by health professionals in Tanzania.

5.1.3 Nutrition in nursing and clinician curriculum

5.1.3.1 Nutrition in nursing curriculum

Respondents with nursing degree qualification had good and mediocre scores in knowledge on nutrition. Moreover, more respondents with diploma and advanced diploma qualification had mediocre scores in nutrition knowledge and no nursing respondent had good or very good nutrition knowledge score. Nutrition topics in nursing curriculum focus on the needs of different age groups. In a workshop conducted in Dar es Salaam, in 2003 to integrate nutrition and HIV/AIDS in pre-service training for nurses and midwives it was observed that, 80 hours of general nutrition are allocated, but less than that is covered, and considerably less is covered for certificate and diploma students. Ten of the 80 hours cover the basics of HIV and nutrition, including specific nutrients and breastfeeding and HIV (Castleman, 2003). Nutrition is integrated into other subjects as well, example child health, paediatrics, medicine, medical nursing, and community nursing.

In Tanzania, nutrition courses in the nursing curriculum are different at different colleges and levels from certificate in nursing to the degree in nursing. Applied nutrition is a core course for nursing degree at the St. John University of Tanzania. The nursing degree curriculum at Tumaini University-Kilimanjaro Christian Medical College does not include nutrition as a core or optional course, however metabolism of proteins, carbohydrates and lipids are incorporated in the biochemistry course. The advanced diploma public health nursing curriculum include metabolism of proteins, carbohydrates and lipids incorporated in biochemistry courses. Biochemistry course introduces the principles and concepts from physical and biological science in their application to nursing practice (MoH, 2005; FoN-KCM College, 2007; SJUT, 2008).

Nutrition is a core course in the nursing diploma and introduces the student to knowledge in management of malnourished patients and is reflected on food groups, feeding habits and requirement for various age groups. The course also focuses on feeding patients based on nutritional needs and depending on nutritional deficiencies (FoN-MUCHS, 2003). Certificate curriculum in nursing include nutrition course as a core course, however, exposes the student to basic concepts of nutrition including types of food groups, serving meals and feeding the patients, especially feeding of hospitalized patients. Students are also exposed to nutrition courses in child health where nutrition deficiency disorders are covered (URT and MoHSW, 2008). The aspect of nutrition counselling is not included.

5.1.3.2 Nutrition in clinicians curriculum

Nutrition courses in medical schools/colleges are different according to the level of clinicians. The degree in medicine does not have a core or optional course in nutrition; however nutrition is incorporated in other courses like biochemistry, child health and epidemiology (Tumaini University-KCM College, 2007). The Assistant Medical Officers' curriculum integrates nutrition in other courses for example: child health, where the clinicians have to be able to describe normal feeding pattern and feeding requirements of children. However, these courses emphasize more in under nutrition for children below the age of five years, and mineral deficiencies, mainly based on iron, iodine, fluoride and zinc. Vitamin deficiency disorders are covered but mainly for vitamin A, B, C, D, K and niacin (MoH, 2005).

The Clinical Officers' curriculum has nutrition course combined with immunization topics. The components include under nutrition, over nutrition and mineral deficiencies in particular iron and iodine deficiency (URT and MoH, 2001). Nutrition education typically

occurs during the first 2 years of medical school training when the basic sciences are being emphasized; nutrition does not appear to get much emphasis during the clinical years when nutrition concepts and skills could be applied more directly to clinical problem-solving (Adams *et al.*, 2006).

5.1.4 Nutrition knowledge level and nutrition tutors

Nurse Tutors and Medical Officers were the nutrition instructors in nursing and medical colleges. However, it was reported during the interviews that nutrition was not given much emphasis. One of the interviewed clinician had this to say “*when it came to nutrition topics we were told to go and read by ourselves*”. One of interviewed nurse had this to say “*we did not have nutrition tutor therefore this time was spent on other subjects*”.

Nurse Tutors and Medical Officers who teach nutrition have gone through the same curriculum in their training which have gaps in nutrition courses hence the cycle repeats. In recent years there has been a growing attention to nutrition and its role in health and disease in most nations. However, nutrition education has not received proper attention and is not enough (Jazayeri, 2003).

5.1.5 Level of nutrition knowledge and health workers category

The level of nutrition knowledge among clinicians was higher, than that of the nurses, because more clinicians had good and very good scores. The nurses however, had good scores for nutrition knowledge but none of them had very good scores. The clinician category included those with diploma, advanced diploma, degree and Masters’ degree qualification. Nurses however included those with certificate in nursing and fewer nurses with diploma, advanced diploma and degree qualification. More clinicians than nurses

indicated that pre-service training prepared them to deal with underweight, overweight and obese patients/clients. This is a pity considering that nurses are the ones who interact with patients the most.

5.1.6 In-service nutrition training

In-service/on job training is important as a continuous education strategy for nutrition as well as other health promotion issues. In this study, fewer health workers had in-service training on several subjects. In addition, nutrition training was not the main topic in the in-service/on job training. Many training programmes in Tanzania are donor funded and are managed by non-governmental organizations according to their own interest, priority and policy of the country. In Tanzania, Malaria and HIV/AIDS are programs mostly funded by Non Governmental Organizations. Integrated Management of Child Hood Illness (IMCI) and community IMCI are programs funded but they have less component of nutrition. Recently management of severe acute malnutrition was introduced. The constraints with donor dependent programs is that fewer health workers are fortunate to attend to these courses and therefore there is a need to have a plan for future progress to teaching health workers during their in-service/on job courses and make a plan for nutrition courses to be a priority.

