INFLUENCE OF CHILDCARE PRACTICES ON THE NUTRITION STATUS OF UNDER-FIVE CHILDREN IN ILEJE DISTRICT COUNCIL, SONGWE REGION

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ABSTRACT

Undernutrition is a big challenge in the world though the rate of stunting has been decreasing in the past two decades. Most of undernourished children are in developing countries, comprising about one quarter of all stunted children in the world. The aim of this study was to investigate the influence of child care practices on the nutritional status of under five children in Ileje district, Songwe region, Tanzania. A cross sectional study involving of 365 children aged 0 - 59 months were assessed to determine their anthropometric measurements WAZ, HAZ and WHZ. A structured questionnaire was administered to collect data on childcare practices and demographic information from the caregivers/mothers. Data were coded and analyzed by ENA and Statistical Product for Social Services (SPSS) program, version 16. Results showed that, 33.4% of the children were stunted, 10.7% were underweight while 1.1% of the children were wasted. Multivariate analysis was done to find association between childcare practices and nutritional status. Feeding styles of the children, individual dietary diversity score, caregiver's/mother's ability to read and write, source of drinking water and participation in community organizations/social programs by the mother/caregiver were strongly associated ($p = 0.05$) with undernutrition. A standard multiple regression model analysis was done to find the factors that were strong predictors of the dependent variables. Factors which were strong predictors of stunting (low HAZ) were poor breastfeeding practices while recognition of child fullness during feeding by the mother/caregiver was a strong predictor for child underweight (low WAZ). Presence of chicken around the premises was a strong predictor for wasting (low WHZ) among children under the age of five years. It was concluded from this study that poor child care practices have positive influence on the anthropometric status of underfive children. It was recommended based on this study that Nutrition intervention programs which emphasizing positive social behavior change on

childcare practices through nutrition education should be introduced in the community to cover all beneficiaries.

DECLARATION

I, Mary Aloyce, 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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The above declaration is confirmed by;

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(Supervisor)

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DEDICATION

I would like to dedicate this dissertation to the Almighty God who gave me life, strength and vision in doing and developing this research.

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LIST OF ABBREVIATIONS

Cm	Centimetre
EED	Environmental Enteric Dysfunction
ENA	Emergency Nutrition Assessment
HAZ	Height-for-Age Z scores
Kg	Kilogram
MDD	Minimum Dietary Diversity
MDDS	Minimum Dietary Diversity Score
MUAC	Mid Upper Arm Circumferences
SAM	Severe Acute Malnutrition
SMART	Standardized Monitoring and Assessment of Relief Transitions
SPSS	Statistical Product Service Solutions
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WAZ	Weight-for-Age Z scores
WHO	World Health Organization
WHZ	Weight-for-Height Z scores

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Undernutrition is a big challenge in the world though the rate of stunting has been decreasing in the past two decades. In 1990 to 2014 the rate of stunting decreased by 15.8% (from 39.6 to 23.8%) (UNICEF, 2015). The number of stunted children declined from 255 million to 159 million worldwide. About 23.8% of the under-five children are stunted while 7.5% are wasted. Most of the malnourished children are in developing countries, comprising about one quarter of all stunted children in the world (UNICEF, 2015).

Tanzania is one of the developing countries with stunting prevalence rate of 34.4%, wasting prevalence rate of 4.5% and underweight prevalence rate of 14.3% (Ministy of Healthy, 2016). According to UNICEF (2006), malnutrition is caused by either immediate, underlying and/or root causes. Underlying causes are the most common and preventable causes and include household food security, mother and childcare, environmental health, hygiene and sanitation. Key childcare practices which play role in improving the nutritional status of children under the age of five years are proper infant and young child feeding, food preparation, storage and hygiene, psychosocial care as well as health seeking practices (Ramji, 2009). According to recent surveys, Tanzania has inadequate childcare practices, whereby 41% of infants below the age of 6 months received supplementary foods apart from breast milk, 74% of children 6 - 23 months consume inadequate diverse diet, 76% of pregnant women do not start antenatal care in their first trimester while 37% of births are home delivery (MINISTY OF HEALTHY, 2016). On the other hand, 25% of children aged 12 - 23 months are not immunized, 45% of underfive children with acute

respiratory infections are not taken to health facilities, 50% of children with fever do not see health care providers while 18% of children with diarrhea are not treated at health facilities. About 49% of Tanzanians have poor access to safe drinking water and one in ten households has no toilets (Ministry of Health, 2016).

Stunting has adverse effects on child growth and development. Some adverse consequences of stunting include low school performance, increased child morbidity and mortality rate and propagation of poverty at family and national level because most of the adults who are stunted during childhood are incapable of thinking well or creating new innovations which can boost their economic status (Blössner *et al.,* 2005).

Various internvesions have been undertaken in Tanzania to address the problem of under nutrition. These included vitamin A supplementation for children under the age of five years, deworming of children under the age of five years, promoting use of iodized salt, nutrition support to people living with HIV/AIDS, identification and treatment of children with severe acute undernutrition, introduced community nutrition education on infant and young child feeding practices, iron-folate supplementation to pregnant women, food handling and hygiene education, social behavior change communication, home food fortification and household food security (TFNC, 2012). Nutrition surveys were conducted to assess the impact of interventions and collected baseline data for planning way forward in areas which required more attention (TFNC, 2012).

