EFFECT OF BEHAVIOUR CHANGE INTERVENTION TO IMPROVE CHILD NUTRITION: A CASE STUDY OF MWANZO BORA NUTRITION PROGRAM IN MOROGORO REGION

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ABSTRACT

The aim of this study was to assess the effect of behaviour change intervention on child's nutritional status among Mwanzo Bora Nutrition Program (MBNP) beneficiaries in Mvomero district and Morogoro Municipality as a case study. A total of 280 mothers with their children between 25 and 59 months old were randomly sampled equally from two wards per district. Data for respective study population were collected by using a structured questionnaire. Measurements of heights and weights of the sampled children were taken and analyzed for nutrition status using ENA for SMART 2011 software. Descriptive statistics were carried out while T-test and Chi-square test were done to determine relationship between variables by using SPSS version 16 software. Prevalence of underweight, stunting and wasting in Mvomero district did not differ significantly ($p>0.05$) between MBNP and non-MBNP respondents. However, in Morogoro Municipality stunting was less prevalent among MBNP (8.6%) compared to non-MBNP (34.3%) respondent ($p\leq0.05$). Early antenatal care (ANC) booking behaviour was observed among MBNP participants whereby more than 60% started ANC clinic within first trimester compared to less than 50% of non-MBNP households in both districts. Exclusive breastfeeding practice was well complied by about 70% of MBNP participants compared to less than 50% of non-MBNP in both districts. In both districts, the consumption of vegetables and fruits was also reported to have increased by more than 75% of the respondents following MBNP interventions. Also positive perception towards MBNP was observed by the majority of the respondents in both Mvomero district (95.7%) and Morogoro Municipality (84.3%). This study revealed significant contribution of behaviour change communication (BCC) approaches implemented by MBNP in improving child nutrition. There is a need to make use of gained experiences from MBNP in implementing other nutrition interventions.

DECLARATION

I **Sarah Deograthias Luzangi** 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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DEDICATION

I dedicate my dissertation work to my beloved family. Special thanks go to my father the late Deogratias Luzangi and my mother Florentina Munyaga. Also my brothers, Emmanuel, Cleophace, Boniface, Nesphory, Fr. Benedict and Phinias, my sisters, Regina, Claudia, Stella and Eugenia for their daily prayers, encouragement, social and financial support. I am truly thankful for having you in my life. Moreover, special gratitude to Mr. and Mrs Faustine Luzangi who laid a foundation for my education together with their family my sincere, appreciations to you all.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURE

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ANC	Antenatal Care
BCC	Behaviour Change Communication
BCI	Behaviour Change Intervention
CDC	Centre for Diseases Control
cm	Centimeter
CONSENUTH	Centre for Counseling Nutrition and Health Care
CSO	Civil Society Organization
CWHs	Community Health Workers
EBF	Exclusive Breastfeeding
ENA for SMART	Emergency Nutrition Assessment for Standardized Monitoring and Assessment of Relief and Transition
GoT	Government of Tanzania
HAZ	Height-for-age z-score
HIV	Human Immunodeficiency viruses
HSPs	Health Service Providers
iAGRI	Innovative Agricultural Research Initiative
IFA	Iron Folic Acid
IPTp	Intermittent Preventive Treatment for malaria in pregnancy
IYCF	Infant and Young Child Feeding
IYCN	Infant and Young Child Nutrition
kg	Kilogram
MBNP	Mwanzo Bora Nutrition Program
ml	Milliliter

NBS	National Bureau of Statistics
NNS	National Nutrition Strategy
PSG	Peer Supporting Group
RCH	Reproductive and Child Health
SBCC	Social-Behaviour Change Communication
SD	Standard Deviation
SPRING	Strengthening Partnerships, Results and Innovations in Nutrition Globally
SPSS	Statistical Packages for Social Sciences
TAWG	Tanga AIDS Working Group
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WAZ	Weight-for-age z-score
WHO	World Health Organization
WHZ	Weight-for-height z-score

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Infant and young child nutrition is of great importance because of its key role in ensuring good social and economic development for future generations (Panigrah and Das, 2014). Adequate nutrition during the first 1000 days of life from conception through the first two years of life is called the "window of opportunity" because of the profound positive effect of optimal nutrition (UNICEF, 2013). Development of a child can be permanently damaged during this period, therefore good nutrition in this period ensures proper development and plays a significant role in lifelong health outcomes (WHO, 2011). Inadequate nutrition during pregnancy and the first two years of life can irreversibly limit the ability of a child to achieve his or her full potential (UNICEF, 2012).

Behavioural nutrition intervention that focuses on exclusive breastfeeding practices, adequate and timely complementary feeding, along with continued breastfeeding for up to 2 years or beyond, are key components of the child survival and development in poor countries (UNICEF, 2013). The 2013 Lancet Nutrition series, highlights the causal role of child under nutrition and emphasizes the integration of nutrition interventions along with reinforcement of the evidence for Behaviour Change Interventions (BCI) in improving complementary feeding practices and linear growth (Bhutta *et al.,* 2013). Several systematic reviews have demonstrated that BCI have the potential to improve child feeding practices, nutritional status and growth (SPRING, 2014; Fabrizio *et al.*, 2014; USAID- IYCN, 2011; Imdad *et al*., 2011).

Adoption of Behaviour Change Communication (BCC) strategy by some of Sub-Saharan Africa countries (Niger and Burkina Faso) in improving maternal and child health and nutrition was observed to have positive outcome and improved community participation and hence sustainability in the long run (Horii *et al.,* 2016; Olney *et al.,* 2015).

Mwanzo Bora Nutrition Program (MBNP) in Tanzania, which is a Kiswahili phrase meaning good start, is one of the nutrition improvement programs that implement nutrition interventions through Social and Behaviour Change Communication (SBCC) approaches. The program aims to improve the lives of pregnant women and children from conception to 24 months through reduction of childhood stunting and maternal anemia by 20% over a five-year period. Also MBNP focuses on sustainably improvement of diet diversification and consumption through intensive community involvement in establishment of vegetable gardens and raising of small animals e.g. poultry and rabbits (MBNP, 2015).

Mwanzo Bora Nutrition Program supports the Government of Tanzania and local Tanzanian Civil Society Organizations (CSOs) through innovative social and behaviour change communications activities including mass media, training community health and agricultural extension workers to deliver consistent nutrition improvement messages, and working with peer support groups to improve nutrition behaviours and practices of caregivers, families and community leaders (MBNP, 2015). According to the approach taken by MBNP, behaviour change is not attainable only by improving people's knowledge about child health care but rather, behaviour change communication strategies draw on dynamic processes of changing behaviour to adopt a new practice. Through BCC, then implementation of interventions leads people to get actively involved in the

decision-making processes. As a result, expected outcomes are not only people's improved knowledge but also their ownership of the change (Horii *et al.*, 2016).

1.2 Problem Statement and Study Justification

The high levels of stunting in the country (34.7%) even in the areas that are known to have high food production, is still a big challenge as it affects over three million children (UNICEF, 2013; NBS, 2015). Despite of the progress made by the country to improve child nutrition through various nutrition intervention programs, still the prevalence of under nutrition is at alarming figures. For example, 33.4% of children are stunted, 11.5% are underweight and 6.0% are wasted in Morogoro region (NBS, 2015). Mwanzo Bora Nutrition Program (MBNP) has been implemented in Morogoro region since 2011. The aim of MBNP is to reduce the extent of stunting among children. The MBNP has been using SBCC strategy to implement its nutritional interventions that aim at improving child nutritional status (MBNP, 2015).

For MBNP to be successful, it depends very much on behaviour change of the beneficiaries who need to be persuaded to accept the optimal behavioural practices. The practices include early seeking of antenatal care, exclusive breastfeeding for the first six months, appropriate complementary feeding of babies after six months and consumption of diverse nutritious foods as introduced by the program. Given the limited resources that are put in for nutrition interventions, it is always necessary to ensure that experiences gained in implementing the few interventions that we have are well captured and shared among stakeholders. Such attempts allow stakeholders to avoid wastage of resources, for example by adopting approaches that have proved to be ineffective.

Mwanzo Bora Nutrition Program is quite unique in the sense that it is strongly based on behaviour change approach for achieving nutrition improvement, as depicted by the conceptual framework in Figure 1. It is assumed that each intervention included in the program will lead to a certain necessary process. Such processes include for example, influence of Peer Supporting Groups (PSGs) on making mothers seek early antenatal care services or undertake exclusive breastfeeding and proper complementary feeding. It is therefore important to assess the process in which these interventions have been implemented and what has been the resulting outcome.

Understanding the effect of behaviour change intervention has particular relevance in maximizing potential efficacy of an intervention and makes it self-sustaining and eventually improve nutritional outcome among beneficiaries. Therefore, this study makes an attempt to compare adherence of best child care and feeding practices and child nutritional status among community members who have participated in MBNP and those who have not. Moreover, the study assesses the outcome of MBNP promoted behavioural practices by relating with the nutritional outcome of children.

1.3 Objectives

1.3.1 Overall objective

The overall objective of this study was to examine the effect of behaviour change intervention on child nutritional status by taking MBNP beneficiaries in Mvomero district and Morogoro Municipality as a case study.

1.3.2 Specific objectives

The specific objectives of this study were:

i. To compare nutritional status of children aged 25-59 months between participants and non-participants of MBNP.

ii. To assess adherence to recommended child care and feeding practices among participants and non-participants of MBNP.

iii. To examine changes in household dietary habit among beneficiaries of MBNP after joining the program.

iv. To document perception of various community stakeholders about changes brought about by MBNP in their society.

1.4 Research Questions

This study was guided by the following research questions:

i. What is the extent of stunting, underweight and wasting of children aged 25-59 months among MBNP participants as compared to non-participants of the program?

ii. To what extent participants and non-participants of MBNP are adhering to recommended child care and feeding practices?

iii. How has the MBNP influenced household dietary habit of its beneficiaries?

iv. What is the general perception of community members about the performance of child health as a result of MBNP?

v. Are the assumptions made in implementing MBNP proving to be working?

1.5 Conceptual Framework

This study is guided by the conceptual framework, which is based on the behaviour change interventions that MBNP has been promoting to improve child nutrition among project beneficiaries (Figure 1). The framework focuses on the behavioural practices as the expected process of improving child nutrition (reduced stunting). This incorporates behavioural practices namely seeking early antenatal care, exclusive breastfeeding for the first six months, complementary feeding of babies over six months and diversification and consumption of nutritious foods as primary contributor of child nutritional status. Therefore change in dietary pattern, adherence to these best behavioural practices and general community perception about the performance of child health as a result of MBNP will be considered as they tend to influence child nutrition as illustrated in Figure1.

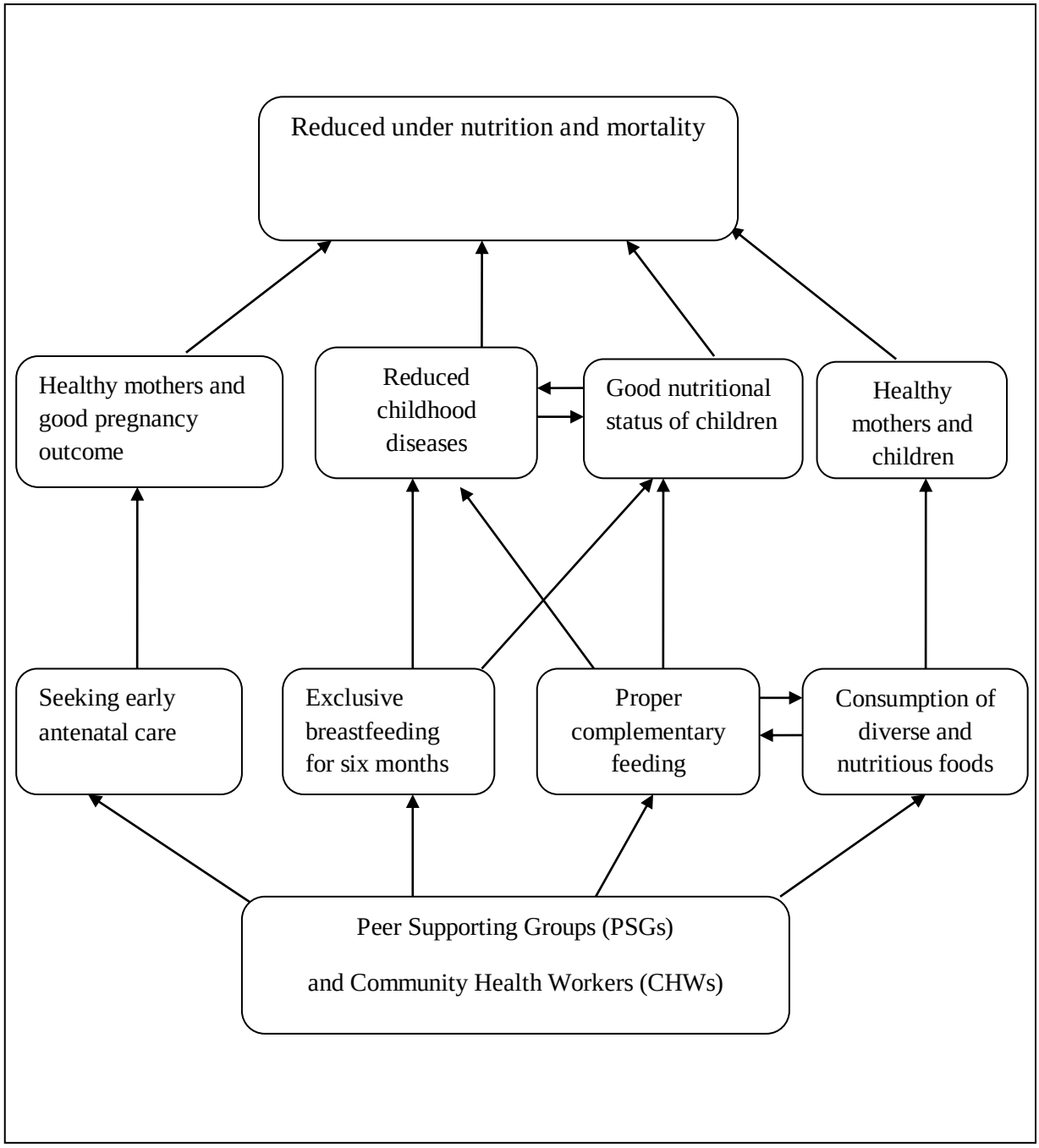

Figure 1: Conceptual framework describing expected process of improving child nutrition as adopted by the Mwanzo Bora Nutrition Program

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Behaviour Change Communication (BCC)

Behaviour Change Communication is an evidence-based, consultative process for developing communication programming that supports and influences practices that promote more productive and healthier lives (Lamstein *et al.,* 2014). The approach fosters behaviour change at the individual, household, and community levels, with the goal of improving health. Within the context of child nutrition, BCC can be applied to a nutrition objective of improving infant and young child feeding practice (Olney *et al.,* 2015). Behaviour Change Communication (BCC) supports the prevention of malnutrition as well as the promotion and maintenance of good nutrition (Fabrizio, *et al.,* 2014). One approach to improve child nutrition practices focuses on changing behaviors of those who directly (caregivers) or indirectly (extended family members and/or community members) influence child nutritional status (SPRING, 2014).

Systematic reviews have demonstrated that Behaviour Change Intervention (BCI) have the potential to improve child feeding practices, nutritional status and growth through Behaviour Change Communication (BCC) programs as comprehensive approach to improving infant and young child nutrition (Fabrizio *et al.*, 2014; Imdad *et al.*, 2011). Likewise, Bhutta *et al.,* 2013 in the Lancet Nutrition series, highlights the causal role of child under nutrition and emphasizes the integration of nutrition interventions along with reinforcement of the evidence for Behaviour Change Interventions (BCI) in improving complementary feeding practices and linear growth.

2.2 Nutritional Status of Children

According to the World Health Organization (WHO) nutritional indicators for children such as stunting, underweight and wasting often serve as proxy indicators of their overall wellbeing worldwide (WHO, 2010).

2.2.1 Stunting

The anthropometric index height for age, reflects linear growth achieved pre- and postnatal, with its deficits indicating long-term and cumulative effects of inadequate nutrition and/or health hence indicating the extent of stunting in a child (Betebo *et al.,* 2017; UNICEF, 2013). Stunting in childhood is linked to slower cognitive development and serious health impairments later in life that reduce the quality of life for individuals (Srivastava *et al.,* 2012). Also the WHO highlights that stunting is associated with increased risks of nutrition related chronic diseases, such as diabetes, hypertension, and obesity and eventually reduced economic capability in future (WHO, 2013).

Nutrition specific interventions that focus on immediate causes of childhood stunting and that directly address appropriate infant and young child feeding, prevention of infection, childhood stimulation in the first 2 years of life and adequate dietary diversity during pregnancy has been identified as an important determinants towards reducing prevalence of stunting (Smith and Haddad, 2015). Thus evidence show that BCC approach that focus on intensive peer counseling on how to achieve successful breastfeeding and appropriate complementary feeding practices as well as good maternal nutrition during pregnancy resulted in significant reduction of childhood stunting in developing countries (Vir, 2016).

2.2.2 Underweight

Underweight reflects depleted body fat and/or lean tissue stores due to unavailability of adequate food; it is public health problem and a foremost contributor to the disease burden in low income countries (Betebo *et al.,* 2017; UNICEF, 2013). Underweight is linked to growth faltering and is associated with increased morbidity and mortality among children (Agbozo *et al.,* 2016; Monyeki *et al.,* 2015). Evidence exists in support of various interventions to improve malnutrition in children on the population-level, including increasing dietary intake following infection to hasten catch up growth controlling infectious diseases and improving diets to prevent infection (Mukabutera *et al.,* 2016). Exclusive breastfeeding on demand for the first six months and timely introduction of safe and nutritionally rich foods after six months along with continued breastfeeding typically practice until 24 months or beyond play significant role in prevention of underweight situation among children (Bhutta *et al.,* 2013).

2.2.3 Wasting

Wasting reflects acute malnutrition featured by reduction or loss of body weight in relation to height (UNICEF, 2013; Dicampo, 2012). Different studies showed wasting is more common in developing countries especially in remote settings as a consequence of acute shortage of food and/or severe disease (Betebo *et al.,* 2017; Saaka, *et al.,* 2015; Faurholt-jepsen *et al.,* 2014).

Studies focusing on developing countries demonstrated that child's nutritional status primarily depend on caregiver adoption of appropriate behavioural feeding practices (Fabrizio *et al.,* 2014; Imdad *et al.,* 2011; USAID- IYCN, 2011). Thus, the 2013 Lancet Nutrition series has emphasized on the integration of nutrition interventions along with

reinforcement of the evidence for Behaviour Change Interventions (BCI) in improving child nutrition and general wellbeing (Bhutta *et al.,* 2013).

2.3 Household Dietary Habit and Nutritional Status

Optimal nutrition and good dietary pattern are important determinants of a child's health, growth and development especially within the first five years of life (Ibeanu *et al.,* 2014; Thorpe *et al.,* 2016). A diet composed of different food groups gives insight about the quality of food consumed in the household (Krebs-smith *et al.,* 2014). Consumption of animal source foods is one of the main indicators commonly used to assess quality of dietary intake in low and middle income countries, whereby it is assumed that, even is consumed in relatively small amounts, it is believed to enrich the body with protein and essential micronutrients and hence decrease susceptibility to malnutrition (Workicho *et al.,* 2016).

2.3.1 Common diet for children aged below five years in sub Saharan Africa

Nutritious foods and diverse diets in sufficient quality and quantity are essential for children to meet their nutrient needs and support growth (Amugsi *et al.,* 2015). Higher dietary diversity has been shown to be associated with increased nutrient adequacy of diets of children and adults in developed countries and associated with increased micronutrient density of foods consumed or better child nutritional status in developing countries (Saaka *et al.,* 2015).

Diets of children below five years in sub-Saharan African countries are predominantly based on starchy foods with little or no animal products and few fresh fruits and vegetables (Bukania *et al.,* 2014). Consequently, inadequate quantities and unbalanced

distribution of food types consumed often result in nutritional deficiencies (Glover-amengor *et al.,* 2016; Abiba *et al.,* 2012).

A study conducted in Cameroon revealed that consumption of diverse and quality foods reduces the rate of malnutrition and it is benefit for children (Gouado, 2014). Diets recognized as monotonous, cereal-based, and lacking diversity that are characteristic of most developing countries, especially in Africa, are comprised of foods low in energy with few animal products, fruits, and vegetables (Bukania *et al.,* 2014).

2.3.2 Nutrition intervention for improving household dietary habit

Access to a home garden is positively linked to improved household dietary habit and negatively related to less improved dietary habit (Taruvinga *et al.,* 2013). The observed association suggests that, rural households with access to home gardens are more likely to move from a medium dietary habit status into an improved dietary habit status. The possible explanation could be based on the fact that, home gardens normally provide a variety of fruits and vegetables that are rich in micronutrients like vegetables, fruits and tubers.

2.4 Adherence to Recommended Child Care and Feeding Practices

2.4.1 Seeking of antenatal care services

Antenatal care (ANC) is the care that a woman receives during pregnancy, which helps to ensure healthy outcomes of women and newborns (Fesseha *et al.,* 2014). The WHO recommends that first antenatal visit should be initiated soon as a woman recognize that she is pregnant or at least within first trimester. This early visit for antenatal care helps diagnose the pregnancy early and receiving necessary health and nutrition interventions (WHO, 2016). Also in Tanzania, Ministry of Health and Social Welfare has adopted this

recommendation on early booking of ANC clinic to ensure number of at least four ANC visits and eventually good pregnancy outcome (URT, 2015).

Health and nutrition intervention offered at antenatal care clinic such as intermittent preventive treatment for malaria in pregnancy (IPTp), nutritional counseling and Iron Folic Acid (IFA) supplementation has been found to have positive health outcome for both mother and her unborn child (UNICEF, 2012). Antenatal care is also an opportunity to promote the use of skilled birth attendance at birth and other healthy behaviours such as proper breastfeeding, early postnatal care, and planning for optimal pregnancy spacing (Blaine *et al.,* 2015). Good antenatal care has contributed significantly to the reduction of maternal and fetal mortality (Agu and Agu, 2011).

A multi-country randomized control trial led by the WHO (2016) and a systematic review showed that essential interventions can be provided over four visits at specified intervals, at least for healthy women with no underlying medical problems. Thus WHO came up with recommendations of minimal number of at least four ANC clinic visits throughout the pregnancy (WHO, 2016; UNICEF, 2012). Studies conducted in some of African countries (Uganda, Ethiopia and Gabon) found that majority of the mothers who attended ANC did not receive adequate number of visits and initiated the visits later than recommended by the WHO (Kawungezi *et al*., 2015; Fesseha *et al.,* 2014; Bouyou-akotet *et al.,* 2013). However, in Tanzania according to TDHS 2015, the proportion of women receiving four or more antenatal care visits as per WHO recommendation is still low about 51% (NBS, 2015).

2.4.2 Breastfeeding practices

The WHO recommends breastfeeding initiation that starting within one hour of birth since early initiation of breastfeeding provides warmth, promotes bonding, and helps the mother by reducing the risk of postpartum haemorrhage (WHO, 2011). The indicators of appropriate breastfeeding practices include: early initiation of breastfeeding, exclusive breastfeeding for children under six months and continued breastfeeding for 2 years or beyond (UNICEF, 2013). Moreover, WHO and the UNICEF recommend that all children should be exclusively breastfed for the first 6 months and thereafter mothers should continue to breastfeed for 2 years or longer (UNICEF, 2012). During the first days of life, breastfeeding helps to prevent low blood sugar (hypoglycemia) and low temperature (hypothermia), which are important contributors to newborn deaths (Bhutta *et al.*, 2013). Exclusive breastfeeding is the foundation of good nutrition and protects children against disease and thus allows all children to thrive and develop to their full potential (Blaine *et al.*, 2015).

Despite the WHO recommends exclusive breastfeeding of infants for the first six months of life, due to its health benefits but still studies shows that many women in Sub- Saharan Africa (SSA) countries do not practice exclusive breastfeeding (Wanjiku, 2015). In resource poor settings where deprived and sub-optimal breastfeeding practices regularly result to child undernourishment which is a key cause of more than half of all child deaths thus exclusive breastfeeding is regarded as crucial for infants' continued existence (Danso, 2014).

In Tanzania current trends in breastfeeding practices shows that 59% of infants under 6 months are exclusively breastfed, an increase from the 2010 TDHS (50%) and in 2004-05 (41%) (NBS, 2015). According to the report 39% of children under age 6 months were

given something other than breast milk. Continued breastfeeding along with complementary foods for up to two years of age or beyond remains to be crucial for child's survival. However, global progress on this intervention is both uneven and suboptimum due to early cessation of breastfeeding (Bhutta *et al.,* 2013).

2.4.3 Appropriate complementary feeding practices

Complementary feeding for infants refers to the timely introduction of safe and nutritionally rich foods in addition to breast-feeding at about 6 months of age and typically provided from 6 to 24 months of age (Gouado, 2014; Bhutta *et al.,* 2013). The WHO and UNICEF recommend initiation of complementary feeding starting at the sixth month of child's age (WHO, 2011). Systematic reviews on causes and prevention of stunting reveal that stunting occurs during the complementary feeding period, between 6 and 24 months of age. Indeed poor complementary feeding has been identified as a risk factor associated directly with stunting (Bhutta *et al*., 2013; Stewart *et al.,* 2013).

As suggested in studies conducted in Tanzania (Muhimbula *et al.,* 2010), Cameroon and Nigeria showed that adhering to appropriate complementary feeding practices amongst infants and young children between 6 and 24 months without discontinuing breastfeeding has positive nutritional implications and general child wellbeing (Gouado, 2014; Lawan *et al.,* 2014) . However, deviations from what is appropriate during infancy and early childhood may result in irreversible faltering in linear growth and cognitive deficit (Lawan *et al.,* 2014; Fabrizio *et al*., 2014).

Introduction complementary of feeding, food choices, dietary diversity, preparation methods, quantity, feeding frequency, responsiveness to infant cues, safe preparation and storage of foods are key aspects in preventing childhood malnutrition and associated mortality (Nankumbi and Muliira, 2015; Bhutta *et al*., 2013; Stewart *et al*., 2013).

2.4.4 Male involvement in child care and feeding practices

Male participation is a crucial component in the optimization of maternal and child health and nutrition (Asefa *et al.*, 2014; Ditekemena *et al.*, 2012). The Tanzanian Ministry of Health, in line with WHO recommendations, also emphasizes the particular importance of male involvement during maternal and child health promotion services (URT, 2015). Regularly, child care and feeding practices in most African countries including Tanzania, has been regarded as a role of mother while father's role is the most neglected part in the continuum of child health care. (Abate *et al.,* 2017). Studies demonstrated that male involvement in maternal and child health care promotion has positive implications by increasing ANC and postnatal uptake services in both developed and developing countries (Yargawa *et al.,* 2015; Redshaw and Henderson , 2013). Moreover, father and other family member support are very important to young child feeding than an individual mother's care giving knowledge alone (Bhatta, 2013). Study conducted in Western Kenya revealed that programs that include innovative approaches to engage these key influencers such as male partner and grandmothers to provide positive social support could be more successful in changing behaviors to improve maternal and child nutrition than programs that focus only on improving mothers' knowledge (Mukuria *et al.,* 2016). Similarly other studies verified that engaging male partners in breastfeeding promotion and education, as well as providing fathers with knowledge and skills for optimal breastfeeding practices, has been shown to positively impact exclusive breastfeeding rates (Global Health, 2014; Bhatta, 2013).

2.5 Mwanzo Bora Nutrition Program

Mwanzo Bora Nutrition Program is a USAID supported program through the Feed the Future (FtF) and Global Health Initiatives. The program is designed to support the Government of Tanzania (GoT) to bring about positive changes in the nutritional status of

Tanzanian people, through the Implementation of the National Nutrition Strategy, and the Tanzania Agriculture and Food Security Investment Plan (TAFSIP). Mwanzo Bora Nutrition Program is implemented by a consortium of four organizations, namely Africare, Deloitte, The Manoff Group and COUNSENUTH (MBNP, 2015).

The overall goal of the program is to improve the nutritional status of children and pregnant and lactating women in Tanzania, with specific focus on reducing maternal anemia and child stunting by at least 20% in the three regions of Manyara, Morogoro and Dodoma in Tanzania Mainland. Mwanzo Bora Nutrition Program is supporting the Government of Tanzania and local Tanzanian Civil Society Organizations (CSOs) to improve nutritional outcomes in targeted regions of the country, with a strong focus on scaling up community level interventions. A core component of the Mwanzo Bora Nutrition program is to engage government and civil society in the development of a vibrant national platform for nutrition, placing an emphasis on the first 1000 days of life (MBNP, 2015).

The Mwanzo Bora Nutrition Program works with the government and civil society through a multi-faceted evidence-based approach, which includes Social and Behaviour Change Communication (SBCC), in form of strategic grants to implement high-impact nutrition interventions. The approach promotes the adoption of positive behaviours at household and community level. This involved strategic partnerships to leverage resources, institutional strengthening to improve the quality of facility-based nutrition services and programming at national and district levels (MBNP, 2015).

CHAPTER THREE

3.0 METHODOLOGY

This chapter describes the methodology that was used in the study. It includes description of the study area and research design, which covers sampling procedures, sample size and sampling frame, and techniques used in data collection and data analysis.

3.1 Study Area

The study was conducted in two districts namely Mvomero district and Morogoro Municipality focusing on Mwanzo Bora Nutrition Program (Figure 2). The program works in collaboration with local government authorities at health facilities and implements the interventions in partnership with Civil Society Organizations (CSOs) who are MBNP sub-grantees. In Mvomero district, MBNP works at community level in 23 wards (115 villages) in partnership with Tanga AIDS Working Group (TAWG), a CSO based in Mvomero, while in Morogoro Municipality the program works in 19 wards (278 streets) in partnership with Umwema Group Morogoro Trust Fund. The MBNP use Peer Supporting Groups (PSGs) as role models and mentors to convey behavioural nutrition interventions to other people residing in their villages.

According to the 2012 Population Census, Morogoro Municipality had a population of 315 866 individuals whereby 151 700 were males and 164 166 were females. For Mvomero district, the total population was 312 109 individuals whereas 154 843 were males and 157 266 were females (NBS, 2012). The major economic activity of the two districts is agriculture although livestock keeping is also practiced by Mvomero residents while petty trading and formal and informal employment are also common among residents of Morogoro Municipality. The Luguru tribe is the native and dominant tribe in

both districts though other Tanzanian tribes are also found in these districts due to socio-economic reasons. The two districts were purposively selected because they are among the Mwanzo Bora Nutrition Program (MBNP) zones of influence in Morogoro region. The inclusion of the two districts also allowed comparison between rural-urban differences.

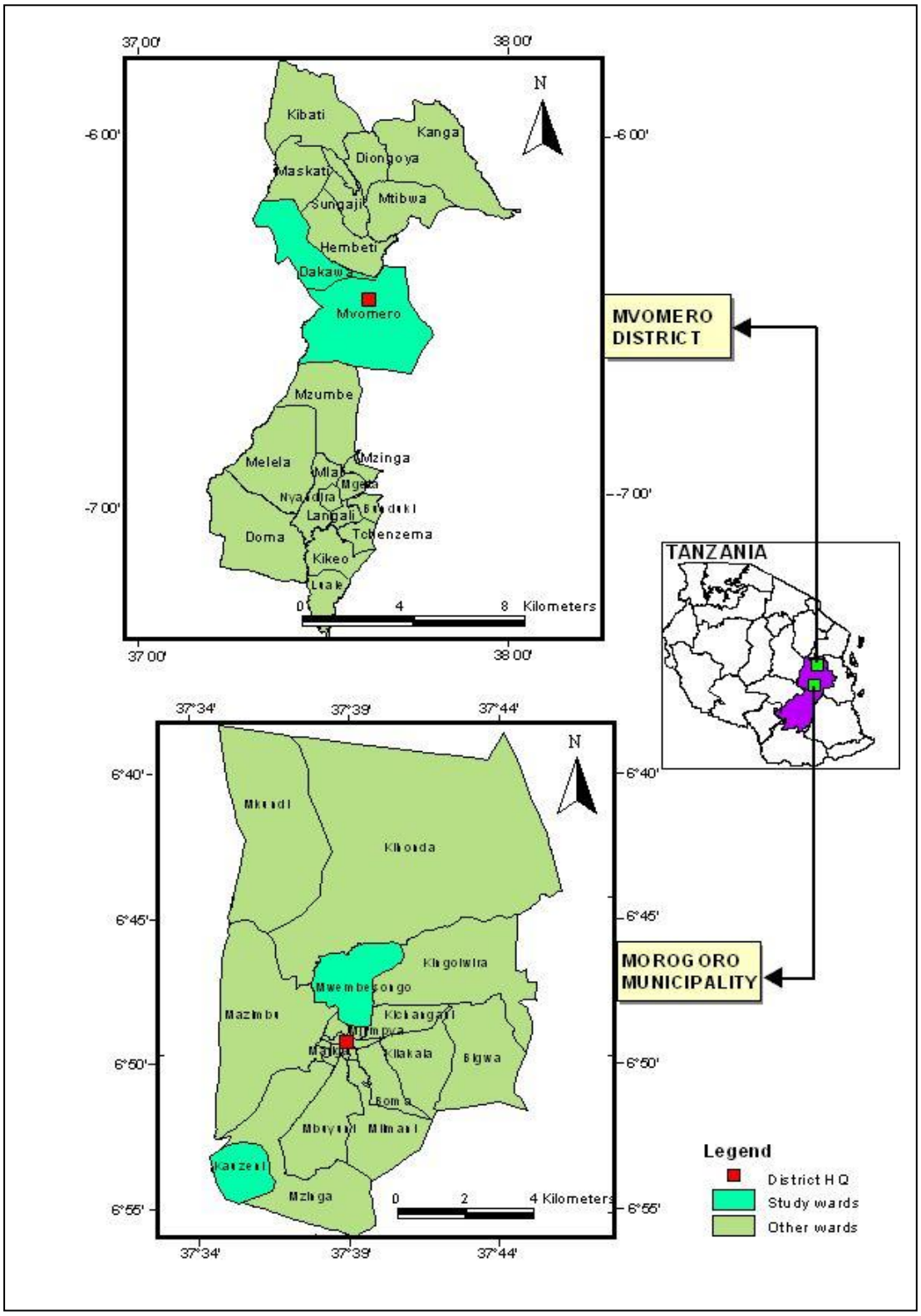

Figure 2: Map of Mvomero district and Morogoro Municipality in which the study areas are located

3.2 Study Design

A cross sectional design was employed in this study, whereby the information about a respondent is gathered at only one point in time. Moreover, the design used "with and without" approach to distinguish households that were direct beneficiaries (i.e. MBNP participants) and the non-direct beneficiaries (non MBNP members of community). In this type of research design, a subset therefore is selected from the entire population from which data are collected to answer questions of interest to address the objectives of the study.

3.3 Sampling Procedure

The two districts i.e. Morogoro Municipality and Mvomero district were purposively selected because MBNP in Morogoro region started in these two districts as first zones of influence. Four wards i.e. Dakawa and Mvomero wards in Mvomero district and Mwembesongo and Kauzeni wards in Morogoro Municipality were selected randomly as sampling frames. Then simple random sampling technique was used to identify participating households whereby a total of 70 households (35 households with MBNP and 35 households without MBNP participants) were selected from each ward. Other stakeholders such as male spouses, health service providers and community health workers were selected purposively.

3.3.1 Sampling frame and sampling unit

The sampling frame consisted of children between 25-59 months old and their respective mothers living in Mvomero and Dakawa wards (Mvomero district), and also those from Mwembesongo and Kauzeni wards in Morogoro municipality. Sampling unit was a household having a child of between 25-59 months old. For households which had more

than one child and more than one woman in the selected category, only one mother-child pair was selected for the study.

3.3.2 Inclusion and exclusion criteria

All women with children of between 25-59 months old living in the sampled areas were eligible for inclusion into the study. Excluded from the study were all women that had no children of the age between 25 and 59 months. Also excluded were all women (mother-child-pairs) known to have chronic diseases and HIV positive status.

3.3.3 Sample size

The sample size was determined based on a total number of PSGs of MBNP in Mvomero district and Morogoro Municipality, which is known to be 563 groups (MBNP, 2015). Five percent was considered to provide a sufficient sample for meaningful analyses. To obtain the number of respondents, the number of representative PSGs was multiplied by the maximum number of members per PSG as expressed mathematically below:-

n =5% *563 = 28 groups

Since one PSG has maximum of 10 members then:-

10 individuals * 28 groups = 280 respondents or mother child pairs. Since the interest of the study was to compare MBNP participants and non-participants, 140 MBNP members and 140 non MBNP members were included. The sample was equally divided between the two districts, allowing 140 (70 of MBNP and 70 of non-MBNP) for each district.

3.4 Data Collection

District Nutritionists and Community Health Workers, who were familiar with the study area, assisted the researcher by facilitating data collection. Three Research Assistants were recruited and trained for two days to understand what they were supposed to do in the field. Data were collected through household visits where-by a sampled mother was interviewed face to face and child's anthropometric measurements were taken.

3.4.1 Instruments for data collection

Data were collected using two sets of structured questionnaires with both open and closed end questions. The questionnaire for MBNP participants (Appendix 1) sought information on socio-economic and demography of household, nutritional status of the target child, adherence to the recommended child care practices, perception of participants towards changes brought by MBNP and change in household dietary habit after joining MBNP. The questionnaire for non MBNP participants (Appendix 2) gathered information on socio-economic and demography of household, nutritional status of the target child and adherence to the recommended child care practices.

Data collection questionnaires were pre-tested before starting data collection in 10 randomly selected households having children aged 25-59 months at Misufini ward in Morogoro Municipality. Appropriate corrections were then made to remove or modify ambiguous questions before the actual data collection started. Approval was sought from Morogoro and Mvomero District Executive Directors before conducting the study. Consent of the participants was obtained verbally after giving them information and explained the purpose of the study. Confidentiality was ensured by conducting personal interviews separately from other respondents.

3.4.2 Assessment of change in dietary habit, adherence to recommended child care practices and perception towards changes brought by MBNP

Change in household dietary habit after joining MBNP among MBNP participating households were examined based on the consumption of selected food items namely; cereals, roots and tubers, foods of animal origins, legumes, vegetables and fruits. Participatory method was used to assess any change of intake of the mentioned food item using three point scale of:- (i) increased (ii) remained the same and (iii) decreased categories to reflect changes (Kennedy *et al.,* 2010; Ntwenya *et al.,* 2015). Face to face interviews with mothers and focus group discussions with Health Service Providers (HSPs) working in health facilities, Community Health Workers (CHWs) and male spouses were held to assess adherence to recommended child care practices as well as getting their perception toward changes brought by MBNP.

3.4.3 Anthropometric measurements of children

Anthropometric measurements of weight and height were taken for computing nutritional status indices namely weight-for- age, weight-for-height and height-for-age z-scores.

(a) Weight

Weight was measured by using SECA-Germany electronic bathroom weighing scale (0-150 kg) using the CDC (2012) procedures. The scale was placed on a flat surface and adjusted to zero before taking measurements. Children were weighed bare feet with only light clothes. While taking measurements, a child stood in upright position at the centre of the balance with the feet placed in a v-shape. The weight was recorded to the nearest 0.1 kg.

(b) Height

Height of a child was measured by use of a stadiometer with precision of 0.1 cm using the CDC (2012) procedures. The bare footed child was assisted to stand straight on the stadiometer which was placed on a flat surface and to look straight ahead. With the help of mother, the heels were maintained together and the body was placed so that the shoulder blades, buttocks and the heels were touching the vertical surface of the stadiometer. The feet were maintained flat on the floor slightly apart, with the legs and back straight and arms at the sides. The shoulders were relaxed and in contact with the stadiometer. As the child stood still, the research assistant took the measurement.

(c) The nutritional status indices

The nutritional indices used for assessing nutritional status of children in this study were weight- for -age z-score (WAZ), height-for -age z-score (HAZ) and weight –for-height z-score (WHZ). According to WHO (2004), children whose WAZ, HAZ or WHZ are ≤ -2SD are classified as being underweight, stunted or wasted respectively. On the other hand, children whose WAZ, HAZ or WHZ lie between -1SD and +2SD are classified as normal (WHO, 2004). This classification criterion was applied in this study.

3.5 Data Processing and Analysis

Anthropometric indices (WAZ, HAZ and WHZ) were computed using the ENA for SMART 2011 software and WHO standards. The rest of collected data were entered into the Statistical Package for Social Sciences (SPSS) version 16 computer program for analysis. Data were analyzed whereby descriptive statistics (mean, frequency and percentage) were computed. T-test was used to compare means of measured variables of interst. Relationships between categorical variables were assessed using Chi-square (χ^2) tests. The statistical levels of significance were set at $p \leq 0.05$ for all analyses.

CHAPTER FOUR

4.0 RESULTS

This chapter presents the results whereby it is divided into four major sections. The first section presents demographic and socio-economic characteristics of the respondents. The second section presents adherence to recommended child care practices. The third section presents the results of assessment of nutritional status of the sampled children while the last section presents performance of households participating in MBNP.

4.1 Demographic and Socio-economic Characteristics of the Sampled Respondents

4.1.1 Education level and marital status

Ten percent of MBNP participants in Mvomero district had no formal education compared to 24.3% of non-MBNP participants (Table 1). Majority of both MBNP and non-MBNP participants in Mvomero district attained primary school level only i.e. 78.6% and 68.6% respectively. Only few respondents from both MBNP and non-MBNP participants had secondary and tertiary education. In Morogoro Municipality, 8.6% of MBNP participants and 14.3% of non-MBNP participants had no formal education (Table 2). Conversely, 71.4% of MBNP participants had attained primary school education only likewise to 70% of non-MBNP participants. Again, very few respondents went beyond primary school education levels as shown in Table 2. Most MBNP and non-MBNP participants in both Mvomero district and Morogoro Municipality were married whereas only few respondents were single, divorced or widowed as shown in Tables 1 and 2.

4.1.2 Main occupation of head of household and contribution of the mother on household income

Farming sector was the leading main occupation of heads of household among MBNP and non-MBNP participants (57.1% and 72.9% respectively) in Mvomero district (Table 1) followed by non-farming (self-employment) with 21.4% of MBNP participants and 10% of non-MBNP participants. Employment sector appeared as third while the least of all was livestock keeping sector (Table 1). In Morogoro municipality, non-farming (self-employment) was also observed to be key occupation of heads of household for MBNP (41.4%) unlike to 37.1% of non-MBNP participants (Table 2). Moreover, farming sector was the leading occupation among non-MBNP participants accounting for 51.4% compared to 32.9% of MBNP participants and while employment sector was the third (Table 2).

It was observed that majority of the mothers in Mvomero district were involved in contributing to household income through farming activities for both MBNP (51.4%) and non-MBNP (70%) participants followed by non-farming (self-employment) activities (Table 1). In Morogoro Municipality, non-farming (self-employment) was the main occupation for majority of mothers in contributing to household income among MBNP participants while for non-MBNP participants farming was the major occupation of mothers in contributing household income followed by self-employment (Table 2).

Table 1: Demographic and socio-economic information of respondents in Mvomero district

Demographic/Economic Information	MBNP Participant		Non-MBNP Participant		Total	
	n	%	n	%	n	%
Education level of the respondent						
None	7	10.0	17	24.3	24	17.1
Primary level	55	78.6	48	68.6	103	73.6
Secondary level	7	10.0	5	7.1	12	8.6
Tertiary level	1	1.4	0	0	1	0.7
Total	**70**	**100**	**70**	**100**	**140**	**100**
Marital status of the respondent						
Single	0	0	9	12.9	9	6.4
Married	67	95.7	53	75.7	120	85.7
Separated/divorced	2	2.9	8	11.4	10	7.1
Widow	1	1.4	0	0	1	0.7
Total	**70**	**100**	**70**	**100**	**140**	**100**
Main occupation of head of Household						
Farming	40	57.1	51	72.9	91	65.0
Livestock keeping	2	2.9	5	7.1	7	5.0
Employment	13	18.6	7	10.0	20	14.3
Self-employment	15	21.4	7	10.0	22	15.7
Total	**70**	**100**	**70**	**100**	**140**	**100**
Contribution of the mother on household income						
Farming	36	51.4	49	70.0	85	60.7
Livestock keeping	2	2.9	5	7.1	7	5.0
Employment	1	1.4	0	0	1	0.7
Self-employment	28	40.0	11	15.7	39	27.9
House wife	3	4.3	5	7.1	8	5.7
Total	**70**	**100**	**70**	**100**	**140**	**100**
Sex of the child						
Male	32	45.7	31	44.3	63	45.0
Female	38	54.3	39	55.7	77	55.0
Total	**70**	**100**	**70**	**100**	**140**	**100**

Table 2: Demographic and socio-economic information of respondents in Morogoro Municipality

Demographic/Economic Information	MBNP Participant		Non-MBNP Participant		Total	
Education level of the respondent	**n**	**%**	**n**	**%**	**n**	**%**
None	6	8.6	10	14.3	16	11.4
Primary level	50	71.4	49	70.0	99	70.7
Secondary level	13	18.6	11	15.7	24	17.1
Tertiary level	1	1.4	0	0	1	0.7
Total	**70**	**100**	**70**	**100**	**140**	**100**
Marital status of the respondent						
Single	2	2.9	5	7.1	7	5.0
Married	63	90.0	56	80.0	119	85.0
Separated/divorced	4	5.7	14	8.6	10	7.1
Widow	1	1.4	3	4.3	4	2.9
Total	**70**	**100**	**70**	**100**	**140**	**100**
Main occupation of head of Household						
Farming	23	32.9	36	51.4	59	42.1
Employment	18	25.7	8	11.4	26	18.6
Self-employment	29	41.4	26	37.1	55	39.3
Total	**70**	**100**	**70**	**100**	**140**	**100**
Contribution of the mother on household income						
Farming	27	38.6	36	51.4	63	45.0
Employment	1	1.4	1	1.4	2	1.4
Self-employment	37	52.9	24	34.3	61	43.6
House wife	5	7.1	9	12.9	14	10.0
Total	**70**	**100**	**70**	**100**	**140**	**100**
Sex of the target child						
Male	35	50.0	32	45.7	67	47.9
Female	35	50.0	38	54.3	73	52.1
Total	**70**	**100**	**70**	**100**	**140**	**100**

4.1.3 Age of the respondents (mothers and target children)

Mean age of respondents (mothers) from MBNP and non-MBNP were similar since there was no significant difference, ($p>0.05$). Similarly, the mean age of target children among the two groups was the same in both Mvomero and Morogoro Municipality districts (Table 3).

Table 3: Mean age of sampled mothers and children for MBNP and non-MBNP participants in Mvomero district and Morogoro Municipality

Variable/location	N	Mean ± SD	Level of significance (p-value)
Mvomero district			
Age of the mothers (years)			
MBNP participants	70	29.57 ± 6.81[A]	0.387
Non-MBNP participants	70	28.61 ± 6.24[A]	(0.867; 138)
Age of the target child (months)			
MBNP participants	70	38.19 ± 8.66[B]	0.194
Non-MBNP participants	70	40.19 ± 9.44[B]	(-1.306; 138)
Morogoro Municipality			
Age of the mothers (years)			
MBNP participants	70	29.96 ± 5.98 [C]	0. 073
Non-MBNP participants	70	28.26 ± 5.09 [C]	(1.809; 138)
Age of the target child (months)			
MBNP participants	70	37.54 ± 9.57 [D]	0.557
Non-MBNP participants	70	38.51 ± 9.94[D]	(-0.589; 138)

[A], [B], [C] and [D] Similar letters denote no significant difference, while figures in the brackets denote t-value and degree of freedom (df) respectively.

4.2 Adherence to Recommended Child Care Practices

This study assessed adherence to recommended child care practices among MBNP and non-MBNP participants. Three issues were considered, namely seeking of antenatal care services, child feeding practices and male involvement in child care practices.

4.2.1 Seeking of antenatal care

Significant difference ($p \leq 0.01$) was noted between MBNP and non-MBNP participants in Mvomero district in terms of the starting time of antenatal care (ANC) clinic (Table 4). More than half of MBNP participants (57.1%) started ANC clinic at 1-3 months of their gestational age, as compared to only 40% of their counterparts (non-MBNP). On the other hand, 50% of non-MBNP participants started ANC clinic after three months of their gestational age compared to only 37.1% of MBNP participants. Ten percent of non-MBNP participants delayed to start ANC clinic until the third trimester of pregnancy

compared to none of MBNP participants (Table 4). In Morogoro Municipality, starting time of ANC clinic also differed significantly ($p \leq 0.01$) between MBNP and non-MBNP participants (Table 4).

Table 4: Distribution of respondents according to starting time and number of visits of ANC clinic in Mvomero district and Morogoro Municipality

Variable/Location	MBNP Participants		Non-MBNP Participants		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Time started ANC clinic Mvomero (n=140)							
Less than one month	4	5.7	0	0	4	2.9	
1-3 months	40	57.1	28	40.0	68	48.6	0.002**(14.444; 3)
4-6 months	26	37.1	35	50.0	61	43.6	
7-9 months	0	0	7	10.0	7	5.0	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n= 140)							
Less than one month	4	5.7	1	1.4	5	3.6	
1-3 months	46	65.7	31	44.3	77	55.0	
4-6 months	17	24.3	37	52.9	54	38.6	0.004** (13.129; 3)
7-9 months	1	1.4	3	4.3	4	2.9	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Number of ANC visits throughout the pregnancy Mvomero (n=140)							
Less than four visits	7	10.0	23	32.9	30	21.4	
At least four visits	63	90.0	47	67.1	110	78.6	0.001*** 10.861;1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							
Less than four visits	7	10.0	12	17.1	19	13.6	
At least four visits	63	90.0	58	82.9	121	86.4	0.217 (1.522; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]
** Significant at p-value ≤ 0.01
*** Significant at p-value ≤ 0.001

Whereas more than 70% of MBNP participants started ANC clinic during the first trimester (within first three months), non-MBNP participants were only about 45%. Number of ANC clinic visits in Mvomero district also showed significant difference ($p \leq 0.05$) between MBNP and non-MBNP participants (Table 4) but not in Morogoro Municipality.

4.2.2 Child feeding practices

The study assessed child feeding practices in terms of breastfeeding practices, type of complementary foods, number of meals and amount of food fed to the child.

4.2.2.1 Breastfeeding practices

Breastfeeding initiation among MBNP and non-MBNP participants in Mvomero district differed significantly (Table 5) at $p<0.05$. Whereas 60% of MBNP participants started to breastfeed soon after birth, their counterparts were only 35.7%. However, breastfeeding initiation did not differ significantly ($p>0.05$) in Morogoro Municipality between the MBNP and non-MBNP participants (Table 6). Duration of exclusive breastfeeding in Mvomero district differed significantly ($p\leq 0.05$) between MBNP and non-MBNP participants whereby 90% of MBNP participants practiced exclusive breastfeeding (EBF) for six months compared to only 40% of non-MBNP participants (Table 5). The extent of exclusive breastfeeding was the same in Morogoro Municipality between MBNP and non-MBNP participants (Table 6). More respondents from MBNP were aware about advantages of practicing exclusive breastfeeding compared to the non-MBNP participants in both districts (Tables 5 and 6). Most of the respondents, regardless of their participation status, mentioned no frequent illness among children as the most noticed advantages of exclusive breastfeeding.

Duration of breastfeeding differed significantly ($p\leq 0.05$) among the two groups in both districts whereby MBNP participants breastfed for longer period than non-MBNP participants (Tables 5 and 6).

Table 5: Breastfeeding practices among the sampled respondents in Mvomero district

Variable	MBNP Participants		Non -MBNP Participants		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Breastfeeding initiation							
Soon after birth	42	60.0	25	35.7	67	47.9	
Within one hour	20	28.6	31	44.3	51	36.4	0.028* (9.085; 3)
Within two hours	6	8.6	11	15.7	17	12.1	
Four and above hours	2	2.9	3	4.3	5	3.6	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Duration of Exclusive Breastfeeding (EBF)							
Less than six months	7	10.0	41	58.6	48	34.3	
Six months	63	90.0	28	40.0	91	65.0	0.000*** (38.548; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Aware about advantages of Exclusive Breastfeeding							
Aware	62	88.6	27	38.6	89	63.6	0.000*** (45.779; 1)
Not aware	8	11.4	43	61.4	51	36.4	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Noticed advantage of EBF							
No frequent illness	50	80.3	24	88.9	74	83.1	
Curiosity of learning	1	1.6	0	0	1	1.1	0.504 (2.346; 3)
Appropriate weight gain	7	11.3	3	11.1	10	11.2	
Good physical growth and development	4	6.5	0	0	4	4.5	
Total	**62**	**100**	**27**	**100**	**89**	**100**	
Duration of continuous breastfeeding							
Less than 12 months	0	0	3	4.3	3	2.1	
12 - 23 months	21	30.0	48	68.6	69	49.3	0.000*** (26.801; 2)
24 months or beyond	49	70.0	19	27.1	68	48.6	
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]

* Significant at p-value ≤ 0.05.

*** Significant at p-value ≤ 0.001

Table 6: Breastfeeding practices among the sampled respondents in Morogoro Municipality

Variable	MBNP Participants		Non- MBNP Participants		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Breastfeeding initiation							
Soon after birth	47	67.1	37	52.9	84	60.0	0.246 (4.151; 3)
Within one hour	22	31.4	29	41.4	51	36.4	
Within two hours	1	1.4	3	4.3	4	2.9	
Four and above hour	0	0	1	1.4	1	0.7	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Duration of EBF							
Less than six months	8	11.4	34	48.6	42	30.0	0.000***(22.993; 1)
Six month	62	88.6	36	51.4	98	70.0	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Aware about advantage of exclusive breastfeeding (EBF)							
Aware	61	87.1	25	35.7	87	61.7	0.000*** (45.452; 1)
Not aware	9	12.9	45	64.3	54	38.6	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Noticed advantage of EBF							
No frequent illness	50	82.0	20	80.0	70	81.4	0.500 (2.368; 3)
Curiosity of learning	2	3.3	0	0	5	2.3	
Appropriate weight gain	7	11.5	5	20.0	12	14.0	
Good physical growth and development	2	3.3	0	0	2	2.3	
Total	**61**	**100**	**25**	**100**	**89**	**100**	
Duration of continuous breastfeeding							
Less than 12 months	4	5.7	1	1.4	5	3.6	0.000*** (26.801; 2)
12 - 23 months	16	22.9	32	45.7	48	34.3	
24 months or beyond	50	71.4	37	52.9	87	62.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]
*** Significant at p-value ≤ 0.001

4.2.2.2 Complementary feeding practices

Results (Table 7) show that, common complementary foods used at different ages differed significantly ($p \leq 0.05$) in Mvomero district. Majority of children at six months, for both MBNP (67.1%) and non-MBNP (50%) participants were fed whole maize porridge with sugar (Table 7). However, in Morogoro Municipality common complementary foods used

at 6-8 months of age did not differ significantly ($p>0.05$) between the two groups of respondents (Table 8). Similarly, at 7-8 and 9-12 months of child's age, also show significant difference on type of complementary foods that were commonly given to the focus child between the two groups. In Mvomero district, majority of MBNP children were fed mashed starchy staple food with relish (legumes/fish/meat/ vegetables) as compared to non-MBNP participants who were fed starchy staple with relish soup. Similar situation was also observed in Morogoro Municipality at 9-12 months of child's age. In both districts, results show that family meals (starchy staple food with relish) were introduced by majority of the respondents at 12-24 months. Moreover, small proportions of children from both MBNP and non-MBNP were fed cow's milk in both districts. Also majority of the children were fed fruits which were in season and plenty though fruits were lately introduced (at 9-24 months) for both groups in Mvomero district and Morogoro Municipality (Tables 7 and 8).

Table 7: Common complementary foods used by the sampled respondents at different ages in Mvomero district

Variable	MBNP Participants		Non-MBNP Participants		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Type of food fed at six months of age							
Whole maize porridge with sugar	47	67.1	35	50.0	82	58.6	0.040* (4.239; 1)
Whole maize porridge with salt	6	8.6	20	28.6	26	18.6	0.002**(9.258; 1)
Composite flour porridge	17	24.3	18	25.7	35	25.0	0.845 (0.038; 1)
Cow's milk	17	23	11	17	28	21	0.205 (1.607; 1)
Type of food fed at 7-8 months of age							
Mashed potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables soup	45	64.3	56	80.0	101	72.1	0.038* (4.301; 1)
Mashed potatoes/Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables	16	22.9	14	20.0	30	21.4	0.680 (0.170; 1)
Cow's milk	21	300	12	17.1	33	23.6	0.073 (3.212; 1)
Composite flour porridge	22	31.4	12	17.1	34	24.3	0.049* (3.885; 1)
Maize porridge	47	67.1	63	90.0	110	78.6	0.001*** (10.861; 1)
Type of food fed at 9- 12 months of age							
Mashed potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables soup	39	55.7	43	61.4	82	58.6	0.493 (0.471; 1)
Mashed potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables	31	44.3	27	38.6	58	41.4	0.493 (0.471; 1)
Cow's milk	14	20.0	12	17.1	26	18.6	0.664 (0.189; 1)
Composite flour porridge	19	27.1	12	17.1	31	22.1	0.154 (2.030; 1)
Maize porridge	50	71.4	58	82.9	108	77.1	0.107 (2.593; 1)
Fruits (orange, banana, pawpaw, avocado)	58	82.9	48	68.6	106	75.7	0.049* (3.885; 1)
Type of food fed at 12- 24 months of age							
Potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables (family meals)	70	100	70	100	140	100	
Cow's milk	5	7.1	12	17.1	17	12.1	0.026* (4.933; 1)
Composite flour porridge	21	30.0	2	2.9	23	16.4	0.000*** (18.781; 1)
Maize porridge	49	70.0	68	97.1	117	83.6	0.000*** (18.781; 1)
Fruits (orange, banana, pawpaw, avocado)	70	100	70	100	140	100	

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]

*** Significant at p-value ≤ 0.001,

** Significant at p-value ≤ 0.01,

* Significant at p-value ≤ 0.05

Table 8: Common complementary foods used by the sampled respondents at different ages in Morogoro Municipality

Variable	MBNP Participants		Non-MBNP Participants		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Type of food fed at six months of age							
Whole maize porridge with sugar	36	51.4	33	47.1	69	49.3	0.612 (0.257; 1)
Whole maize porridge with salt	5	7.1	12	17.1	17	12.1	0.070 (3.281; 1)
Composite flour porridge	30	42.9	19	27.1	49	35.0	0.051 (3.799; 1)
Cow's milk	20	28.6	21	30.0	41	29.3	0.853 (0.034; 1)
Type of food fed at 7-8 months of age							
Mashed potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables soup	40	57.1	38	54.3	78	55.7	0.734 (0.116; 1)
Mashed potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables	30	42.9	32	45.7	62	44.3	0.734 (0.116; 1)
Cow's milk	24	34.3	23	32.9	47	33.6	0.858 (0.032; 1)
Composite flour porridge	39	55.9	28	40.0	67	47.9	0.063 (3.464; 1)
Maize porridge	31	44.3	42	60.0	73	52.1	0.091 (2.859; 1)
Type of food fed at 9- 12 months of age							
Mashed potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables soup	7	10.0	41	58.6	48	34.3	0.000*** (36.649; 1)
Mashed potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables	63	90.0	29	41.4	92	65.7	0.000*** (36.649; 1)
Cow's milk	24	34.3	16	22.9	40	28.6	0.134 (2.240; 1)
Composite flour porridge	42	60.0	31	44.3	73	52.1	0.063 (3.463; 1)
Maize porridge	28	40.0	39	55.7	67	47.3	0.063 (3.463; 1)
Fruits (orange, banana, pawpaw, avocado)	70	100	68	97.1	138	98.6	0.050* (3.857; 1)
Type of food fed at 12- 24 months of age							
Potatoes/ Banana/ Rice/ Ugali with legume/ Fish/ Meat/ Vegetables (family meals)	70	100	70	100	140	100	
Cow's milk	9	12.9	7	10.0	16	11.4	0.595 (0.282; 1)
Composite flour porridge	38	45.7	26	37.1	58	41.4	0.303 (1.060; 1)
Maize porridge	32	54.3	44	62.9	82	58.6	0.303 (1.060; 1)
Fruits (orange, banana, pawpaw, avocado)	70	100	70	100	140	100	

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]

******* Significant at p-value ≤ 0.001

* Significant at p-value ≤ 0.05

4.2.2.3 Number of meals per day fed to a child at different ages

Feeding frequency did not differ significantly ($p>0.05$) between MBNP and non-MBNP participants in Mvomero district for all the age categories included (Table 9). However, in Morogoro Municipality, feeding frequency showed significant difference ($p\leq 0.05$) at age of 12 -24 months whereby about two-thirds of MBNP compared to only one third of non-MBNP participants fed their children more than thrice a day.

4.2.2.4 Amount of food per meal fed to a child at different ages

In both Mvomero and Morogoro Municipality districts amount of food per meal fed to a child was not significant different between MBNP and non-MBNP participants at all age stages except at 12-24 months of age in Mvomero district (Table 10). The results show that at 12-24 months of age, more children of non-MBNP participants were fed up to one cup (250 ml) per meal compared to the children of MBNP participants in Mvomero district.

Table 9: Number of meals per day fed to a child at different age among the sampled respondents in Mvomero district and Morogoro Municipality

Number of meals per day/Location	MBNP participants		Non-MBNP participants		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Numbers of meals per day at six months of age							
Mvomero (n=140)							
One meal	2	2.9	0	0	2	1.4	0.292
Two meals	20	28.6	28	40.0	48	34.3	(3.733; 3)
Three meals	40	57.1	10	50.0	75	53.6	
More than three meals	8	11.4	7	10.0	15	10.7	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							
One meal	1	1.4	0	0	1	0.7	0.201
Two meals	26	37.1	16	22.9	42	30.0	(4.628; 3)
Three meals	39	55.7	49	70.0	88	62.9	
More than three meals	4	5.7	5	7.1	9	6.4	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Numbers of meals per day at 7-8 months of age							
Mvomero (n=140)							
Two meals	7	10.0	9	12.9	16	11.4	0.350
Three meals	44	62.9	49	70.0	93	66.4	(2.099; 2)
More than three meals	19	27.1	12	17.1	31	22.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							0.896
Two meals	8	11.4	7	10.0	15	10.7	(0.220; 2)
Three meals	49	70.0	48	68.4	95	69.3	
More than three meals	13	18.6	15	21.4	28	20.0	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Numbers of meals per day at 9- 12 months of age							
Mvomero (n=140)							
Three meals	37	52.9	48	68.6	85	60.7	0.057
More than three meals	33	47.1	22	31.4	55	39.3	(3.624; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							0.173
Three meals	35	50.0	43	61.4	78	55.7	(1.853; 1)
More than three meals	35	50.0	27	38.6	62	44.3	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Numbers of meals per day at 12- 24 months of age							
Mvomero (n=140)							
Three meals	36	51.4	45	64.3	81	56.4	0.123
More than three meals	34	48.6	25	35.7	59	42.1	(2.373; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							
Three meals	25	35.7	43	61.4	68	48.6	0.002**
More than three meals	45	64.3	27	38.6	72	51.4	(9.265; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]

****** Significant at p-value ≤ 0.01

Table 10: Amount (250 ml cup) of food per meal fed to a child at different age among the sampled respondents in Mvomero district and Morogoro Municipality

Variable	MBNP Participants		Non-MBNP Participants		Total		Level of significance (p-value)
Amount of food per meal at six months	**n**	**%**	**n**	**%**	**n**	**%**	
Mvomero (n=140)							
1/4 cup or less	27	38.6	23	32.9	50	35.7	
1/2 - 2/3/ cup	25	35.7	31	44.3	56	40.0	0.780
3/4 cup	1	1.4	1	1.4	2	1.4	(1.088; 3)
1 cup	17	24.3	15	21.4	32	22.9	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							
1/4 cup or less	22	31.4	12	17.1	34	24.3	
1/2-2/3 cup	28	40.0	37	52.9	65	46.4	0.093
3/4 cup	2	2.9	0	0	2	1.4	(6.418;3)
1 cup	18	25.7	21	30.0	39	27.9	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Amount of food per meal at 7-8 months							
Mvomero (n=140)							
1/2 - 2/3/ cup	14	20.0	15	21.4	29	20.7	
3/4 cup	9	12.8	8	11.4	17	12.2	0.793
1 cup	47	67.1	47	67.1	94	67.1	(1.034; 2)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							
1/2-2/3 cup	20	28.6	10	14.3	30	21.4	
3/4 cup	5	7.1	4	5.7	9	6.4	0.098
1 cup	45	64.3	56	80.0	101	72.1	(4.642; 2)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Amount of food per meal at 9- 12 months							
Mvomero (n=140)							
1/2 - 2/3/ cup	10	14.3	11	15.7	21	15.0	
3/4 cup	10	14.3	8	11.4	18	12.9	0.869
1 cup	50	71.4	51	72.9	101	72.1	(0.280; 2)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							
1/2-2/3 cup	6	8.6	5	7.1	11	7.9	
3/4 cup	4	5.7	0	0	4	2.9	0.117
1 cup	60	85.7	65	92.9	125	89.3	(4.291; 2)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Amount of food per meal at 12- 24 months							
Mvomero (n=140)							
1/2 - 2/3/ cup	1	1.4	3	4.3	4	2.9	0.006**
3/4 cup	9	12.9	0	0	9	6.4	(10.386; 2)
1 cup	60	85.7	67	95.7	127	90.7	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality (n=140)							
1/2-2/3 cup	0	0	1	1.4	1	0.7	0.367
3/4 cup	3	4.3	1	1.4	4	2.9	(2.007; 2)
1 cup	67	95.7	68	97.1	135	96.4	
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, respectively, Chi-square value and degree of freedom (df)]

****** Significant at p-value ≤ 0.01

4.2.3 Male involvement in child care and feeding practices

Results from Mvomero district showed that there was significant difference ($p \leq 0.05$) between MBNP and non-MBNP participants regarding male involvement in all aspects of child care and feeding practices that were considered in this study (Table 11). More of MBNP male spouses involved themselves in accompanying their spouses and children to clinic, supported exclusive breastfeeding and timely appropriate complementary feeding and facilitating consumption of diverse and nutritious food compared to their counterparts (non-MBNP participants). In contrary, in Morogoro Municipality male involvement in child care and feeding practices was not significantly different ($p > 0.05$) between MBNP and non-MBNP participants in all aspects except accompanying their spouses to clinic. In that respect, 17.1% of MBNP participants as compared to only 5.7% of non-MBNP participants were reported to be strongly involved.

Table 11: Male involvement in child care and feeding practices in Mvomero district and Morogoro Municipality

Variable	MBNP participants		Non MBNP participants		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Spouse accompanying respondent and focus child to clinic							
Mvomero							
Strongly involved	15	21.4	3	4.3	18	12.9	0.000***
Somewhat involved	35	50.0	23	32.9	58	41.4	(19.483;2)
Not involved	20	28.6	44	62.9	64	45.7	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality							
Strongly involved	12	17.1	4	5.7	16	11.4	
Somewhat involved	44	62.9	39	55.7	83	59.3	0.015*
Not involved	14	20.0	27	38.6	41	29.3	(8.423; 2)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Spouse support exclusive breastfeeding							
Mvomero							0.000***
Strongly involved	50	71.4	28	40.0	78	55.7	(16.228; 2)
Somewhat involved	16	22.9	25	35.7	41	29.3	
Not involved	4	5.7	17	24.3	31	29.3	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality							
Strongly involved	40	57.1	30	42.9	70	50.0	0.185***
Somewhat involved	24	34.3	29	41.4	53	37.9	(3.371; 2)
Not involved	6	8.6	11	15.7	17	12.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Spouse support timely appropriate complementary feeding							
Mvomero							
Strongly involved	51	81.4	35	50.0	92	65.7	0.000***
Somewhat involved	12	17.1	21	30.0	33	23.6	(18.982; 2)
Not involved	1	1.4	14	20.0	15	10.7	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality							
Strongly involved	45	64.3	36	51.4	81	57.9	0.305
Somewhat involved	20	28.6	27	38.6	47	33.6	(2.376; 2)
Not involved	5	7.1	7	10.0	12	8.6	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Spouse facilitate consumption of nutritious and diverse food							
Mvomero							
Strongly involved	58	82.9	34	48.6	92	65.7	0.000***
Somewhat involved	11	15.7	23	32.9	34	24.3	(20.782; 2)
Not involved	1	1.4	13	18.6	14	10.0	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality							
Strongly involved	46	65.7	36	51.4	82	58.6	
Somewhat involved	19	27.1	26	37.1	45	32.1	0.223
Not involved	5	7.1	8	11.4	13	9.3	(3.001; 2)
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, respectively, Chi-square value and degree of freedom (df)]

*** Significant at p-value ≤ 0.001, * Significant at p-value ≤ 0.05

4.2.4 Focus Group Discussion on adherence to recommended child care practices

Focus group discussions (FGDs) on adherence to recommended child care practices were conducted with health service providers (HSPs) working at reproductive and child health (RCH) section, community health workers (CHWs) and male partners. Table 12 presents FGD results in accordance with the major themes discussed with participating members. Themes discussed were (a) seeking of ANC services, (b) breastfeeding practices, (c) timely appropriate complementary feeding practices, (d) male involvement in child care practices and (e) challenges that hinder adherence.

In general, the findings revealed that there was a common agreeing that:

- Improvement in early seeking of antenatal care services
- Prevalence of exclusive breastfeeding has increased
- Timely introduction of complementary foods by majority of families
- Greater involvement of male partners in maternal and child health and nutrition issues.

Table 12: Summary of FGDs with HSPs, CHWs and male partners (spouses) on adherence to recommended child care practices

Theme discussed	Remarks
Early seeking of antenatal care	"*Currently there is improvement in ANC attendance especially in first trimester period as compared to previous time whereas majority used to start ANC clinic when they are in second or even in third trimesters*". Cited by RCH nurse *"Male partners also have tried to change their negative perception towards ANC attendance since most especially who under MBNP groups tend to accompany their spouse though the attendance is not promising"* Cited by RCH nurse
Challenges that hinder compliance of ANC	• Lack of adequate health facilities • Long distance to health facility • Teenage pregnancy • Late recognition of pregnancy
Breastfeeding practices	"*The situation has improved, more mothers now practice EBF though on pastoralists community is still not well practiced"* Cited by RCH nurse *"After receiving MBNP education I helped my wife to do some household chores so that she can breastfeed our child"* Cited by male participant.
Challenges that hinder compliance of breastfeeding practices	• Poor social economic status • Lack of social support • Maternal workload • Lack of adequate information on successful breastfeeding • Limited food availability • Negligence • Child refusing to eat • Teenage motherhood
Appropriate complementary feeding	"*Majority of the families are aware of this but the practice is not well adhered due to some challenges".* Cited by CWH *"Usually most families introduction of solid foods to their children is preceded by thin maize porridge enriched with sugar or salt depending on the family income".* Cited by CWH
Challenges that hinder compliance of complementary feeding	• Unstable financial status • Lack of adequate information of proper complementary feeding • Limited food availability due to land conflict between farmers and pastoralists
Male involvement in child care practices	"*Regular and strong emphasis on male involvement in health issues from MBNP has made us proud of ourselves as head of household and provider"*. Cited by male participant.

4.3 Nutritional Status of the Children

The results from this study show that stunting is a leading (26.4%) form of under nutrition in Morogoro region by accounting higher prevalence compared to underweight (7.9%) and wasting (2.5%) as shown in Table 13.

4.3.1 Underweight (Weight-for- Age)

Prevalence of underweight appears to be slightly high among children of MBNP (11.4%) compared to 8.6% of non-MBNP participants in Mvomero district (Table 13), but it was not statistically significant different ($P>0.05$). However, in Morogoro Municipality, underweight prevalence differed significantly ($P\leq0.05$) between children of MNBP (1.4%) and children of non-MBNP (10%) participants (Table 13). Similarly, in Morogoro Municipality (Table 14) mean weight-for-age z-scores (WAZ) differed significantly ($p\leq 0.001$) between MBNP and non-MBNP participants, whereby MBNP were better off.

4.3.2 Stunting (Height- for-Age)

The results (Table 13) show that prevalence of stunting did not differ significantly ($p>0.05$) between MBNP (30%) and non-MBNP (32.8%) participants in Mvomero district. However, there was significant difference ($p\leq0.001$) between MBNP and non MBNP participants in Morogoro Municipality in terms of stunting levels (8.6% for MBNP compared to 34.3% for non-MBNP participants). Also, mean height-for-age z-scores (HAZ) showed significant difference ($P<0.001$) between MBNP and non-MBNP participants in Morogoro Municipality (Table 14).

4.3.3 Wasting (Weight-for-Height)

Results in Table 13 indicate that nearly 3% of children of MBNP were wasted in Mvomero district unlike their counterpart's non-MBNP participants where none was wasted. On the other hand, 1.4% of children of MBNP and 5.7% of children of MBNP

participants in Morogoro municipality were wasted. However, all these were not statistically significant different (P>0.05). Similarly, mean weight-for-height z- scores (WHZ) did not differ significantly (P>0.05) between MBNP and non-MBNP participants in both districts (Table 14).

Table 13: Nutritional status of children among the sampled respondents in Mvomero district and Morogoro Municipality

Location/variable	MBNP participants		Non MBNP participants		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Weight- for- Age (Underweight)							
Mvomero							
Normal	62	88.6	64	91.4	126	90.0	0.573
Underweight	8	11.4	6	8.6	14	10.0	(0.317; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality							
Normal	69	98.6	63	90.0	132	94.3	0.029*
Underweight	1	1.4	7	10.0	8	5.7	(4.773; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Overall underweight	**9**	**6.4**	**13**	**9.3**	**22**	**7.9**	
Height- for- Age (stunting)							
Mvomero							
Normal	49	70.0	47	67.1	96	68.6	0.716
Stunting	21	30.0	23	32.8	44	31.4	(0.133; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality							
Normal	64	91.4	46	65.7	110	78.8	0.000*** (13.745;1)
Stunting	6	8.6	24	34.3	30	21.4	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Overall stunting	**27**	**19.3**	**47**	**33.6**	**74**	**26.4**	
Weight-for- Height (Wasting)							
Mvomero							
Normal	68	97.1	70	100	138	98.6	0.154
Wasting	2	2.9	0	0	2	1.4	(2.029; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Morogoro Municipality							
Normal	69	98.6	66	94.3	135	96.4	0.172
Wasting	1	1.4	4	5.7	5	3.6	(1.867; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Overall wasting	**3**	**0.7**	**4**	**2.9**	**7**	**2.5**	

[Figures in brackets denote, respectively, Chi-square value and degrees of freedom (df)]

**** Significant at p-value ≤0.001

* Significant at p-value ≤ 0.05

Table 14: Mean WAZ, HAZ and WHZ among the sampled respondent in Mvomero district and Morogoro Municipality

Variable/location	Mean ± SD	Level of significance (p- value)
Weight-for-Age Z-scores (WAZ)		
Mvomero district		
MBNP Participants	-0.83 ± 0.92[A]	0.407 (-0.831; 138)
Non-MBNP Participants	-0.70 ± 0.86[A]	
Morogoro Municipality		
MBNP Participants	- 0.37 ± 0.74 [B]	0.000*** (3.885; 138)
Non-MBNP Participants	- 0.92 ± 0.93 [C]	
Height-for-Age Z-scores (HAZ)		
Mvomero district		
MBNP Participants	-1.39 ± 1.17[D]	0.670 (0.427; 138)
Non-MBNP Participants	-1.47 ± 1.19[D]	
Morogoro Municipality		
MBNP Participants	-0.79 ±1.02 [E]	0.000*** (4.480; 138)
Non-MBNP Participants	-1.59 ± 1.09 [F]	
Weight-for-Height Z-scores (WHZ)		
Mvomero district		
MBP Participants	-1.47 ± 1.19[G]	0.158 (-1.418; 138)
Non MBNP Participants	0.19 ± 1.12[G]	
Morogoro Municipality		
MBNP Participants	0.86 ± 0.96 [H]	0.553 (0.595; 138)
Non-MBNP Participants	-0.01 ± 1.00 [H]	

[A] , [B], [C], [D], [E], [F], [G] and [H] Similar letters denote no significant difference and vice versa, figures in the brackets denote t-value and degrees of freedom (df) respectively.
*** Significant at p-value ≤ 0.001

4.4 Performance of Participating Households in Mwanzo Bora Nutrition Program activities

4.4.1 Respondents participation in MBNP

Five issues were considered to reflect the extent to which participants of MBNP were taking part in the program. The five issues were namely; time when joined MBNP, means of joining MBNP, time taken to join MBNP, participation status of the respondent and innovation adopted from the program. While the largest group of the MBNP participants in Mvomero district joined the program when their children were less than six months of age (38.6%), the largest group in Morogoro Municipality (42.9%) joined when their children were between 6 and 24 months old (Table 15).

On the other hand, while the majority of the respondents in both districts joined the program by being mobilized by their Community Health Workers (CHWs), a good proportion in Mvomero district (11.4%) than in Morogoro Municipality (1.4%) were also convinced to join the program when attending Reproductive and Child Health (RCH) clinic. Greater proportion of the respondents in Morogoro Municipality (84.3%) compared to Mvomero district (61.4%) reported to be active in the program despite the fact that their children were no longer within 1000 days, i.e. they were still taking part in activities of Peer Supporting Groups (PSGs). Except for normal home gardens, all the other innovations introduced by the program were reported to be more adopted in Mvomero district than in Morogoro Municipality.

Table 15: Participation of sample respondents in Mwanzo Bora Nutrition Program in Mvomero district and Morogoro Municipality

Variable	Mvomero district (N=70)		Morogoro Municipality (N=70)		Total		Level of significance (p- value)
	n	%	n	%	n	%	
Time of when joined MBNP							
During pregnancy	21	30.0	26	37.1	47	33.6	0.053* (5.885; 2)
When a child was less than 6 months old	27	38.6	14	20.0	41	29.3	
When a child was 6-24 months old	22	31.4	30	42.9	52	37.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Means of joining MBNP							
Mobilized by CHWs	60	85.7	68	97.1	128	91.4	0.043* (6.278; 2)
Convinced when attending RCH clinic	8	11.4	1	1.4	9	6.4	
Heard from friend/relative	2	2.9	1	1.4	3	2.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Time taken to join MBNP							
Soon after being mobilized	67	95.7	70	100	137	97.4	0.216 (3.066; 2)
Six months after being mobilized	2	2.9	0	0	2	1.4	
More than six months after being mobilized	1	1.4	0	0	1	0.7	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Participation status							
Active	43	61.4	59	84.3	102	72.9	0.002** (9.247; 1)
Inactive	27	38.6	11	15.7	38	27.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Innovation adopted from MBNP							
Sack garden	5	7.1	0	0	5	3.6	0. 023* (5.185; 1)
Normal home garden	37	52.9	65	92.9	102	72.9	0.000*** (28.318; 1)
Poultry/Rabbit raising	29	41.4	12	17.1	41	29.3	0.002** (9.968; 1)
Tip tap	31	44.3	7	10.0	38	27.1	0.000*** (20.805; 1)
None	6	8.6	2	2.9	8	5.7	0.145 (2.121; 1)

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]

**** Significant at p-value ≤0.001

** Significant at p-value ≤0.01

* Significant at p-value ≤0.05

4.4.2 Perception of MBNP participants towards changes brought by the program on child health improvement

In assessing perception of MBNP participants about child health improvement, six issues were considered namely; opinion about what needs to be done next, comparison on MBNP approaches and other known programs, testimonies on child health improvement following MBNP implementation, willingness to recommend other parents to adopt MBNP interventions and what should be recommended to others. Results are summarized in Table 16. Majority of the respondents in both Mvomero district (95.7%) and Morogoro Municipality (84.3%) had the opinion that education on infant and young child feeding should be continued.

Comparison of MBNP approaches with other known programs showed greater variations in two districts ($p \leq 0.05$). While more than 40% of the respondents in Mvomero district indicated that MBNP uses Peer Supporting Groups (PSGs) to enhance participation, the same was noted by one quarter (25.7%) in Morogoro Municipality (Table 16). On the other hand, more than one third (35.7%) of the respondents in Morogoro Municipality, as compared to only 15.7% in Mvomero district, indicated that MBNP uses demonstrations and media to enhance understanding. While all the respondents in Mvomero district could give testimonies on child health improvement following the MBNP implementation, 7.1% of the respondents in Morogoro Municipality could not find any testimony to give. The other aspects included in this assessment did not show any significant variation between the two districts.

Table 16: Reported Perception of MBNP participants towards the program in Mvomero district and Morogoro Municipality

Variable	Mvomero district (N=70)		Morogoro Municipality (N=70)		Total		Level of significance (p-value)
	n	%	n	%	n	%	
Opinion about what needs to be done next							
Should continue to provide education on IYCF	67	95.7	59	84.3	126	90.0	0.138 (5.508; 2)
Should pay regular household visit	1	1.4	5	7.1	6	4.2	
Should continue to emphasize male involvement in caring of children	2	2.9	6	8.6	8	5.7	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Comparison on MBNP approaches with other known programs							
MBNP uses PSGs to enhances participation	31	44.3	18	25.7	49	35.0	0.026* (9.304; 3)
MBNP uses demonstrations and media enhance understanding	11	15.7	25	35.7	36	25.7	
MBNP emphasizes male involvement	1	1.4	2	2.9	3	2.1	
No difference	25	38.6	27	35.7	52	37.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Any Testimonies on child health improvement following MBNP implementation							
Yes	70	100	65	92.9	135	96.4	
No	0	0	5	7.1	5	3.6	0.023* (5.185; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Mentioned testimonies							
No frequent illness	51	72.9	47	67.1	98	72.6	
Curiosity of learning	4	5.7	7	10.8	11	8.1	0.585 (1.942; 3)
Appropriate weight gain	6	8.6	6	9.2	12	8.9	
Good physical growth and development	9	12.9	5	7.7	14	10.4	
Total	**70**	**100**	**65**	**100**	**135**	**100**	
Willingness to recommend parents to adopt MBNP intervention							
Yes	69	98.6	70	100	139	99.3	
No	1	1.4	0	0	1	0.7	0. 316 (1.007; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
What should be recommended to others							
Education on IYCF	60	85.5	65	92.9	125	89.3	
Education on ANC seeking	8	11.6	2	2.9	10	7.1	0.143 (3.890; 2)
Education on garden/poultry/rabbit farming	2	2.9	3	4.3	5	3.6	
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]

* Significant at p-value ≤ 0.05

4.4.3 Focus Group Discussion on community perception towards changes brought by MBNP

Focus group discussions (FGDs) were conducted with health service providers (HSPs) working at reproductive and child health (RCH) section, community health workers (CHWs) and male partners to seek community perception towards changes brought by MBNP. Table 17 presents FGDs results in accordance with the major themes discussed including the summarized remarks and responses. Themes discussed were: (a) trend of common childhood disease following MBNP interventions, (b) Community benefits following MBNP interventions and (c) Comparison of MBNP approaches with other programs.

In general, the findings revealed that there was a common agreeing that:

- Common childhood diseases have declined.
- Community members have benefited a lot from the activities of MBNP; involving change in behaviour.
- Compared to other known or previous programs implemented in the area, MBNP has many aspects that are appreciated by the community members.

Table 17: Summary of FGDs with HSPs, CHWs and male partners on community perception towards changes brought by MBNP

Theme discussed	Remarks
Trend of common childhood disease following MBNP interventions	"*For sure now I can say that since inception of MBNP there is decrease in childhood diseases such as frequent fever, diarrhea and malnutrition (kwashiorkor, marasmus and anemia)"* "*Also childhood discomfort such as cholic (gas forming) due to early complementary feeding has decreased"* Cited by nurses.
Community benefits following MBNP interventions	*"Antenatal care attendance has increased especially first trimesters"* *"Low birth weight and still birth cases have decreased"* *"Improved availability and use of Iron and Folic acid supplements"* *"Increased access to diverse and nutritious food through vegetable garden, poultry raising establishment".* *"By owning a vegetable garden my family has improved a lot in eating habit since every day we pick adequate vegetables from our own source rather than purchasing from local markets as we used before".* Cited by nurses and CHWs
Comparison of MBNP approaches with other programs	*"MBNP uses PSGs which enhance freedom of participation"* *"MBNP is practical oriented through demonstration which facilitate more understanding"* *"MBNP uses radio tapes to convey messages and sharing testimonies during PSGs meetings"* *"MBNP emphasizes male involvement in child caring"* Cited by male participants

4.4.4 Change in household dietary habits after joining MBNP

Three point scale namely; increased, remained the same and decreased were used to reflect perceived changes in household dietary habits after joining Mwanzo Bora Nutrition Program (MBNP). Food items assessed in this objective were cereals, roots and

tubers, foods of animal origin, legumes, vegetables and fruits. Results are summarized in Table 18.

Majority of the respondents in both Mvomero (60%) and Morogoro Municipality (64.3%) districts reported to have increased consumption of foods of animal origin. In both districts, the consumption of vegetables and fruits was also reported by more than three-quarters of the respondents to have increased following MBNP intervention on improving dietary behaviours (Table 18). While more than 50% reported increased consumption of legumes in Morogoro Municipality, the same was noted by 44.3% in Mvomero district. However, greater proportion of respondents in both districts indicated that the consumption of cereals, fats/oil, roots and tuber food did not change subsequent to MBNP intervention.

Table 18: Reported change in household dietary habits after joining MBNP in Mvomero district and Morogoro Municipality

Intake of specific food groups	Mvomero district (N =70)		Morogoro Municipality (N = 70)		Total		Level of significance (p- value)
	n	%	n	%	n	%	
Cereals							
Increased	11	15.7	13	18.6	24	17.1	
Remained the same	58	82.9	55	78.6	113	80.7	0.748 (0.580; 2)
Decreased	1	1.4	2	2.8	3	2.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Roots and tubers							
Increased	7	10.0	6	8.6	13	9.3	
Remained the same	62	88.6	62	88.6	124	88.6	0.815 (0.410; 2)
Decreased	1	1.4	2	2.4	3	2.1	
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Foods of animal origin							
Increased	42	60.0	45	64.3	87	62.1	
Remained the same	28	40.0	25	35.7	53	37.9	0.601 (0.273; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Legumes							
Increased	31	44.3	38	54.3	69	49.3	
Remained the same	39	55.7	32	45.7	71	50.3	0.273 (1.400; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Vegetable							
Increased	56	80.0	64	91.4	120	85.7	
Remained the same	14	20.0	6	8.6	20	14.3	0.533 (3.733;1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Fruit							
Increased	55	78.6	62	88.6	117	83.6	
Remained the same	15	21.4	8	11.4	23	16.4	0.110 (2.549; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Oil seeds/fats							
Increased	2	2.9	0	0	2	1.4	
Remained the same	68	97.1	70	100	138	98.6	0.154 (2.029; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, Chi-square value and degree of freedom (df) respectively]

4.4.5 Sustainability of Mwanzo Bora Nutrition Program Practices

In assessing sustainability of MBNP practices among the participants, four issues were considered, namely: possession of home garden, raising of poultry/rabbits, possession of tip tap for hand washing and inviting another person into Peer Supporting Group (PSG). The results are summarized in Table 19.

This study revealed that there was significant difference ($p \leq 0.001$) in possession of vegetable garden between Mvomero district and Morogoro Municipality since majority of respondents (87.1%) in Morogoro Municipality had vegetable gardens compared to only 30% in Mvomero district. Moreover, raising of poultry/rabbits showed greater variations ($p \leq 0.001$) in the two districts. About two-thirds (64.3%) in Mvomero district practice poultry/rabbits raising compared to only one quarter (25.7%) in Morogoro municipality. More than 30% in Mvomero district had tip tap for hand washing compared to only 17.1% in Morogoro Municipality. Eighty percent of the respondents in the two districts reported to have invited another person in the program through Peer Supporting Groups (Table 19).

Table 19: Assessment of Sustainability of MBNP Practice in Mvomero district and Morogoro Municipality

Variable	Mvomero district (N= 70)		Morogoro Municipality (N=70)		Total (N = 140)		Level of significance (p-value)
	n	%	n	%	n	%	
Possession of garden							
Yes	21	30.0	61	87.1	82	58.6	0.000***
No	49	70.0	9	12.9	58	41.4	(47.098;1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Raise Poultry/Rabbits							
Yes	45	64.3	18	25.7	63	45.0	0.000***
No	25	35.7	52	74.3	77	55.0	(21.039; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Have Tip tap for hand washing							
Yes	27	38.6	13	17.1	41	27.9	0.005**
No	53	61.4	57	82.9	29	72.1	(7.997; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	
Invited another person into Peer Supporting Group							
Yes	57	81.4	56	80.0	113	80.7	0.830
No	13	18.6	14	20.0	27	22.3	(0.046; 1)
Total	**70**	**100**	**70**	**100**	**140**	**100**	

[Figures in brackets denote, respectively, Chi-square value and degree of freedom (df)]

**** Significant at p-value ≤ 0.001

*** Significant at p-value ≤ 0.01

CHAPTER FIVE

5.0 DISCUSSION

This chapter presents discussion of the findings of the study. The discussion is organized according to the research objectives of this study, namely:

- Comparison of nutritional status of children of MBNP and non-MBNP participants
- Adherence to recommended child care practices among MBNP and non-MBNP participants
- Change in household dietary habit among MBNP beneficiaries after joining the program
- Perception of community towards changes brought by Mwanzo Bora Nutrition Program (MBNP)

5.1 Comparison of Nutritional Status of Children

This study observed childhood undernutrition is still a major public health problem among sampled respondents. Taking three indicators of under nutrition into account namely; stunting, wasting and underweight this study revealed that stunting is the leading form of undernutrition among surveyed non-MBNP children followed by underweight compared to MBNP participants in the study areas. The observed significant improvement on child nutritional status among of MBNP participants than their counterparts non-MBNP participants (Table 13) especially stunting indicates that good compliance of MBNP promoted behaviours such as early seeking of antenatal care services, exclusive breastfeeding, timely introduction of complementary foods and consumption of diverse and nutritious foods contributed to such positive observation. The use of Peer Supporting Groups (PSGs) to deliver education on promoted behavioural practices helped the target MBNP individuals to participate fully and create sense of

ownership. Also, MBNP has been using Community Health Workers (CHWs) as PSGs mentors which allowed ample time for learning process, close and regular follow up of the participants as compared to non-MBNP individuals who rely only on nutrition education delivered at health facilities. These results coincided with a study conducted in Cameroon on effectiveness of nutrition improvement programs on infant and young child feeding and nutritional status (Reinsma *et al.*, 2016). It was observed that behaviour change interventions delivered through groups have higher impact on child nutritional status than those delivered only in a massive population such as at health facilities where individuals gathered only once a month. Similarly, studies conducted in Ethiopia and systematic review done by SPRING project in which level of stunting was higher among those who did not receive behaviour change intervention. (USAID-IYCN, 2011; Lamstein *et al.,* 2014; SPRING, 2014).

Also, several studies demonstrated linkage between lack of nutrition education about infant and young child feeding practices and malnutrition especially in the course of 1000 days of child's life. In Ghana, Agbozo *et al.* (2015) revealed malnutrition to be positively linked to the complementary feeding where feeding practices become suboptimum implying that there is inadequacy either in quantity or quality of complementary foods and eventually children become malnourished. Moreover, a study conducted in South Ethiopia, Betebo *et al.* (2017) found that frequent illnesses such as malaria, frequent episodes of diarrhoea, respiratory infections and worms do worsen the problem of under nutrition in children.

The current study observed no significant difference between MBNP and non-MBNP participants in Mvomero district in terms of child nutritional status. It is likely that unfavorable underlying conditions in Mvomero district (rural setting) including lack of

quality health services, lack of clean and safe water and other sanitation facilities as well as low maternal education as compared to Morogoro Municipality (urban settings) to be part of underlying causes. These findings are similar with studies conducted in Nigeria and Ethiopia, which noted that urban children generally have a better nutritional status than their rural counterparts particularly for linear growth (stunting) and for underweight (Ezeama *et al.*, 2015; Tadesse *et al.*, 2015).

Also it has been reported in other studies by Ijarotimi *et al.* (2016) and Agbozo *et al.* (2016) that in Sub-Saharan Africa (SSA) child undernutrition is higher in rural areas than in urban areas due to socio-economic disparities. Individuals residing in urban settings tend to have more socio-economic opportunities such as employment and petty trading that enable them to acquire necessities of life including food. As suggested by UNICEF (2013) and Ijarotimi *et al.* (2016) good nutritional status of children in urban areas is most likely due to more favourable fundamental determinants of child nutritional status such as presence of health and sanitation facilities, good access to clean and safe water and open livelihoods for generating income. The suggested factors are more likely to strengthen compliance to nutrition interventions when they are available.

5.2 Adherence to Recommended Child Caring Practices

5.2.1 Seeking of antenatal care

Antenatal care (ANC) is a key strategy to improve maternal and infant health. The findings of this study observed that early ANC seeking behaviour among MBNP participants was higher than their counterparts' non-MBNP participants in both Mvomero district and Morogoro Municipality. This positive observation among MBNP participants could be due to MBNP approaches delivered by trained community health workers who pay household visits to promote early attendance to ANC plus the messages emphasized

through radio tapes during PSGs meetings. Moreover, this study observed that the proportional of mothers who had at least four ANC visits as recommended by WHO was significantly higher for MBNP participants than for non-MBNP participants in both districts.

These findings coincide with review made by Elmusharaf *et al.* (2015) that community based interventions that involve CHWs through home visits and group sessions have significant effect on improving uptake of ANC services as compared to health facility based interventions. Similarly, in non-randomized controlled community based intervention conducted in Ghana, it was found that social and behaviour change communication had significant contribution in improving maternal knowledge and eventually scaling up of uptake of ANC services (Saaka *et al.,* 2017). Also, several studies conducted in Burkina Faso, Uganda and Tanzania indicated that women who initiate ANC attendance late do not achieve the WHO recommended number of at least four ANC visits (Conrad *et al.,* 2012; Gross *et al.*, 2012). Focus group discussions (FGDs) with health service providers also indicated the same but noted long distance to health facility in Mvomero district to be a challenge for early ANC initiation. Sanda and Asia. (2014) from Nigeria and, Patel *et al.* (2016) in India reported that BCC approaches that are aiming at awareness creation on importance of ANC has significant effect in improving ANC attendance and overall compliance with WHO recommendations. Also UNICEF (2012) demonstrated that women who adhere to at least four ANC visits, as per WHO recommendations are more likely to receive adequate health and nutrition interventions offered at ANC clinic such as intermittent preventive treatment for malaria in pregnancy (IPTp), nutritional counseling and Iron Folic Acid (IFA) supplementation.

5.2.2 Breastfeeding practices

This study assessed the adherence of breastfeeding practices in accordance of WHO recommendations in terms of breastfeeding initiation, duration of exclusive and continuous breastfeeding practices among MBNP and non-MBNP participants.

Breastfeeding initiation differed significantly ($p \leq 0.05$) between MBNP and non-MBNP participants in Mvomero district, whereby the proportion of MBNP mothers who initiated breastfeeding to their children soon after birth and within one hour according to WHO recommendations were higher than non-MBNP mothers. However, there was no significant difference between MBNP and non-MBNP participants in Morogoro Municipality. The positive observation could be due to influence of PSGs on making mothers seek early antenatal care services or undertake exclusive breastfeeding and timely and appropriate complementary feeding practices. Behaviour change communications approaches such as peer counseling and use of media intervened by MBNP through PSGs appears to be key intervention in strengthening compliance of WHO recommendations among MBNP participants.

Moreover, substantial difference between MBNP and non-MBNP participants regarding exclusive breastfeeding practices was observed in both districts whereby MBNP participants had higher prevalence than non-MBNP participants. The prevalence was even higher than the national average (59%) of exclusive breastfeeding as reported by NBS (2015). However, the prevalence of exclusive breastfeeding for non-MBNP participants in both districts was lower than the national average.

These findings are in line with the findings of Ogbo *et al.* (2017), Agbozo *et al.* (2015) and Engebretsen *et al.* (2014) in comparative studies on infant and young child feeding

practices conducted in multi-countries in sub-Saharan Africa, including Tanzania, whereas peer counselling intervention resulted to less prelacteal feeding hence increased the extent of exclusive breastfeeding during the first six months. Similar findings were also observed in studies conducted in Zambia and Uganda whereas mothers who received counseling from CHWs were more likely to initiate breastfeeding within one hour after than those who did not receive counselling (Katepa-bwalya *et al.*, 2015; Engebretsen *et al.*, 2014). Also in FGDs with Health Service Providers (HSPs) and Commnunity Health Workers (CHWs), mentioned several challenges that hinder optimal exclusive breastfeeding for six months to include, level of education of mothers, socio-economic factors, late antenatal care booking, lack of social support from family members especially the spouse and maternal workload.

The study found that majority of MBNP participants breastfed their children longer (24 months or beyond) compared to non-MBNP participants in both Mvomero district and Morogoro Municipality. It was made clear during FGDs that a child should be breastfed for two years or beyond, but they stop to breastfeed early due to negligence, child refusing to eat young mothers not liking to continue breastfeeding. Kimani-murage *et al.* (2015) and Nankumbi *et al.* (2015) reported teenage motherhood, heavy agricultural workload, lack of social support, unintended pregnancies, poverty and child refusing to eat other foods as important factors affecting breastfeeding compliance to WHO recommendations in Kenya and Uganda.

5.2.3 Complementary feeding practices

The WHO recommends introduction of solid, semi-solid and soft foods (complementary foods) to infants at around the age of six months along with continued breastfeeding until the child is two years and beyond (WHO, 2011). This study assessed adherence to

complementary feeding practices based on WHO recommendations in terms of type of food, amount of food and number of meals a child is fed per day at different stages of growth (Tables 7-10). This study revealed that majority of MBNP participants complied with WHO recommendations as addressed by the program as compared to non-MBNP participants in both districts. The possible explanation for this difference is that MBNP participants through PSGs were more knowledgeable on appropriate complementary feeding in terms of type of food, feeding frequency and quantity of food because of the training they were frequently receiving. In contrary, majority of non-MBNP children were fed complementary foods that are predominantly based on starchy foods with little or no animal source foods and few vegetables which do not comply with WHO recommendations i.e. the complementary food should be diverse and nutritious comprising of at least five food groups. In line with these findings, other studies demonstrated that the choice of complementary foods is usually based on the maternal knowledge, household socio-economic status, availability and affordability of local complementary foods (Kassa *et al.,* 2016; Belete *et al.,* 2017).

However, no difference was observed between the two study groups in both districts with regard to the number of meals (frequency of feeding) per day and amount of food per meal. It appears that some children from age of six to 12 months were underfed and others overfed while only few complied with WHO recommendations. However, at age of 12-24 months more than 80% comply to IYCF standards and only few were fed less compared to WHO recommendations for both MBNP and non-MBNP participants in all two districts. Moreover**,** it was noted during focus group discussions, there is strong perception that introducing a child to solid foods needed to be preceded by a period of first feeding with thin porridge made from maize meal. This meal is usually not enriched with other foods rather than sugar or salt. These findings are in support with the findings

of Belete *et al.* (2017) and Katepa-bwalya *et al.* (2015) that complementary foods commonly introduced to children in sub Saharan Africa do not meet the minimum standards recommended by WHO with respect to food diversity, frequency of meals, food quantity and quality. Likewise, findings of this study support other studies in Kenya and Ethiopia that the foods introduced are not adequate in nutrition and tend to be low in energy and micronutrients since they are predominantly based on starchy foods with little or no foods of animal source and few fresh fruits and vegetables (Bukania *et al.*, 2014; Dangura *et al.,* 2017).

5.2.4 Male involvement in child caring practices

Male involvement in maternal health is recommended as one of the interventions to improve maternal and child health and nutrition (Yargawa *et al.,* 2015). This study assessed male partner involvement in child caring practices in different aspects namely, accompanying female partner and child to clinic, and providing support on exclusive breastfeeding, timely appropriate complementary feeding and consumption of diverse and nutritious foods. This study revealed that more mothers of MBNP intervention were accompanied by their male partners to clinic than mothers who were not MBNP participants in both districts.

These findings are in line with those of August *et al.* (2016) in Tanzania specifically in Pwani region, where community based education program resulted to increased proportion of men who accompanied their spouses to ANC visits. Moreover, in focus group discussion male partners who are non-MBNP participants stated reasons for not accompanying their spouses and child to clinic to be the belief that ANC is an issue of women only and male feeling shame to be seen there. The findings of this study are

consistent with those in Eastern Ethiopia which revealed similar reasons for males not accompanying their female partners during ANC visits (Asefa *et al.,* 2014).

The study also observed male partner involvement in providing social support on exclusive breastfeeding differed significantly in Mvomero district between MBNP and non-MBNP participants unlike in Morogoro Municipality where the difference was not significant. It was explained during FGDs that by reducing maternal workload through helping their spouses household chores and purchasing of adequate food for mothers helped them to achieve successful exclusive breastfeeding for six months as advocated by MBNP. Findings in Kenya and Malawi have demonstrated how male partner engagement in maternal and child health and nutrition promotions has brought positive outcome to their general wellbeing and eventually reduced childhood diseases and under nutrition (Mukuria *et al.,* 2016; Chilanga, 2013; Bhatta, 2013).

Similarly, in Zambia, Katepa-bwalya *et al.* (2015) reported that fathers are important influencers in improving IYCF practices by supporting the mothers financially and morally to breastfeed optimally. Therefore, moving from a woman-centered approach to a family-centered or household-based approach may help to reduce barriers and increase uptake and sustainability of optimal nutrition practices.

5.3 Household Dietary Habit

A diet composed of different food groups gives insight about the quality of food consumed in the household (Krebs-smith *et al.,* 2014). This study examined change in household dietary habit after joining MBNP. A three point scale of increased, remained the same and decreased was used to reflect changes in consumption habit of specific food groups. The study observed higher proportion of households to have increased

consumption of foods of animal source, vegetables and fruits than before in both Mvomero district and Morogoro Municipality. The increased consumption of foods of animal source, fruits and vegetable could be from a direct production or through increased purchasing. Mwanzo Bora Nutrition Program was promoting and facilitating poultry raising and home garden establishments. These findings are in line with Taruvinga *et al.* (2013) in South Africa who reported ownership of small livestock and home garden to be positively linked to improved household dietary habit. However, in Mvomero district owning a home garden is still a challenge for many household especially in Dakawa ward. The population in this ward is comprised of farmers and pastoralists therefore many households do not have home gardens because they get destroyed by free range animals. Also water shortage was observed to be a main hindrance for many households to own home gardens in Mvomero district. The given reasons may affect vegetable consumption pattern whereas household have to purchase which practically is difficult for them to buy adequate amount that will suffice every households member needs.

Participants in FGDs also indicated how MBNP had helped them to change their dietary habits through promotion of home/kitchen gardens and small livestock keeping. One of the participant's response was "*By owning a vegetable, garden my family has improved a lot in eating habit since every day we pick adequate vegetables from our own source rather than purchasing from local markets as we used to do before".*

5.4 Community Perception towards Changes Brought by MBNP

The study also explored community perception towards changes brought by MBNP in their society with special focus on child health and nutrition improvement. Large proportion of the participants reported to be impressed by MBNP interventions. They even recommended that the program should continue to provide nutrition education

for the betterment of their children. Approaches of MBNP were also highly praised by the community. For example they indicated that use of Peer Supporting Groups (PSGs) approach for counseling and demonstration facilitated beneficiaries to understand and participate effectively unlike the public health and nutrition education provided at health facilities. Use of media such as recorded tapes to convey messages during community gatherings was appreciated to be an effective approach in changing behaviours of the beneficiaries. This was proven by a male partner during focus group discussion (FGD) who pointed out that "*Through listening to the recorded tape about lessons on importance of nutrition during 1000 days, I decided to help my spouse in taking care of our child because before MBNP I used to perceive child caring to be a woman's role*".

Moreover, the interviewed beneficiaries and participants of FGDs admitted that following MBNP interventions, they have observed notable reduction in occurrence of childhood illnesses such as fever and diarrhoea. Also absence of known cases of kwashiorkor and marasmus were among testimonies given by MBNP community beneficiaries. Health service providers explained that MBNP has helped pregnant mothers to adopt Iron and Folic Acid (IFA) supplements intake which resulted into reduced complications due to maternal anemia such as low birth weights and still birth cases. They also admitted that antenatal care services at early stages of pregnancy and exclusive breastfeeding practices have improved in their communities.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In conclusion, the findings of this study observed significant contribution of Behaviour Change Communication as an effective approach used by MBNP in improving child nutrition. This was proven by the observed better nutritional status of children who were MBNP participants compared to their counterparts (non-MBNP participants). The prevalence of stunting for children who were MBNP participants is lower compared to their counterparts. The observed low prevalence of stunting in intervention group suggests that the approach was effective.

The study also observed good adherence to recommended child care and feeding practices among MBNP participants. The recommended practices include early seeking of antenatal care services, infant and young child feeding (IYCF) practices which included breastfeeding initiation, exclusive breastfeeding in the first six months, continued breastfeeding for up to two years or beyond and complementary feeding practices. Household dietary habit in both Mvomero district and Morogoro Municipality indicated that the consumption pattern of foods of animal source and fruits has increased compared to the situation before MBNP interventions. The increased consumption of vegetables is likely due to ownership of home gardens as promoted by MBNP especially in Morogoro Municipality. Community members in both Mvomero district and Morogoro Municipality have shown positive perception about MBNP by wishing an extension of the program so that they can learn more about maternal and child nutrition. Also testimonies were given showing that MBNP interventions have reduced incidences of childhood diseases and

have improved participation of male partners in providing health and nutrition care activities for their spouses and children.

6.2 Recommendations

i. This study should serve as the evidence of Behaviour Change Communication approach in improving child nutrition in designing and implementing nutrition improvement programs in Tanzania. Therefore nutrition improvement programs should adopt approaches used by MBNP in fighting against malnutrition.

ii. Lack of significance difference on child nutritional status in Mvomero district between MBNP and non -MBNP participants calls for public sectors and other stakeholders to work effectively on challenges that face rural communities that hinder significant progress in child nutrition despite of the existing interventions. Such challenges include poor health services and lack of clean and safe water.

iii. Observed high prevalence of stunting and poor compliance to recommended child care and feeding practices especially among non- MBNP participants, call for joint efforts from the government, development partners and other stakeholders to fight against malnutrition. Government and other stakeholder should make sure that every targeted individual is reached by the introduced program.

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APPENDICES

Appendix 1: Questionnaire for Ex-Mwanzo Bora Member

Respondent ID _____, District _____,

Ward _____Village/street _____

Note to Enumerator: Explanation to interviewer

My name is…… from SUA. We are working on a research concerned with "**EFFECT OF BEHAVIOUR CHANGE INTEVENTION TO IMPROVE CHILD NUTRITION IN MOROGORO REGION**". In this study we are requesting information on participation on nutrition improvement programs, adherence of child care best practices, household dietary habit and sustainability of Mwanzo Bora practices. The study will also involve measurement of weight and height of a child aged 25 - 59 months for nutrition assessment. We therefore request for your willingness and time to participate in the interview. The interview will take 30 minutes only. All the information we obtain is for educational purposes only and will strictly remain confidential. Also, you are not obliged to answer any question you do not want to, and you may stop to participate at any time.

A. DEMOGRAPHIC INFORMATION

Instruction: Please fill in the blanks or circle the letter bearing the correct answer where applicable.

1. Age of respondent_____
2. Educational level of respondent
   a. None
   b. Primary level
   c. Secondary level
   d. Higher level (specify) _____
3. Marital status
   a. Single
   b. Married
   c. Separated/divorced
   d. Widow

4. Main source of income /occupation of the household
    a. Farming
    b. Livestock keeping
    c. Employment
    d. Self-employment
    e. Others (specify _____
5. How is the mother participating in this? _____

B. NUTRITIONAL ASSESSMENT OF A CHILD

6. Anthropometric indices for child aged 25 - 59 months

Child's number	Date of survey	Date of birth	Age (months)	Sex	Weight (kg)	Height (cm)

C. PARTICIPATION IN MWANZO BORA NUTRITION PROGRAM

7. When did you join Mwanzo Bora Nutrition Program?
    a. During pregnancy
    b. When a child was below 6 months
    c. When a child was at 6 -24 months

8. How did you join Mwanzo Bora Nutrition Program?
    a. Mobilized by community health workers or leaders
    b. Convinced when attending RCH
    c. Heard from a friend/relative

9. How long did you take to join Mwanzo Bora program
    a. Soon after being mobilized
    b. Six months after being mobilized
    c. More than six months after being mobilized

10. Are you still actively participating in your group?
    a. Yes
    b. No

11. What did your Peer Supporting Group establish through MBNP?
    a. Sack garden with vegetables
    b. Normal home garden
    c. Rabbits/chicken raising
    d. Tip tap for hand washing
12. What did you adopt from these establishments in your household/family?
    a. Sack garden with vegetables
    b. Normal home garden
    c. Rabbits/chicken raising
    d. Tip tap for hand washing

D. ADHERENCE TO BEST CHILD CARE PRACTICES

I. Seeking of Antenatal Care

13. When did you start antenatal care clinic for the focus child?
    a. Less than 1 month
    b. 1 - 3 months
    c. 4 - 6 months
    d. 7 - 9 months
14. How many visits did you pay at antenatal care clinic (ANC) throughout your pregnancy?
    a. less than four visits
    b. At least four visits
    c. Never attended

II. Child Feeding Practices

15. When did you start to breast feed your child?
    a. Soon after birth
    b. Within one hour
    c. Within two hours
    d. Others (specify)_____

16. How long did you exclusively breastfeed your child? (in months) _____

17. Did you notice any advantages of exclusive breastfeeding for your child

    a. Yes

    b. No

18. If yes, what did you notice? _____

19. How long did you breastfeed your child?

    a. Less than 12 month

    b. 12 - 23 months

    c. 24 months or beyond

20. At what age your child was given a complementary food?

    a. Before six months.

    b. At six months

    c. After 6 months

    d. Don't know

21. What types of food did you use to complement your child?

Age category	Types of food
6 months	
7 - 8 months	
9 - 12 months	
12 - 24 months	

22. How many meals did you complement your child per day?

Age category	Number of meals per day	Amount (in 250 cup) per meal
6 months		
7 - 8 months		
9 - 12 months		
12 - 24 months		

23. How can you rate your spouse involvement on adherence of best child caring practices

    (Assign number: 1 = strongly involved, 2 = somewhat involved, 3 = Not involved)

Practices	Rate
Accompany his spouse and child to clinic	
Support exclusive breastfeeding	
Support appropriate complementary feeding	
Facilitate consumption of diverse and nutritious foods.	

E. Perception of community Towards Mwanzo bora nutrition program on child health performance

24. What is your opinion about MBNP in improving child health performance?
    a. _____
    b. _____
    c. _____
25. How do you compare MBNP approaches with other program you have experienced?
    a. _____
    b. _____
    c. _____

26. Are there any testimony regarding child health performance following implementation of MBNP? If yes please can you mention
    a. _____
    b. _____
    c. _____

27. Based on your child's health performance would you recommend other parents to adopt MBNP intervention? Why?
    a. _____
    b. _____
    c. _____

F. Household dietary pattern

28. Considering your dietary pattern can you explain any change in eating pattern after receiving Mwanzo Bora training? (Please assign number for corresponded food group: 1 = Increased, 2 = remained the same, 3 = Decreased)

Food Item	After Joining MBNP
Cereals	
Roots And Tubers	
Animals	
Legumes	
Vegetables	
Fruits	
Others (Fats/Oils)	

G. Sustainability of Mwanzo bora practices/knowledge

29. Does the respondent keep a home/sack garden or animals?
    a. Yes
    b. No
30. Has she invited/attracted someone to the program?
    a. Yes
    b. No
31. Does the respondent have tip tap for hand washing?
    a. Yes
    b. No
32. Does the respondent have another child who is within 1000 days? (if yes go to next question)
    a. Yes
    b. No
33. Did the respondent seek early the antenatal care clinic?
    a. Yes
    b. No
34. Did the respondent exclusively breastfed the young sibling for six months?
    a. Yes
    b. No
35. Did the respondent timely practice appropriate complementary feeding after six months to young sibling?
    a. Yes
    b. No

THANK YOU VERY MUCH FOR YOUR COOPERATION

Enumerator's name: ……

Appendix 2: Questionnaire for Non-Mwanzo Bora Member

Respondent ID _____, District _____,

Ward _____ Village/street _____

Note to Enumerator: Explanation to interviewer

My name is…… from SUA. We are working on a research concerned with "**EFFECT OF BEHAVIOUR CHANGE INTEVENTION TO IMPROVE CHILD NUTRITION IN MOROGORO REGION**". In this study we are requesting information on participation on nutrition improvement programs and adherence of child care best practices. The study will also involve measurement of weight and height of a child aged 25 - 59 months for nutrition assessment. We therefore request for your willingness and time to participate in the interview. The interview will take 30 minutes only. All the information we obtain is for educational purposes only and will strictly remain confidential. Also, you are not obliged to answer any question you do not want to, and you may stop to participate at any time.

A. Demographic Information

Instruction: Please fill in the blanks or circle the letter bearing the correct answer where applicable.

1. Age of respondent_____ years
2. Educational level of respondent
   a. None
   b. Primary level
   c. Secondary level
   d. Higher level (specify) _____
3. Marital status
   a. Single
   b. Married
   c. Separated/divorced
   d. Widow
4. Main source of income/occupation of the household
   a. Farming
   b. Livestock keeping

c. Employment

d. Self employed

e. Others (specify _____

5. How is the mother participating? _____

B. Nutritional Assessment of a child

6. Anthropometric indices for child aged 25 - 59 months

Child's ID	Date of survey	Date of birth	Age (months)	Sex	Weight (kg)	Height (cm)

C. Adherence to best child care practices

I. Seeking of Antenatal Care

7. When did you start antenatal care clinic for focus child?

a. Less than 1 month

b. 1 - 3 months

c. 4 - 6 months

d. 7 - 9 months

8. How many visits did you pay at antenatal care clinic (ANC) throughout your pregnancy?

a. Less than four visits

b. At least four visits

c. Never attended

II. Child Feeding Practices

15. When did you start to breast feed your child?

a. Soon after birth

b. Within one hour

c. Within two hours

d. Others (specify)_____

16. How long did you exclusively breastfeed your child? (In months) _____

17. Did you notice any advantages of exclusive breastfeeding for your child?

a. Yes

b. No

18. If yes, what did you notice? _____

19. How long did you breastfeed your child?

a. Less than 12 month

b. 12 - 23 months

c. 24 months or beyond

20. At what age your child was given a complementary food?

a. Before six months

b. At six months

c. After six months

d. Don't know

22. What types of food did you use to complement your child?

Age category	Types of food
6 months	
7 - 8 months	
9 - 12 months	
12 - 24 months	

23. How many meals did you complement your child per day?

Age category	Number of meals per day	Amount (in cup) per meal
6 months		
7 - 8 months		
9 - 12 months		
12 - 24 months		

26. How can you rate your spouse involvement on adherence of best child caring practices?

(Assign number: 1 = strongly involved, 2 = somewhat involved, 3 = Not involved)

Practices	Rate
Accompany his spouse and child to clinic	
Support exclusive breastfeeding	
Support appropriate complementary feeding	
Facilitate consumption of diverse and nutritious foods.	

THANK YOU VERY MUCH FOR YOUR COAOPERATION

Enumerator's name: ……