5.1.7 Duration since graduation

Duration since graduation in the present job title did not have any significant effect on the knowledge scores. Respondents who graduated 10 years before the survey had slightly less respondents with poor nutrition knowledge compared to those who graduated more than 11 years before the survey. Respondents who graduated recently may have memory of the knowledge obtained during training however those who had more exposure in the

medical field have advantage of practicing the skills. During the late 1980s and early 1990s nutrition in medical and nursing training was emphasising under-nutrition of children below five years of age and marasmus and kwashiorkor were the main nutritional problems being discussed. Until the year 2000 obesity and non communicable diseases were considered to be of less concern in Sub Saharan Africa than in other regions of the world (Villamor *et al.*, 2006). Hence obesity and chronic diseases were not taught as nutritional problems or associated with nursing and medical schools before the late 1990s. Similarly, HIV/AIDS was not part of the training in medical and nursing schools until the late 1990 and early 2000. Ozcelyk *et al.* (2007b) observed that physicians with highest good nutrition knowledge were those who graduated from the University 11-20 years before the survey.

5.1.8 Gender and nutrition knowledge

Male respondents in the present study had higher scores (very good and good) on nutrition knowledge than female respondents. Moreover the mean scores of male respondents were significantly higher than mean scores of female respondents ($p < 0.01$). This could be due to the fact that the majority of nursing respondents were female as compared to clinicians. In addition nursing category had more Enrolled Nurses with certificate level compared to Registered Nurses who had diploma, advanced diploma and degree qualifications hence their level of education could have contributed to their nutrition knowledge scores.

5.2 Attitude towards Nutrition

A positive attitude had a significant effect on understanding and retention of nutrition knowledge. However, the majority of interviewed respondents thought nutrition instruction was not enough and did not prepare them well to deal with nutrition problems.

Such negative attitude may impede health workers and patients interaction and result in perceived helplessness on the part of the health workers. One of the probable explanations of this attitude may be the low level of knowledge and skills regarding nutrition issues and the gap in nutrition instructions at the college and in-service practice.

5.2.1 Knowledge in nutrition and nutrition attitude

More nurses than clinicians did not know that nutrition is a health problem in Tanzania. Lack of awareness of health workers on the extent of over-nutrition and under-nutrition in the country may affect their attitude on spending more time exploring dietary habits of the patients. This study had majority of its respondents working in the medical field for more than 20 years the time when over nutrition was not a health problem hence, over nutrition was not part of health worker's pre-service training, and under nutrition courses focused on children under the age of five years. However, more respondents had no in-service/on job training in nutrition. During focus group discussions some nurses indicated that over nutrition was not taught during their pre-service courses *"Before, I only knew marasmus and kwashiorkor to be the only malnutrition. It was only recently that I came to realize that being fat is also malnutrition. This was not being taught during our pre-service courses in the late 1970s and early 1980s."* In addition, there is a myth within Africans that being fat is being health and wealthy. There is a need to let health workers understand how obesity contributes to non communicable diseases and to empower them with information and knowledge which will help them assess and manage overweight and obesity in addition to other nutrition disorders.

More nursing respondents perceived that the pleasure of eating is much more important than the potential health benefits and that the adolescents were not at risk of malnutrition. This negative attitude raises a concern over the level of knowledge and practice of

nutrition in health facilities. This has been reflected as a gap in extent and content of nutrition in the nursing curriculum.

5.3 Nutrition Practice

5.3.1 Level of nutrition knowledge

Lack of nutrition knowledge and confidence of health workers may contribute to the lack of practice. Health workers did not acknowledge the existence of over-nutrition as a health problem in Tanzania nor did they have knowledge on the basic nutrition component and skills to categorize nutrition status of patients and clients. This could hinder motivation to assess and counsel on nutrition. Many respondents had different opinion on the feeding frequency of pregnant women and children under the age of five years. The advices that respondents provide to mothers on infant and child feeding frequency vary from two, three, four, five and six times a day. Others recommended feeding children aged six to twelve months for two to six times a day. Different nutrition information given to the patients/clients may certainly confuse them. Monte *et al.* (2004) recommended two to three meals per day of complementary foods for breastfed infants between six and eight months of life and three to four meals a day for those between nine and 24 months, with additional nutritious snacks once or twice a day at 12 months. If the child has completely stopped breast feeding, a higher frequency of meals may be necessary example; four to five meals a day.

The clinician respondents in this study had poor knowledge on the best test for assessing nutritional status of hospitalized patients. Pre-albumin test and a low pre albumin concentration can be regarded primarily as an indicator for identifying at-risk patients who require careful assessment and monitoring and for whom nutritional support may be

needed as part of the treatment plan (Shenkin, 2006). Clinicians who do not know tests for nutrition status of hospitalized patients are either not using the test for assessing nutrition status of hospitalized patients or are still basing on other assessment measurements which are too weak to identify patients who are at risk of malnutrition. Since clinicians are involved in diagnosis and management of patients it is important that they have a clear understanding of these important components.