1.2 Problem Statement

In September 2000, Tanzania endorsed the Sustainable Development Goal (SDG) at the General Assembly of the United Nations. One of the goals was to reduce hunger (URT, 2010). Indicators selected for assessing the progress of hunger reduction in Tanzania were

reduction of underweight and stunting from 28.8% and 46.6% to 14.4% and 23.3%, respectively by 2015. The baseline data between 1990 and 2015 were used to assess the progress of hunger reduction based on underweight and stunting indicators. According to Tanzania Demographic Health Survey (2015), stunting rate is still higher (34.4%) than the expected target of 23.3%, though the target of underweight reduction was achieved (14.3%). In Mbeya region, prevalence of stunting was higher than the national level at 37.7% (Ministry of Health, 2016). This rate was also higher than the expected national target of 23.3%, however the target of underweight reduction in Mbeya region was also achieved (12.2%).

1.3 Study Justification

Underlying causes of under nutrition include household food security, mother and child care and environmental health, sanitation and hygiene. According to UNICEF (2016) Malnutrition Framework the components of mother and child care, environmental health, sanitation and hygiene are the major causes of under nutrition (UNICEF, 2016). Therefore there is a need to investigate the influence of key childcare practices on the nutritional status of children under the age of five years in Ileje which was one of the districts in Mbeya region, but currently relocated to Songwe region. Mbeya is one of the regions with high food production, recording bumper harvest of various food crops every cropping season (TFNC, 2012). Childcare practices that may influence nutritional status of children include psychosocial care, sanitary and hygiene, infant and young child feeding and health seeking practices. Nutrition interventions conducted at district level use regional data as reference. Currently, there is no nutritional survey that has ever been conducted at district level in Ileje, thus there is a need to conduct this survey in the district which will provide baseline information on the nutritional status of underfive children and the role that childcare practices contribute to this problem.

1.4 Overall Objective

To investigate the influence of child care practices on the nutritional status of children under the age of five years in Ileje district, Songwe region, Tanzania.

1.4.1 Specific objectives

i. To assess child care practices of children aged 0 - 59 months focusing on psychosocial care, environmental sanitation, child feeding and health seeking behaviours.

ii. To determine socio – economic and demographic factors which influence childcare practices in Ileje district.

iii. To determine the anthropometric status of children under the age of five years namely WAZ, WHZ and HAZ scores.

1.4.2 Hypothesis testing

H_o: Poor childcare practices do not have any influence on the anthropometric status of underfive children.

H_1: Poor childcare practices have positive influence on the anthropometric status of underfive children.

CHAPTER TWO

2.0 LITERATURE REVIEW

Undernutrition is defined as the outcome of insufficient food intake and repeated infectious diseases. One can be too short for age, too light for the age, too light for the height with or without micronutrients deficiencies (UNICEF, 2006). The major contributor of undernutrition among children under the age of five years is poor maternal and child care practices (Ramji, 2009). Maternal care practices recommended by WHO (2014, 2016) are prenatal and postnatal care, proper maternal health and nutritional status before and during pregnancy. The caring practices for children are child feeding practices, psychosocial care and health and hygiene practices (Range *et al.,* 1997). The term feeding practices is also used to describe the broad scope of dietary, behavioral and physiological processes involved (Engle *et al.,* 2000). Care determines the delivery of food and health care resources to the child by optimizing the existing resources to promote good health and nutrition in children (Februhartanty *et al.,* 2007).

2.1 Infant and Young Child Feeding Practices

Poor feeding practices contribute to undernutrition and deaths in the first years of life, adequate nutrition during childhood may prevent and reduce these consequences (WHO, 2009). Mothers and caregivers should be given proper education on optimal feeding practices of children under the age of five years in order to improve feeding practices thus preventing and reducing its negative consequences on child health. Poor knowledge of caregivers on nutrition and food diversity influences feeding practices (Fosu and Arthur, 2015). WHO (2010) recommended that, infant and young child feeding indicators should be used during assessing feeding practices for infants and young children. Some of the indicators are early initiation of breastfeeding after birth, exclusive breastfeeding of

infants up to six months, extended breastfeeding of the infants up to two years of age, timely introduction of semi-solid and soft foods, minimum meal frequency and minimum dietary diversity.

2.1.1 Early initiation of breastfeeding after birth

Early initiation of breastfeeding refers to initiation of breastfeeding within one hour after birth. It helps infants to get the first breast milk commonly known as colostrum, which has nutrients and antibodies for diseases prevention (Liben *et al.,* 2016). Also early initiation of breastfeeding reduces the risk of low birth weight when initiation was done within 24 hours as well as reducing postpartum hemorrhage in mothers (Khanal *et al.,* 2015). It influences childhood nutrition and sustain breastfeeding (Sharma and Byrine, 2016).

2.1.2 Exclusive and extended breastfeeding

Exclusive breastfeeding means that, an infant does not receive any other liquid or foods apart from breastmilk and medicines or any supplementation under doctor's prescriptions (Kumar and Singh, 2015). Exclusive breastfeeding reduces the risks of diseases and keeps children health (Esndaftari *et al.,* 2014). It also reduces type 1 insulin dependent diabetes mellitus up to 30% and non-insulin dependent diabetes mellitus up to 40% (Anatolitou, 2012). Children who are exclusively breastfeed have benefits of consuming transitional and mature milk which are available on 7 to 21 as well as 21 on wards days post-partum. Transitional milk has high levels of fat, lactose, water soluble vitamins and contains more calories than colostrum while mature milk contains high levels of water, carbohydrate, protein and fats which are required to maintain hydration of infants, to promote growth and to meet energy requirements of the baby (Motee and Jeewon, 2014). Extended breastfeeding for up to 2 years of age is essential for child to obtain adequate nutrition (Thet *et al.,* 2016). It also has a stronger protective effect against obesity (McCrory and

Layte, 2012). Overweight or obese is lower among children who are exclusevely breastfed for more than 6 - 12 months and beyond 12 months (Hassan *et al.,* 2018).

2.1.3 Introduction of solid, semisolid and soft food

At six months of age, breast milk alone cannot provide sufficient nutritional requirements to infants. At this age infants enter a period of complementary feeding whereby they start to eat family foods (WHO, 2001). Late or early introduction of complementary foods or the types of complementary foods may affect child nutritional status in his early or later life (Carletti *et al.,* 2017). Early introduction of complementary foods may increase infant mortality, morbidity and may reduce the rate on intake of breast milk (Dewey *et al.,* 2001), inhibit the uptake of nutrients found in breast milk such as Iron and Zinc (Dewey, 2002) and reduce the effectiveness of family planning for mothers who use lactation amenorrhea method (LAM) as a contraceptive method of preventing pregnancy (Ssemukasa *et al.,* 2014). Late introduction of complementary foods increases the risk of nutrients deficiencies and undernutrition to infants (Przyrembel *et al.,* 2012). Acceptable types of complementary foods should consist of high energy, micronutrients, little salt and spices, free of pathogens, toxins, easy to eat and acceptable by infant (Monte and Giuglian, 2004).

2.1.4 Minimum dietary diversity and meal frequency

The quality of complementary food introduced to infants should be improved in order to improve child nutrition (Ocampo *et al.,* 2016). Nutrient and energy dense food is required during introduction of new foods at six months. To achieve this, dietary diversity should be given attention (Annim *et al.,* 2014). To measure the quality of dietary diversity, seven food groups namely (1) grains, roots and tubers (2) legumes and nuts (3) Milk and dairy products (4) flesh foods (5) eggs (6) vitamin A rich fruits (7) other fruits and vegetables are used to calculate the minimum dietary diversity (MDD) (WHO, 2010). To meet the

MDD the child should consume four food groups out of seven groups in the previous day (WHO, 2008). Apart from MDD, the complementary food should meet the minimum meal frequency recommended by WHO (2010). The WHO (2010) proposed that, children between 6 - 8 months should be fed 2 - 3 times a day while 9 - 24 months children should be fed 3 - 4 times a day with addition of 1 - 2 nutritious. To reduce the risk of undernutrition for the underfive children, the complementary foods introduced should meet the minimum dietary diversity and the minimum meal frequency per day (Kiminywe and Chege, 2015).

2.2 Psychosocial Care

Psychosocial care is responsive interaction between children and care-provider to support children's development including, acquisition of language and other communication skills through attention, affection and involvement, encouragement of exploration and learning, responsiveness to developmental milestones and cues, and protection from child abuse and violence (Lungu *et al.,* 2016).

2.3 Health Seeking Behaviour

The health seeking behavior of a community determines how primary health care services are used and in turn the health outcomes of populations (Musoke *et al.*, 2014). Access to primary healthcare is a crucial determinant of health, including child health. Access to healthcare has been shown to reduce child mortality and morbidity. In a viscious cycle of malnutrition, morbidity reduces the rate of nutrients intake and absorption, accelerating onset of under nutrition (Lungu *et al.*, 2016). Health-seeking behavior includes consulting a physician during the prenatal period for mothers, to be immunized against tetanus and receive health education, neonatal care for place of delivery and assistance at delivery and postnatal care vaccination, vitamins supplementation of the child at the period when

disease symptoms are apparent (Ajibade *et al.*, 2013). Vaccination provides protection against morbidity for children under the age of five years. In the long run, it improves nutritional status as repeated illnesses would lead to deterioration of health (Abedi and Srivastava, 2010). Antenatal care has a beneficial impact on pregnancy outcome. It is a means of identifying mothers at risk of delivering a preterm or growth retarded baby. It also provides an array of available medical, nutritional and educational interventions intended to reduce the risk of low birth weight and other adverse pregnancy outcomes (Chuku, 2008). Adequate maternal delivery service places have benefits because mothers who deliver their children at health care facilities are more likely to practice exclusive breastfeeding than their peers who deliver at home (Dhakal *et al.*, 2017). Timely initiation and exclusive breastfeeding contribute to the sustainable health of the child by way of curbing undernutrition, gastroenteritis and strengthening the immune system of the child against diseases (Fosu and Arthur, 2015).

2.4 Water, Sanitation and Hygiene

It has been estimated that, environmental factors, including lack of access to water and sanitation and poor hygiene practices, may account for half of all undernutrition cases globally (UNICEF, 2015). Child deaths attributable to under nutrition could be prevented with improved WASH. Water, Sanitation and Hygiene could potentially affect childhood nutrition via three pathways namely intestinal worms, environmental enteric dysfunction (EED) and repeated bouts of diarrhea. They may also limit growth and cognitive development (UNICEF, 2015). Nutrition-sensitive WASH interventions have been integrated into nutrition programmes to ensure communities have clean environment and prevent water borne diseases. Categories of WASH intervention programmes are hygiene behaviors, including hand washing with soap, food hygiene and environmental hygiene,

safe drinking-water management from collection to use in the household, sanitation and water supply (WHO, 2015).

2.5 Conceptual Framework of Undernutrition

Figure 1 shows the conceptual framework of undernutrition.

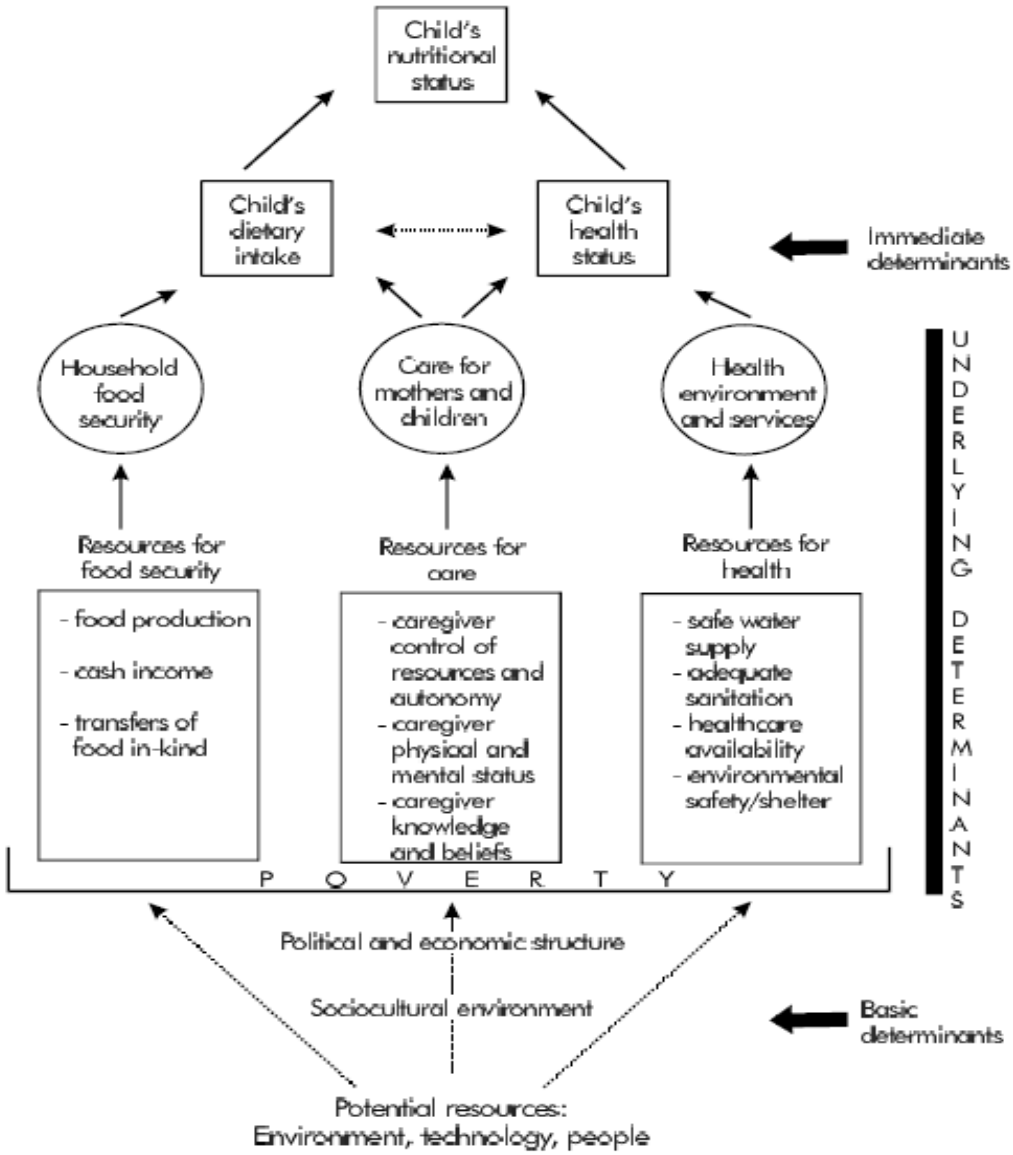

Figure 1: Conceptual Framework of Undernutrition

Child nutrition may be caused by factors at three different levels namely, immediate (individual) level, underlying (household/community) level, and the basic (societal) level. These levels link to one another (Pridemore and CarrHill, 2009).

In order to reduce undernutrition from the basic causes, potential resources should be controlled by the ruling power with an effective governance system which enables food security, health and care resources to be equal distributed in the community (Smith and Haddad, 2000). This action can be achieved through proper social protection policies, productive safety nets policies and good health service policies (Pridemore and Carhill, 2009).

Effective social protection policies reduce poverty for the vulnerable people through unconditional transfers such as food aid which reduces food insecurity at household level, subsidizing fertilizers and agricultural inputs to farmers which increases food production at household level while proper social pension policies at old age increases cash in the household enabling them to purchase food (Devereux and White, 2008). Formulation of strong health policies with physical, human, natural and social capitals can influence the availability of health resources with good environment and services at household level (Poder and He, 2010). Policy developments which support women status have a beneficial role of improving nutritional status to both mothers and their young children (Doocy *et.al*, 2005). Improving women power enhances their control of resources at the household level which inturn increases their ability to take care of themselves and their children. Such powers involve access to information/knowledge and health services, good mental health and control of household resources (Smith *et al.,* 2003).

Access to food alone at household level cannot improve child nutritional status. To ensure there is adequate dietary intake to a child (immediate level) there must be nutrition education (Bhutta *et al.,* 2008). Nutrition education improves the knowledge of the caregivers/ mothers about hygiene and feeding practices such as exclusive breastfeeding, timing of introducing complementary foods and child care during illnesses (Galasso and

Umapathi, 2009). Provision of care during pregnancy improves birth outcomes and child nutritional status (Tofail *et al.*, 2008). Care provided to pregnant women involves Iron-Folate supplementation, prevention and treatment of malaria, education on the use of mosquito bednets treated with insecticides, using iodized salt and supplementation with dense energy protein foods (Bryce *et al.*, 2008).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Description of the Study Area

This study was conducted in Ileje district in Songwe region. Ileje is located at the eastern part of the region between latitudes 9º 141 and 9º 371 and longitudes 32º 801 and 33º 451 East. It is bordered by Kyela district to the East, Rungwe district to the North – east, Mbozi district to the North-west and Mbeya rural district to the North. The district has an area of 1908 square kilometers (ESRF, 2014).

Administratively, Ileje district has 2 divisions, 18 wards and 71 villages with a population of 124451 people, of whom 47% are males and 71% are females. Average family size is four persons per household. The total number of underfive children in the district is 17 674. The population growth rate is 1.5% per year (ESRF, 2014).

The main ethnic groups found in Ileje district are Ndali and Lambya. Other tribes residing in the area include Malila and Nyiha. Majority of the Ileje people are Christians comprising of Moravians (majority) and Roman Catholics (minority). Other Pentecostal denominations are also found in small quantities.

The district has two hospitals namely Itumba and Isoko. Itumba is owned by the government while Isoko is owned by the Moravian church. There is one public health center and a total of 20 dispensaries. Out of these dispensaries, 6 are owned by the Moravian Church while 14 dispensaries are owned by the Government.

A large proportion of the population lives in houses that are in good conditions. Most houses are constructed by burned bricks, roofed by corrugated iron sheets with floors made up of stone/gravel, sand and cement. Few households located in the remote rural

areas have houses in poor conditions. Most houses (60-80%) have basic furniture and majority of the households own cell phone (ESRF, 2014).

The main economic activity in Ileje district is agriculture. There are about 101 600 ha of arable land. The inhabitants produce both food and cash crops. Common food crops produced are maize, paddy, beans and groundnuts. They also produce Irish potatoes, sweet potatoes, millet, plantains, cassava and horticultural products. Cash crops include coffee, pyrethrum, sunflower, cardamom and cocoa. There is also mining activity for coal and limestone which contribute to the economic growth of the local people. Small scale businesses such as shops and food stalls are also common. The border that connects the district with Malawi facilitates cross-border trade (ESRF, 2014).

3.2 Study Design

Cross – sectional study design was used to determine the influence of childcare practices on the nutritional status of children under the age of five years. This design was adopted due to the fact that, it is easy, fast to conduct, inexpensive and gives prevalence rates of various nutrition aspects.

3.3 Sampling Frame and Eligibility

Sampling frame included all households in the district with children under the age of five years. Eligible households were those having children under the age of five years and have lived in the district for at least two years.

3.3.1 Exclusion criteria

Children who were suffering from any chronic illness which influenced their nutritional status were excluded. Also children who were born with congenital abnormalities or visible deformities at the time of data collection and those whose parents refused to participate in the study were excluded from the study.

3.3.2 Inclusion criteria

Mothers or caretakers with children under the age of five years who lived in the study area for ≥ 2 years and children in the age of 0 – 59 months where included.

3.4 Sampling Techniques

Probability sampling was applied during selection of villages to be surveyed using a table of random numbers. At the village level, a sampling frame with a list of households with underfive children was obtained. The number of households with underfive children were randomly selected by using simple random technique. To obtain a representative sample of households, a table of random numbers facilitated their randomization.

3.5 Sample Size

A sample size was calculated using Fisher's (1991) formula. Since the prevalence of stunting in Mbeya region was 37.7 %, the sample size was:

$N = Z^2pq / d^2$

$N = 1.96^2 * 0.377 * 0.63 / 0.05^2$

$N = 365$

Where; N = sample size

Z = the risk of error

p = prevalence of stunting

q = non-prevalence of stunting

d = relative desired precision

3.6 Data Collection

3.6.1 Construction of a questionnaire

A questionnaire was constructed to solicit information from the subjects. The questionnaire was divided into five sections. Section A established rapport, section B solicited information about health seeking behaviors, section C solicited information about

infant and young child feeding practices, section D solicited information about sanitation, hygiene and psychosocial care, and section E solicited information about socio–economic and demographic factors influencing childcare practices and anthropometric measurements.

3.6.2 Administration of the questionnaire

Before administration of the questionnaire there was a short training of the enumerators on how to collect qualitative and quantitative data from the respondents and how to use the instruments. The questionnaire was administered through home visits on selected days. Administration of the questionnaire was conducted by face by face interviews in the morning hours of the day.

3.6.3 Pre-testing the questionnaire

The questionnaire was pre-tested in Ibaba village in which the study was not conducted but had conditions and characteristics that were similar to the villages where the study was not conducted. After pre-testing the questionnaire, minor corrections such as addition of few questions in section B were done so as to collect the desirable information.

3.6.4 Measurements taken

3.6.4.1 Weight measurements

Weight was measured in kilograms (Kg) using a Seca electronic scale (Seca GmbH and CO. KG Hamburg, Germany) available at the Ileje district hospital. The electronic weighing scale was reset during each measurement to obtain correct readings adjusted for absolute errors. For infants and those children who were unable to stand, the mother was first requested to stand on the weighing scale. The scale was then zeroed. She was then requested to hold the baby who was lightly dressed and the weight was then recorded. The weight was there after recorded to the nearest 0.1g.

3.6.4.2 Height measurements

The height/Length of the children was measured using height/length board with an accuracy of 0.1 centimeters. Recurmbent length was taken for children below two years or those below 84 cm while height was taken for children above 2 years.

3.6.4.3 Oedema assessment

Assessment of bilateral oedema was done by applying mild pressure was applied on both feet of the child for three seconds using the thumbs. Children showing the print of the thumbs were considered to have oedema.

3.7 Data Analysis

Emergency Nutrition Assessment (ENA) for Standardized Monitoring and Assessment of Relief Transitions (SMART) 2011 was used to analyze the anthropometric data. Weights for Height Z scores (WHZ), Height for Age Z scores (HAZ) and Weight for Age Z scores (WAZ) were determined by ENA for SMART program. The data were entered into IBM SPSS program version 16 for further analysis.

Descriptive analysis to check out the prevalence of nutritional status and frequencies of various age groups and sex were done by SPSS program, version 16. Multivariate analysis was used to determine the relationship between independent variables (data on child care practices obtained from respondents) and dependent variables (WAZ, HAZ and WHZ data). After multivariate analysis, a follow-up one-way ANOVA analysis was done to obtain a multivariate level which had stronger association with the dependent variables after Bonferroni adjustment on the alpha level. One way ANOVA post hoc test analysis was done to assess association between independent variables with more than two levels in order to obtain one level which was more significant than the others while for the

independent variables with two levels the association was obtained from the mean scores indicated by a dependent variable which reached Bonferroni adjusted alpha level in a test of between-subjects effects output box and its level was recorded from the estimated marginal means output boxes. A level with highest mean score was considered to have higher influence on the all dependent variables. There was no follow-up analysis for a multivariate output in which at least one of its dependent variables did not show any significant association after Bonferroni adjustments in a test of between-subjects effects output box, the mean scores were considered the same for all levels. A standard multiple regression model analysis was done to find the variables contributed to the prediction of the dependent variables (Pallant, 2013).

3.8 Ethical Consideration

Permission to conduct this was obtained from Sokoine University of Agriculture, College of Agriculture, Department of Food, Technology, Nutrition and Consumer Sciences, and from the officials at different levels in the study area. Letters were written to the district administrative office to request for their permission. Verbal informed consent was taken from each respondent prior to the interview after the purpose of the study clearly stated to them. Confidentiality of the information was assured and privacy of the respondents was maintained.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio – economic and Demographic Characteristics of the Respondents

Results in Table 1 show the socio-economic and demographic characteristics of the respondents. It was noted that, 46.03% of the children were males and 53.97% of the children were females. Out of these, 5.2% were in the age group 0 - 5 months, 11.8% were in the age group of 6 - 11 months while 83% were in the age group of 12 months and above. The proportion of females in the studied sample was slightly higher than of males. This finding was different from the study conducted by Garcia *et al.* (2017) who reported that 57.4% of the children were males while 42.6% were females. Another author revealed that, the proportion of the studied sample for both males (49.99%) and females (50.01%) was slightly the same (Wamani *et al.,* 2007). Other studies do not include the age group below six months in their sample. A study conducted in Kenya indicated that, age distribution of underfive for 6 - 11 months children were 10.24% and above 12 months were 89.76% (Badake *et al.,* 2014). In a study survey conducted by Brhane and Regassa (2014), the range and percentage of age distribution were 12.3% for 0 - 5 months children, 15.2% for 6-11 months children while 72.5% for children aged above 12 months children.

Distribution of martenal age was mothers with ≤ 19 years 7.6%, mothers with 20 - 24 years 27.7%, mothers with 25 - 29 years 21.4%, mothers with 30 - 34 years 22% and mothers with ≥ 35 years 21.4%. These observations indicated that, the proportion of mothers with age ≤ 19 years was the smallest of all mother's age groups but the proportion increased between 20 - 34 years and reduced at 35 years and above. These results were similar to those reported by Negash *et al.* (2015). As the mother's age increased, their proportion in the study sample increased but decreased when mothers reached the age of

35 years and above. According to Negash *et al.* (2015), 2.5% of mothers had ≤ 19 years, 19.3% had 20 - 24 years, 48.2% had 25 - 29 years, 22.8% had 30-34 years while 7.1% had ≥ 35 years. Another study by Ajao *et al.* (2010) found that, 0.5% of mothers had ≤ 19 years, 14.1% had 20 - 24 years, 26.7% had 25 - 29 years, 28.6% had 30 - 34 years while 29.1% had ≥ 35 years. The proportion of mothers with ≤ 19 years was small in line with our results but increased with age.

Majority of the mothers were married (93.7%), 1.4% were widowed, 1.6% were divorced while 3.3% were single. A study conducted in Ethiopia community showed similar observations (Kabeta *et al.,* 2017). It was revealed that, 89.2% of the mothers were married, 1% were widowed, 3.76% were divorced while 6% were single. In both studied samples most mothers were married, there were small poportions of widowed and divorced mothers and higher percentage of single mothers. Girma and Genebo (2002) reported that, 59.5% of the mothers were married, 3.9% were widowed, and 9.5% were divorced while 27% were single. In contrast to other studies, this study had smaller proportion of married mothers and higher proportion of single mothers. Dewana *et al.*, (2017) reported that, undernutrition was higher among divorced, widowed or single mothers which caused by lack of household resources and inadequate time for caring children. Dewana *et al.* (2017) report was incontrary to this study as there was no association between marital status and child undernutrition.

About 8.8 % of the mothers did not have formal education, 8.2% did not complete primary school education, 73.7 % completed primary school education, 8.8% reached secondary school where 0.5% had tertiary school education (College and University). The studied sample had mothers with neither formal education nor completed primary school education. These results were similar to those found at national level whereby 15% of the

mothers had no formal education while 12% did not complete primary school education (Ministry of Health, 2016). Studies of other communities had no mothers who did not complete primary school education or with no formal education. Example, a study conducted in Ankara showed that, 1% of the mothers were literate, 30.9% of the mothers completed primary school education, 18.6% had secondary education level, 36.4% attained high school education level while 13.1% of the mothers had attained university education (Özdoğan *et al.*, 2012).

The major socio-economic activities of the mothers/caretakers were agriculture. The observations made during the survey showed that, 72.6% of the mothers were farmers, 15% were petty traders, 8.8% were petty traders and farmers, 3.3% were housewives while 0.3% were professional employees. The observations reported by Nordang (2011) in Rukwa region Tanzania showed that, 92.8% of the mothers were farmers, 2.6% were petty traders, 1.9% were conducting medium/large business, 1.3% were craftsmen, 0.7% were professionals employees while 0.7% were engaged in other economic activities. This study observed that, few caregivers did not engaged in economic activities (3.0%), in this case most households had good capital made them capable to get basic services which minimizes on set of undernutrition. Kamiya (2011) reported that, households with poor economic status were not capable of having basic services hence make them to be at risk of being undernourished.

Table 1: Socio-economic and demographic characteristics of the respondents

Variable	Total	%
Sex of the children		
Males	168	46.03
Females	197	53.97
Age distribution of the children (months)		
0-5	19	5.2
6-12	43	11.8
> 12	303	83
Caretaker child relationship		
Mother	355	97.3
Grand parents	10	2.7
Age of caretakers (years)		
< 19	28	7.6
20-24	101	27.7
25-29	78	21.4
30-34	80	21.9
≥35	78	21.4
Marital status		
Married	342	93.7
Widowed	5	1.4
Separated	6	1.6
Single	12	3.3
Education level of the caretakers		
None	32	8.8
Did not complete standard seven	30	8.2
Completed primary school education	269	73.7
Secondary school education	32	8.8
Tertiary school education	2	0.5
Socio-economic activities of the caretakers		
Agricultural work	265	72.6
Petty traders	55	15
Vendor and agricultural work	32	8.8
Jobless/Housewife	12	3.3
Paid professional	1	0.3
Total number of people in the household		
1-4	188	51.5
5-8	171	46.9
9-12	6	1.6
Number of under five children in the household		
One	318	87.1
Two	47	12.9
Birthweight profile of the underfives		
< 2.5 Kg	17	4.7
>2.5 Kg	348	95.3

4.2 Nutritional Status of the Studied Children

Table 2 shows the distribution of stunted, underweight and wasted children. Out of 365 children who were studied, 33.4% were stunted, 10.7% were underweight while 1.1%, were wasted. Prevalence of undernutrition in the studied sample was lower than the national prevalence rate. According to Ministry of Health (2016), 34.4% of the children were stunted, 13.7% were underweight while 4.5% of the children were wasted. Prevalence of undernutrion was also lower than that reported in East African countries but slightly higher than those from other countries around Sub-Saharan Africa. Akombi *et al.* (2017) observed that, 39% of the children in East Africa were stunted, 14.4% were underweight while 5.4% were wasted. In West Africa, 31.8% of the children were stunted, 20.1% were underweight while 10% were wasted. In Southern Africa, 30.6% of the children were stunted, 10.7% were underweight while 4.1% were wasted. In Central Africa, 28.8% of the children were stunted, 12.8% were underweight while 6.7% were wasted.

Table 2: Distribution of stunted, underweight and wasted children (n=365)

Nutritional status	n	%
Stunted	122	33.4
Underweight	39	10.7
Wasted	4	1.1

4.3 Factors Influencing the Nutritional Status of the Children

Table 3 summarizes the variables associated with undernutrition and with highest mean scores. Three anthropometric variables, HAZ, WAZ and WHZ were significantly associated with child care practice variables which were care during feeding the child, individual dietary diversity score, mother's ability to read and write, source of drinking water and program participation in the community. Multivariate analysis was used to find

association between variables and anthropometric parameters at 5% level of probability ($p \leq 0.05$) while one way ANOVA post hoc analysis test was used to find the levels of the variables with highest mean scores which were considered to have higher influence on child's nutritional status.

Table 3: Socio-economic variables with highest mean scores and associated with undernutrition

Variables	n	%	P-value	Subset for alpha = 0.05 Mean score
Who feeds the child (6-59 months)				
Caregiver	46	13.3	0.027	11.07
Self-feed	240	69.6		11
Caregiver/Self-feed	59	17.1		11
Individual dietary diversity score (48-59 months)				
0	0	0	0.016	-
1	2	3.3		12
2	12	19.7		11
3	29	47.5		11.41
4	16	26.2		11.25
5	2	3.3		11.5
6	0	0		-
7	0	0		-
Individual dietary diversity score, (12-23 months)				
0	2	2.3	0.004	11
1	16	18.6		11
2	19	22.1		11
3	20	23.3		11
4	24	27.9		11
5	5	5.8		11.2
6	0	0		-
7	0	0		-
Mothers ability to read and write (12-59) months				
Able to read whole sentence	255	85	0.022	11.8
Able to read part of sentence	6	2		11.28
Cannot read and write	39	13		11.17
Water source based on WHO guideline (21-47 months)				
Improved source	113	46.7	0.048	1.32
Unimproved source	129	53.3		1.48
Program participated, (24-47 months)				
Community chicken's group	1	0.7	0.040	Same effects
Credit association/Saccos	16	11		
Fisheries group	1	0.7		
Mwanzobora	1	0.7		
Malezi na makuzi	4	2.8		
Orphan group	2	1.4		
None	120	82.8		

*P≤0.05

4.4 Variables that are Strong Predictors of Undernutrition

Results in Table 4 show the variables that are strong correlated to undernutrition and serve as strong predictors for the conditions. A standard multiple regression model explained 8.9%, 10.3% and 10.2% of HAZ, WAZ and WHZ. Three variables namely child breastfeeding status, child fullness recognition and presence of chicken around the premises showed strong association with HAZ, WAZ and WHZ status. These variables were therefore good predictors for these conditions.

Table 4: Summary of variables that were strongly associated with low HAZ, WAZ and WHZ status

	Beta Coefficients			P value		
Variables	**HAZ**	**WAZ**	**WHZ**	**HAZ**	**WAZ**	**WHZ**
Marital status	0.000	-0.028	0.001	0.999	0.718	0.987
Child eating stimulation	-0.014	0.090	0.033	0.869	0.303	0.707
Child recognition of hunger cues	-0.112	0.059	-0.023	0.442	0.450	0.766
Child fullness recognition	-0.061	-0.172	0.142	0.168	0.034*	0.080
Child movement during eating	0.031	0.149	0.097	0.441	0.060	0.222
Who feeds the child	-0.018	0.036	0.063	0.710	0.668	0.455
Education level of caregiver	0.091	0.053	0.030	0.834	0.541	0.728
Occupation status	0.060	-0.029	-0.023	0.251	0.710	0.771
Source of drinking water	-0.043	0.081	0.106	0.449	0.307	0.180
Presence of chicken in premises	-0.015	0.039	0.174	0.582	0.609	0.025*
First visitation to ANC	-0.034	-0.042	-0.043	0.869	0.638	0.627
Frequency visitation to ANC	0.095	-0.020	-0.005	0.694	0.815	0.950
Programme participation	-0.044	0.011	0.010	0.221	0.888	0.9000
Introduction of solid foods	0.183	-0.018	-0.021	0.563	0.809	0.787
Breastfeeding status	-0.0082	-0.073	-0.060	0.048*	0.425	0.512
Initiation of breastfeeding within first hour	-0.069	-0.009	-0.042	0.306	0.911	0.592
Meal frequency per day	-0.072	-0.062	-0.082	0.413	0.457	0.324
Individual dietary diversity score	-0.027	-0.104	-0.147	0.371	0.192	0.067
Age of caregiver	-0.042	-0.129	-0.103	0.611	0.113	0.204

*P value associated with undernutrition
*P≤0.05

4.5 Psychosocial Care during Feeding

Table 3 shows that, child's feeding style was strongly associated with undernutrition ($p = 0.027$). Children became undernourished when they were fed by their mothers/caregivers. Table 3 data supported this proposition, where by more children who were fed by their caregivers/mothers was undernourished compared to the children who were self-fed or self-fed while supported by other people. This could be due to the fact that the mean score for caregiver/mother feeding status was 11.07. A study conducted in India concluded that, poor interaction between children and their caregivers accelerate the trend of undernutrition among the children (Singh and Kumar, 2016). Haycraft *et al.* (2011) described some children behaviors which can affect their food intake. Such behaviors include low appetite and difficult temperament. Poor psychosocial care for underfive children during eating increases the prevalence of undernutrition while good psychosocial care influences adequate food intake to children (Carvalhaes and Benicio, 2006).

Table 4 shows that recognition of child fullness was strongly associated with underweight (WAZ) ($p = 0.034$). Hodges *et al.* (2013) reported that, mothers/caregivers who are not effective in recognizing child fullness cues during feeding cannot control the children's food intake. Responsive feeding can help the caregivers to identify the hunger and fullness signals of the child which influence proper dietary intake. Failure to identify the signals can reduce proper food intake (Agampodi, 2014). In this study recognition of child fullness was a strong predictor of underweight (low WAZ). This could be due to low dietary intake caused by failure of identifying hunger or satiety/fullness cues.

4.6 Individual Dietary Diversity

Results in Table 3 showed that, there was a significant association between individual dietary diversity and undernutrition (HAZ, WAZ and WHZ) for children aged 12 - 23

months (p = 0.004) and 48 - 59 months (p = 0.016). