

**QUALITY OF NUTRITION SERVICES PROVIDED AT REPRODUCTIVE AND
CHILD HEALTH CLINICS IN ADDRESSING MATERNAL UNDERNUTRITION
IN TEMEKE DISTRICT, DAR-ES-SALAAM**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
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ABSTRACT

Maternal undernutrition is a significant nutrition problem in Tanzania. Chronic energy deficiencies, iron deficiency anaemia, iodine deficiency disorder and vitamin A deficiency are the major manifestations of maternal undernutrition. This study examined the quality of nutrition services at RCH clinics in addressing maternal undernutrition in Temeke District. A cross sectional study design, involving 100 pregnant women and 108 RCH providers from 12 selected health facilities was employed. Structured questionnaires, checklists with key informants, client exit interviews, structured observations and focus group discussions were used in data collection. SPSS software version 16 was used in data analysis. Results showed that, RCH providers had inadequate nutrition knowledge due to limited nutrition courses during nursing training and in-service training. All RCH providers advised that, nutrition knowledge is important to pregnant women hence they were responsible for its delivery. Understaffing and lack of teaching aids contributed to the failure in the delivery of quality nutrition education. Most pregnant women (81%) started attending antenatal care in the second trimester and were neither aware of nutritional needs during pregnancy nor the relationship between maternal dietary intake and birth outcomes. About 54% of pregnant women were not satisfied with antenatal services provided at the surveyed clinics. Reasons mentioned included, spending long hours at clinic, high costs of some services and inadequate number of service providers. Common foods consumed by these women were maize flour, rice, tomatoes, carrots, green vegetables and fruits, while less commonly consumed foods were legumes, sea foods, meat, milk and milk products. The overall quality of nutrition services provided at the surveyed RCH clinics was low, mainly due to inadequate nutrition knowledge among RCH providers and inadequate education tools. This study

recommends a review of nursing curriculum to add more nutrition courses, conducting of regular in service nutrition training and formulation of nutrition guidelines.

DECLARATION

I, ABELA ZAKAYO TWIN'OMUJUNI, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

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LIST OF ABBREVIATIONS AND SYMBOLS

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
BMI	Body Mass Index
BP	Blood Pressure
BSc	Bachelor of Science
CDC	Centre for Disease Control
CED	Chronic Energy Deficiency
CEI	Client Exit Interview
DHMT	District Health and Management Team
EmOC	Emergency Obstetric Care
FANC	Focused Antenatal Care
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
Hb	Haemoglobin
HCP	Health Care Provider
HIV	Human Immunodeficiency Virus
IDA	Iron Deficiency Anaemia
IDD	Iodine Deficiency Disorder
IEC	Information, Education and Communication
IOM	Institute of Medicine
IPHI	Institute of Public Health in Ireland
IPPF	International Planned Parenthood Federation
IPT	Intermittent Preventive Treatment

ITN	Insecticide-Treated Nets
IUGR	Intra-Uterine Growth Retardation
Kcal	Kilo calories
LBW	Low Birth Weight
MCHA	Maternal and Child Health Aiders
MDGs	Millennium Development Goal(s)
MoH	Ministry of Health
MoHSW	Ministry of Health and Social Welfare
MSD	Medical Stores Department
MUHAS	Muhimbili University of Health and Allied Sciences
NBS	National Bureau of Statistics
NGO	Non- Governmental Organisation
NM	Nurse Midwife
NO	Nurse Officer
NTA	National Technical Award
NTD	Neural Tube Defect
PHN	Public Health Nurse
PMTCT	Prevention of Mother to Child Transmission
RCH	Reproductive and Child Health
RPR	Rapid Plasma Reagin
SD	Standard Deviation
SP	Sulfadoxine Pyrimethamine
SSA	Sub-Saharan Africa
STIs	Sexually Transmitted Infection (s)

TCU	Tanzania Commission for Universities
TDHS	Tanzania Demographic and Health Survey
TFNC	Tanzania Food and Nutrition Centre
TMC	Temeke Municipal Council
TNW	Tanzania National Website
TT	Tetanus Toxoid
UN	United Nations
UNSCN	United Nations Standing Committee on Nutrition
UNICEF	United Nations Children's Fund
URT	United Republic of Tanzania
USA	United States of America
USAID	United States Agency for International Development
VAD	Vitamin A Deficiency
VDRL	Venereal Disease Research Laboratory
WFP	World Food Programme
WHO	World Health Organisation

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Nutrition is a fundamental pillar of women's wellbeing and right during pregnancy and lactation (Williamson, 2006). Good maternal nutrition is important for the health and reproductive performance of pregnant women and for growth, survival and development of the foetus (Pillar *et al.*, 2006). Maternal nutrition prior and during pregnancy is the key modifier of birth outcomes (Brown, 2008). Although pregnancy is regarded as a normal physiological event in life cycle, it is considered as life-threatening for most African women due to the intergenerational link of factors (Benson, 2005). Nutrition and health of women are affected by complex and highly interrelated biological, social, cultural, economical, and health related factors (Pick *et al.*, 2005). Due to these factors, most pregnant women in developing countries gain less than the recommended weight hence they are at a greater risk of developing maternal undernutrition (Lartey, 2008). The recommended weight gain during pregnancy for women with normal nutrition status is 11-16 kilograms (FAO, 2008; Torjusen *et al.*, 2010; URT, 2012).

Undernutrition is due to lack of macronutrients, micronutrients, or both (Baker *et al.*, 2009). Macronutrients are nutrients that are needed in large amounts in the body. These include, carbohydrates, proteins and fats. Inadequate intake of macronutrients leads to macronutrient deficiency. Common macronutrient deficiency is chronic energy deficiency (Allen, 2005). Micronutrients are nutrients that are needed in small amounts by the body. These include vitamins and minerals. Micronutrient undernutrition occurs when essential vitamins and/or minerals are not taken in the recommended amounts. Common

micronutrient deficiencies are iron (anaemia), vitamin A (xerophthalmia and blindness) and iodine (goitre and cretinism) (FAO, 2000; WFP, 2005; WHO, 2007).

Immediate causes of maternal undernutrition are inadequate dietary intake and poor health status (LINKAGES PROJECT, 2001; Lartey, 2008). Inadequate dietary intake is caused by household food insecurity, food taboos, poor intra-household food distribution which does not favour women, lack of credible advice on what to eat and poor dietary practices (UNICEF, 2004). In some areas, pregnant women are advised to eat less during pregnancy while others are discouraged from consuming nutritious foods such as eggs, liver and fish in an attempt to have small babies and avoid complications during labour (Ojofeitimi *et al.*, 2008). Poor dietary practices include sharing the food from the same pot with other family members and the women's tendency of eating leftovers (men are usually served first then women and children are served later) (Huybregts *et al.*, 2009). Women are also faced with poor health status due to infections and diseases. Infections and diseases increase nutrition needs of pregnant women and at the same time hinder nutrient absorption (Black *et al.*, 2008). Poor access to health services, heavy workload, frequent births, inadequate nutritional knowledge, and high levels of poverty worsen nutrition-infection cycle, hence poor maternal nutritional status (Benson, 2005).

Maternal undernutrition is a significant health problem in most of the African countries including Tanzania. Maternal undernutrition has both short and long term implications to pregnant women, their newborn, family and the whole community (Mora and Nestel, 2000; Bhutta *et al.*, 2008). The effects of maternal undernutrition to pregnant women include increased rates of infections due to low immunity, reproductive losses due to

increased rates of miscarriages, stillbirth and intrauterine growth retardation (Shrimpton, 2006). Maternal undernutrition also is the major cause of anaemia in most of pregnant women in Africa. The prevalence of anaemia in Africa ranges from 21 to 80% (Lartey, 2008). Moreover, maternal undernutrition is the major predisposing factor for increasing morbidity and mortality rates among pregnant women in Africa (Abdoulae, 2006). Maternal morbidity and mortality rates are highest in sub-Saharan Africa ranging from 230 to 1100 deaths per 100 000 live births (Barker, 2006). The probability of dying is one in 16 pregnant women for sub-Saharan Africa compared with one in 4000 pregnant women in developed countries (Lartey, 2008).

Maternal undernutrition prior and during pregnancy has serious consequences on infant's health and survival. It causes intrauterine growth retardation (IUGR), can initiate and perpetuate an intergenerational cycle of undernutrition and is a leading cause of low birth weight babies (UNICEF, 2004; Mmbando *et al.*, 2008). Low birth weight (weight less than 2500g at birth) is a leading cause of increased neonatal and infant mortality rates, impaired immune function, and increased risk of cognitive and neurological impairment (Brown, 2008). Low birth weight (LBW) is an important secondary factor in 40 to 80% of neonatal deaths, of which 98% of deaths occurs in developing countries (Abu-Saad and Fraser, 2010). In these countries, neonatal and infant mortality rates are two to three times higher for LBW babies than for normal babies (UNICEF, 2005; Siza, 2008). Additional effects of LBW during adulthood include; high risk of developing hypertension, cardiovascular diseases and non-insulin dependent diabetes mellitus (IPHI, 2006; Barker, 2007; Yakoob *et al.*, 2010). In spite of all the above consequences of maternal

undernutrition, maternal nutrition has received less attention in the health, population and nutrition programmes (Shija *et al.*, 2011).

Health sector and health providers have a great role to play in the alleviation of maternal undernutrition. It had been documented in several studies conducted that, maternal education is the key element to be considered in addressing maternal undernutrition reduction (Christiaensen, 2001). Health care providers are very important because they are responsible for the provision of nutrition education to pregnant women at the Reproductive and Child Health (RCH) clinics (Elias and Green, 2007). Nutritional knowledge enables pregnant women to understand various nutrition aspects that are related to pregnancy and foetal growth (Rosal, 2001). Pregnant women receive the knowledge during antenatal, delivery and postnatal visits because these are the best moments for the health system to easily reach them (Szwajcer *et al.*, 2005; WHO, 2007). Therefore, it is important for nutrition education to be a strong component of RCH services.

1.2 Problem Statement and Justification

Maternal undernutrition is one of the significant nutrition problems in Tanzania. Chronic energy deficiency (CED), iron deficiency anaemia (IDA), vitamin A deficiency (VAD) and iodine deficiency disorder (IDD) are the major manifestations of maternal undernutrition and are of public health significance in the country (Seumo and Abdallah, 2008; TNW, 2009). According to 2004-2005 Tanzania Demographic Health Survey (TDHS), 19% of women of reproductive age (15- 49 years) were underweight (BMI < 18.5), 58% of pregnant women were anaemic (haemoglobin level <110 g/L), 65% of

pregnant women had VAD (plasma retinol < 1.05 µmol/L), and only 43% of households used iodized salt (NBS and ORC Macro, 2005). On the other hand the TDHS of 2010 found that, 11% of women of reproductive age were underweight, 53% of pregnant women were anaemic, 4% of women had VAD and 56% of household used iodized salt (NBS and ICF Macro, 2011). These data show that the burden of maternal undernutrition falls disproportionately among pregnant women in Tanzania and has been high for the past five years (Shija *et al.*, 2011).

Maternal undernutrition has several consequences to mothers and newborn. Chronic energy deficiency during pregnancy predisposes pregnant women to low weight gain hence high risk of LBW babies at delivery (Brown, 2008). Iron deficiency anaemia has severe consequences to pregnant women namely, blood loss during delivery, puerperal infection, heart failure (circulatory shock) during labour and delivery and obstetric haemorrhage (a leading cause of maternal death in developing countries) (de Benoist *et al.*, 2008; Siza, 2008). Deficiency of vitamin A during pregnancy, leads pregnant women to severe xerophthalmia. Xerophthalmia increases vulnerability to infections to these women. The deficiency also is associated with an increased risk of miscarriage and maternal mortality (Seumo and Abdallah, 2008). The other cause of maternal undernutrition is iodine deficiency. Iodine deficient pregnant woman is at increased risk of miscarriage, early rupture of membranes, foetal growth restriction, anaemia, perinatal morbidity and neonatal death (URT, 2008). Maternal undernutrition is also among the leading cause of maternal mortality in the country. Maternal mortality rate in Tanzania, was reported to be 529 per 100 000 live births for the period from 1987-1996 and 578 per 100 000 live births for the period from 1995-2004 (NBS and ORC Macro, 2005). In 2008, maternal mortality rate increased to 580 per 100 000 live births (UN, 2008) and in 2011 it

was 454 per 100 000 live births (NBS and ICF Macro, 2011). In addition, maternal undernutrition is the major cause of LBW (UN, 2008). In Tanzania, LBW rate was 10% in 2008 (UN, 2008) and 7% in 2011 (NBS and ICF Macro, 2011).

Maternal undernutrition problems are caused by factors that can potentially be brought under control. The costs of preventing these problems are within reach of even poor countries like Tanzania. Several efforts and attempts have been made in addressing maternal undernutrition problems in the country. These attempts include, formulation of National Health Policy in 1992. The National Package of Essential Reproductive and Child Health Intervention were also developed in 2000 for the same purpose. This package focused on improving quality of life of children, adolescents and women through provision of antenatal care, child birth care, emergency obstetric care (EmOC) and post-partum care (MoH, 2000). National Policy Guidelines for Reproductive and Child Health Services were also developed in 2003 (MoH, 2003) followed by Reproductive and Child Health Strategy (2005 to 2010) in 2004 (MoH, 2004). The strategy focused on improving the quality of reproductive and child health services that are accessible, affordable and sustainable. Key priority areas identified in this strategy were antenatal care, skilled care during childbirth, obstetric emergency care, postpartum care, family planning and prevention of harmful birth practices (MoH, 2004). Moreover, the Health Sector Strategic Plan of 2003-2007 was formulated for the same reason (URT, 2008). In 2006, the National Road Map Strategic Plan of 2006-2010 was formulated in order to accelerate the reduction of maternal and newborn mortality (URT, 2008). This plan was reviewed in 2008 hence titled as one plan 2008-2015 (MoHSW, 2008). In addition, some policy guidelines were introduced during the same period. These

included, the human resource for health strategic plan (2008-2013), the draft for national supervision guidelines for quality health care services which focused on antenatal care and natal and post natal care (Shija *et al.*, 2011). The above efforts aimed at improving coordination of interventions and delivery of services that would improve maternal nutritional status hence reduces maternal mortality. Besides all these efforts, maternal nutritional status is still poor hence high maternal mortality in Tanzania and is far from reaching the millennium development goal number five: “improvement of maternal health and reduction of maternal mortality by three quarters by 2015” (UN, 2011).

In Tanzania, majority of pregnant women (96%) attend Reproductive and Child Health (RCH) clinics at least once in nine months of pregnancy and receive various antenatal care (ANC) services (NBS and ICF Macro, 2011). These include, provision of tetanus toxoid (TT) vaccination, detection and diagnosis of diseases, prevention of maternal to child transmission (PMTCT) of human immune deficiency virus (HIV), health promotion counselling, and education on birth preparedness. Hellings and Howe (2011) in their study on assessment of breastfeeding knowledge of nurse practitioners and nurse-midwives in USA reported that, nutrition education was very important during pregnancy and health providers are responsible for its delivery. Due to this, it is crucial for RCH providers to be knowledgeable enough on the nutritional needs of pregnancy and should disseminate adequate and quality nutrition knowledge to pregnant women (NBS and ICF Macro, 2011). A similar study on Health facility performance assessment conducted in Arusha and Iringa Regions in Tanzania, revealed several gaps regarding the knowledge and attitude of health care providers on the importance of nutrition education in addressing maternal undernutrition (URT, 2004). For this reason, there is need to assess

the nutritional knowledge of RCH providers in the country in order to come up with feasible intervention strategies that would improve the quality of nutrition services delivered to pregnant women. Little has been done to address maternal undernutrition through assessment of nutrition knowledge of providers (URT, 2004; Shija *et al.*, 2011).

Although ANC coverage in Tanzania is high (96%), there are still wide gaps in terms of its utilization, quality and ability to prevent, diagnose or manage nutritional deficiencies. Moreover, less is known about the nutrition education content and capacity of RCH providers in the delivery of nutrition services. This realization calls for a need to assess quality of nutrition and health services that are provided at RCH clinics. This study therefore aimed at assessing the quality of nutrition services provided by RCH providers and the extent to which pregnant women are exposed to adequate nutritional knowledge during gestation.

1.3 Study Objectives

1.3.1 General objective

The main objective was to assess the quality of nutrition services provided at reproductive and child health clinics in addressing maternal undernutrition in Temeke District.

Specific objectives

- (i) Assess the nutrition knowledge and practice of RCH providers on maternal nutrition.
- (ii) Document the timing and delivery of nutrition and other related health services to pregnant women at RCH clinics.
- (iii) Assess the awareness of nutrition among pregnant women.

- (iv) Evaluate the satisfaction of nutrition services provided at the RCH clinics among pregnant women.
- (v) Assess the food consumption pattern of pregnant women.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Prevalence of Maternal Undernutrition

Maternal undernutrition is the prevailing nutritional problem worldwide and is one of the most notorious challenges facing developing countries. Maternal undernutrition includes chronic energy deficiency and micronutrient deficiencies (UNICEF, 2004; Benson, 2005; Black *et al.*, 2008). Its prevalence ranges from 10 to 19% worldwide. In sub-Saharan Africa, Asia and Yemen, maternal undernutrition rate is over 20% and is more critical in

India, Bangladesh and Eritrea where 40% of women are undernourished (Black *et al.*, 2008). In Africa, between 5 and 20% of women are undernourished (Lartey, 2008). Short stature (height less than 145cm) is a sign of past undernutrition. Short stature is more prevalent in many regions worldwide but is more prominent in south-central Asia, where more than 10% of women aged 15 to 49 years (reproductive age group) are shorter than 145 cm (Baker *et al.*, 2009).

2.2 Causes of Maternal Undernutrition

Most women living in developing countries were undernourished at birth, stunted during childhood, became pregnant at adolescent and continued to be underfed and overworked during pregnancy and lactation resulting into complex nutritional deficiencies (Benson, 2005). Most of the undernourished women also experience various biological and social stresses which, when combined with other factors, increase the risk of undernutrition throughout one's life (Black *et al.*, 2008). These factors include; inadequate dietary intake, micronutrient deficient diet, infections, high energy expenditure (heavy work burdens), and high demands of pregnancy and lactation. Others include; poverty, lack of purchasing power, food insecurity, poor health services, gender inequities and limited general knowledge about appropriate nutritional practices. These factors are compounded by repeated pregnancies, high fertility rates, and short intervals between pregnancies (Yakoob *et al.*, 2010). Among the above, inadequate dietary intake, micronutrient deficient diets, infections, high energy expenditure, and high demands of pregnancy and lactation are leading causes of maternal undernutrition in Africa (LINKAGES PROJECT, 2001; WFP, 2005; Black *et al.*, 2008).

2.2.1 Inadequate dietary intake

Inadequate dietary intakes are caused by low intake, high variability of food availability over seasons and consumption of low nutrient dense foods such as roots, tubers and grains based diets. These are highly consumed foods in most areas of Africa (WFP, 2005). However, roots and tubers have inadequate protein content to meet pregnant woman's nutritional needs; maize-based diets lack niacin and certain essential amino acids. Diets based on grains (maize) or tubers (cassava) also provide inadequate micronutrients.

Various symptoms of pregnancy (nausea, vomiting, and heartburn) also reduce food intakes among pregnant women (Williamson, 2006). In addition, during pregnancy some women experience abnormal cravings, aversions, and pica (Nyaruhucha, 2009). Cravings and aversions refer to strong desires and strong dislikes for certain foods respectively. Pica refers to the compulsion for persistent ingestion of unsuitable substances or non food substances of little or no nutritional value (Gretchen *et al.*, 2000). Such non-food substances include, clay soils, ice, burnt matches, soot, charcoal, cigarette ashes, and baking soda. These symptoms may not only cause discomfort during pregnancy but also may interfere with dietary intake and sometimes can cause hyperemesis gravidarum (Caplan, 2001). Hyperemesis gravidarum is excessive vomiting, which may lead to inadequate protein and energy intakes and loss of vital vitamins, minerals, and electrolytes (Nyaruhucha, 2009). Moreover, consumption of soils has been linked with increased anaemia cases in pregnant women (Gretchen *et al.*, 2000).

Food taboos and beliefs during pregnancy deprive women of necessary nutrients and foods available. Studies done in southern Tanzania showed that, pregnant women are discouraged from consuming fish and meat based on the belief that, these foods are linked with anaemia during pregnancy (Marchant *et al.*, 2000). In most parts of Tanzania, intra-household food distribution does not favour women and children because they eat last hence, they eat low portions of poorest quality foods (Ojofeitimi *et al.*, 2008). In other areas of Tanzania, pregnant women are advised to eat low portions of food because of the local belief that eating more during pregnancy would result into a big baby that would be difficult to deliver. This has been reported in Maasai tribe (Huybregets *et al.*, 2009). These practices put women and newborns at a greater risk of pregnancy complications such as foetal death, maternal death, or both.