5.3.2 Attitude of health workers and patients/clients on nutrition practice

Health workers in the current study acknowledge their responsibility to advice patients on nutrition issues however; their attitude contradicts their nutrition practice since they did not always give nutrition advice to patients. Readiness to give nutrition advice had significant effect on nutrition practice of patients or clients (Hajjar *et al.*, 2006). Positive attitude gives the health worker confidence and willingness to provide nutrition advice. Health workers in this study did not have the confidence and the competency of nutrition knowledge which could hinder their nutrition practice. Leshabari *et al.* (2007) observed a high level of stress and frustration among the nurse-counsellors who found themselves unable to give qualified and relevant advice to HIV-positive women on how best to feed their infants. The willingness of patients to ask for nutrition advice have effect in motivating health workers to give nutrition advice ($p < 0.001$), the more the health workers were asked for advice the more they always gave nutrition advice. These results show that willingness of patients to know about nutrition motivated the health workers to provide nutrition advice. The success of health workers' advice on nutrition relies to a large part on the patient's decision to accept such advice by making it 'his or her own' and putting it into practice. A good relationship between the health worker and the patient is crucial. The health worker/patient relationship, together with optimal continuity of care, both depend

on sufficient periods being available for consultations to take place without the inconveniences of a heavy workload and/or lack of time.

The attitude of the health workers to change their own dietary pattern may contribute to good nutrition practice. Few respondents in this study who changed their dietary pattern were motivated by staying healthy. There is interaction between lifestyle habits and counselling beliefs and practices. Health workers with healthier lifestyle habits more frequently counselled their patients on better lifestyles and had positive beliefs about counselling. Health workers who have healthier eating habits were more likely to counsel their patients/clients on lifestyle and nutrition (Hajjar *et al.*, 2006).

5.3.3 Nutrition practice and area of work

Area of work had significant effect ($p < 0.05$) on the health workers provision of nutrition advice. More health workers in health centres and dispensaries most of the time provided nutrition advice. Area of work determines the work load of the health workers since those working in health centres and dispensaries have fewer patients compared to those working in hospitals and therefore had less workload. Health workers reflected that lack of space for giving nutrition advice a barrier to practice nutrition counselling. It is important for the patients/clients to have privacy before they open up during individual counselling. Group health education is given at Reproductive and Child Health clinics to issues concerning pregnancy and child growth however nutrition issues are not part of the topics and if mentioned during sessions they are not elaborated widely.

Chilimo and Lwoga (2004) reported that RCH clinics and nutritional education session were an important aspect in disseminating nutrition information to mothers although these sessions were seldom conducted and attendance of mothers to these sessions was poor.

5.3.4 Workload and nutrition practice

Health workers in health facilities are often fewer compared to the number of patients who visit the facilities. Shortage of health workers increases the workload hindering them time to assess nutrition status of the patients and provide nutrition advice. According to the Morogoro Urban district health administration the district had 246 nurses and 103 clinicians in the year 2007. The ratio of people to health facility in Morogoro Urban district is 1:7,421; and there is one physician per 23,188 people (Kithakye *et al.*, 2009). Furthermore, Tanzania has four nurses per 10,000 patients, and it is estimated that one nurse serves an entire ward of 50 patients. The international standards peg the ratio at 1:6 (Mjasiri, 2010). Human resource shortage increases health workers workload which might further be a barrier to their efforts for counselling and support to patients on nutrition issues.

5.3.5 Shortage of resources and nutrition practice

There were shortage of nutrition assessment tools in health facilities and weighing scale was the only tool available although not to all the health workers. Unavailability of assessment tools may be a barrier to assessment of nutrition status of patients and later provision of nutrition advice. However, weight of patients is usually taken to enable the clinicians prescribe drugs showing the rationale for availability of the only assessment tool. Kobe (2006) reported that most of the Registered Nurses in Kenya weighed their patients for medication purpose only and they seldom discussed nutrition during ward rounds and reviews. Taking weight without other parameters might not help in assessment of the nutrition status of patients as one needs to have height parameters to calculate the BMI in adults.

5.3.6 Nutrition resource and nutrition knowledge of health worker

Lack of appropriate resource for nutrition may hinder health workers from providing nutrition advice. Results of this study have shown that fewer health workers consulted books and more health workers consulted their superior/supervisors when they encountered a nutrition knowledge problem. It is a norm to consult a colleague higher in the professional hierarchy for help in medical profession. Health workers in higher ranks might as well have poor nutrition knowledge therefore it is important to have other nutrition resource/centres for health workers to consult including books and access to Internet. Interestingly health workers preferred to consult nutritionist or dieticians but at present these health facilities do not have nutritionist or dietician.

5.4 Needs of Health Workers on Nutrition Knowledge and Skills

Health workers had inadequate nutrition knowledge and skills. The medical and nursing curriculum does not have nutrition as a core subject/or optional subject in some institutions, and nutrition is incorporated in other courses like midwifery, child health, epidemiology, biochemistry, medicine, paediatrics and community health. Furthermore respondents did not have in-service courses on nutrition. Respondents identified the following nutrition training needs: nutrition and diseases, nutritional disorders, drug and nutrition interaction and nutrition for different age groups. These topics are important for the health workers as they may be a step towards reducing morbidity and mortality caused by nutrition related diseases as well as workload.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Although clinicians and nurses regarded nutritional care as important, their attitude seemed to contradict their practice. Despite the huge responsibility entrusted on clinicians and nurses with regard to nutritional care of patients, the current knowledge, attitude and practice of health workers towards nutritional care is a cause for concern.

Lack of applied nutritional knowledge of clinicians and nurses is one of the main problems that have been identified by this study. In developing countries where health facilities have no nutritionists/dietitians, the responsibility of educating patients about their diet and nutrition status relies on the clinicians and nurses. For this matter therefore, clinicians and nurses should be well equipped with nutrition knowledge and skills.

Overall, the evidence from this study clearly indicates that health workers need more knowledge and skills in nutrition. Accordingly, nutrition as a subject needs to be properly integrated in the curriculum of medical and nursing schools. Moreover, nutrition should be first and foremost, an essential part in continuing medical and nursing education, since most respondents in this study lacked the necessary and basic nutrition knowledge. Frequent in-service/on job nutrition training is also crucial considering nutrition knowledge is highly and rapidly evolving all the time.

6.2 Recommendations

1. Ministry of Health in collaboration with medical and nursing training institution should consider reviewing and improving nutrition package in terms of content and teaching duration to pre-service courses.
2. Ministry of Health in collaboration with health facilities at regional and district levels should consider reviewing, planning implementing in-service/on job nutrition training to keep health workers updated with nutrition issues.
3. Nutritionists should be involved in instructing nutrition courses during pre-service, in-service/on job training for nurses and clinicians.
4. There should be a nutrition department and nutritionist(s) in district and regional hospitals as a nutrition education leader and the main adviser on matters concerning nutrition.
5. In this era of triple burden of obesity, under-nutrition and HIV/AIDS, pre-service and in-service training should put more emphasis on these conditions.

Further research should be done to establish nutrition knowledge of health workers in other areas of the country to get a bigger picture. In addition, research on the quantity and quality of nutrition courses in medical and nursing schools is of major importance in the country.

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APPENDICES

Appendix 1: Calculation of Sample Size

A total of 268 respondents are expected to be selected using the following formula

$$n = z^2 * p * (1-p) / d^2$$

Where:

n = Sample size when population is greater than 10,000

z = Confidence interval; considered as 1.96 at 95%

p = proportion of health workers (clinicians and nurses) in Morogoro Urban district obtained from the equation:

Total health works (clinicians and nurses)/Grand total workers in health facilities at the Morogoro Urban district*100

$$349/670 * 100 = 52.0896\% \sim 52\%$$

d = Margin of error (0.05)

$$(1.96)^2 * 0.52(1-0.52) / (0.05)^2 = 383.5$$

Since population is less than 10,000

The following formula is used;

$$nf = n / 1 + (n/N)$$

nf = sample size when population is less than 10,000

n = desired sample size when population is less than 10,000

N = the estimate of population size

$$nf = 383.5 / 1 + (383.5/670)$$

$$= 243.8965$$

Attrition rate 10%

$$243.8965 * (10/100) = 24.38965$$

$$243.8965 + 24.38965 = 268.2862$$

The total number of health workers for self administered questionnaire will be 268

Appendix 2: Questionnaire for Clinicians

Please note that this research is purely academic and therefore your privacy is completely respected.

Instructions:

1. Read each statement carefully and answer the question.
2. Based on your impression indicate response in a relevant question.
3. Please ensure you answer all questions.
4. Once complete please double check to ensure any missing answers.

Section one

1. Serial number _____
2. Date of completion of questionnaire _____
3. Name of the health facility (hospital, health centre, or dispensary) _____
4. Sex
 - a. Male
 - b. Female
5. Age of the participant _____
6. What is your current job title
 - a. Medical doctor/general practitioner
 - b. Specialist please mention the title _____
 - c. Assistant Medical Officer
 - d. Clinical officer
 - e. Assistant clinical officer
7. How long have you been working with the above mentioned job title _____
8. How many years have you been working in the medical field _____

9. What is your highest level of primary or secondary education that you completed

- a. Completed form six
- b. Completed form four
- c. Completed primary education
- d. Some primary education

10. At which college/ university did you study?

Courses: degree or diploma or certificate	College name	Country	Graduation year

11. What department are you currently working (e.g. paediatrics, OPD) _____

Section two

1. Was nutrition part of your training in college?

- a. Yes
- b. No
- c. Not sure

2. How much time was spent on nutrition during your training?

- a. None
- b. Less than 1 week
- c. One to two weeks
- d. Two to four weeks
- e. More than one month

3. Did nutrition education during training prepare you well to deal with under nutrition and obesity/overweight

- a. Yes
 - b. No
4. Do you feel it necessary to receive nutrition education at the college/university?
- a. Yes
 - b. No
5. Have you received any in-service course/seminars/workshops?
- a. Yes
 - b. No
6. If your answer is yes to question 5 above what course/s or seminars did you attend?
- Please mention.
- a.
 - b.
7. Would you like to have in-service courses/seminars on nutrition?
- a. Yes
 - b. No
8. If the answer to question 7 is yes which topics/skills would you like to learn
- a.
 - b.

Section three

1. Do you provide nutrition/dietary advice to your patients or clients?
- a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never

2. How often were you asked for nutritional advice by your patients in the past six months?
- a. Never
 - b. Less than 25% of patient
 - c. (25-50%) of patients
 - d. (50-75%) of patients
 - e. More than 75% of patients
3. Which of the following do you consider barrier towards providing nutrition/dietary counselling to your patients?
- a. Not enough time during consultation
 - b. Lack of adequate information/knowledge in nutrition
 - c. Nutrition advice is not important
 - d. Patients are not interested
 - e. Dietary advice is too complicated
 - f. Others mention _____
4. When you encounter problem in giving dietary/nutrition advice to your patients where do you go for help/advice
- a. To a nutritionist
 - b. To a dietician
 - c. To my superior/supervisor
 - d. To the library
 - e. To the internet
 - f. Others please mention _____

5. Have you ever changed your own dietary/eating pattern to lose or stay health?
- a. Yes
 - b. No
6. If the answer to question 5 is yes why did you change your dietary/eating pattern
- a. Clinicians/doctors advice
 - b. Health problem
 - c. Others mention _____
7. Which of the assessment tools do you have in your clinic/place of work
- a. Weighing scale
 - b. Height meter/stadiometer
 - c. Tape measure
 - d. No assessment tool
 - e. Others (please specify)_____
8. How often do you use the assessment tools mentioned in question 7 above?
- a. Always
 - b. Sometimes
 - c. Never

Section four

Tick one statement you think is appropriate among the five;

Strongly agree, Agree, Undecided, Disagree, and strongly disagree.

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Diet has an important role in the Prevention and treatment of disease					
Medical schools should place greater emphasis on nutritional education.					
On job training should devote time to nutrition related issues.					
Obesity is a health problem in Tanzania					
It is important to have an understanding of food composition and preparation to provide reliable nutritional counselling.					
In many cases, medication could be reduced or eliminated if patients followed a recommended diet.					
Doctors/clinicians should spend more time exploring dietary/eating habits during patient evaluation.					
Most doctors/clinicians are very knowledgeable about nutrition.					
Clinicians should involve themselves in Nutrition counselling.					
Nurses should involve themselves in Nutrition counselling.					
Nutrition counselling is not the responsibility of the clinician.					
Diet has no effect on prolonging life.					
Nutrition/dietary counselling should be given to only those who are obese					
Dietary counselling is a waste of time because people don't change their eating habits anyway.					
Nutrition advice is not important to people with HIV/AIDS.					
Adolescents are not at risk of malnutrition					
There is no need of early diagnosis and treatment of obesity					
The pleasures of eating are more important than the potential health benefits of dieting.					

Section five

*** indicate correct answer**

1. What type of dietary fibre is helpful in lowering the blood cholesterol level?
 - a. Soluble fibre*
 - b. Insoluble fibre.
 - c. Cellulose.

2. Excess of which nutrient may increase body calcium loss:
 - a. Protein *
 - b. Saturated fat
 - c. Sugar

3. A nutrient believed to help prevent thrombosis is:
 - a. Omega-3 fat*
 - b. Monounsaturated fat
 - c. Vitamin C

4. The adequate intake level of calcium for adult aged 51-70 years is:
 - a. 500 milligrams/day
 - b. 1200 milligrams/day*
 - c. 2000 milligrams/day

5. Which nutrient is protective against hypertension?
- Potassium*
 - Chlorine
 - Iron
6. Some vitamins may accumulate in the body to dangerous levels if large doses of vitamin supplements are frequently taken. Examples of these would be:
- Vitamin A and D*
 - Vitamin A and C
 - All B vitamins
7. The most concentrated source of vitamin B 12 is:
- Fruit
 - Whole grain cereals
 - Meat*
8. Which substance raises the blood high density lipoprotein-cholesterol level?
- Animal protein.
 - Riboflavin.
 - Alcohol*
9. Type of food believes to have a preventive effect on various types of cancer is:
- Fruit and vegetable*
 - Milk
 - Beans
10. The number of kilocalories in one gram of fat is:
- 4
 - 7
 - 9*

11. Which of the following is not an antioxidant nutrient?
- a. Vitamin E.
 - b. Beta-carotene.
 - c. Zinc*
12. What is the best test among these tests for assessing nutritional status of hospitalized patients?
- a. albumin
 - b. Pre-albumin*
 - c. Haemoglobin
13. What percentage of daily calorie intake should come from fat?
- a. 15%
 - b. 25%*
 - c. 35%
14. The possibility of which one is higher for a patient with pneumonia and a history of good nutritional status if has inadequate nutrition for one week during hospitalization?
- a. malnutrition will occur and marasmus is more probable
 - b. malnutrition will occur and kwashiorkor is more probable*
 - c. malnutrition won't occur
15. A common nutrient deficiency in alcoholic is:
- a. Vitamin B1*
 - b. Iron
 - c. Protein
16. The nutrient strongly associated with prevention of neural tubal defects is:
- a. Folate*
 - b. Zinc

c. Beta-carotene

17. Nutrition status of an adult whose Body Mass Index is between 25.0-29.9 kg/m² is rated?

a. Underweight

b. Normal weight

c. Overweight*

18. An ideal weight gain for the normal pregnant woman is:

a. 11–14 kg.*

b. 14–16 kg.

c. 18–23 kg.

19. Administration of drugs such as isoniazid used in the treatment of tuberculosis for a long time can cause deficiency of which nutrient?

a. Vitamin B complex

b. Calcium and iron

c. Niacin and vitamin B6*

20. A person eating diet containing large amount of raw egg white for a long time is likely to develop:

a. Niacin deficiency

b. Biotin deficiency*

c. Vitamin A deficiency

21. The minerals most often at risk of being deficient in the average diet are:

a. Calcium, iodine and iron*

b. Iron, sodium, calcium

c. Potassium, calcium

22. The food groups:

- a. Represent requirements for only four nutrients to be selected.
- b. Represent the safe way to assure adequate food intake.
- c. Suggest amounts of certain broad groups of foods to be selected daily*

23. How do you rate your nutrition knowledge?

- a. Poor
- b. Moderate
- c. Excellent

Thank you very much for you time and participation

Appendix 3: Questionnaire for Nurses

Please note that this research is purely academic and therefore your privacy is completely respected.

Instructions

1. Read each statement carefully and answer the question.
2. Based on your impression indicate response in a relevant question.
3. Please ensure you answer all questions.
4. Once complete please double check to ensure any missing answers.

Section one

1. Serial number _____
2. Date of completion of questionnaire _____
3. Name of the health facility (hospital, health centre or dispensary) _____
4. Sex
 - a. Male
 - b. Female
5. Age of the participant _____
6. What is your current job title
 - a. Registered nurse
 - b. Enrolled nurse
7. For how long have you been with the above mentioned job title _____ years
8. How many years in total have you been working in the medical field _____ years
9. What is the highest level of primary or secondary education that you completed
 - a. Completed form six
 - b. Completed form four
 - c. Completed primary education

- d. Some primary education

10. At which college/ university did you study?

Courses: degree/diploma/certificate	College name	Country	Graduation year

11. What department are you currently working (e.g. paediatrics, OPD) _____

Section two

1. Was nutrition part of your training in college?

- a. Yes
b. No
c. Not sure

2. How much time was spent on nutrition during your training?

- a. None
b. Less than 1 week
c. One to two weeks
d. Two to four weeks
e. More than one month

3. Did nutrition education during training prepare you well to deal with under nutrition and obese/overweight

- a. Yes
b. No

4. Do you feel it necessary to receive nutrition education at the college/university?

- a. Yes
b. No

5. Have you received any in-service course/seminars/workshops?
- a. Yes
 - b. No
6. If your answer is yes to question 5 above what course/s or seminars did you attend?
- Please mention.
- a.
 - b.
7. Would you like to have in-service courses/seminars on nutrition?
- a. Yes
 - b. No
8. If the answer to question 7 is yes which topics/skills would you like to learn
- a.
 - b.

Section three

1. Do you provide nutrition/dietary advice to your patients or clients?
- a. Always
 - b. Most of the time
 - c. Sometimes
 - d. Never
2. How often were you asked for nutritional/dietary advice by your patients/clients in the past six months?
- a. Never
 - b. Less than 25% of patients
 - a. (25-50%) of the patients
 - b. (50-75%) of the patients

- c. More than 75% of the patients
3. Which of the following do you think prevent you from providing nutrition/dietary advice to patients?
- a. Lack of time to give nutrition/dietary advice
 - b. Lack of adequate information/knowledge in nutrition
 - c. Nutrition advice is not important
 - d. Patients are not interested
 - e. Dietary advice is too complicated
 - f. Others mention _____
4. When you have problem in giving dietary/nutrition advice to your patients where do you go for help?
- a. To a nutritionist
 - b. To a dietician
 - c. To my superior/supervisor
 - d. To the library
 - e. To the internet
 - f. Others please mention _____
5. Have you ever changed your own dietary pattern to lose weight or stay health?
- a. Yes
 - b. No
6. If the answer to question 5 is yes why did you change your dietary pattern
- a. Clinicians/doctors advice
 - b. Health problem
 - c. Others mention _____

7. Which of the assessment tools do you have in your clinic/place of work

- a. Weighing scale
- b. Height meter/stadiometer
- c. Waist circumference tape
- d. No assessment tool
- e. Others (please specify)

8. How often do you use the tools mentioned in question 7 above?

- a. Always
- b. Sometimes
- c. Never

Section four

Tick one statement you think is appropriate among the five

Strongly agree, agree undecided, disagree, and strongly disagree.

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Diet has an important role in prevention and treatment of disease.					
Nursing schools should place greater emphasis on nutritional education.					
On job training should devote time to nutrition-related issues.					
It is important to have an understanding of food composition and preparation to provide reliable nutritional advice.					
In many cases, medication could be reduced or eliminated if patients followed a recommended diet.					
Nurses should spend more time exploring dietary/eating habits during patient care.					
Most nurses are very knowledgeable about nutrition.					
Doctors/Clinicians should involve themselves in nutrition counselling.					
Nurses should involve themselves in nutrition/dietary counselling.					
Obesity is a health problem in Tanzania					
The pleasures of eating are more important than the potential health benefits of dieting.					
Diet has no effect on prolonging life.					
Nutrition/dietary counselling should be given to only those who are obese					
Dietary counselling is a waste of time because people don't change their eating habits anyway					
Nutrition advice is not the responsibility of the nurse.					
Nutrition advice is not important to people with HIV/AIDS.					
Adolescents are not at risk of malnutrition					
There is no need of early diagnosis and treatment of obesity					

Section five

*** Indicate correct answer**

1. Children should breast feed exclusively for

- a. 2 months

- b. 4 months
 - c. 6 months*
2. What mineral is important for menopausal women?
- a. Iron
 - b. Zinc
 - c. Calcium*
3. Which groups are at risk of malnutrition in the community?
- a. Under five children and pregnant women
 - b. Adolescents, under five children and pregnant women*
 - c. Old people, adolescents and adult men
4. The adequate intake level of calcium for adult aged 51-70 years is:
- a. 500 milligrams/day
 - b. 1200 milligrams/day*
 - c. 2000 milligrams/day
5. Which nutrient is protective against hypertension?
- a. Potassium*
 - b. Chlorine
 - c. Iron
6. The most concentrated source of vitamin B 12 is:
- a. Fruit
 - b. Whole grain cereals
 - c. Meat*
7. Which of the following is not an antioxidant nutrient?
- a. Vitamin E
 - b. Beta-carotene

- c. Zinc*
8. Excess of which nutrient may increase body calcium loss:
- a. Protein*
 - b. Saturated fat
 - c. Potassium
9. What percentage of the daily total energy should come from fats?
- a. 20%
 - b. 25%*
 - c. 35 %
10. Types of food believed to have a preventive effect on various types of cancer are:
- a. Fruit and vegetable*
 - b. Milk
 - c. Meat
11. The number of kilocalories in one gram of fat is:
- a. 4
 - b. 7
 - c. 9*
12. A common nutrient deficiency in alcoholic is:
- a. Vitamin B1*
 - b. Iron
 - c. Protein
13. Nutrient strongly associated with the prevention of neural tube defects is:
- a. Folate*
 - b. Zinc
 - c. Beta-carotene

14. Nutrition status of an adult whose Body Mass Index is between 25.0-29.9 kg/m² is rated?
- Underweight
 - Normal weight
 - Overweight*
15. Administration of drugs such as isoniazid used in the treatment of tuberculosis for a long time can cause deficiency of which nutrient?
- Vitamin B complex
 - Calcium and iron
 - Niacin and vitamin B6*
16. A person eating diet containing large amount of raw egg white for a long time is likely to develop:
- Niacin deficiency
 - Biotin deficiency*
 - Vitamin A deficiency
17. Vitamin C is not involved in:
- Maintaining healthy gum.
 - Muscle contraction*
 - Strengthening blood vessel walls
18. In order to obtain adequate calcium from diet you could eat:
- Oranges and bananas
 - Chicken and fish
 - milk and yogurt*
19. The minerals most often at risk of being deficient in the average diet are:
- Calcium, iodine and iron*

b. Iron, sodium, calcium

c. Potassium, calcium

20. An ideal weight gain for the normal pregnant woman is:

a. 11–14 kg*

b. 14–16 kg

c. 18–23 kg

21. The food groups:

a. Represent requirements for only four nutrients to be selected.

b. Represent the safe way to assure adequate food intake.

c. Suggest amounts of certain broad groups of foods to be selected daily.*

22. Some vitamins may accumulate in the body to dangerous levels if large doses of vitamin supplements are frequently taken. Examples of these would be:

a. Vitamins A and C

b. Vitamins A and *.

c. All B-vitamins

23. How do you rate your nutrition knowledge?

d. Poor

e. Moderate

f. Excellent

Thank you very much for your time and participation.

Appendix 4: In-depth Interview Checklist

1. Health Facility _____

2. Date of interview ___ / ___ / ___

3. Interview number ___ ___
4. Name of respondent _____
5. Sex 0 ___ Male 1 ___ Female

I would like to begin with some questions about your work.

6. What is your current job title? _____
7. How long have you been working in this job? ___ ___ years
8. Who do you report to? _____
9. What are your job responsibilities?

Now I would like to ask you some questions about nutrition and your work. There are no right or wrong answers. I just want to understand your views and experiences as a health professional.

10. What are the main nutrition issues that exist in this community?
11. How do these nutrition issues come up in the work that you do?
- a. Which are the most common nutrition issues that you see in your work?
12. How do you assess/identify/evaluate nutrition issues in your patients?
13. What nutrition interventions do you give your patients/clients? [By interventions we mean any nutrition products/supplements/therapies or advice/counselling.]
- a. *If respondent mentions nutrition counselling, ask:* If I were in the room where you were doing nutrition counselling, what would I see? [probe for details to get a full picture, including setting, materials, people present, length of time, etc.]
14. How capable/confident do you feel that you are to address nutrition issues effectively with your patients?
- a. What are some of the things that make it difficult for you to address these nutrition issues?

- b. If you have a nutrition issue that you cannot adequately address, where do you turn for help?
 - c. In your experience, are these resources helpful and adequate?
15. Tell me about how nutrition issues were taught in your professional training. [probe for examples]
- a. Did you have a special course or module in nutrition? If yes, please describe it. . .
 - b. Which nutrition topics were emphasized in your training? [probe for details]
 - c. Have you received any in-service course or training related to nutrition? If yes, please describe it . . . (When, where, how long, who taught, etc.)
 - d. If you had the chance to get more nutrition training, what specific skills or knowledge would be most useful in your work?

Finally, I would like to ask you a few more questions about you and your education.

16. Age __ __ years
17. What is the highest level of primary or secondary education that you completed?
- a. __ some primary education
 - b. __ completed primary education
 - c. __ completed Form IV
 - d. __ completed Form VI
18. What is the highest level of professional training that you completed? _____
19. At what college/university did you get that degree?
20. In what year did you complete this highest diploma/degree? __ __ __ __
21. How many years have you worked in total as a health professional? __ __ years
22. Finally, do you have any questions for me?

Thank you very much for your time. We have learned a lot from you today that will help us strengthen nutrition training in the future.

Appendix 5: Focus Group Discussion Checklist

Introductory discussion (10 minutes)

Welcome the respondents.

Short presentation of the research:

Hello every one, I am Happy Moses from the Sokoine University of Agriculture.

First of all I would like to thank you for accepting this invitation.

Nutrition is seen as part of morbidity and mortality in the world. The millennium development goal (MDG) number 4 focus on reducing child (under five) mortality by two thirds and the MDG 5 focuses at reducing maternal mortality by three quarters in 2015.

Today we will talk about nutrition, I will introduce some discussion issues and I would be happy to hear you opinion regarding each topic. I am very interested in your sincere opinion on this subject. Please share these with me even if they are totally different from the opinions of others participants.

There is no right or wrong opinion/ answer. Everyone's opinion will be accepted as input to this research.

While we are talking here it is difficult for me to take notes and this is why the discussion will be audio recorded, in order to help me summarize the points discussed today. But every thing is strictly confidential in the sense that no names are going to be used in the report.

Self introduction for each participant

Warm-up 10 minutes

1. What are the first things that come into your mind when you think of diseases and deaths in Morogoro?
2. What are the causes of morbidity in Morogoro?
3. What are the causes of mortality in Morogoro?

4. Who are the most affected by Morbidity and mortality?

The nutrition discussion component 50 minutes

1. Let's talk about nutrition. What comes in your mind when you hear about nutrition?
2. What is the importance of nutrition? Worldwide, Africa, Tanzania and Morogoro.
3. What are the obstacles in community nutrition promotion?
4. What should be done to promote nutrition? Who should be involved in nutrition promotion?
5. How can health workers take part in the nutrition promotion?
6. Are health workers well equipped to promote/counsel nutrition in the community?
Why so? Why not?
7. What should be done to equip health workers with nutrition information and prepare them for field nutrition and nutrition counselling?
8. In current situation who are responsible for the promotion of nutrition in health facilities.
9. Let's talk about nutrition education in medical/nursing schools? Is nutrition covered in medical or nursing curriculum? Is nutrition taught as a separate subject or as a subtopic/ incorporated in other subjects?
10. What are your recommendations on the nutrition content in medical or nursing schools?
 - a) Is it enough. Can you give reasons?
 - b) How many hours are allocated in nutrition courses/subject?
 - c) What exactly is taught about nutrition in medical or nursing schools
 - d) Is obesity part of nutrition course in medical or nursing schools?
 - e) What do you recommend should be taught in medical or nursing school?
 - f) Why did you choose those topics

- g) Who teaches nutrition in medical or nursing schools?
- h) Who should teach nutrition subject/courses?
- i) How should nutrition subjects be taught in medical or nursing schools?

12. Lets talk about nutrition in health system

- a) Does nutrition have special part in the health system?
- b) How much is nutrition allocated in health system?
- c) What is your recommendation on this?

13. How important is it to have a nutritionist within hospitals, and department in hospitals? Why so, or why not please explain.

- a) How should health system benefit from nutrition and vice verse?
- b) What do health workers think about nutrition in their daily work?

Thank you for your time and participation

Appendix 6: Consent Form: Self Administered Questionnaire Survey for Health Workers at Morogoro Urban District Health Facilities

You are invited to participate in a survey of health workers working at the Morogoro Urban district. You are invited because you are one of the health workers in the district. Please read this consent form carefully and ask questions before you make decision to participate.

Aim of the survey

The aim of the survey is to assess nutrition knowledge attitude and practice of health worker working in Morogoro Urban district. This survey is for academic purpose.

In case you decide to participate in the survey you will be given a questionnaire to answer provided questions. Questions will involve knowledge attitude and practice of basic issues on nutrition which are important in the maintenance and promotion of nutrition in Tanzania. The questions may take up to 30 minutes to answer.

Advantage and disadvantages of participating:

There is no possibility of getting any side effects/disadvantaged or straight forward advantages if you participate in the survey.

The main aim of the survey is to facilitate improvement of nutrition training in colleges and eventually improve your work at the health facility. This survey will enable the researcher to qualify for her degree programme.

If you volunteer to participate you may decide to withdraw your participation any time during the survey.

Confidentiality

Remember your participation will be strictly confidential and no any other person will read the answered questionnaire. The questionnaire will be stored in a safe place where the researcher only will have access. The questionnaire will be destroyed after one year.

If you have any questions you may contact the research Happy Moses with the phone number

Consent:

I have read the content in this form and understood the content. I agree to participate in the survey.

Signature of the participant

Date

.....

.....

Appendix 7: Consent Form for Interviewed Health Workers of the Morogoro Urban District Health Facilities

You are invited to participate in a survey for health workers working at the Morogoro Urban district. You are invited because you are one of the health workers in the district. Please read this consent form carefully and ask questions before you make decision to participate.

Aim of the survey

The aim of the survey is to assess nutrition knowledge, attitude and practice of health workers working at Morogoro Urban district. This survey is for academic purpose.

In case you decide to participate in the survey you will be asked questions which will be tape recorded to enable easy participation and management. Questions will involve knowledge attitude and practice of basic issues on nutrition which are important in the maintenance and promotion of nutrition in Tanzania. The questions may take 30 to 60 minutes to complete.

Advantage and disadvantages of participating:

There is no possibility of getting any side effects/disadvantaged or straight forward advantages if you decide to participate.

The main aim of the survey is to facilitate improvement of nutrition training in colleges and eventually improve your work at the health facility. The survey will enable the researcher to qualify for her degree programme.

If you volunteer to participate you may decide to withdraw your participation any time during the survey.

Confidentiality

Remember your participation will be strictly confidential and no any other person will listen to the tape recorded content. The recorded tapes will be stored in a safe place where the researcher only will have access. The recorded tape will be destroyed after one year. **If you have any questions you may contact the research Ms. Happy Moses with the phone number**

Consent:

I have read the content in this form and understood the content. I agree to participate in the survey.

Signature of the participant

Date

.....

.....