2.2.2 Micronutrient deficiency diets

Micronutrient deficient diets are highly prevalent in Africa. A significant proportion of women of reproductive age in these countries have different levels of micronutrient deficiencies (Allen, 2005). High prevalence of multiple micronutrient deficiencies are caused by low dietary intakes, poor bioavailability of micronutrients and minimal consumption of animal products and fortified foods (Dairo and Ige, 2009). Other causes of micronutrient deficiencies include poor access to sufficient supply of nutritious foods, metabolic and physiologic demands of pregnancy as well as infections (Bhutta and Haider, 2009). Iron, vitamin A, folate (folic acid) and iodine are common micronutrient deficiencies with iron deficiency being the most common (Allen, 2005).

2.2.2.1 Iron deficiency

Iron deficiency is the alarming deficiency to pregnant women due to their increased demands of the micronutrient, in order to fulfil physiological changes and dietary demands of mother and the foetus (de Benoist *et al.*, 2008). High rates of nutritional anaemia among pregnant women in most of African and Asian countries continue to be a major factor for infant prematurity and low birth weight babies (LINKAGES PROJECT, 2001; Rao *et al.*, 2010). Unlike other nutritional problems, anaemia is a widespread health problem that has not improved over time. According to the UNSCN 6th report, the prevalence of anaemia in women is fairly static at around 45% in Asia and Africa, and 25% in South America and the Caribbean (UNSCN, 2010). It is highest in South Central Asia, mainly India, where nearly 60% of women are anaemic. In East, Central and West Africa the prevalence is over 40% and appears to be worsening (WFP, 2005). Iron deficiency is caused by inadequate dietary intake of bioavailable iron, increased iron requirements due to pregnancy, parasitic infections (intestinal worms, schistosomiasis and malaria), and excessive blood loss which occurs during delivery (Hill *et al.*, 2005). Inadequate dietary intake of bioavailable iron foods is caused by high consumption of cereal-based diets (which have high content of phytate, an inhibitor of iron absorption) (Allen, 2005). Iron deficiency is the primary cause of anaemia in pregnancy, although other micronutrient deficiencies such as vitamins A, B₆, B₁₂, C and folate can also result into anaemia (Baker *et al.*, 2009). Iron status can be improved by providing iron supplements to women, improved iron diets and control of parasitic infections such as malaria and worms (Rao *et al.*, 2010).

2.2.2.2 Vitamin A deficiency

Vitamin A Deficiency (VAD) during pregnancy is caused by inadequate dietary intake of vitamin A to meet physiological body needs. The deficiency results from inadequate intakes of animal foods, lack of enzyme needed to cleave carotenoids to retinol and inadequate intakes of fat which facilitates the absorption of carotenoids (Jamil *et al.*, 2008). Dietary sources of preformed vitamin A include liver, milk and egg yolk. Dark green leafy vegetables such as spinach, yellow and orange non citrus fruits (mangoes, apricots, papayas) and vegetables (pumpkins, squash, carrots), are common sources of carotenoids (vitamin A precursors). Recurrent infections are also the cause of vitamin A deficiency (Yakoob *et al.*, 2010). Infections reduce the efficiency of absorption, conservation and utilization of vitamin A. It also reduces vitamin A intake by depressing the appetite (Hill *et al.*, 2005). Moreover, frequent reproductive cycles also cause the deficiency. As with iron and other micronutrients, vitamin A requirements increase with lactation. This is to say that, for vitamin A, lactation puts greater demands on the vitamin on maternal reserves than pregnancy (Black, 2001).

2.2.2.3 Folate (folic Acid) deficiency

Folate a water-soluble B-complex vitamin is considered as an essential nutrient, since it cannot be synthesized in the human body (Yakoob *et al.*, 2010). Folate is critical for foetal development because it is a cofactor for many essential cellular reactions, including DNA and nucleic acid synthesis (Hill *et al.*, 2005). Folic acid needs increase during early pregnancy, the period of rapid tissue growth as it assists in increasing red blood cell mass, enlargement of the uterus and the growth of the placenta and foetus (Bailey, 2000). Insufficient maternal folate (folic acid) intake is said to result in low birth weight, IUGR,

and preterm birth. Marginal maternal folate intake also, can impair cellular growth of the placenta or foetus (Abu-Saad and Fraser, 2010). Folate deficiency among women, especially during the first few weeks of pregnancy is the leading cause of neural tube defects (NTD), another congenital malformation that damages the foetal brain and spinal cord. Maternal folate deficiency is also linked with higher risks of perinatal and infant mortality rates (Pitkin, 2007).

2.2.2.4 Iodine deficiency

On the same token, iodine deficiency is considered to be the most common preventable cause of mental disorders in the world today, and manifests at different stages of human life (Yakoob *et al.*, 2010). Women of reproductive age comprise a large proportion of people with severe iodine deficiency (Black, 2001). Severe iodine deficiency among pregnant women is said to result to high incidences of goitre. Severe iodine deficiency also can cause irreversible brains and nervous damages of the offspring (Jamil *et al.*, 2008). Pregnant women with severe iodine deficiency are at a higher risk of pregnancy-related problems such as miscarriages, stillbirth, LBW infants, and lower chances of foetal survival (Allen, 2005). Iodine deficiency among children can lead to goitre and brain damage. Other manifestations of iodine deficiency in children include loss of energy, impaired school performance and retarded physical development (Barker, 2007). Severe iodine deficiency in children is also linked with reduction of intelligence quotient, the leading intellectual impairment among children. In adults, iodine deficiency lead to goitre and its related complications such as energy loss and impaired mental function (Abu-Saad and Fraser, 2010).

2.2.3 Infections

Infections put an additional burden on the dietary needs of women. Many infections mainly those associated with fever decrease appetite hence lowers dietary intake (LINKAGES PROJECT, 2001). Gastrointestinal infections reduce absorption of nutrients in the body and the metabolic stress of illness increases energy and nutritional needs. Three major infections affecting maternal nutrition in Africa include hookworm, malaria and HIV (Lartey, 2008).

Malaria is the primary cause of anaemia to pregnant women in many malaria endemic areas. In these areas, pregnant women suffer from malaria more frequently and have more severe infections than non-pregnant women, mostly in their first or second pregnancy (Mmbando *et al.*, 2008). Malaria destroys red blood cells and reduces immune response (Mubyazi *et al.*, 2005). Malaria infection during pregnancy causes adverse outcomes such as foetal loss, premature delivery, intrauterine growth retardation, preterm delivery and delivery of low birth-weight infants (CDC, 2004). Malaria is also responsible for about 20% of all deaths among pregnant women, while malaria related anaemia contributes significantly to maternal deaths in Tanzania (Mubyazi *et al.*, 2005).

Other serious infection which occurs during pregnancy is hookworm infection. Prevalence of hookworm infections among African women aged 15 to 45 years is estimated at 32% (Black, 2001). Hookworms attach and feed on the intestinal epithelium causing bleeding and hence blood loss (Adam *et al.*, 2005). Hookworm infections may cause chronic blood loss, resulting into iron deficiency anaemia (Solomons, 2007). Hookworm infection of moderate intensity may cost a woman as much or more iron as

required during pregnancy. The concentration of 10 mg/g faecal haeme represents a daily loss of more than 2 mg of iron, comparable to the amount of iron required per day during pregnancy (Black, 2001). The degree of iron deficiency anaemia associated with hookworm infection is dependent on a number of variables such as, worm burden (intensity and duration), the type of hookworm (*Ancylostoma duodenale* causes more blood loss than *Necator americanus*), woman's iron reserves and woman's overall nutritional status (LINKAGES PROJECT, 2001).

High rates of HIV infection among women affect their energy and nutrient needs. Approximately 12.9 million African women of reproductive age (15 to 49 years) are living with HIV/AIDS (USAIDS, 2000). Malabsorption of fats and carbohydrates is common at all stages of HIV infection. Fat malabsorption affects the absorption and utilization of fat-soluble vitamins such as vitamin A, D, E and K (Seumo and Abdallah, 2008). The infection also increases the burden of maternal nutritional needs and reduces maternal immune status (Lartey, 2008). Inadequate dietary intake to meet the increased metabolic demands for both energy and protein resulting from HIV infection is likely to result into weight loss in women (LINKAGES PROJECT, 2001). This can further reduce a woman's ability to fight against HIV infection.

2.2.4 High energy expenditure

High energy expenditure during pregnancy is a widespread problem in most of the African countries (LINKAGES PROJECT, 2001). African women engage in physically demanding activities requiring high energy levels throughout pregnancy. Women in sub-Saharan Africa, contribute 60 to 80% of agricultural labour, which requires them to produce food for sale and for household use (Lartey, 2008). Pregnant mothers maintain

high levels of activity throughout pregnancy, without compensating for the increased energy demands of gestation which predisposes them to maternal undernutrition.

2.2.5 High demands of pregnancy and lactation

High demands of pregnancy and lactation which are caused by short intervals between pregnancies and regular pregnancies are other contributing factors to maternal undernutrition. In most developing countries, women spend a large proportion of their reproductive years in pregnancy, lactation or in pregnancy and lactation (Lartey, 2008). African women between the ages of 15 and 45 years get pregnant or lactate at an average of 30 to 48% of their life time (LINKAGES PROJECT, 2001). If a woman does not consume enough food to meet energy requirements during pregnancy, her body makes up for the deficit by depleting energy stores. If energy intake continues to be adequate after delivery, her body uses fat stores to support lactation (Smith *et al.*, 2003). Short intervals between births do not provide enough time for women to replenish lost energy stores before another reproductive cycle begins. Short birth intervals are also associated with high rates of anaemia (Hill *et al.*, 2005). Large amounts of iron are lost during pregnancy due to tissue synthesis for the mother, placenta and foetus and blood loss during delivery (USAID, 2006). The review of birth intervals in most African countries shows that, more than half of birth intervals were less than three years and about a quarter were less than two years (Lartey, 2008). Birth intervals of three years or more ensures child survival and gives mothers more time to replenish their nutritional stores (UNICEF, 2004). The actual length of birth intervals in many African countries is often much shorter.

2.3 Maternal Nutrition Status

2.3.1 Food consumption pattern of pregnant women

Nutrition is a fundamental pillar of women's wellbeing and women's right during pregnancy and lactation. Adequate nutrition during pregnancy is essential for both maternal and foetus health (Pillar *et al.*, 2006). In order to meet nutrient requirements of pregnancy, adequate energy intake and diversified diets throughout the gestation period are important (Kind *et al.*, 2006). Energy is the chief nutritional determinant of gestational weight gain. During pregnancy, additional energy is required for the growth and maintenance of the foetus, placenta and maternal tissues (Brown, 2008). Pregnant women should increase the frequency of meals to meet their daily energy needs. It is recommended that pregnant women should have snacks every day in addition to the regular three meals per day to meet their daily energy requirements (Seumo and Abdalah, 2008). FAO/WHO/UN in 2008 recommended that, pregnant women should increase their energy intake by 85 kcal/day in the first trimester, 285 kcal/day in the second trimester, and 475 kcal/day in the third trimester (Abu-Saad and Fraser, 2010). They also recommended that, pregnant women should eat diversified diets, comprised of fruits, vegetables, cereals, bananas, roots and tubers, fats, oil, sugar and honey, pulses, nuts and foods of animal origin (fish, meat, milk, eggs, and edible insects). Moreover, pregnant women and their households should consume iodized salt every day in order to meet their iodine needs (Seumo and Abdalah, 2008). In addition, pregnant women should eat enough iron-rich or iron-fortified foods (meat/meat products, breads, and cereals) along with vitamin C rich foods (orange, broccoli or passion juice) so as to enhance their iron absorption. Pregnant women are not allowed to skip meals. These women are required to

eat three small to moderate sized meals at regular intervals and two to four nutritious snacks in between meals per day (Fowles, 2006).

Some nutrient requirements, particularly iron, folic acid, and vitamin A, are more difficult to achieve through food sources. For this reason, supplements are recommended in addition to improved diets (Fowles, 2006; Muthayya, 2009). Iron and folic acid supplementation (60 mg of iron and 400 µg of folic acid) are recommended daily to all pregnant women for six months during pregnancy (WHO, 2001). If the woman is anaemic, she should continue with the supplementation for six months post-partum. Tanzanian policy on micronutrient supplementation (Micronutrient Deficiency Control Policy Guidelines for Supplementation of 1997) recommends that, pregnant women should be supplemented with 200 mg iron and 1 mg folic acid once a day throughout pregnancy (Seumo and Abdalah, 2008).

2.3.2 Relationship between maternal nutrition status and birth outcomes

The quality of a woman's diet during pregnancy, mainly during the first trimester of pregnancy, has a profound positive influence on foetal and placental development and on subsequent foetal growth and maternal well-being (Fowles, 2006). During the first half of pregnancy, extra nutrients are primarily required to increase maternal tissues such as expansion of blood and extra cellular fluid volume, enlargement of uterus, mammary tissues and fat deposition. During the third trimester, the additional nutrients are mainly used by the foetus for rapid growth and storage (Seumo and Abdalah, 2008). Healthy maternal eating habits lead to stronger immune system, less illnesses and better maternal health status and pregnancy outcomes (WHO, 2007). Literatures also show that, an

increase in energy and protein intakes seems to be successful in achieving good maternal nutritional status hence good birth outcome (NICE, 2008).

Inadequate weight gain during pregnancy results into LBW, which increases infant's risks of dying (Nyaruhucha *et al.*, 2006). Maternal deficiencies of certain nutrients are associated with maternal complications and death, foetal and/or newborn death, birth defects and decreased physical and mental potential of the child (Brown, 2008). Poor maternal nutritional status has been related to adverse birth outcomes; however, the association between maternal nutrition and birth outcome is complex and is influenced by social, biological, and economic factors (Siza, 2008). Understanding the relation between maternal nutrition and birth outcomes has provided the basis for developing nutritional interventions that improve maternal health-care costs and long-term quality of life that reduces maternal morbidity and mortality rates.

2.4 Importance of Nutrition Knowledge to Pregnant Women

Nutrition knowledge is the understanding of different types of food and how food nourishes the body and influences health (Ongosi, 2010). Pregnant women perceive nutrition knowledge to be very important because it is among few things which they can apply in their daily lives to protect their health and the health of their foetus. Understanding nutritional requirements of pregnancy is a guide for maternal health eating. Research shows that, pregnant women have increased nutrition awareness as they are great seekers of nutrition information (Szwajcer *et al.*, 2005). From these observations, nutrition knowledge is effective in increasing pregnant women's nutritional status. There is some evidence of a fair quality from the field of nutritional support that,

intensive antenatal dietary counselling and support is effective in increasing women's knowledge about healthy eating and can impact upon eating behaviours (NICE, 2008).

2.5 Satisfaction of Pregnant Women on Nutrition Services Provided at RCH Clinics

Satisfaction and dissatisfaction indicate patients' judgment about the strengths and weaknesses of the service (Chow *et al.*, 2009). Patient satisfaction of the quality of care is the degree to which the patient's expectations, goals and/or preferences are met by the health care providers and/or by the service (Debono and Travaglia, 2009). Client satisfaction is the litmus test that enables health programmes to assess the impact of their services thus it is an integral part of the quality assurance processes of health delivery (Ghobashi and Rajiv, 2008). Pregnant women's satisfaction on care often determines their willingness to comply and continue with the service (Fawole *et al.*, 2008). Women want to receive information that is relevant to their needs, desires, and lifestyle behaviours and therefore they may only perceive information that addresses personal circumstance as useful (Sandberg, 2005; Montasser *et al.*, 2012). Other studies have reported dissatisfaction with antenatal care among pregnant women (Oladapo and Osiberu, 2008). The reasons for dissatisfaction in these studies included long waiting time, inadequate supply of medicines and negative attitudes of providers towards clients and service provision. For antenatal services to bring most wanted outcomes (that is safer delivery with skilled personnel and desirable birth outcome) maternal satisfaction and high quality services are crucial.

2.6 Nutrition Knowledge and Practice of RCH Providers towards Nutrition

Nutrition is considered to be the bedrock of wellbeing and prevention of ill health in the society. It is also an essential factor in promoting health of the pregnant women as well as the public. Since nutrition is recommended as the key to the health of the pregnant women, it is essential for all health care providers to understand the impacts of dietary intake to pregnant women's wellbeing and thereby provide appropriate nutrition information to these women (Montasser *et al.*, 2012). It is vital for midwives to have nutrition knowledge that is current, clear, accurate and relevant. Nutrition messages from midwives should be locally made and tested to ensure that such messages address women's specific fears, concerns and constraints and offers locally available appropriate solutions (Elias and Green, 2007). Common nutrition messages taught by RCH providers during delivering antenatal services to pregnant women in Tanzania include, eat green vegetables daily, eat balanced diet frequently and avoid consumption of charcoal and soils during gestation. These messages are prepared by health and nutrition experts from MoH, TFNC and many others. Majority of RCH providers know that nutrition is very important during pregnancy and they have a significant role to play in providing nutrition education to pregnant women. A large number of providers however, feel moderately confident or not confident at all in providing nutrition information to pregnant women (Schaller and James, 2005).

2.7 Roles of Health Sector in Improving Maternal Nutritional Status

Health sector plays an important role in addressing maternal nutrition needs during ANC contacts. Antenatal clinic is the place which provides an opportunity for health and nutrition education and clarification of topics related to pregnancy and nutrition (Raooof

and Al-hadithi, 2011). Antenatal care is a term used to describe the procedures and care provided to pregnant women at RCH clinics which aims at producing safe and healthy outcome of the mother and her offspring at the end of pregnancy (Seiber *et al.*, 2005). Antenatal care is a routinely care ranging from screening to intensive life support provided to pregnant women at RCH clinics during gestation to delivery. One of the main goals of antenatal care is the provision of adequate information that is essential for maintaining and improving pregnancy outcomes. Antenatal care provides an opportunity to inform and educate pregnant women on various issues related to pregnancy, birth, and parenthood. For antenatal care to be effective, the timing of the first visit, the number of visits, maternal nutrition education and the quality of services provided at antenatal clinics must be considered. Besides the benefits of identifying high risk pregnancies and providing timely assessment and treatment, one of the expected utilities of antenatal care is the provision of nutrition education and other health services to pregnant women.

2.7.1 Provision of nutrition education to pregnant women

Maternal nutrition education given at RCH clinics should address the prevention of maternal undernutrition by advising pregnant women on adequate food intake, malaria and hookworm prevention, and birth spacing (Anderson *et al.*, 1995). Besides, it should address micronutrient needs of pregnant women and raise awareness among pregnant mothers of the grave effects of poor maternal micronutrient intake to themselves and to their offspring (Black, 2001). During ANC contacts, RCH providers should find out from pregnant women their food beliefs and eating practices to guide them on suitable diet intake and food diversification basing on their locally available foods (Anderson *et al.*, 1995, Black, 2001).

2.7.2 Provision of education on malaria and hookworm prevention

As for the malaria prevention, Tanzania Health Policy of 2003 recommends three approaches of preventing adverse effects of malaria infection. These approaches include, intermittent preventive treatment (IPT) with antimalarial drugs, insecticide-treated bed nets (ITN), and febrile malaria case management (CDC, 2004). Providers should prevent malaria infections to pregnant women through, provision of antimalarial prophylaxis, sulfadoxine pyrimethamine (SP) tablets. This is the current drug of choice for malaria prevention during pregnancy. Pregnant women should take SP tablets in the 2nd and 3rd trimesters of pregnancy and promote vector control measures like the use of insecticide-treated bed nets (WHO, 2000a). As for hookworm infection, RCH providers should counsel pregnant women on preventive measures such as appropriate disposal of human waste (as transmission occurs mainly through physical contact with soil contaminated by human faeces) and deworming. Moreover, RCH providers should give pregnant women anthelmithic drugs (mebendazole tablets) once in their second trimester of pregnancy (Solomons, 2007).

2.7.3 Provision of education on birth spacing

Extending birth spacing and longer non-pregnant and lactating intervals provide women with enough time to replenish nutrition stores and improve infant health (UNICEF, 2004; USAID, 2006). Promotions of increased birth spacing through support of optimal breastfeeding and family planning have a major positive impact on maternal nutrition and child survival. Birth spacing could be promoted as a health intervention by RCH

providers through maternal and child health programmes and family planning programmes (Mora and Nestel, 2000).

2.7.4 Provision of education on the consumption of micronutrients rich diets

Specific micronutrient deficiencies affect maternal and foetal health. Micronutrient deficiencies during pregnancy can be prevented through diet diversification and micronutrient supplementation (Fowles, 2006). Accordingly, the health sector should encourage and counsel pregnant women on diet diversification. Optimal practices for diet diversification include, increased daily consumption of green leafy vegetables, yellow and orange fruits and animal products. Increased vitamin C consumption from fruits and vegetables will enhance the iron bioavailability from other foods (Brown, 2008). Animal products are the best source of protein, fat, and micronutrients. Many micronutrients from animal products are more readily absorbed and/or utilized by the body (LINKAGES PROJECT, 2001; Muthayya, 2009). Moreover, specific micronutrient deficiency can be prevented through consuming foods that are rich in that specific micronutrient. For example to prevent iodine deficiency, promotion of use of iodized salt by the entire family is of a top priority (Allen, 2005).

The roles of the health sector in improving maternal nutritional status should be integrated within the existing health care systems. These roles would promote self-care among women and thereby foster their empowerment. In playing these roles, RHC providers need first to understand the technical basis of the recommended actions; secondly to be aware of the factors that motivate or inhibit adoption of behaviours; thirdly to have effective counselling skills, and fourthly to have reliable supplies of micronutrient

supplements, anti-malarial drugs and hookworm medication (LINKAGES PROJECT, 2001).

2.8 Timing and Delivery of Nutrition and Health Services at RCH Clinics

The timing of the first antenatal visit is very important as it provides excellent opportunity to reach the pregnant women with diagnosis and treatment of diseases and health education programs (Turan and Sale, 2003). It also provides opportunity for preventive health care services such as immunization against neonatal tetanus, prophylactic treatment of malaria (through intermittent presumptive treatment approach) and HIV counselling and testing to prevent maternal to child transmission of the disease. Another advantage is early detection of modifiable pre-existing medical conditions that may influence the course and outcome of pregnancy such as cervical incompetence, chronic hypertension and diabetes mellitus (Ndidi and Oseremen, 2010). Pregnant women are advised to start ANC before the 16th week of gestation (Mrisho *et al.*, 2009). For the desired birth outcomes, the timing for the first visit and the subsequent number of visits is vital.

The number of visits assists in the establishment of confidence between the pregnant woman and her health care provider, the promotion of health messages and essential services, and in the identification and management of maternal complications or risk factors (Gross *et al.*, 2012). Currently, WHO recommends four visits for uncomplicated pregnancies (WHO, 2000b). Each visit has a well defined set of activities related to three equally essential areas namely, screening for conditions that are likely to increase adverse pregnancy outcomes, provision of therapeutic interventions known to be beneficial and education to pregnant women on planning for safe birth, and emergencies during

pregnancy and how to deal with them (von Both *et al.*, 2006). Table 1 presents detailed information on ANC services provided to women during each visit.

Table 1: Checklist of focused antenatal services provided at RCH clinics in Tanzania

Parameter	First visit (<16 wks)	Second visit (20–24 wks)	Third visit (28–32 wks)	Fourth visit (36 wks)
1. Registration	yes			
2. History taking				
Personal history	yes			
Family history	yes			
Social history	yes			
Past medical/surgical history	yes			
Complaints in current pregnancy	yes	yes	yes	yes
3. Examination				
Head to toe (whole body)	yes	yes	yes	yes
Pallor	yes	yes	yes	yes
Oedema	yes	yes	yes	yes
Breast	yes			yes
Lungs and heart	yes			yes
4. Clinical investigation				
Temperature	yes			
Pulse	yes			
Blood pressure	yes	yes	yes	yes
Weight	yes	yes	yes	yes
5. Obstetric complications				
Fundal height	yes	yes	yes	yes
Foetal presentation and engagement			yes	yes
Foetal heart sound		yes	yes	yes
6. Pelvic (vaginal) examination				
Soft tissue assessment	yes			yes
Bony pelvic assessment				yes
7. Laboratory investigations				
Blood:				
Haemoglobin	yes	yes	yes	yes
Grouping and rhesus factor	yes			
VDRL	yes			
HIV testing	yes			
Urine:				
Protein, sugar, acetone	yes	yes	yes	yes
8. Drugs and immunization				
Iron	yes	yes	yes	yes
Folic acid	yes	yes	yes	yes
Antimalarial (Fansidar 3 tablets)		yes	yes	
Tetanus toxoid	yes	yes	yes	
9. Client Education and counselling (for the couple)				
Pregnancy and its complications	yes	yes	yes	yes
Diet and nutrition	yes	yes	yes	yes
Rest and exercise in pregnancy	yes	yes	yes	yes
Personal hygiene	yes	yes	yes	yes
Danger signs in pregnancy	yes	yes	yes	yes
Use of drugs in pregnancy	yes	yes	yes	yes
Effects of STI/HIV/AIDS	yes	yes	yes	yes
Voluntary counselling and testing	yes			
Care of breast and breast feeding	yes			yes

Symptoms/signs of labour				yes
Plans of delivery	yes	yes	yes	yes
Plans for postpartum care				yes
Family planning			yes	yes
Harmful habits (smoking, drug abuse and alcoholism)	yes	yes	yes	yes
Schedule of return visit	yes	yes	yes	yes

Source: von Both *et al.* (2006)

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Area

The study was conducted in Temeke District in Dar es Salaam Region. The district is located in the southern part of the region, along the Indian Ocean. The district shares borders with the Indian Ocean to the east, Mkuranga District to the south and Ilala District to the north and west. The district has a total area of 786.5 square kilometres with a coast line of 75 kilometres. The district has 3 divisions, 24 wards, 97 streets, 15 villages, 62 hamlets and 187 609 households (URT, 2004). In the 2002 census, the district had a population of 948 498 people with the growth rate of 4.6% per year. The original inhabitants of the district are the Zaramo and Ndengereko, but due to urbanization the district has become multi-ethnic (URT, 2004).

3.2 Rationale for Choosing the Study Area

The district was selected because it is the largest district in the region by both size and population. In addition, primary health indicators of the district showed that, its residents have poor health status. Infant mortality rate was 63/1000 against the national goal of 50/1000; under fives mortality rate was 181/1000 against the national goal of 70/1000; and the maternal mortality rate was 643/100 000 against the national goal of 400-600/100 000 (TMC, 2006). Moreover, the district has fewer health facilities than the other two districts in the region. This could be one of the predisposing factors for poor health status of Temeke residents. Temeke district has three hospitals, five health centres and 127 dispensaries. Comparatively, Kinondoni District has a total of 21 hospitals, 11 health

centres and 184 dispensaries while Ilala District has 10 hospitals, 12 health centres and 112 dispensaries (Mamkwe, S.A. personal communication, 2012). Reproductive and Child Health (RCH) services are provided in all hospitals and health centres in the district and only 60 dispensaries of the district provide RCH services (TMC, 2006).

3.3 Study Design

A cross-sectional design was used in this study because it has a greater degree of accuracy and precision in social science studies compared to other designs. It also allows the collection of in-depth data from different groups of respondents at one point in time. Moreover, the design is good in determining the relationship between and among variables (Kothari, 2004).

3.4 Study Population

The study involved RCH clinic health providers and pregnant women from 12 selected health facilities in Temeke District. The RCH providers were selected because they were key providers of nutrition education to pregnant women during ANC visits. The inclusion criterion for selecting health providers was involvement in RCH services in the selected health facilities. The inclusion criterion for pregnant women was ANC attendance in selected health facilities. Pregnant women were the key beneficiaries of health and nutrition education and other services offered at RCH clinics during antenatal and postnatal periods. The criteria for excluding pregnant women from the study were infection with any chronic diseases such as Tuberculosis, HIV/AIDS, Sickle cell disease, Diabetes Mellitus, Hypertension and mental illness. These women were excluded from the study because of their chronic disease pattern so their pregnancy performances are not

normal. Moreover, these women were receiving special services and care in addition to health and nutrition education.

3.5 Sampling Procedure and Sample Size Determination

3.5.1 Sampling procedure

Multistage and purposive sampling was adopted. Multistage sampling is documented to be convenient and useful for studying large samples, diverse populations and populations whose list of individuals to be studied (sampling frame) is hardly available (Kothari, 2004). The technique also allows more than one sampling method to be applied and have the population sampled by phases (Fowler, 1993). Purposive sampling relies on the judgment of the researcher during the selection of sample units (people, organisations, events) that are to be studied. This sampling mainly focuses on particular characteristics of interest, which will best answer the research objectives. In this study, multistage sampling facilitated selection of pregnant women and RCH providers whereas; purposive sampling was used in the selection of number of health facilities to be involved in the study.

Temeke District has three Hospitals, five Health Centres and sixty Dispensaries which provide RCH services. Of the three Hospitals, two are government-owned and one is privately-owned. All three hospitals were selected for this study. The first one was selected because is the district hospital hence, it receives women from all other health facilities of the district, thus its involvement in the study helped to obtain various types of information from all parts of the district. The second government owned hospital was selected because of its geographical location; it attends a high number of pregnant women and has adequate number of RCH providers. The privately-owned hospital was selected to

represent private facilities. Of the five Health Centres in the district, only one is government-owned and the rest four are privately-owned. The government-owned health centre was selected as it was the only facility in that category, whereas two privately-owned centres were selected due to the high number of pregnant women attended, their geographical locations, and the large number of RCH providers present. Out of the sixty Dispensaries of the district, 33 were government-owned, 20 were privately-owned, 4 were faith-based, and 3 were military-owned. To be included in the sample, a dispensary should have provided RCH services for more than 5 years, have adequate number of RCH staff (> 10), serve a high number of pregnant women (>50), its geographical location and its ownership nature (government, private-owned or faith-based facility) were considered. Six out of sixty dispensaries were selected because they met the mentioned above criteria. Among the selected dispensaries, three were government-owned, one a privately-owned, and two were faith-based facilities. Military-owned dispensaries were not included in the study because permission was denied to conduct the study in military premises. Location of selected RCH health facilities out of the existing health facilities in Temeke District is shown in Fig. 1.

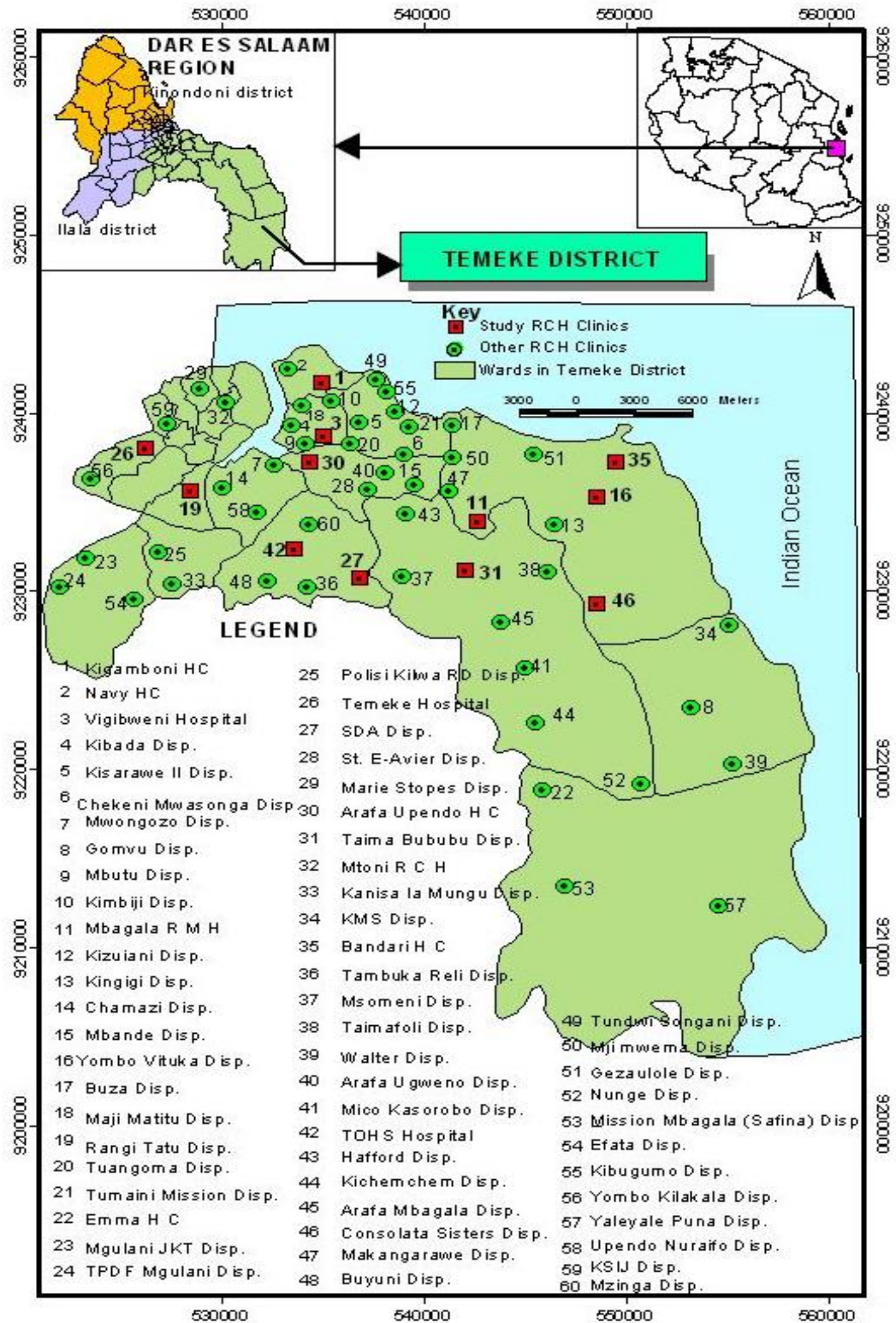


Figure 1: A map of Temeke district showing the studied RCH health facilities

The multistage sampling involved two sampling stages namely stratified and simple random sampling. The first stage involved the selection of health facilities. By using stratified random sampling, three strata, public, private and faith-based facilities, were formulated. Health facilities in each stratum were further stratified as hospitals, health centres and dispensaries. A list of hospitals, health centres and dispensaries which provide RCH services was obtained from Temeke Municipal Council. Their names were written on pieces of papers. Later, these papers were folded and selected using simple random sampling to get the names of facilities for this study. The second stage involved selection of study participants. Names of RCH providers were obtained from the selected health facilities. These names were written on pieces of papers then folded and chosen by simple random sampling to get the names of RCH providers to be involved in the study. In addition, names of pregnant women were obtained from RCH registers of the selected health facilities. Later, these names were written on pieces of papers then folded and chosen by simple random sampling to get the names of women for inclusion in the study.

3.5.2 Sample size determination

A total of 208 respondents (108 RCH providers and 100 women) were recruited for this study. The formula used for calculating sample size for RCH providers was by Fischer *et al.* (1991).

Formula: $n = Z^2 pq/d^2$ (1)

n = sample size when population is greater than 10 000

Z = standard normal deviation, which is 1.96 set at 95% confidence level

p = proportion in target population with features of interest (If unknown use 50%) = 0.5

$$q = 1.0 - p \text{ (expected non-prevalence)} = 0.5$$

$$d = \text{degree of accuracy desired } 5\% = (0.05)$$

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2}$$

$$= 384$$

Since population of RCH providers in Temeke District is less than 10 000, the following formula by Kothari (2009) was used,

$$n = \frac{no}{1 + \frac{(no-1)}{N}} \dots\dots\dots(2)$$

Where n = Sample size when population is less than 10 000

no = Sample size when population is less than 10 000 (calculated from above)

N = Number of RCH providers in Temeke District (150 RCH providers)

$$n = \frac{384}{1 + \frac{(384-1)}{150}}$$

$$= 108$$

The number of pregnant women for this study was determined using the same formula, based on the prevalence of low birth weight (the major adverse pregnancy outcome) of 7% for Tanzania (NBS and ICF Macro, 2011).

$$\text{Formula: } n = Z^2 pq / d^2 \dots\dots\dots(3)$$

Where: n = sample size when population is greater than 10 000

Z = standard normal deviation, which is 1.96 set at 95% confidence level.

p = expected prevalence (0.07)

$q = 1.0 - p$ (expected non-prevalence) = 0.93

d = degree of accuracy desired 5% (0.05)

$$n = \frac{(1.96)^2 \times 0.07 \times 0.93}{(0.05)^2}$$

$$= 100$$

The total sample size for this study was $108+100 = 208$ respondents.

3.6 Data Collection

Data were collected over the period of six months from November 2011 to April 2012. Several techniques were used in the data collection. The application of more than one technique in data collection was vital in order to provide checks and balances regarding shortfalls characterized by each technique (Chilimo, 2002). Both primary and secondary data were collected. Primary data were collected through semi-structured questionnaire, in-depth interviews with key informants, client exit interviews, structured observation, and focused group discussions (FGDs). Secondary data were reviewed in relation to the research topic: these included reports and records from sampled health facilities and other relevant sources such as Temeke Municipal Council and Ministry of Health and Social Welfare.

3.6.1 Pre-testing of survey tools

All tools were pre-tested in three health facilities, Mwananyamala Hospital, Magomeni Health Centre and Kigogo Dispensary in Kinondoni District. It involved six RCH providers and six pregnant women (two from each facility). The district was selected because it has similar features to Temeke District and the facilities were not part of the study area. After pre-testing, changes and modifications such as rephrasing, deleting, and addition of questions were made.

3.6.2 Semi-structured questionnaire

The method was selected because it involves several respondents, it allows the collection of large amount of information in a short time hence it is cost effective, it facilitates wide geographical coverage and the respondents complete it at their own pace (Kothari, 2009). It also gives the respondents a great feeling of anonymity which in turn encourages openness to questions (Powell, 1991). Two semi-structured questionnaires were constructed, one for RCH providers (Appendix 1) and another for pregnant women (Appendix 2). The semi-structured questionnaire for RCH providers was divided into four sections. Section one represents social demographic characteristics such as age, education level, marital status, occupation category and working duration. Section two and three were about nutrition knowledge of the providers and the timing and delivery of nutrition services respectively. Section four presents the perception and practice of providers towards nutrition and was aimed at gathering information on how providers perceive nutrition and their practices towards nutrition.

The semi-structured questionnaire for pregnant women sought information related to their social demographic and social economic characteristics such as age, marital status, education, tribe, occupation, income and household composition. These characteristics are known to influence nutrition status of a pregnant woman. Pregnant women were also asked questions regarding RCH services such as initiation of ANC, its importance, services provided, nutrition education given and their practices towards nutrition.

3.6.3 In-depth interviews with key informants

Information obtained through face-to-face in-depth interviews with key informants was used to supplement information gathered from structured questionnaires. In-depth face-to-face interview is flexible and provides opportunity to probe and ask follow-up questions (Kothari, 1993). In so doing, more and greater in-depth information was obtained. Checklists for key-informant interviews are presented in Appendix 3. The first interview was conducted with the Assistant Director of Nursing Schools from the Ministry of Health and Social Welfare (MoHSW) of Tanzania. This interview aimed at obtaining information on education level of nurses responsible for RCH services, duration of their training, courses offered, nutrition courses and the awards given. Qualification of lecturers responsible for nutrition courses was also investigated. This information helped to relate nursing training and their nutrition knowledge. The second interview was done with the Assistant Director of Reproductive and Child Health Section of MoHSW. The director was required to provide information on RCH services, nutrition knowledge of providers, initiation and delivery of nutritional education to pregnant women, and the national plans of addressing maternal undernutrition. The third interview was conducted with the Nutritionist from Muhimbili University of Health and Allied Sciences (MUHAS). The university was selected to represent other universities in the country offering nursing degrees. Lastly, all RCH in-charge from selected health facilities were involved in the interviews. Information from RCH in-charge supplemented the information provided by RCH providers.

3.6.4 Client exit interviews

Client exit interview (CEI) was a type of survey conducted with users after they had received the service or as they left the health facility. It was useful in the determination of client satisfaction with the services (IPPF, 2008). Information obtained from CEI was used to supplement information gathered from other methods. In this study, CEI was conducted with pregnant women in order to determine their satisfaction to nutrition related services provided to them by the RCH providers. Pregnant women who attended RCH services from the selected health facilities but who did not participate in the first interview were randomly selected for CEI. Fifty pregnant women were selected for client interviews, four from each health facility (N=11), and the remaining six women came from maternity home government dispensary. The client exit interviews were done soon after the women completed their clinic visit and just before they were about to leave. Information sought included the manner in which RCH providers behaves themselves, nutrition counselling messages given, the level of satisfaction of ANC services by pregnant women, and suggestions on what should be done to improve health and nutrition education at RCH clinics (Appendix 4).

3.6.5 Structured observation

Structured observations of routine RCH services and other issues that were relevant to the study were done in randomly selected days in each healthy facility. One advantage of the method is that users do what they normally do without knowing that they are being observed in their normal settings (Ram *et al.*, 2010). The method helped to compare the information given by RCH providers and their real practice during ANC contacts in the RCH clinics. Providers were observed in terms of how they provide nutrition education

and other health services. All RCH structural attributes were observed. The process of care attributes, namely interpersonal and technical attributes were also observed and recorded on the structured observation guide (Appendix 5). Structural attributes and Process of care attributes are important aspects in the assessment of quality (Boller *et al.*, 2003).

3.7 Operational Definitions of Quality Used in this Study

This study employed the conceptual framework developed by Donabedian (1988), who operationalised the terms used in quality. He offered the definition of quality based on three attributes: structure, process and outcome. ‘Structure’ refers to the attributes of the setting in which care is provided. General infrastructure, basic diagnostic equipments present, drugs and vaccines available, information, education and communication (IEC) materials reflect structural aspects of quality in this study (Boller *et al.*, 2003; Agha and Do, 2009). ‘Process’ is the performance of the practitioner and comprises technical and interpersonal elements. Technical elements are measured by the provider’s adherence to what is considered as good clinical procedures. Interpersonal elements include personal interactions between providers and clients (Agha and Do, 2009). The outcome indicates the effects of care on the health status of patients (Boller *et al.*, 2003). The main focus of this study was based on the structural attributes and process of care (Table 2) only because outcome is a consequence of care rather than a component of quality so it was not further assessed (Boller *et al.*, 2003).

Table 2: Attributes used for assessment of quality adopted in this study

Attributes of quality	Elements assessed with their scores (one score for each element)
Structural attributes^a	
General Infrastructure	Toilets with water, Waiting area, Privacy of examination room, Water to wash hands, Presence of enough rooms for RCH activities (5 points)
Basic equipment available	B.P Machine, Microscope, Gloves, Stethoscope, Laboratory, Uristix, HaemoCue, Weighing scale, Stadiometer, Examination bed, HIV tests, Urine bottles, VDRL tests, Foetal scope and Tape measure (15 points)
Supplements and vaccines	Iron and folic acid tablets, Mebendazole tablets, SP tablets and TT vaccine (4 points)
IEC materials	Posters with relevant nutrition information, Presence and use of visual aids and nutrition reading materials (3 points)
Process of care	
Interpersonal attributes^b	
Making women comfortable	Seat offered, Comfort in the room and use little time at clinic (3 points)
Provider-woman interaction	Enthusiasm, Non-interruption of woman's speech, Politeness, Asking woman's concerns and Elaborate RCH services to women (5 points)
Privacy	Door closed during examination, Examination room with curtains and Absence of other person in the room during examination (3 points)
Clarifying procedures to pregnant women	Clarify before examination, Clarify diagnosis, Clarify importance of TT vaccine, Clarify supplements use and Clarify advantage of RCH services to pregnant women (5 points)
Technical attributes^c	
Assessing the history of women	Past surgical history, Personal history, Family history, Social history, Past medical history, Complaints in current pregnancy, Malaria history, Urinary Tract Infection history, History of other STI and History of HIV/AIDS (10 points)
Diagnostic approach	B.P measurements routine, Routine checking of haemoglobin, Urine for albumin/infection/sugar, Blood grouping and rhesus factor, RPR/VDRL and HIV/AIDS (6 points)
Provision of supplements	Iron and folic acid tablet, SP tablets and Mebendazole tablets (3 points)
Physical examination	Checking of (eyes, palm and tongue), Legs for oedema, Foetal heart rates, Weight, Height and Abdominal examination (6 points)
Provision of Health education	General health education, Nutrition education, Health education on prevention on malaria and Benefits of deworming (4 points)

^aMaximum 27 points, ^bMaximum 16 points, ^cMaximum 29 points

Source: Boller *et al.* (2003)

3.8 Focus Group Discussions

Focus Group Discussion (FGD) is a method that involves the use of in-depth group interviews with purposively selected participants. Participants are usually selected because they have something to say on the topic; have similar socio characteristics; they are within a certain age range; and are comfortable talking to the interviewer and to each other (Rabiee, 2004). In this study, FGD was conducted with RCH providers from three health facilities, one district hospital (six members), one government dispensary (ten members) and one faith-based dispensary (four members). The district hospital was selected because it serves as RCH referral hospital of pregnant women from all other health facilities in the district; it attends high number of clients and has adequate number of RCH staff. The government dispensary was selected because it deals with RCH services only; it also has high flow of clients, adequate number of RCH providers, and has experienced providers who have done RCH activities for a long time. One faith-based dispensary was sought to be representative of faith-based facilities and attends an adequate number of clients. Private health facilities were not considered for FGD due to having fewer numbers of RCH staff and low flow of pregnant women attending ANC services in these facilities. Moreover, RCH providers in these facilities worked in more than one health facility, so its arrangement for FGD was impossible. Female RCH providers alone were involved in the current study because in all facilities there was no male provider performing RCH duties.

Focus group discussions were conducted to obtain in-depth information from providers regarding their knowledge and practices towards nutrition (Appendix 6). The introductory

remarks on the aim, duration, and mode of FGD were given and the respondents' cooperation was solicited. In order to capture full information, FGD was recorded using the 1975 Microcassette (M-570V) tape recorder (Sony Corporation). Various aspects on Focused Antenatal Care (FANC), the timing of ANC, nutrition knowledge of RCH providers and suggestions of improving nutrition services in RCH clinics were discussed. It took one hour to conduct one FGD. Each FGD was moderated by three people, the main moderator (for facilitating the discussion), a note taker (for notes taking) and a recorder (for operating the tape recorder). Focus group discussions were conducted in each respective health facilities. Bus fare was given to each participant as a token at the end of each FGD.

3.9 Data Analysis

Quantitative data were coded, cleaned and analyzed using Statistical Product and Service Solutions (SPSS) version 16 (SPSS software for windows, release 16.0, SPSS, Inc., USA). The data with multiple responses were classified into meaningful categories and recoded. Descriptive statistics e.g. frequencies, percentages, mean and cross tabulation were computed. Qualitative data were analysed using structural functional analysis approach whereby, the collected information was summarized and later discussed in relation to study objectives.

3.10 Ethical Issues

Permission to conduct the study was obtained from Sokoine University of Agriculture (SUA) and Temeke District Municipality. The selected respondents gave verbal informed consent. This was done after explaining the purpose of the study, study procedures and

the benefits of the study. High levels of individual consent and confidentiality were observed.

CHAPTER FOUR

4.0 RESULTS

4.1 Interviews with Pregnant Women

4.1.1 Socio-demographic and socio-economic characteristics

The total number of women interviewed was 100. Their mean age was 27.4 ± 5.34 (range: 18-40) years. Among the interviewed women, 88% were married or cohabitating, 10% were single and 2% were divorced. Charcoal was their main source of cooking fuel used by 96% of the respondents; whereas only 4% used gas. Their main source of light was electricity used by 66% of the respondents; while 34% used kerosene. Few women (19%) were formally employed while 46% were housewives and 35% were involved in small scale business. The results on occupation of spouses show that 44% were business men, 40% were employed and 16% were casual labourers. The household members' age distribution showed that, majority (67%) were between 15 to 64 years, few (21%) were between 5 to 14 years and minority (12%) were under five years of age. The distribution of women according to their education level showed that, most of women had completed primary school education (Table 3).

Table 3: Distribution of pregnant women by education level (N=100)

Education level	No. of respondents	Percent
None	4	4.0
Incomplete primary	7	7.0
Complete Primary	56	56.0
Incomplete secondary	6	6.0
Complete secondary	12	12.0
Certificate/ Vocational	8	8.0
Diploma	5	5.0
University	2	2.0

4.1.2 Maternal characteristics

Majority of pregnant women started attending ANC services mainly in advanced stages of pregnancy. Other maternal characteristics such as pregnancy trimester, the number of gravid and the number of stillbirths, miscarriages or abortion were explored and its summary is presented in Table 4.

Table 4: Distribution of women according to maternal characteristics

Maternal characteristics	No. of respondents	Percent
Gestational age		
First trimester (0 - 3 months)	4	4.0
Second trimester (4 - 6 months)	25	25.0
Third trimester (7- 9months)	71	71.0
Frequency of Conception		
Gravida one	30	30.0
Gravida two	32	32.0
Gravida three	19	19.0
Gravida four	14	14.0
Gravida five	5	5.0
Number of stillbirth, miscarriage or abortion		
One time	11	11.0
Two times	2	2.0
Three times	2	2.0
None	85	85.0

4.1.3 Initiation and other ANC services provided to pregnant women

Majority of the women (81%) started ANC attendance in the second trimester, few (17%) in the first trimester and 2% in the third trimester. Abdominal examination (fundal height, foetal presentation and lie), laboratory investigations, and supply of supplements and

immunization were reported by pregnant women as the routine services given to them. Very few women added nutrition education provision among the services provided. All pregnant women reported that ANC services were important for regular checking and monitoring of both maternal and foetal health. Other important aspects reported were to know maternal HIV status and prevention of maternal deaths due to pregnancy complications. Reasons for early or late initiation for ANC services are presented in Table 5.

Table 5: Reasons for initiating ANC services

Reasons for early ANC	Reasons for late ANC
Sickness	Live very far from hospital
Advised to start ANC early	Taking care of the sick person
To know HIV status	Self choice
To know prognosis of the foetus	Uncertain of pregnancy
Early diagnosis and treatment of other diseases present	Lack of permission from job
	Avoid frequent clinic visits
	Lack of money for investigation (Hb, Urine)

4.1.4 Nutrition knowledge and lifestyle practices of pregnant women

4.1.4.1 Nutrition knowledge of pregnant women

Most pregnant women were not aware of the nutritional needs during pregnancy. Among the studied women, 33% did not know that pregnant women have different nutritional needs according to gestation age, physical activities levels and pre-conceptual health status. Although some pregnant women (48%) reported of being aware of the fact that there are differences in nutritional needs during pregnancy, they could not clearly explain the difference. The remaining 19% reported that the nutritional needs during pregnancy are similar regardless of the factors mentioned above. Moreover, this study found that most women (63%) were not aware that maternal nutrition has influence on birth outcomes. Only 37% of women reported to have been aware of the association between

the two. The reported reasons for such responses include absence or occasional provision of nutrition education during ANC visits. Slightly above half of the women (57%) reported that nutrition education was occasionally provided while 38% reported that such education was not provided at all. Others (2%) were not aware if nutrition education is provided or not; and only 3% reported that nutrition education is usually provided. Another reported reason for the lack of awareness on the relationship between maternal dietary intake and birth outcome was, inadequate use of visual aids among RCH providers during nutrition education sessions. Majority of pregnant women (83%) reported absence of visual aids, while 17% reported the use of visual aids (brochures or leaflets) during nutrition education sessions. In addition, majority of women (91%) reported that nutrition reading materials were not provided during ANC services.

Another aspect investigated was the pregnant women's perception on the adequacy of nutrition education given to influence the improvement of their nutrition status. Fifty-eight percent of the women were of the opinion that nutrition education given was not adequate, 12% felt that it was adequate and 30% could not state whether the education was adequate or not. In addition, a good number of women (64%) thought that nutrition education was given less emphasis than was the case with other services that are provided at ANC; whereas 27% did not know if nutrition education was given less emphasis or not; and 9% thought that nutrition education was given emphasis.

Pregnant women were able to identify several nutrition topics/issues which are taught during the education session. The main topics identified were balanced diet, breast feeding, increase consumption of green vegetables and fruits, increasing frequency of

meals and the use of natural foods (Table 6). Women also reported of being aware that some food/drinks were encouraged to be consumed while others were restricted. Green vegetables and fruits were emphasized more than other foods in order to increase blood while alcohol, cigarettes, illicit drugs, clay soils and charcoal products were the highly restricted items. The reported reasons for such restrictions include lack of nutrition value in the body and its side effects to the mother and the foetus. Although pregnant women were encouraged to consume green vegetables and fruits more than other foods, most women (69%) cited poor methods of preparation and cooking of green vegetables; only 31% of the respondents reported to have used the optimal ways (ways which prevents and retains nutrients from green vegetables). These pregnant women reported that they prepare green vegetables by cutting them first and later wash them or they washed them first and later they cut them and lastly wash them again. Although 31% of pregnant women reported to use the optimal ways of green vegetables preparation, but they failed to give the nutrition reason for that practice. They reported removal of dirtiness, insects and sand as the main reasons for optimal green vegetables preparation rather than to retain nutrients. Their responses showed that these women used optimal ways of green vegetables by chance but were not aware of the nutritional reason behind the practice.

Table 6: Nutrition topics reported by pregnant women and the number of times the topic was mentioned to be taught during health education sessions

Nutrition topic or issue	Frequency
Balanced diet	54
Increase consumption of green vegetables and fruits	23
Breast feeding	23
Frequent meals	17
Use of natural foods	16
Green vegetables preparation	13
Drink adequate boiled drinking water	9
Avoid consumption of soil /charcoal	9

Food hygiene	9
Importance of resting	8
Pregnant women who don't know topics being taught	23

4.1.4.2 Lifestyle practices of pregnant women

All interviewed women reported not to have been smoking, 98% of them reported not have been consuming alcohol and 2% reported to have been consuming alcohol. Pregnant women who reported to have been consuming alcohol did not know that alcohol consumption during pregnancy was bad and did not know the bad effects of alcohol. One third of women (33%) were consuming tea/coffee/Pepsi/Coke drinks with food and they were not aware of the effects of these drinks on nutrient bioavailability. Although a good number of the women (67%) were not taking the above drinks with food, but they did not have nutrition knowledge of the effects of these drinks. These women cited reasons such as lack of money to buy the drinks, dislikes of the drinks and avoidance of effects of these drinks (frequent urination).

Mean birth interval for pregnant women between the previous and current pregnancy was 4.83 ± 2.65 (range: 1-12) years. Few women (12%) had a birth interval of 2 years and below; whereas majority (59%) had the birth interval of above two years; and 29% of the respondents were in their first pregnancy. Pregnant women associated the current birth interval to several reasons such as individual decision, poor economic status, failure to conceive, advice from elders, getting enough time for the mother to regain health status and the need for the baby.

4.1.5 Food consumption pattern of pregnant women

The consumption pattern of pregnant women a day before the survey and within the last seven days of the week showed that cereals (maize flour and rice), carrots, tomatoes, cooking oil, and tea and sugar were the most consumed foods. Green vegetables and fruits were frequently consumed foods; legumes, sea foods (fish, sardines), milk and milk products and flesh meat beef were less consumed foods and nuts and oil seeds like groundnuts and sun flower were the least consumed foods. Detailed food consumption pattern is shown in Table 7.

Table 7: Distribution of food consumption patterns among pregnant women

Type of food or meal	Consumed yesterday	Frequency of consumption within a week							
		0	1	2	3	4	5	6	7
Cereals (maize, sorghum, rice)	100	-	-	-	-	-	-	-	100
Vitamin A-rich tubers (carrots)	99	1	-	-	-	-	-	-	99
Roots and tubers (cassava)	16	23	23	36	16	1	1	-	-
Green leafy vegetables	76	2	-	3	9	18	17	4	47
Fruits	79	2	2	9	15	17	8	3	44
Legumes (beans and peas)	37	2	2	15	40	24	10	-	7
Nuts and oil seeds (sun flower)	0	100	-	-	-	-	-	-	-
Animal milk and milk products	29	25	20	41	10	2	1	-	1
Meat, chicken, duck and liver	33	10	25	49	14	2	-	-	-
Fish, sardines, other sea food	37	7	18	46	24	5	-	-	-
Oil or fat used for cooking	100	-	-	-	-	-	-	-	100
Sugar or sugary products	100	-	-	-	-	-	-	-	100

4.2 Exit Interviews with Pregnant Women

4.2.1 Characteristics of interviewed clients

A total of 50 pregnant women who attended RCH clinics but did not participate in the first interview were identified for client exit interviews (CEI). A total of 52% pregnant women came from dispensaries and 48% came from health centres and hospitals (Table 8). The mean age of CEI respondents was 26.90 ± 5.29 (range: 17-39) years.

Table 8: Distribution of respondents according to type of facility and ownership (N=50)

Health facility	No. of respondents	Percent
Facility type		
Hospital	12	24.0
Health centre	12	24.0
Dispensary	26	52.0
Facility ownership		
Government	24	48.0
Faith-based	8	16.0
Private	18	36.0

Regarding initiation, majority (62%) reported that the second trimester was the best trimester for initiation of ANC services, few (22%) reported the first trimester, and 16% did not know the best trimester for initiation of ANC services. Several reasons were given for the current ANC initiation and these included knowing HIV status, seeking medical advice, knowing foetal progress, and early identification and treatment of diseases. Most pregnant women (46%) were in their third trimester, 36% were in their second trimester and 18% were in their first trimester. Based on the conception times, 68% had conceived once or twice; and 32% had conceived three to five times.

4.2.2 Nutrition education provision during ANC

Among women involved in CEI, 28% reported to have been provided with nutrition education at the ANC and 72% reported not to have been provided nutrition education.

Those who reported being provided with nutrition education cited balanced diet, increased eating of green vegetables and fruits, HIV issues and breast feeding as the main topics taught during ANC.

4.2.3 Client satisfaction on nutrition knowledge provided at RCH clinics

Forty-six percent of pregnant women who participated in CEI were not satisfied with the ANC services provided on the interview day, while others (54%) were not satisfied in all the visits. Reasons for satisfaction and dissatisfaction of the services are presented in Table 9.

Table 9: Reasons for satisfaction and dissatisfaction with the ANC services

Dissatisfaction with ANC services	Satisfaction with ANC services
Services takes long time	Services takes reasonable time
Delayed starting time for ANC sessions	Obtained all services expected
Lack of adequate sitting places	Received health and nutrition education
Few health providers	Nurses were calm, polite and humble
Priority not given to sick pregnant women (were not attended first)	Read and understood information displayed on posters
Payment of some ANC services (Haemoglobin)	
Nutrition education is not provided	
Lack of minerals/vitamin supplements	

4.3 Interviews with RCH Providers

4.3.1 Socio-demographic and socio-economic characteristics

All (108) RCH providers were females and their mean age was 45.87 ± 8.65 (range: 29-64) years. Majority (45%) were aged between 40 and 50 years; whereas 30% were aged 51 years and above and 25% were aged between 29-39 years. Most providers (60%) were married, 15% were widowers, 13% were single, and 12% were divorced. The distribution of RCH providers according to their education level and cadre is shown in Table 10. Majority of RCH providers (81.5%) had certificate level of education and few (18.5%) had diploma education. The results show that there is an association between the education level of RCH providers and their nursing categories ($X^2 = 59.39$; $p = 0.00$). All Nursing Officers (NO) had a diploma level while all Maternal and Child Health Aiders (MCHA) had certificate level of education.

Table 10: Distribution of RCH providers according to their education level and cadre

RCH cadre	Education level					
	Certificate		Diploma		Total	
	N	% ^a	N	% ^a	N	%
Nurse Officer (NO)	0	0	11	100	11	100
Nurse Midwife (NM)	25	78.1	7	21.9	32	100
Public Health Nurse (PHN)	28	93.3	2	6.7	30	100
Maternal and Child Health Aid (MCHA)	35	100	0	0.0	35	100
Total	88	81.5	20	18.5	108	100

^aRow percent N=Number of RCH providers

There was a big difference in the number of NO and NM as opposed to that of PHN and MCHA in the health facilities (Table 11). The PHN and MCHA were higher in number in the government facilities but for the opposite were true with private facilities.

Table 11: Distribution of facility administration and nursing category

Facility administration	Nursing category				Total
	NO	NM	PHN	MCHA	
Government	7	17	21	28	73
Faith-based	3	7	3	2	15
Private-owned	4	8	4	4	20
Total	12	32	30	34	108

The results further show that RCH providers have done the RCH activities for a long time as their mean working duration in years was 15.07 ± 10.73 (range: 1-41) years. All the Nurse Officers have done RCH activities for short duration ranging between 1-10 years; whereas PHN and MCHA have done RCH activities for a long time ranging from 1- 41 years.

4.3.2 Nutrition knowledge of RCH providers

Nutrition knowledge of the RCH providers was assessed through finding out whether or not they have attended nutrition training, their sources of nutrition knowledge and nutrition advice given to pregnant women. The results showed that majority of RCH providers (81%) had not attended any nutrition training in the past five years, whereas 19% had attended one or more nutrition training. For those who attended nutrition training, the main themes of such training were nutrition for HIV/AIDS pregnant women and infant feeding options in the context of prevention of maternal to child transmission (PMTCT). Most RCH providers (75%) reported that nutrition training was less

emphasized than was the case with training on other health related issues. The main source of nutrition knowledge for most of the providers (74%) was nursing schools; whereas 18% were from nursing schools and nutrition training; and 8% were from nursing schools and mass media. Regarding nutrition advice given to pregnant women, the results show that majority of RCH providers (66%) taught suboptimal ways of preparing and cooking green vegetables and only 34% taught the optimal ways.

Most RCH providers (84%) reported of there being differences in nutrition requirements between trimesters while 16% reported no differences. The reasons attributed to the differences in nutrition requirements included consumption of less food during the first trimester due to hormonal changes (food selectivity, hyperemesis gravidarum and pica) and less demand of food due to small foetus. The respondents further explained that as the pregnancy progresses there is an increase in food demands due to the growing foetus, preparation for delivery and breast feeding hence more food is consumed in the second and third trimesters. All providers also reported that during nutrition education sessions, some foods were emphasized to be consumed more than others. Foods which were emphasized more included green vegetables, fruits and the use of natural foods and drinks. Alcohol, cigarette smoking, and consumption of clay soil and charcoal products were discouraged practices. Almost all providers (98%) reported that, green vegetables and fruits were mainly emphasized in order to increase blood whereas the main reason for the restrictions was that have affects to the foetus, mother or both. Despite the emphasis on consumption of green vegetables and fruits, anaemia was reported by the providers as the leading nutrition deficiency among pregnant women in the district. Other common nutrition deficiency reported in the area was low weight gain during pregnancy.

4.3.3 Timing and delivery of health and nutrition services

Majority of RCH providers (76%) reported that most pregnant women begin ANC attendance in the second trimester (4-6 months), whereas 14% of pregnant women initiated ANC at sixth month or later; and 10% initiated ANC during the first trimester. Health providers' opinion was sought to see how effective the FANC was, as the new schedule of providing RCH services to pregnant women. Majority of the RCH providers (72%) reported that FANC was very effective; whereas 16% said was not effective; and 12% could not decide whether FANC was effective or ineffective. The reasons which providers provided regarding the effectiveness and ineffectiveness of FANC are shown in Table 12.

Table 12: RCH providers' opinion on FANC effectiveness and ineffectiveness

Opinion on FANC	Reasons
FANC is effective	Reduced workload to providers Provides focused services on improving maternal outcomes Convenient to pregnant women (in terms of time and cost) Reduced the number of visits from monthly visits to only four visits for normal pregnancy Eliminates the traditional pregnancy assessments (the use of tape measure instead of fingers in fundal height measurements).
FANC is not effective	There is no close monitoring of pregnant women Longer time is spent at the clinic Delayed diagnosis of some conditions (e.g. anaemia) as women can start first ANC visit any time within the first 16 weeks. Some pregnant women do not follow some advice given to them hence attend the clinic on wrong dates

With regard to the delivery of nutrition education to pregnant women, all providers reported that no nutrition guideline to guide them to have effective nutrition education delivery. The RCH providers reported to have been providing nutrition education through experience and knowledge received from their previous formal nursing training. Group

education was the most common teaching technique used during health and nutrition education sessions in all government and faith-based facilities. One-to-one counselling was reported to be the most common technique in the private facilities. During education sessions, some providers reported to have been using visual aids, whereas others said they were not using visual aids. Brochures and posters were reported to be the commonly used visual aids. These visual aids were obtained from governmental and non governmental institutions like World Division, Care International, TFNC and UMATI. The RCH providers further reported that reading materials were distributed to pregnant women whenever they became available. The main materials provided were brochures or leaflets on nutrition issues.

All providers reported that physical examination (weight, height, oedema), history taking (personal, surgical and medical), and laboratory investigations (urine for sugar/protein, HIV status and haemoglobin) were used to assess nutrition status of pregnant women. During history taking and abdominal examination, the information on the avoidance of tobacco, cigarettes, alcohol and illicit drugs and their effects on pregnancy were given to women. After the assessments, specific advice was given to woman depending on her status.

4.3.4 Attitude and practice of RCH providers towards nutrition

The RCH providers perceived the provision of nutrition education as an important service to be provided during ANC visits. However, due to understaffing and heavy workload, the providers had developed an informal practice of reducing the number of education sessions, shortening the sessions, or skipping, or providing nutrition education to women

occasionally. Providers felt that nutrition education was given less emphasis at the RCH clinics. Table 13 presents RCH providers' opinions as to why nutrition education was given less emphasis.

Table 13: RCH providers' opinion on why nutrition education was given less emphasis

Reasons for less emphasis by RCH providers	Reasons for less emphasis by the Government
Providers not competent in nutrition	It is not a priority
Lack of motivation and incentives	Budget constraints
Heavy workload	Inadequate number of trained nutritionist
Nutrition education takes a long time to prepare and conduct	The assumption that people are aware of nutrition issues thus there is no need for mass education on nutrition
Lack of supervision and guideline on nutrition issues	
Lack of teaching materials/aids	
Inadequate nutrition training	

4.4 Key-informant Interviews

4.4.1 In-charge of RCH clinics

A total of twelve individuals who were in-charge of RCH clinics in the surveyed health facilities were interviewed as key informants. They reported that ANC services were offered daily, Monday to Friday. The services offered varied across health facilities but generally they were organized along the five thematic components stipulated by FANC. These components included history taking, laboratory investigations, supplements and vaccine provision, health education provision and physical examination. The number of clients attending each of the health facility per day is presented in Table 14. Most of privately-run facilities served fewer numbers of women compared with those run by the government or faith-based facilities.

Table 14: Distribution of clients attending the health facilities per day

Number of pregnant women attended per day	Facility administration							Total
	Government			Privately-owned			Faith-based	
	H	HC	D	H	HC	D	D	
0 - 10	0	0	0	1	2	1	0	4
11- 20	1	0	0	0	0	0	0	1
51- 60	0	1	1	0	0	0	1	3
71- 80	1	0	1	0	0	0	1	3
81- 90	0	0	1	0	0	0	0	1
Total	2	1	3	1	2	1	2	12

H = Hospital

HC = Health centre

D = Dispensary

According to those in-charges of RCH clinics, diet and nutrition guideline were non-existent, therefore RCH providers used experience of what they knew about nutrition during the delivery of nutrition education to pregnant women. The summary of topics which are taught during ANC education sessions reported included food types, food hygiene and preparation, importance of breast feeding, immunization and infant feeding options in the context of HIV/AIDS. The teaching materials used were from the government and non-governmental organizations (NGO). Eight of the In-charges reported that reading materials were provided to pregnant women, whereas four of the In-charges said such materials were not provided to pregnant women. The reading materials provided include brochures or leaflets.

Regarding in-service nutrition training, eight providers were reported to have attended nutrition training while four providers reported not to have done so in the past five years. According to those who attended training, the main themes included nutrition for HIV positive women and infant feeding options in the context of PMTCT. The criteria considered for attending these training were rotation so that every provider had to attend,

preferential choice of RCH in-charge and some training comes with pre-defined name or title of whom to attend the training.

Ten in-charges cited anaemia as the common nutrition deficiency in their facilities while the rest two reported anaemia and low weight gain. Majority of in-charges (84%) reported that there were no any nutrition programmes focusing pregnant women with nutritional deficiencies in their health facilities. Each facility was expected to take care of his clients who diagnosed to have nutrition deficiencies. These providers reported that, as they were not getting any assistance from the government as well as the donors they help these women by providing them with personal nutrition advice and close monitoring (monthly visits). Information on the supervision of RCH activities was also sought from the In-charges. Monthly supervision was done by Temeke Municipal Council RCH leaders while three-month interval supervision was done by Temeke District Health Management Team (DHMT). Depending on the objectives of the scheduled supervision, the non-specific schedule supervision was done by the Ministry of Health and Social Welfare and other health and nutrition stakeholders like TFNC. Activities observed during such supervision included RCH reports and specific RCH activities like cold chain system, supplements provision, tetanus toxoid provision, breast feeding and family planning methods counselling or other health and maternal issued at RCH clinics depending on the nature and aim of the supervision.

4.4.2 Nursing education in Tanzania

The results from the Assistant Director of nursing schools are presented under two categories: nursing education and responsibilities and nutrition training and capacity of RCH staff in delivering nutrition information.

4.4.2.1 Nursing education and responsibilities

The Director provided a summary of nursing schools that are run by the government through the Ministry of Health and Social Welfare (Table 15) and information regarding nursing training. The prerequisite education level for joining the nursing training varies depending on the level of nursing training to be pursued. For certificate level, the candidate should have completed ordinary secondary school education with passes in science subjects (Physics, Chemistry, and Biology). For diploma level (pre-service), candidate should have completed advanced secondary school education with passes in science subjects. The candidate joining diploma education (in-service) should have basic certificate in general nursing. The prerequisite for Advanced Diploma in Nursing, the candidate should have Ordinary Diploma in Nursing, and for degree level education, the candidate should have an advanced secondary education (1st division with a pass in science subjects) for direct entrant and for in-service, the candidate should have either ordinary or advanced diploma in nursing.

Table 15: Distribution of nursing schools in Tanzania

Nursing school level	Number	Duration of training	Award
Universities	7	4 years	Degree (BSc. Nursing general, Nursing in midwifery and Nursing management)
Advanced diploma	8	2 years	Advanced Diploma in Midwifery, Public health, Paediatrics or Psychiatric
Pre-Service	29	3 years	Diploma in Midwifery

Diploma			
In-Service diploma	16	3 years	Diploma in Midwifery or Psychiatric
Certificate	29	2 years	Certificate in general nursing

The course structure for certificate and diploma education is under NTA (National Technical Award) whose teaching system is by modules and semesters. The certificate education level involves four semesters in two years time and has a total of 19 modules (10 modules in the 1st year and 9 modules in the 2nd year) with a total of 240 credits (120 credits each year). Each semester has 22 weeks (44 weeks in a year) which include classroom sessions and clinical practice. The ratio of theory to practice is 1:3 (11 weeks theory and 33 weeks practice). For diploma level, the study duration is 3 years (with a total of six semesters, 360 credits and 28 modules). The degree level of nursing education is under TCU (Tanzania Commission for Universities) and TCU is under the Ministry of Education so it follows all the rules and regulations of Universities; thus these were not investigated any further. All the nurses are responsible for the provision of RCH services. In nursing colleges, nurses are taught all basic courses of nursing hoping that any nurse will be able to perform any duty regardless of their education level including RCH activities.

4.4.2.2 Nutrition training and capacity of RCH staff in delivering nutrition information

Nutrition course in nursing training is offered in the second semester of the first year and it carries 5 credit hours for both certificate and diploma students. According to the Director, the course is taught by professionals who are not trained as nutritionists. It was

further reported that some colleges hire individuals to teach nutrition course because they are given resources. The Director further reported that nutrition knowledge provided during certificate and diploma training was not adequate because it is offered in one semester and it carries fewer credit hours than do the other nursing courses. Because the tutors responsible for nutrition course are not trained nutritionist, it is obvious that they provide substandard level of education. In addition the Director reported that, RCH providers face a lot of challenges at their work places leading to poor nutrition education delivery hence causes pregnant women to miss nutrition education. These challenges include inadequate staff, lack or few working facilities such as inadequate RCH rooms, irregular shortages of supplements, lack of teaching aids, laboratory equipments and reagents. These challenges lead to poor nutrition services to pregnant women in almost all health facilities surveyed.

4.4.3 Academic qualifications of the RCH providers

The information obtained from the Assistant Director of RCH services from the MoHSW was summarised into three main categories, namely the RCH providers' academic qualifications and services offered to pregnant women, the quality of nutrition services offered at ANC clinics, and the national plans for addressing maternal undernutrition.

4.4.3.1 RCH providers' qualifications and services offered to pregnant women

The nurses' categories and their years of training include Nurse Officers (4 years), Nurse Midwife (3 years), Public Health Nurse (2 years), and Nurse Assistant (1 year). There are several services offered at RCH clinics ranging from simple procedures to complicated procedures needing more skilled personnel. Simple procedures include registration,

provision of supplements and tetanus toxoid vaccination, and weighing of pregnant women. These procedures can be provided by lowest cadre of nursing (NA). Complicated procedures which need more skilled personnel such as Nurse Midwifery and Nurse Officers include health and nutrition education, abdominal examination, pre and post-counselling on HIV status and interpretation of some of laboratory results such as urine for albumin and venereal diseases reagent laboratory (VDRL). All levels of nurses are responsible for provision of RCH services.

A total of 4 visits at RCH clinics for normal pregnant women are required in the period of nine months of pregnancy. The timing for the first visit is soon after conception to before 16 weeks of gestation. For abnormal pregnancy that is pregnancy with complications or danger signs or PMTCT one (HIV positive pregnant women), the number of visits is one in each month. Monthly visits are recommended for close monitoring and observation of these women. The services provided in each visit are shown in Table 1. According to the Director, the current schedule of FANC is very effective not only to providers but also to pregnant women. FANC effectiveness was attributed to reduced workload to providers, provision of focused ANC services and the fact that it is convenient to pregnant women.

4.4.3.2 Quality of nutrition services offered at ANC clinics

According to the Director of RCH services from the MoHSW, the guideline used in the delivery of health education is FANC, but there is no guideline for delivery of nutrition education to pregnant women. The Director reported that the quality of nutrition services provided at RCH clinics is inadequate and this was attributed by inadequate nutrition education among the majority of providers, lack of frequent in-service nutrition training,

lack of working tools, inadequate number of staff and poor working environment. The Director further reported that, anaemia is still the leading nutrition deficiency in the country.

4.4.3.3 National plans for improving maternal undernutrition

There are various plans for improving maternal undernutrition in the country as were reported by the director. These include, ensuring supply and availability of supplements in all RCH clinics, increasing the number of providers and improving the working environment. Other plans reported include employment of nutritionists, frequent in-service nutrition training, collaboration with other ministries in the delivery of health services (multi-sectoral approach) and provision of incentives to providers working in hard to reach areas (remote areas).

4.4.4 Nutrition training of nurses at degree level

Muhimbili University of Health and Allied Sciences (MUHAS) is one of the universities which offer nursing degrees in Tanzania. It offers first Bachelor's degrees, Masters Degrees, and doctorates. It is among the largest and oldest universities. Information regarding, nutrition training of nurses and opinions about nutrition knowledge of nurses was obtained from a nutritionist from the school of nursing at MUHAS.

4.4.4.1 Nutrition training of nurses

As far as nutrition is concerned, nursing students have one nutrition course called Nutrition which is taught by a Nutritionist at MUHAS. The course is offered in the second semester of the first year. The course has three modules namely, Basic Principles

of Nutrition Sciences, Nutrition throughout the Life Cycle, and Community Nutrition. The course has 7.1 credit hours out of a total of 60 credit hours in the semester. Other aspects of nutrition are taught in other courses such as maternal and child health; however this course is more health-oriented and is taught by a non-nutritionist.

4.4.4.2 Nutritionist opinions regarding nutrition knowledge of nurses

Regarding nutrition knowledge of RCH providers, the Nutritionist at MUHAS reported that, they have inadequate nutrition knowledge, attributing to this is inadequate nutrition knowledge they receive from nursing schools (one nutrition course in four years of nursing training). Lack of in-service nutrition oriented refresher/short courses especially for nurses working at RCH clinics was also cited as the second reason. According to the nutritionist, the nurses with degrees are basically supposed to work in the national or regional or district hospitals, and thereby deal with inpatients and outpatient as well as complicated and uncomplicated cases. Since some of these cases require detailed nutrition management, RCH providers need to be competent in the nutrition field.

The quality of nutrition services provided at the RCH clinics also was another aspect which was investigated in the current study. According to the nutritionist, there are a number of challenges in judging the quality of nutrition services provided at the RCH clinics. These include heavy workload and poor working environment. Other challenges reported were understaffing, lack of incentives (low payments, inadequate and poor working tools) and inadequate in-service nutrition training. Due to various constraints mentioned quality of nutrition services provided at RCH clinics is inadequate as was reported by nutritionist.

4.5 Focus Group Discussion with RCH Providers

Table 16 presents detailed information of the FGDs including the profile of the participants. The FGD results were presented in accordance with the major categories that emerged from the content analysis of FGD information. These included (i) the timing and delivery of RCH services, (ii) the perceived practice and constraints of pregnant women towards nutrition as was reported by providers, (iii) nutrition knowledge and competence of providers towards nutrition, and (iv) ways of improving competence of providers and nutrition services at RCH clinics. Inferences reflecting the feelings of the majority were presented and supported by either relevant statements or direct quotations from the providers.

Table 16: Profile of RCH providers who participated in focus group discussions

Item	Facility type			Total
	Hospital	Dispensary	Dispensary	
Facility administration	Government	Government	Faith-based	
FGD group size	6	10	4	20
Gender	female	female	female	
Age in years				
29- 39	0	0	2	2
40- 50	3	2	0	5
51≤	3	8	2	13
Nurse category				
NO	2	3	0	5
NM	1	2	2	5
PHN	0	2	1	3
MCHA	3	3	1	7
Education level				
Certificate	4	7	3	14
Diploma	2	3	1	6

4.5.1 The timing and delivery of ANC services

According to the RCH providers, majority of pregnant women initiated ANC attendances in the fourth or fifth month (second trimester) of pregnancy. *“Most pregnant women especially the multi para (have one child and above) start ANC in the second trimester as they are more experienced with pregnancy. Majority who come in the first trimester are prime Gravida”* (RCH provider in a government dispensary). Among the reasons for initiating ANC either early or late cited by the providers include avoiding frequent ANC attendances, knowing HIV status, being unaware of pregnancy, poor advice from elders and illiteracy (ignorance). As the majority of pregnant women initiate ANC very late (in the second trimester), they attended ANC clinics two or three times only before delivery. The results from faith-based facility RCH providers show that, their clients attend ANC clinic monthly thus the number of visits by a clients’ depends on the initiation month. The reason cited for not following the current FANC was their trust on the previous schedule in close monitoring and follow up to pregnant women.

The preparation of topics to be taught at the ANC sessions was also investigated. The response to this question revealed a heterogeneous picture. In all facilities involved in FGDs, RCH providers failed to respond to the question in clearer terms. According to some providers, the topics were prepared by in-charge of RCH clinic alone; however other providers said that the topics were prepared by RCH in-charge with the assistance from other RCH staff. On the other hand, In-charges of the health facilities said that the topics were prepared by all providers together with their in-charge. The preparation of the topics depended on the circumstances prevailing at the clinic; however, the topics are generally planned on the yearly basis. Furthermore, this study investigated constraints in

delivering nutrition education to pregnant women and these barriers are summarised in Table 17.

Table 17: Barriers for delivery of nutrition education to women as reported by providers

Providers are not competent on nutrition
Lack of nutritionist in health facilities
Use of short time for nutrition education at the RCH clinics due to heavy workload
Majority of pregnant women came late at clinic so they miss the education sessions
Most pregnant women are illiterate so do not practice what they are taught
Inconsistent attendance of pregnant women (failure of pregnant women to attend ANC routinely)
Absence of adequate sitting places
Lack of teaching materials (nutritional guidelines)
Ignorance on nutrition issues among the clients
Lack of visual aids (brochures, posters, pictures, modules and realism)
Inadequate nutrition knowledge due to lack of up to date nutrition information

4.5.2 Perceived practice and constraints of pregnant women towards nutrition

All RCH providers who participated in FGDs perceived nutrition education as important in improving nutrition status of pregnant women. According to the providers, majority of pregnant women (80%) did not follow nutrition advice given. And this was attributed by several factors namely, poor economic status, ignorance, big family size, laziness and non preference of nutrition issues. *“Majority of women in coastal areas prefer clothes and traditional dances (ngoma) because they have been raised so. These women do not follow nutrition advice given at RCH clinics and use most of their resources to buy clothes and cosmetics instead of food, they eat three times per day ignoring in-between meals”* (RCH provider, government dispensary).

4.5.3 Nutrition knowledge and competence of RCH providers towards nutrition

Majority of RCH providers reported that nutrition is very important during pregnancy however, majority of them reported not to have been competent with nutrition. Some providers jokingly had this to say, *“We cannot say that we are not competent while the government has given us the mandate to handle all nutrition issues at the RCH clinics. If the government thought we are not competent, it would have brought trained personnel (nutritionist) to handle nutrition issues, but we are competent that is why the government left us to perform nutrition duties”* (RCH provider, government hospital). The providers cited several reasons for lack of or inadequacy of competence on nutrition, namely non-existence of nutrition guidelines, lack of incentives and up-to-date information on nutrition (in-service nutrition training). Other reasons were out-dated nutrition education (education received from nursing school), lack of visual aids, demonstration materials and reading materials to be given to pregnant women. *“Nutrition education nowadays is theoretical instead of being practical as was the case in the past. Sometimes, pregnant women ask us to demonstrate in practice some of the nutrition issues; we just look at each other as we do not have demonstration facilities. We feel embarrassed* (RCH provider, faith-based dispensary).

4.5.4 Ways of improving nutrition services at RCH clinics

In all FGDs, providers gave suggestions as to what should be done in order to improve their nutrition competence as the key providers of nutrition education to pregnant women. The overriding suggestion was frequent nutrition training to all RCH providers. All providers in FGDs raised concern about this aspect and reported that there are tendencies of selecting providers who do not perform RCH activities to attend nutrition seminars.

“The one, who attends the nutrition seminar, should be the one who deals with nutrition issues and should teach nutrition during ANC teaching sessions and not otherwise”

(RCH provider, government hospital). Other suggestions given were provision of current nutrition information, frequent visits by nutrition professionals in order to observe the nutrition education provision at the RCH clinics and formulation of nutrition guidelines. It was thought that the guidelines would help to remind the providers on what to teach and how to teach it so as to be uniform in the nutrition education delivery across the RCH clinics in the country. Moreover, providers suggested having nutritionists who would deal with nutrition matters and providers would deal with other RCH services in all health facilities in the country. Other suggestion was increasing number of RCH providers in order to cope with the increasing number of clients.

4.6 Structured Observation of Services Provided at RCH Clinics

The provision of nutrition services by RCH providers were observed and recorded in 12 health facilities surveyed. The attributes observed included the structure and process of care. In all the facilities, RCH services were provided from 8:00 am to 3.30 pm. In all government facilities, the ANC services start with group education on health and nutrition issues such as breast-feeding, HIV/AIDS, diet and nutrition and preparedness for delivery. The clients are usually encouraged to come early in the morning in order to attend these sessions before continuing with other ANC services provided at the clinics. In the faith-based facilities, the general routine is the same like that in the government facilities. In almost all government and faith-based facilities observed, all clients would have been attended by 1:00 pm except for those who come late. The clinics with heavy flow of clients' (refer to Table 14) consultations continued till 3:00 pm. In the private

facilities, the provision of health and nutrition education and other ANC services is through one to one counselling because clients in these facilities come at their own time (no group gatherings). These facilities finish ANC services early in the morning due to having a fewer number of clients.

4.6.1 Structural attributes

A total of four structural attributes was observed. These attributes were general infrastructure, basic diagnostic equipments present, supplements and vaccination available and information, education and communication (IEC) materials available. The general infrastructure involved in the observation of five of its sub-attributes namely toilets with running water, the presence of waiting area in the RCH clinic, privacy in the examination room, availability of water (for washing hands) and adequate rooms for RCH activities (Appendix 7). The minimum score for this was three points and the maximum score was four points out of five points (Table 18).

Availability of supplements (iron and folic acid); drugs (mebendazole and SP tablets) and tetanus toxoid (TT) vaccination and basic diagnostic equipment had the highest scores. Each scored all points (Table 18). This implies that these attributes were available in the respective health facilities during the observation days.

Among the structural attributes observed, IEC materials scored the least, as its minimum score was zero and the highest score was one point out of three points (Table 18). This implies that there was low availability of IEC materials in almost all the health facilities observed. All surveyed health facilities did not have visual aids for

demonstration during nutrition education sessions and there were no reading materials provided to pregnant women.

Table 18: Distribution of scores of structural and process of care attributes

Attributes of quality	Total points	Minimum Scored points	Maximum Scored points
Structural attributes			
General infrastructure	5	3	4
Basic diagnostic equipment available	15	15	15
Supplements and vaccination available	4	4	4
Information, education and Communication (IEC) materials	3	0	1
Process of care attributes			
Interpersonal aspects			
Making woman comfortable	3	0	3
RCH provider -woman interaction	5	4	4
Privacy	3	1	3
Explaining procedures to women	5	2	2
Technical aspects			
Assessing history of woman	10	5	5
Diagnostic approach	6	5	5
Provision of supplements and vaccination	4	4	4
Physical examination	6	4	4
Health education	4	0	1

4.6.2 Interpersonal attributes

In this category the observed attributes include, making woman comfortable, RCH provider-woman interaction, privacy, and explaining procedures to women.

4.6.2.1 Making woman comfortable

Making women comfortable involved three sub-attributes namely, adequate seats at clinic comfort in the examination room and the use of short time at clinic (Appendix 7). The minimum score for this attribute was zero out of three points. This implies that this attribute (making women comfortable) was not present in some of the health facilities

observed. In all government and faith based clinics there was inadequate sitting space for pregnant women. Majority of women in these facilities were lying down while waiting for services. Also during the provision of health and nutrition education, most pregnant women were standing up. Regarding the examination rooms, in the government clinics were small in size, had small windows and had no enough ventilation. This situation makes these rooms stuffy and thus making both the provider and pregnant women feel uncomfortable. Moreover some of these facilities had no curtains on the windows hence clients privacy during examination was not guaranteed. As for the faith-based facilities, the rooms were big in size with all accessories needed; however these clinics had high flow of clients hence the providers were forced to examine two clients at one time and in one room. In addition, in both government and faith-based facilities clients spent much time waiting for ANC services. Although the minimum score for this attribute (making women comfortable) was zero, the maximum score was three points which imply that some facilities offered all the attributes required for making women comfortable. There were adequate seats, examination rooms were large and well ventilated; and the services took a short time. This was observed in all private facilities surveyed.

4.6.2.2 RCH provider - woman interaction

In this attribute a total of five sub-attributes were observed namely interest, non-interruption of women's speech, politeness, asking about women's concern and elaboration of ANC services to women (Appendix 7). This attribute scored four points out of five points indicating that all the mentioned above sub-attributes were present in all facilities surveyed except one namely elaboration of ANC services to pregnant women prior to service delivery which was observed to be minimally practiced.

4.6.2.3 Privacy

Privacy was the third attribute of interpersonal attributes assessed (Appendix 7) and its minimum score was one point while its maximum score was three points (Table 18). This indicated that some facilities had maximum privacy through having their doors closed during examination while in some facilities there was less privacy as the clients' examination activities took place while the examination rooms' doors were open. Regarding the number of people in the examination rooms, three facilities namely two faith-based and one government facilities had more than one person in the examination room. These facilities had fewer rooms for ANC activities with high flow of clients hence they were compelled to have two examination beds in one room. During examination two women are examined by two providers thus reducing the client's level of privacy.

4.6.2.4 Clarifying procedures to pregnant women

This attribute scored two points as minimum scores out of five points. This is to say that procedures were carried out to pregnant women without prior clarifications of what are they and why they were carried out to pregnant women. The most notorious areas in this attribute where clarification procedures were not done include: clarify before examination, clarify importance of TT vaccine and clarify the importance/ benefits of ANC services to pregnant women (Appendix 7).

4.6.3 Technical attributes of quality

A total of five attributes were observed which include assessing the history of women, diagnostic approach, supplements and vaccination, physical examination and health education provision (Appendix 7).

4.6.3.1 Assessments of maternal histories

Its minimum scores were five points out of 10 points as only five histories were assessed and the other five were left out (Table 18). The history about recent malaria episodes, social, family, urinary tract infections and other sexually transmitted diseases were hardly ever asked by RCH providers in all the observed facilities. The histories that were observed to be asked were on personal, past medical, surgical, HIV/AIDS and complaints in the current pregnancy histories (Appendix 7).

4.6.3.2 Diagnostic approach

There were variations in carrying out specific diagnostic approach with some diagnoses being carried out and others not. Diagnostic approaches which were observed to be carried out were blood pressure, haemoglobin, VDRL/RPR, HIV/AIDS, Blood grouping and Rhesus factor determination. From the observation, the determination of albumin and sugar in the urine was not carried out (Appendix 7).

4.6.3.3 Provision of supplements and vaccination

The provision of supplements and vaccination scored highly in all the facilities (Table 18). This implies that there is a regular provision of supplements and tetanus vaccination to pregnant women in all facilities surveyed during all the observation days.

4.6.3.4 Physical examination

Physical examination also was observed. Four types of physical examinations were observed to be carried out to pregnant women namely, listening of foetal heart rates, checking of weight, checking of height and abdominal examination. From the observation, examination of the eyes, palms and tongue and examination of legs for oedema were not carried out.

4.6.3.5 Health education

There was provision of health education to pregnant women which was seen to comprise of general health education, nutrition education, education on malaria and education on the benefits of deworming. The minimum score for this was zero point and the maximum score was one point out of four points. This implies that most facilities were not providing health and nutrition education to pregnant women.

CHAPTER FIVE

5.0 DISCUSSION

5.1 Timing of the First ANC Visit

All the surveyed pregnant women admitted that ANC services were very important for regular checking and monitoring of the maternal health and foetal condition. This is also illustrated in other studies done in China, Kerala estate of India, Sri Lanka and Costa Rica (Ikamari, 2004). It is important for pregnant women to start ANC early, before reaching 16 weeks of gestation, in order to enjoy fully the benefits of ANC services (Gross *et al.*, 2012). Majority of the surveyed pregnant women in this study initiated ANC attendance later than the recommended period. They initiated during their second trimester (4 to 6 months) of pregnancy, at an average of 5 months. This finding was consistent with findings from other studies where women in sub-saharan Africa start ANC considerably later than women from other regions (Magadi *et al.*, 2000; Abou-Zahr and Wardlaw, 2003; Okunlola *et al.*, 2006; Ndidi and Oseremen, 2010). Literature from Tanzania also show that more than 80% of pregnant women initiate ANC after 17 weeks of gestation (MoH, 2004; Mrisho *et al.*, 2009) instead of the recommended period of within the first 16 weeks of gestation.

Early initiation is an excellent time for pregnant women to have prophylactic medication, vaccinations, diagnosis and treatment of infectious diseases and health and nutrition education programmes (Turan and Sale, 2003; Yousif and Abdul, 2006; Gross *et al.*, 2011). In the current study younger ages pregnant women (18 to 25 years) initiated ANC services earlier compared to middle aged pregnant women (26 to 33 years). This could be attributed to the advice they received from mothers and other relatives. This implies that

close family members particularly mothers play an important role in supporting adolescent pregnant women in having early ANC initiation. Majority of adolescents are not married hence are dependants to their mothers or other close relatives so do not have self decision (Gross *et al.*, 2012). This finding is in contrast with the findings from a study done in Uganda, which compared ANC attendance between adolescents and adult mothers. In the Ugandan study, there was no significant difference in the timing of the first visit between the two groups, although, there were fewer subsequent ANC visits among the adolescents (Gross *et al.*, 2012).

Factors influencing pregnant women's timing for the first ANC visit were also investigated. Early initiation was influenced by advice from relatives, neighbours and mothers in-laws; woman's needs for treatment; confirmation of pregnancy; and the need to know maternal HIV status and foetal prognosis. Late initiation was influenced by ignorance, maternal decision, unsure of conception/pregnancy and lack of money for laboratory investigations. Ignorance was the major cause for delayed first ANC visit among majority of the surveyed women. Moreover, these women considered antenatal care as primarily curative intervention (detect and treat diseases) rather than preventive intervention which is a sharp contrast from the goals of antenatal cares which are mainly preventive. Similarly, as Gharoro and Igbafe (2000) reported, ignorance was the underlying factor for late initiation in two-fifth of Nigerian women. Other studies on timing of ANC from developing countries show that late initiation is associated with high parity, young age, unwanted pregnancies, premarital status, lack of formal education and low socio-economic status (Gross *et al.*, 2012).

Late initiation observed in this study could be attributed to the fact that majority of the surveyed women were not aware of the recommended period for ANC initiation. Most of them reported to have imagined that the second trimester was the recommended initiation period. Late ANC initiation limits women from receiving the full benefits of preventive services of pregnancy hence hinder the safeguarding strategies of mother's health and undesirable birth outcomes (Temu, 2009). These strategies include counselling on the expected physiological changes, normal course and possible complications of pregnancy and labour, early documentation of woman's baseline physiological and laboratory parameters for subsequent comparison and early detection of present pregnancy anomalies (Renkert and Nutbeam, 2001; Ndidi and Oseremen, 2010).

5.2 Delivery of Health and Nutrition Services to Pregnant Women at RCH Clinics

Abdominal examination, laboratory investigations, supply of nutrient supplements, and immunization were reported by pregnant women as routine services provided during ANC contacts. Very few women cited nutrition education provision as among the services provided. Similar findings were reported by Mrisho *et al.* (2009), where women reported to receive vouchers for bed nets and counselling on birth preparedness, in addition to laboratory investigations, supply of nutrient supplements, and immunization. Health Policy of Tanzania of 2003 stipulates that pregnant women should be given nutrient supplements (iron and folic tablets) and drugs (SP and mebendazole tablets) in the scheduled order (MoH, 2007; Shija *et al.*, 2011). In this study, absence of nutrient supplements and drugs was not observed during the observation days but was reported by pregnant women during the main interview. In addition, RCH providers also reported regular absence of supplements and drugs during main interview as well as during FGDs.

The regular absence of nutrient supplements and drugs reported might contribute to the existence of high rates of micronutrient deficiencies among pregnant women in Tanzania. Shirima and Kinabo (2005) also found that, nutrient supplements and drugs are not supplied on regular basis in the country. The key challenge for supplementation programme in Tanzania is inconsistent supply. Some of the women who received nutrient supplements in this study complained that they were given nutrient supplements without being informed of what they are, its purpose and its importance. This reduced acceptability and adherence to consumption of the recommended nutrient supplements among pregnant women in the country. Similar results were also reported by Benjamin and Ash (2003), that inadequate counselling and distribution of iron supplements were frequently reported as the major factors distressing supplementation programmes in Tanzania.

5.3 Utilisation of ANC Services by Pregnant Women

The revised FANC model of WHO recommend four ANC visits for uncomplicated pregnancies (Gross *et al.*, 2012). All pregnant women involved in the main survey as well as in the client exit interviews reported that ANC services are very important. Although the timing for ANC services among the surveyed women was not optimal (as majority initiated in the second trimester), the antenatal seeking behaviour of these women was satisfactory. More than half of women in CEI had made one to two visits, whereas 34% had made three to four visits and 4% had done five visits. The reasons given by women for this high attendance included perceived health benefits of ANC services. These included, receiving physical examinations, laboratory investigations, tetanus immunization, diagnosis and treatment of diseases. Other reasons reported include

knowledge of maternal HIV status, referrals to women with complications along with provision of transport (ambulance) to hospital in cases of emergence and avoidance of unnecessary deaths due to pregnancy. The TDHS conducted in 2010 found that, 96% of pregnant women had done at least one ANC visit before delivery (NBS and ICF Macro, 2011), unlike in the TDHS conducted in 2004/2005 where, 94% of women were found to have made at least one ANC visit before delivery (NBS and ORC Macro, 2005). High ANC coverage also was observed in Iraq where 84% of women were found to have made at least one antenatal visit during pregnancy (Raoof and Al-hadithi, 2011). Other studies done in Tanzania showed that urban women were more likely to have more ANC visits (99%) compared to rural women (95%) (NBS and ICF Macro, 2011). This could be influenced by high awareness, high socio-economic status and availability and accessibility of health services to urban residents as opposed to rural residents.

5.4 Pregnant Women's Nutritional Knowledge and Lifestyle Practices

5.4.1 Nutritional knowledge

Majority of women were found to have inadequate nutrition knowledge. This was reflected by the fact that these women did not know nutritional needs during pregnancy and they were not aware that nutritional needs increase as the pregnancy progresses. They were found to be consuming the same number of meals like other family members (three meals per day) without additional snacks in between meals to compensate for increased demands of pregnancy. Although nearly half of women reported to have known that there are differences in nutritional needs during pregnancy, they failed to explain the differences. Similar findings were reported by Mosha and Philemon (2010) in their study done in Morogoro, Tanzania. Inadequacy of nutrition knowledge of the surveyed pregnant

women might be contributed by several factors reported in the study. These included occasional or non-provision of nutrition education during ANC visits, inadequate or non use of visual aids during education sessions by providers, absence/inadequacy of nutrition reading materials and less emphasis given to nutrition by RCH providers and the government. A study by Fowles (2002) on the comparison between pregnant women's nutrition knowledge and their actual dietary intake in USA found that, most women had inadequate nutrition knowledge, hence their dietary intake failed to meet their nutritional needs for pregnancy.

Frequently mentioned nutrition topics taught during nutrition education sessions were balanced diet, increased consumption of green vegetables and fruits, importance of breast feeding and frequent use of natural foods. Women also reported that, increased consumption of green vegetables and fruits, which were aimed at increasing maternal blood, were among the most emphasized topics as opposed to other topics. Despite the emphasis on the consumption of green vegetables and fruits by pregnant women, anaemia is still the leading nutrition deficiency among pregnant women in Temeke District as was reported by RCH providers. Sub-optimal practices in the preparation and cooking of green vegetables could be a contributing factor to inadequate intake of iron resulting in maternal anaemia. Majority of the surveyed pregnant women were using sub-optimal ways of retaining nutrients from vegetables (such as cut first then wash, sun-dry of vegetables, throw away water from cooked vegetables, and not covering the vegetables while cooking). Sub-optimal ways of preparing and cooking green vegetables were also documented in other studies done in rural Tanzania (Temu, 2009). Better optimization of preparation of locally available green vegetables with proper preparation and cooking methods ensures high nutrient retention from green vegetables.

The association between maternal nutrition and birth outcomes was not well known by many of the surveyed women. For those few who reported of there being the association, clarification on the association between the two was lacking. A study done by Mosha and Philemon (2010) on the risk factors influencing pregnancy outcomes in Morogoro Region Tanzania found that, majority of pregnant women were aware that good diet and nutrition are important for the mother and well being of the foetus.

5.4.2 Lifestyle practices of pregnant women

Lifestyle practices among pregnant women showed that, some women were consuming tea/coffee/Pepsi/coke drinks with food. They were not aware of the bad effects of these drinks on nutrient absorption. Although more than half of them were not consuming the above-mentioned drinks with food because they were discouraged to do so, they did not know why they were discouraged. The reasons for not consuming soft drinks cited by pregnant women included lack of money, dislikes of the drinks and avoidance of frequent urination.

Almost all the interviewed women were neither smoking nor taking alcohol. However, they were not aware of nutritional and health consequences of the two practices. The dislikes of cigarette and lack of money to purchase alcohol were cited as the main reasons for these pregnant women to abstain from smoking or drinking alcohol. Cigarette smoking and alcohol consumption during pregnancy have side effects to both pregnant women and the foetus (Williamson, 2006; Brown, 2008). Cigarette smoking causes low birth weight, small for gestation age and preterm birth (Cogswell *et al.*, 2003; Brown,

2008). Alcohol intake has been linked to spontaneous abortions, miscarriages and still births. Moreover, alcohol intake is also associated with developmental defects, foetal growth retardation which later results into LBW babies and foetal malformations like small head size (Wardlaw and Kessel, 2002; Williamson, 2006; Brown, 2008). Inadequate knowledge on the effects of alcohol intake and cigarette smoking during pregnancy among the surveyed women might be contributed by absence or occasional provision of nutrition and health education during ANC contacts.

5.5 Food Consumption Pattern among Pregnant Women

Cereals (maize flour and rice), vitamin A-rich vegetables and tubers, cooking oil and cane sugar were the mostly consumed foods by the surveyed pregnant women. Vitamin A-rich vegetables and tubers such as carrots and tomatoes were consumed daily as were mostly added in other dishes such as meat/fish or any other stew prepared as a family meal. Cooking oil was daily added to food during meal preparation whereas cane sugar was daily added to tea because tea was consumed everyday by majority of the surveyed women. Fruits and green vegetables were frequently consumed by majority of women. High consumption of fruits and green vegetables could have been influenced by the nutrition education delivered to these women during ANC contacts. Tanzanian FANC guideline emphasises more consumption of green vegetables and fruits during pregnancy (URT, 2004).

Less consumed foods included legumes, sea foods (fish, sardines), milk and milk products and meat. These foods are good sources of proteins, fats, minerals and vitamins. High prices of these foods, low income and inadequate nutrition knowledge regarding the

importance of these foods could have contributed to its low consumption. Food aversions and pica due to pregnancy was another contributing factor for less consumption of these foods. Nyaruhucha (2009) also reported that, meat and fish were disliked by majority of women during pregnancy in Dar-es Salaam region, Tanzania. Rarely consumed foods in the current study were roots and tubers such as cassava, round and sweet potatoes and yams. This was greatly influenced by seasonal availability and accessibility of these foods in the study area. Nuts and oil seeds (groundnuts and sunflower) were the least consumed foods in Temeke district. This could be attributed to high consumption of coconut milk and other commercial vegetable cooking oil brands.

Diets in rural and urban Tanzania are mainly made from cereal grains (maize, millet, and sorghum), starchy roots (cassava), and pulses (beans, cow peas, pigeon peas) and vegetables (FAO, 2008). These diets lack or have small amounts of animal products and fruits, resulting in a widespread micronutrient deficiencies (iron, zinc, iodine, vitamin A and folate), which are important for the mother and the foetus (Tabriz and Saraswathi, 2011).

5.6 Extent of Satisfaction with Nutrition and Health Services by Pregnant Women

Client satisfaction is an important outcome measure of health care. The efficacy of health service is enhanced by greater patient satisfaction. It can also be taken as the proxy measure of quality of health care (Patro *et al.*, 2008). Nearly half of pregnant women involved in the client exit interview were not satisfied with ANC services provided in the surveyed clinics. More dissatisfaction was reported in the government and faith-based facilities compared to private facilities. A significant proportion of users were not

satisfied with the starting time for the services. There was a considerable time lag between the opening time of the facility and the actual commencement of the services. This was due to either late arrival of pregnant women or RCH providers being busy with cleaning exercise and preparation of working tools. Majority of women were also not satisfied with the time spent at the clinic. In almost all government and faith-based clinics, the clients were attended by 1.00 pm (from 8.00 am). Few clinics with high turn-up of clients (Table 14) would continue till 3.00 pm. The situation was different in private facilities where ANC services ended early due to low turn-up of clients. The current WHO model suggests that 40 minutes be used for first visit client consultation and 20 minutes for a revisit (von Both *et al.*, 2006). Although the actual time spent for each client was not assessed in this study, but structured observation done in selected health facilities found that most time spent at clinic was waiting time rather than consultation time. This could be due to understaffing and high attendance of clients in these facilities. Agha and Do (2009) also found large discrepancy in the waiting time for ANC services at public and private facilities in Kenya. Other studies done in Tanzania also reported similar findings like Kenyan study (von Both *et al.*, 2006; Gross *et al.*, 2011).

Other aspects which were a source of much dissatisfaction among women in the current study were inadequate sitting places in most of government and faith-based facilities, payments for some of the laboratory investigations (e.g. haemoglobin level, urine, malaria and stool) in faith-based and private facilities and infrequent supply of nutrient supplements in all facilities. Similar findings were also reported by Patro *et al.* (2008) in the study on community perception and client satisfaction on primary health care services in New Delhi. Another study done in Bangladesh reported similar findings (Andaleeb *et*

al., 2007). In addition, inadequate number of providers, absence or occasional nutrition education sessions, and less emphasis given on nutrition issues by the government and RCH providers were also cited as factors that caused dissatisfaction among pregnant women in the current study. While some women were not satisfied with health and nutrition services provided in most government and faith-based facilities, others were satisfied with ANC services provided in private facilities. Among the reasons for satisfaction included high level of privacy, less time spent for the ANC activities, availability of expected services, and providers' politeness. Aldana *et al.* (2001) in the study carried out in rural Bangladesh found that, client satisfaction was mainly due to guaranteed privacy, less time spent at clinic, clarification of health issues and providers' politeness.

5.7 Nutritional Knowledge of the RCH Providers

Majority of the surveyed RCH providers reported to have inadequate nutrition knowledge and had a feeling that they were not competent in delivering nutrition education to pregnant women. The Assistant Director of nursing schools in Tanzania at the MoHSW concurred with the providers' response. According to the Director, one nutrition course offered during nursing training was not adequate because it was offered in one semester only, it had fewer credit hours compared to other nursing courses, and tutors responsible for the course were not trained nutritionists. The same also was reported by Nutritionist from MUHAS. A training of needs assessment conducted in Tanzania also found that, most providers had not obtained adequate nutrition training during their nursing training (Seumo and Abdalah, 2008). This may contribute to poor nutritional information to be offered at the RCH clinics in the country.

The main source of nutrition information for RCH providers in this study was found to be their former training at nursing schools. In-service nutrition training and mass media were rarely mentioned by these providers as sources of nutrition information. Lack of wide range nutrition information sources could be the predisposing factor for inadequate nutrition knowledge among RCH providers. In other parts of the world for example New Zealand, midwives have a wide range of sources hence more nutrition information. New Zealand midwives obtain much of their nutrition information from nutrition organisations, midwifery education, midwifery journals and other health professionals (Elias and Green, 2007).

To be up to date and well informed on recent nutrition information, frequent nutrition training is important. This is particularly so for RCH providers as these are the key providers of nutrition information to pregnant women. Majority of providers in this study had not attended any in-service training or short course in nutrition in the past five years. Shai *et al.* (2001) in the study done in Israel found that, health providers who receive frequent nutritional training could treat their patients with nutrition problems more professionally than those who did not receive such training. Inadequate nutrition knowledge of RCH providers in this study was also reflected in the way green vegetables were reported to be prepared and cooked. Women reported that, they were advised to wash vegetables, cut and then wash them again; or cut and then wash them before cooking. Providers who reported optimal practices (that is wash first then cut) failed to give the nutrition reason behind the practice. This provides further evidence that nutrition knowledge of RCH providers was inadequate.

5.8 Attitudes and Current Practices of RCH Providers towards Nutrition

Most providers in this study perceived nutrition education as very important to pregnant women and that RCH provider are responsible for the practice. This perception is consistent with the one reported by Elias and Green (2007) whereby New Zealand midwives rated nutrition as an important aspect of pregnancy and felt that nutrition education was a midwifery role. In this study, RCH providers had developed informal practice of reducing time for nutrition education sessions, delivering few nutrition sessions, or ignoring provision of such education to women. Inadequate number of RCH providers and heavy workload were cited as the main constraint for the service. Low competence in nutrition among providers also appeared to constrain the provision of nutrition education to women. Furthermore, lack of teaching aids, nutrition guideline, and supportive supervision in nutrition issues has worsened the situation. The current study observed that, some RCH providers did not regard nutrition education as routine service to be provided at ANC particularly in the private facilities. Magoma *et al.* (2010) in the study done in Ngorongoro, Arusha reported that, some ANC programmes (such as PMTCT, immunization, HIV/AIDS) are more emphasized than is the case with nutrition issues due to a number of reasons, namely, these programmes are highly supported by donors, have adequate working tools, motivates staff, and have incentives. On the other hand, monitoring of nutrition issues is weak, has no incentives and with inadequate working tools (Temu, 2009).

5.9 Quality of Health and Nutrition Services Provided at RCH Clinics

5.9.1 Structural attributes of quality

Structural attributes of quality in all surveyed health facilities were generally satisfactory. Two sub-attributes of structural attributes namely general infrastructure and information, education and communication (IEC) materials scored poorly (Table 18). These sub-attributes were poorer in the government and faith-based facilities than in the private facilities. Among the two sub-attributes the availability of IEC materials was observed to be alarming signifying that, the availability and provision of IEC materials to women were very minimal or not available at all. Unavailability, non-use of visual aids during nutrition education sessions and the failure of distribution of nutrition reading materials to pregnant women were poor in all the facilities surveyed. The reason given for the failure of providing reading materials was lack of these materials in the facilities. Similar findings were reported in the Iraq study on the assessment of IEC strategy (Raoof and Al-hadithi, 2011). More than half of women in this study did not receive IEC materials, implying that the provision of IEC was relatively poor.

The two remained sub-attributes of structure namely basic diagnostic equipments and availability of supplements and vaccination each scored excellently during the observation days but, majority of women attending ANC services in government facilities reported lack of or irregular supply of supplements in these facilities. Structured observations in these health facilities were conducted a short period after the distribution of Medical Stores Department (MSD) drug kits in all facilities in Temeke District. This could have influenced the availability of supplements in these facilities during the observation period. Irregular supply reported by pregnant women could be an indication

of past pattern since the question did not limit on recall period. A study on quality of antenatal care in Tanzania also reported irregular shortage of nutrient supplements in most of the government health facilities in the country (Sarker *et al.*, 2010).

5.9.2 Process of care

5.9.2.1 Interpersonal attributes of quality

Interpersonal aspects of quality generally were poor in all facilities surveyed. The minimum scores for this aspect were seven points out of 16 points (Table 18). Regarding making women comfortable particularly comfortability in the examination rooms (Appendix 7), the situation was worse in government facilities than in the private and faith-based facilities where rooms were small, crowded and less ventilated. Other studies done in Tanzania on ANC services also found similar shortfalls (Sarker *et al.*, 2010; Gross *et al.*, 2011). Examinations rooms in faith-based and private facilities were big enough, with big windows, curtains and were well ventilated. Regarding the total time spent at clinic in most government and faith-based clinics, the time spent was longer than the recommended. A similar finding was reported in another study done in Dar-es-Salaam (von Both *et al.*, 2006).

Regarding sub-attributes of RCH provider-pregnant women interaction (Appendix 7) namely, interest, non-interruption of woman's speech, politeness and asking woman's concerns each scored highest scores, implying that RCH providers acted very professionally as is always emphasized. This was in contrast to what was said regarding rudeness of these providers. This finding was in line with Turkson (2009) findings where by nice reception from health workers were observed. Only one sub-attribute namely

clarification of ANC services to women scored the least indicating that, procedures were done to pregnant women without/prior to its clarification to clients. Similar finding was reported in a study done in rural Tanzania (Sarker *et al.*, 2010).

On the side of privacy, lack of privacy during pregnant women examinations was more evident in government and faith-based facilities than in private facilities. Privacy is a very important aspect to be considered during examination because, women are more likely to give their important obstetric histories to RCH providers if there is a guarantee for confidentiality and privacy (Murray and Frenk, 2000). In rural Bangladesh, the second most powerful predictor of pregnant women satisfaction with ANC service was respect for privacy (Aldana *et al.*, 2001). Other studies conducted in Tanzania documented similar findings indicating that lack of privacy was a constraint to delivering quality ANC services to pregnant women (Mrisho *et al.*, 2009).

5.9.2.2 Technical attributes of quality

Regarding assessing maternal histories, in the current study personal history, past medical and surgical histories, history on current pregnancy complaints and HIV/AIDS histories were observed to be part of assessment (Appendix 7). However, family history, social history, malaria history, and history related to urinary tract infections and sexually transmitted diseases were not part of the assessment. Observations and informal conversations with RCH providers showed that, ANC maternal card was an important working tool for the RCH providers although, the card covers only a subset of the histories recommended in the guideline. This might explain why some of the recommended histories were omitted. Every history has its importance in maternal health

therefore all histories should be given equal weights during assessment and should be considered routinely. Similar observations were made in the study by Gross *et al.* (2011) in Kilombero Valley in Tanzania where maternal histories not indicated in the clinic card were regularly neglected by RCH providers.

With respect to carrying out specific diagnostic approach, blood pressure, haemoglobin checkups, blood grouping, Rhesus factor, VDRL/RPR and HIV/AIDS screening were observed to be carried out (Appendix 7). Urine for albumin/sugar was not observed to be carried out. Sarker *et al.* (2010) also found that RCH providers performed majority of clinical examinations in rural Tanzania, except for urine tests for albumin and glucose determination which were largely omitted. Other studies done in Tanzania also reported similar findings (Gross *et al.*, 2011). Similar findings also were reported in Kenya by Mwaniki *et al.* (2002) whereby irregular supply and absence of reagents were reported to limit the conduct of certain tests and investigations in the area. Shortage of reagents and other supplies was the main reason given in this study for not performing urine tests in most of the RCH clinics surveyed.

As for physical examinations, four aspects out of six were observed to be done namely, foetal heart rate, weight, height and abdominal examination. The other two aspects, checking of eyes, palm, tongue, and checking of legs for oedema were not routinely considered. No explanations were given for not carrying out such examinations, but this could be attributed to lack of place for its documentation in the maternal clinic card.

Another technical attribute observed was provision of health education, which included general health education, nutrition education, education on methods of malaria prevention, and education on the benefits of deworming. Health and nutrition education provision was among the poorly performed attribute. Only three facilities (two health centres and one District hospital) provided general health education. There are various studies in Tanzania which reported on poor counselling and inadequate health and nutrition education to pregnant women (Mrisho *et al.*, 2009; Sarker *et al.*, 2010; Gross *et al.*, 2011). Nutrition education exposes pregnant women to informed dietary intake leading to good maternal health status and birth outcome. If pregnant women are equipped with better health and nutrition knowledge they (women) can motivate their family members to play roles in the health care seeking behaviours particularly seeking of nutrition information (Elias and Green, 2007; Gross *et al.*, 2012).

5.10 Barriers to Provision of Nutrition Services at RCH Clinics

Understaffing observed in the study area and reported by pregnant women, key informants, and by RCH providers themselves was a major barrier for the delivery of nutrition and health services at RCH clinics. Inadequate number of providers results into heavy workload for the existing staff and leads to the reduced quality of services provided to women. Understaffing in health facilities in Tanzania has also been documented in several studies done in the country (Mamdani and Bangser, 2004; Manongi *et al.*, 2006, Temu, 2009). Shortage of staff was also a major constraint in the delivery and contributing to inadequate provision of ANC services in Iraq (Raoof and Al-hadithi, 2011) and Ghana (Turkson, 2009).

Heavy workload, inadequacy of working tools, equipment, supplies, supplements and vaccine stock-outs, and inadequacy of sitting place were reported by pregnant women, RCH providers and key informants as obstacles in the delivery of nutrition and health services at RCH clinics in the study area. Occasional drug and vaccine stock-outs and inadequacy of working tools, equipment and supplies were also mentioned as factors impeding RCH providers' ability to consistently deliver quality ANC services in other studies done in Tanzania (Mrisho *et al.*, 2009; Magoma *et al.*, 2010, Gross *et al.*, 2011).

The cost of health care services in Tanzania is one of the major obstacles prohibiting women from seeking and/or receiving health care services (MoH, 2003; Mamdani and Bangser, 2004). Health care fees were formally introduced in Tanzania in 2004 to improve access, quality and equity of health care services and to generate additional revenue to be spent at the health care facility on items directly related to quality of health care services (Mamdani and Bangser, 2004). Although ANC services should be free to all pregnant women (MoH, 2000), unofficial charges to pregnant women are still common in some RCH clinics in Tanzania. This is particularly the case in the faith-based and privately-owned facilities (Mamdani and Bangser, 2004). Other studies in Tanzania found that, payment for ANC services contributed much to underutilization of ANC services in the country (Sarker *et al.*, 2010; Gross *et al.*, 2012). Based on structured observations and information from focus group discussions with RCH providers, RCH clinics in the current study area were not able to provide all RCH services free of charge. In such situations, pregnant women were required to pay for haemoglobin check up and urine testing for sugar and albumin. The services offered free of charge were abdominal examination, HIV/AIDS testing, weight and height measurements.

Non prioritization of nutrition issues was mentioned as another obstacle in the delivery of nutrition services. Nutrition receives low priority in national development agenda, despite there being clear evidence of the consequences of nutritional deprivation in the short and long term basis. Thus nutrition ends up either receiving inadequate funding or not receiving any funding at all. Lack of competence on nutrition among RCH providers mainly due to inadequate nutrition knowledge also was reported as one of the barrier in the provision of nutrition education among RCH providers from the surveyed health facilities. Other barriers reported to constrain the provision of nutrition services at RCH clinics include: lack of nutritionist in almost all health facilities surveyed, non-existence of nutrition guideline, and lack of awareness on nutrition issues among pregnant women. In addition, poor working environment such as inadequate, small, crowded and less ventilated RCH rooms was among the barriers reported. These findings are in line with the findings reported in Nigerian study which examined nutritional knowledge of nurses (Bakre *et al.*, 2012).

5.11 Improvement of Nutrition Services at RCH Clinics Suggested by RCH

Providers and Key-informants

Nearly all RCH providers and key-informants suggested that, refresher courses on nutrition should be offered in order to improve job skills. Better living conditions for RCH providers as well as other incentives like payment for extra time spent on ANC activities would improve delivery of RCH services. These suggestions were also documented in other studies (Rowe *et al.*, 2005). Increasing the number of RCH

providers will improve the provision of ANC services as women thought that, shortage of staff made them spend much time at the clinics (Mrisho *et al.*, 2009).

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This study assessed the quality of nutrition services provided at RCH clinics in addressing maternal undernutrition. Generally, the quality of nutrition services provided in the surveyed health facilities were poor. This was reflected by the inadequate nutrition knowledge of RCH providers. Lack of competence of RCH providers on nutrition issues was due to inadequate nutrition knowledge acquired during nursing training and lack of in-service nutrition training. The RCH providers understand the importance of nutrition knowledge to pregnant women; however, nutrition knowledge acquired during nursing training was not sufficient to enable them to confidently deliver nutrition education to pregnant women. In addition, heavy workload, understaffing and lack of resources such as nutrition guidelines and nutrition up-to-dates constrained the delivery of quality nutrition education. Other constraints reported were non prioritization of nutrition issues by the providers as well as the government and lack of nutritionists in these health facilities.

Majority of pregnant women initiate ANC services in the second trimester (4-6 months gestation), thus majority of pregnant women start to receive ANC services at this period. Reasons for late initiation included lack of awareness, lack of money for investigations (in some of the private and faith-based facilities) and avoidance of frequent clinic visits. Most pregnant women were not aware of the nutritional needs during pregnancy and the association between maternal dietary intake and birth outcomes. This was probably contributed by inadequate nutrition education received during ANC contacts. Moreover,

most pregnant women were not satisfied with nutrition services provided at the RCH clinics. Inadequate number of RCH providers to provide all ANC services, particularly nutrition education which is most neglected, long duration used for ANC services, delays in starting ANC services in contact days, and lack of adequate sitting places were the main reasons for dissatisfaction. Most pregnant women consumed meals containing maize, rice, carrot, tomatoes, green vegetables and fruits. Less consumed foods were legumes, meat, sea foods, milk and milk products. Moreover, women were found to consume three meals per day without addition of in between meals so as to meet nutritional demands during pregnancy.

This study found that, private health facilities were better than the government and faith-based facilities with regard to observed structural attributes (privacy in the examination rooms and water for washing hands), interpersonal aspects (making women comfortable and having privacy) and technical aspects (supplements and vaccination provision). It is worth noting that, private health facilities served few numbers of pregnant women for the most attributes to have a significant impact. Government and faith-based facilities provided adequate services in terms of RCH provider-women interaction, detailed exploration of maternal histories, HIV/AIDS screening and counselling, and free provision of ANC services. Government and faith-based facilities were important providers of RCH services in the study area, as these facilities attended a large number of pregnant women. Provision of IEC materials, elaboration and clarification of ANC services and procedures, and provision of nutrition education were quality attributes which were not done efficiently in most facilities surveyed. Given that government and faith-based facilities appeared to be important providers of RCH services, care should be

taken to improve nutrition services of these facilities. Nutrition related shortcomings observed in this study should be addressed in order for nutrition services to achieve its full potentials and reach the community at large. Improvements of nutrition services in these facilities should focus on the remedying shortages of supplies, improving providers' nutrition knowledge and strengthening human resource capacity.

6.2 Recommendations

Based on the study findings, the following recommendations were drawn:

- (i) Review of nursing education curriculum. There is need for the inclusion of comprehensive nutrition courses in the nursing school syllabus which will ultimately improve nutrition knowledge of nurses of different cadre, and increase nurses' ability to handle emerging nutritional challenges in a competent and confident manner.
- (ii) Regular in-service nutrition training to RCH providers. In-service training and short courses should be provided regularly, and in a sustainable manner in order to build capacity of RCH providers in nutrition education and counselling.
- (iii) The Ministry of Health and Social Welfare and Tanzania Food and Nutrition Centre (TFNC) in collaboration with other nutrition agencies and stakeholders in the country should:
 - Formulate nutrition education guidelines for pregnant women and monitoring tools of nutrition activities at RCH clinics in the country. This

will assist in effective delivery and supervision of optimal nutrition education and counselling in clinics.

- Improve production and distribution of IEC materials focusing on nutrition for pregnant women in order to create awareness on various nutrition issues and foster dietary modification.
- Make concrete efforts in improving women's eating practices and raising awareness on the importance of maternal nutritional status through the provision and emphasising on adequate nutrition education during ANC visits.

(iv) RCH leaders at all levels (national to health facility) should ensure that supplements (ferrous sulphate, folic acid and vitamin A), drugs (mebendazole, SP tablets) and tetanus toxoid immunization are available in all RCH clinics in the country through frequent and close monitoring and supervision.

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APPENDICES

Appendix 1: Questionnaire for RCH provider on the quality of nutrition services at RCH clinics in addressing maternal undernutrition

Facility name: _____ Type of facility (1=Hospital 2=Health center 3=Dispensary)
 Facility administration (1=Government 2=Mission 3=Private 4. Army)
 Number of the respondent: _____ Date of interview: _____

Section A: Socio-demographic characteristics (tick the correct answer)

1. What is your age? Years.
2. What is your marital status? 1. Single 2.Married 3.Divorced/separated
4. Widow/Widower
3. What is your religion? 1. Christian 2.Muslim 3. Others (specify).
4. What is your education level? 1. Primary 2.Secondary 3.Certificate 4.Diploma
5. Graduate.
5. What is your occupation category? 1. Nurse Officer 2. Nurse Midwife
3. PHN 4.MCHA
6. How long have you been providing RCH services? Years.
7. Have you received any basic training on focused ANC? 1. Yes 2. No.

Section B: Nutrition Knowledge of RCH provider

8. What is the main source of information for your nutrition knowledge? 1. Mass media (radio, television) 2.Nursing school syllabus 3.Nutrition trainings in work 4.Any combination
9. What nutrition issues/topics are addressed during ANC services? List them.
10. Are nutrition requirements (food types, quantity) of pregnant women the same in all trimesters or differs according to trimesters? 1. Same 2.Different 3. I don't know
11. If different, how and why are they different?
12. What advise do you give pregnant women on the preparation soft green vegetables? (Sort, wash, cut, sun /shade dry, boil/ fry, oil, cover, through or retain water)
13. What is the best practice on green vegetables preparation, “wash first then cut or cut first then wash?”
14. What are the main reasons for the above answer?
15. During ANC sessions, are some foods emphasized more than others? 1. Yes 2.No
16. If yes, which ones are emphasized more?
17. Why do you think they are more emphasized?

18. Is there any food/drink which is restricted to be used during pregnancy?
1. Yes 2. No 3. Don't know
19. If yes, please mention them.
20. On your opinion, why do you think these foods/ drinks are restricted to be used during pregnancy?
21. What nutrition deficiencies (problems) are common among pregnant women attending this facility?
22. In past five years, have you attended any nutrition training/seminar/short course?
1. Yes 2. No
23. If yes, how often?
24. What were the main themes of the training? Please mention.

Section C: The timing and delivery of nutrition services

25. When do the majority of pregnant women start attending ANC for the first time (indicate the month after each response). 1. First trimester () 2. Second trimester () 3. Third trimester ()
26. The current schedule for ANC (FANC) is different from the old schedule. Has the new schedule been effective? How?
27. If it has not been effective, why not?
28. Do you use specific guideline in the delivery of nutrition education? 1. Yes 2. No
29. If none how do you deliver the nutrition education to pregnant women?
30. If specific guides are used, please mention them (job aids, counseling cards, leaflet & brochures, memory)
31. What techniques do you use to deliver nutrition information to mothers?
(Group education, one to one counseling, both).
32. In which situation do you use each technique?
33. Do you use any visual aids during the delivery of nutrition education?
1. Yes 2. No
34. If yes what visual aids do you use? Please mention them.
35. Where do you get the teaching materials used in delivering nutrition education to pregnant women? 1. Government 2. NGOS 3. Any combination 4. Others (specify)
36. Do you provide any reading material on nutrition to pregnant women to read at home? 1. Yes 2. No
37. If yes, what reading material do you provide? Please mention.
38. If not, why aren't reading materials distributed to pregnant women?
39. Do you allocate time for individual women to discuss their concerns?
1. Yes 2. No
40. If yes, which concerns are commonly discussed?
41. What approach do you take for a client with chronic conditions, TB, HIV, hypertension and diabetes?
42. Do information about the risks of using tobacco, alcohol, illicit drugs provided to

pregnant women?

43. How do you assess nutrition status of pregnant women? (Measurements, signs)
44. What advice do you give pregnant women on their overall nutrition status?

Section D: Perception and practice of RCH providers towards nutrition

45. Do you think pregnant women are practicing what they are taught about nutrition?
1. Yes 2. No 3. Both
46. If not, what do you think could be the main reasons?
47. Do you think providing adequate, correct and timely nutrition education to pregnant women will reduce the problem of maternal malnutrition? 1. Yes 2. No
48. If not, why?
49. Do you think nutrition education is given emphasis by RCH providers like other services which are provided in the ANC? 1. Yes 2. No
50. If not, what do you think are the main reasons?
51. In your opinion, do you think the government gives priority to nutrition services at the RCH clinics? 1. Yes 2. No
52. If yes, how?
53. If not, what do think could be the main reasons?

Appendix 2: Questionnaire for pregnant women on the quality of nutrition services at RCH clinics in addressing maternal undernutrition

Facility name: _____ Type of facility (1=Hospital 2=Health center 3=Dispensary)
 Facility administration (1=Government 2=Mission 3=Private 4. Army)
 Number of the respondent: _____ Date of interview: _____

Section A: Socio-demographic characteristics (Tick the appropriate answer)

1. How old are you? Years.
2. What is your Religion? 1. Christian 2. Muslim 3. Others (specify).
3. What is your Tribe?
4. How many years have you attended school? 1. Informal/none 2. Incomplete Primary
3. Complete primary 4. Secondary 5. Certificate/vocational 6. Diploma 7. University.
5. What is your marital status?
1. Single 2. Married monogamy 3. Married polygamy 4. Divorced/ separated 5. Widowed
6. What kind of work do you do? (House wife, employed, small business, and casual laborer)
7. What is the source of income of your spouse?
1. Employed 2. Business man 3. Casual laborers
8. What major type of fuel do you use for cooking?
1. Firewood 2. Charcoal 3. Kerosene 4. Gas 5. Biogas
9. What major source of lighting do you use? 1. Kerosene 2. Candles 3. Electricity 4. Solar
10. Number of people in the household

AGE	0-4.9YRS	5-14 YRS	15- 64 YRS	>65 YRS	TOTAL
NUMBER					

11. How old is your pregnancy? Months.
1. First trimester 2. Second trimester 3. Third trimester
12. How many times have you ever been pregnant including this time?
13. How many times have your pregnancy resulted in stillbirths, miscarriage or abortions?

Section B: Antenatal care services provided to pregnant women

14. When did you start attending ANC for this pregnant? Month.
15. Why did you start attendance at this time? Mention the reasons.
16. What is the best time to start ANC services? month
1. First trimester 2. Second trimester 3. Third trimester.
17. What are the reasons for the answer above?

18. What services (or items) have you received up to today for this pregnancy from the clinic?
19. Do you think ANC services are important to pregnant women? 1. Yes 2. No 3. Don't know
20. If yes, what are the importances's of ANC?

Section C: Nutrition knowledge of pregnant women

21. Can you explain how the diet of a pregnant woman should be? (Food types, frequency, amount, fluids)
22. Which is your major source of nutrition information? (Hospital, relatives, friends, mass media, books).
23. Do RCH providers usually offer nutrition education during ANC?
1. Yes usually 2. Yes occasionally 3. No
24. If yes, how is nutrition education provided at the ANC?
1. One-way (e.g. Lecture method)
2. Two-way (interactive way) 3. Group education or counseling 4. Personal counseling.
25. What nutrition issues/topics are taught during ANC? Please mention.
26. During ANC sessions, are some foods emphasized more than others?
1. Yes 2. No 3. Don't know
27. If yes, which ones are emphasized more?
28. Why do you think they are more emphasized?
29. Is there any food/drink which is restricted to be used during pregnancy?
1. Yes 2. No 3. Don't know
30. If yes, please mention them.
31. On your opinion, why do you think these foods/ drinks are restricted to be used during pregnancy?
32. Do RCH providers use any visual aids during the sessions?
1. Yes 2. Yes occasionally 3. No
33. If yes, what visual aids are normally used?
1. Picture 2. Models 3. Realism 4. Any combination
34. Are you normally given reading materials to read at home? 1. Yes 2. No
35. If yes, the materials were related to what issues? (Food types, nutrition of pregnant women)
36. Are you separated in any way (according to your trimesters, parity) during health and nutrition education sessions? 1. Yes 2. No
37. Do you think nutrition requirements (quantity and food types) are the same or differ throughout pregnancy? 1. Same 2. Different 3. Don't know
38. If different, please explain?
39. Do the providers give opportunity to pregnant women to discuss their concerns in one-to-one session?
40. Do you think nutrition education is given emphasis like other services which are provided in ANC? 1. Yes 2. No 3. Don't know

41. If not, what do you think is the reason?
42. Do you think the nutrition knowledge you are receiving from RCH clinics is enough for you to improve your nutrition status? 1. Yes 2. No 3. Don't know
43. If no, why?

Section D: Nutritional practices of pregnant women

44. Do you usually take alcohol? 1. Yes 2. No
45. Do you usually smoke cigarettes or use tobacco? 1. Yes 2. No
46. Are you currently taking soil based products? 1. Yes 2. No
47. Do you usually consume tea/ coffee/Pepsi/ Coca-Cola drinks with food?
1. Yes 2. No
48. If no can you give the reasons?
49. Do you usually practice dietary advice given to you? 1. Yes 2. No
50. If not, what hinders you from practicing what you are advised?
51. How do you prepare and cook soft green vegetables? (Sort, wash, cut, sun /shade dry, boil/ fry, oil, cover, through or retain water)

Vegetable	Preparation and cooking
Amaranth	
S/potato	

52. What is the best practice on green vegetables preparation, "wash first the cut or cut first then wash?"
53. What are the main reasons for the above answer?
54. Do you think maternal nutrition has any association with her birth outcome?
1. Yes 2.No 3.Don't know
55. If yes, can you explain the association?
56. What can you say about your usual daily activities, have they:
1. Increased 2.Same 3. Reduced
57. What are the reasons for your answer?
58. What is the current birth interval between your last child and this pregnancy?
.....Years.
59. What are the reasons for the current birth interval?
60. What is the recommended birth interval between one child and another? years
61. Give reasons for your answer above.

Section E: Food consumption pattern of a pregnant woman

62. Is your meal frequency same as that of the family? 1. Yes 2. No
63. If no give reasons for your answer.

64. Did you eat any of the following food items (or meals made from these) yesterday (day and night)? How frequently in the past seven days did you eat any of the following food items (or meals made from these?)

Type of Food or Meal	1=Yes =No	Freq Per Week
Cereals (maize, wheat, finger millet, sorghum)		
Vitamin A-rich(red/yellow/orange) vegetables and tubers e.g. pumpkin, carrots, tomatoes,		
Other roots and tubers e.g. cassava, round & sweet potato. yams		
Green leafy vegetables		
Vitamin A- rich (red/yellow/orange) fruits e.g. mangoes, papaya		
Legumes e.g. beans, peas, cowpeas, pigeon peas, soy been,		
Nuts and oil seeds e.g. groundnuts, sunflower		
Animal milk, Milk products, eggs		
Flesh Meat beef, goat, pork ,chicken, duck, liver kidney		
Fish, sardines, or other sea foods		
Oil fat, ghee or butter used for cooking or added to food		
Sugars, honey or sugary products e.g. sodas, sweets , teas		

65. Do you any general advice/suggestions on the RCH providers and the health and nutrition education service which is provided in this health facility?

Appendix 3: Checklists for key informants' interviews

A Assistant Director of nursing schools in Tanzania

1. May I know what nursing institute offers in terms of type of award given, name of award, duration of training, type of cadres graduating, numbers graduating?
2. I would like to know the course structure of each degree and diploma in terms of types of courses offered, practical training (where, duration).
3. In case of courses that are nutrition-oriented, who is responsible for teaching those courses?
4. What characteristics (e.g. type of training, degree/certificate, duration, and cadre) does an individual supposed to have in order to qualify to offer RCH services?
5. What is your opinion regarding nutrition knowledge of RCH providers as key deliverers of nutrition education to pregnant women? Explain.
6. In your opinion, do you there is a gap (something missing or anomaly) between training of RCH and the quality of RCH services at health facility? Please explain.

B Assistant Director of Reproductive and Child Health Unit in Tanzania

1. Please give a brief explanation of RCH services and how they are conducted? (Who is responsible, timing of delivery of RCH services, time table for delivery of services, schedule for RCH services).
2. Are the services provided standard for all RCH clinics or differs? If differ please explain.
3. The current schedule for ANC (i.e. FANC) is different from the old one. Do you think the current schedule has been effective?
4. If it has not been effective, why not?
5. Do you have documentations that guide the delivery of health education and counseling for pregnant women? 1. Yes seen 2. Yes not seen 3. No
6. Do you have documentations that guide the delivery of diet and nutrition education? 1. Yes seen 2. Yes not seen 3. No
7. If none how do you deliver education and counseling for diet and nutrition?
8. What are the most common health and nutrition problems facing pregnant women in Tanzania?
9. What is your opinion regarding nutrition knowledge of RCH providers as key deliverers of nutrition education to pregnant women? Explain.
10. In your opinion, do you think there is a gap (something missing or anomaly) between nutrition training of RCH provider and the quality of nutrition services provided at the RCH clinics? Please explain.
11. What are the national plans on improving maternal undernutrition?

C Nutritionist of Muhimbili University of Health and Allied Sciences

1. For nutrition oriented courses, can you explain its course structure, scores, mode of delivery, and who is responsible for teaching those courses?
2. For nursing universities without nutritionist, how do they provide nutrition courses to their students? Please explain.
3. What is your opinion regarding nutrition knowledge of RCH providers as key deliverers of nutrition education to pregnant women? Explain.
4. In your opinion, do you think there is a gap (something missing or anomaly) between nutrition training of RCH provider and the quality of nutrition services provided at the RCH clinics? Please explain.

D RCH In-charge

1. How often per week (or month) do you hold ANC services? Approximately how many women do you attend per session?
2. Do you have documentations that guide the delivery of health education and counseling for pregnant women? 1. Yes seen 2. Yes not seen 3. No
3. Do you have guideline for delivery of diet and nutrition education?
1. Yes seen 2. Yes not seen 3. No
4. If none how do you deliver education and counseling for diet and nutrition?
5. What nutrition issues/topics are addressed during ANC services? List them.
6. Do you separate pregnant women according to any category (e.g. trimesters) during delivery of nutrition education? 1. Yes 2. No
7. If yes, do you have different teaching materials for each group? 1. Yes 2. No
8. If not, explain why?
9. Where do you get the teaching materials used in delivering nutrition education to pregnant women? 1. Government 2. NGOS 3. Nursing school notes 4. Seminar/short-course notes 5. Any combination 6. Develop yourself 7. Others (specify)
10. Do you provide any reading material about nutrition to pregnant women to read at home?
1. Yes 2. No
11. If yes, what reading material do you provide? Please mention.
12. If not, why aren't reading materials distributed to pregnant women?
13. In past five years, have you or any RCH staff attended any nutrition training/seminar/short courses? 1. Yes 2. No
14. If yes, how often?
15. What were the main themes of the training? Please mention.
16. How is the selection of RCH Staff done for attending any seminars in your facility? (Priority, criteria, alternates the staff).
17. What are the most common health and nutrition problems facing pregnant women in this health facility?

18. Are there special programmes focusing pregnant women with nutrition deficiencies in this facility?
19. If not, what do you do to pregnant women with nutrition deficiencies?
20. How often is supervision of RCH activities done? Who is doing it? How is it done?

Appendix 4: Checklist for Client Exit Interview

1. What is your age? Years.
2. How old is your pregnancy?months.
3. How many times have you ever been pregnant including this time?
4. Was this your 1. First visit 2. Second visit 3. Third visit 4. Fourth visit 5. Fifth visit?
5. When did you start attending ANC for this pregnant?Month.
6. Why did you start attendance at this time? Mention the reasons.
7. What is the best time to start ANC service..... month
 1. First trimester 2. Second trimester 3. Third trimester
8. What are the reasons for the above answer?
9. What services did you receive today? (Mention all that was done/ given).
10. Did you receive nutrition education in today's visit? 1. Yes 2. No
11. If yes, what main message about nutrition do you remember?
12. Were you satisfied with today's visit? 1. Yes 2. No
13. If yes, why?
14. If no, why?
15. What suggestions do you have for improving nutrition education and counseling in this facility?

Appendix 5: Structured observation guide

1. Structural attributes

A. General infrastructure	Present or absent	Scores
Toilets with water		
Waiting area		
Privacy of examination room		
Water to wash hands		
Presence of enough (more than one) rooms for RCH activities		
B. Basic diagnostic equipment available		
B.P Machine		
Microscope		
Gloves		
Stethoscope		
Laboratory		
Haemoglobin measurement		
Uristix		
Weighing Machine		
Stadiometer		
Examination bed		
HIV tests		
Urine containers		
VDRL tests		
Foetal scope		
Tape measure		
C. Drugs availability		
Iron (II) sulfate and folic acid		
Mebendazole		
SP tablets		
Tetanus toxoid vaccination		
D. Information, Education & communication materials (3points)	Seen or not seen	Scores
Posters displayed on the walls (10 posters enough)		
Presence of visual aids for health education		
Provision of reading materials to read at home		

2.0 Process of care

2.1. Interpersonal aspects

A. Making woman comfortable (3 points)	Yes or no	Scores
Seat offered		
Comfort in the room (fan, window, curtains)		
Use of short time at clinic (less than 2 hours)		
B. Health worker – woman interaction (5 points)		
Shows interest		
Non – interruption of woman's speech		
Display politeness		
Asking about woman's concerns		
Clear elaboration of ANC services to pregnant woman		
C. Privacy (3 points)		
Door closed during examination/consultation		
Presence of examination room (PMTCT, abdominal)		
Absence of other person in the room during examination		
D. Explaining of procedures to women (5 points)		
Explaining before examination		
Explaining diagnostic procedures		
Explaining use of prophylactic drugs		
Explaining on the importance of tetanus toxoid Immunization		
Explaining on the importance of ANC services to pregnant woman		

2.2. Technical aspects

A. Assessing the history of woman (10 points)	Done or not done	Scores
Personal history		
Family history		
Social history		
Past medical history		
Past surgical history		
History of complaints in current pregnancy		
Malaria history		
Urinary Tract Infection history		
History of other sexual transmitted infections		
History of HIV/ AIDS		
B. Diagnostic approach (6 points)		
Blood Pressure measurement routine		

Routine checking of haemoglobin		
Urine for albumin/ infection/ sugar		
Blood grouping and rhesus factor		
RPR/ VDRL		
HIV/ AIDS		
C. Supplements and vaccination (4 points)		
Iron sulphate and folic acid		
SP tablets		
Tetanus toxoid immunization		
Mebendazole tablets		
D. Physical examination (6 points)		
Checking eyes, palm and tongue		
Checking legs for oedema		
Checking foetal heart rates		
Taking weight measurements		
Taking height measurements		
Abdominal examination		
E. Health education provision (4points)	Done or not done	Scores
General health education		
Nutrition education		
Education on malaria prevention		
Benefits of deworming		

Appendix 6: Focus group discussion guide**Section A: Timing of FANC**

1. When do majority of pregnant woman start attending ANC for first time (how early do women go for ANC) mention the trimester and the exact month?
2. Why do they go at that time?
3. How often do the majority of clients with normal pregnancy go for ANC (how many times in 9 months do they attend for ANC)

Section B: Nutrition knowledge of RCH providers

1. How do you prepare/plan topics to be taught during health education session (is it prepared by in charge alone or all staff members are involved?)
2. What criteria are taken into consideration during the preparation of nutrition topics to be taught during ANC?
3. What constraints do you face during the delivery of nutrition education?
4. What should be done to improve the situation?
5. What is your opinion on practice of diet and nutrition knowledge among pregnant woman?
6. What factors constrain pregnant woman from practicing diet and nutrition advice given to them?
7. In your opinion do you think you are competent in nutrition issues which in turn you are supposed to deliver to pregnant woman in order to improve their nutrition status and hence their birth outcome.
8. What should be done to improve /solve the problem?
9. What is your advice/suggestion to improve nutrition services in health facilities?

Appendix 7: Structured Observation Guide Scores

[illegible]

Facility Type	H 1	H 2	H 3	HC 1	HC 2	HC 3	D 1	D 2	D 3	D 4	D 5	D 6	Total
. Drugs and vaccine available													
i. Iron (II) sulfate and folic acid	1	1	1			1	1	1	1	1	1	1	12
ii. Mebendazole	1	1	1			1	1	1	1	1	1	1	12
iii. SP tablets	1	1	1			1	1	1	1	1	1	1	12
iv. Tetanus toxoid vaccination	1	1	1	1	1	1	1	1	1	1	1	1	12
Subtotal	4	4	4	4	4	4	4	4	4	4	4	4	48
D. IEC materials													
i. Posters displayed (10 posters enough)	1	0	0	0	0	0	1	0	0	0	0	0	1
ii. Visual aids presence and use	0	0	0	0	0	0	0	0	0	0	0	0	0
iii. Home reading materials	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	1	0	0	0	0	0	1
Total	23	23	23	23	22	23	24	23	23	22	22	22	273

2. Process of Care

2.1 Interpersonal Attributes^b

A. Making women comfortable

i. Seat offered (enough)	1	1	1	1	1	1	1	0	0	1	0	1	9
ii. Comfort ability in the room (fan)	1	1	1	1	1	1	0	1	0	1	0	1	9
iii. Use of short time at clinic	0	0	1	1	1	0	0	0	0	0	0	1	4
Subtotal	2	2	3	3	3	2	1	1	0	2	0	3	22
B. RCH Provider - Pregnant woman interaction													
i. Interest	1	1	1	1	1	1	1	1	1	1	1	1	12
ii. Non-interruption of woman's speech	1	1	1	1	1	1	1	1	1	1	1	1	12
iii. Politeness	1	1	1	1	1	1	1	1	1	1	1	1	12
iv. Asking about woman's concerns	1	1	1	1	1	1	1	1	1	1	1	1	12
v. Elaborate ANC services to women	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	4	4	4	4	4	4	4	4	4	4	4	4	48

Facility Type	H 1	H 2	H 3	HC 1	HC 2	HC 3	D 1	D 2	D 3	D 4	D 5	D 6	Total
C. Privacy													
i. Door closed during examination	1	1	1	1	1	1	0	1	1	1	1	1	11
i. Examination room with curtains	1	1	1	1	1	1	1	1	1	1	1	1	12
ii. iii. Absence of other person in the room during examination	1	1	1	1	1	1	0	1	1	0	0	1	9
Subtotal	3	3	3	3	3	3	1	3	3	2	2	3	32

D. Clarify procedures to pregnant women

H = Hospital HC = Health centre D = Dispensary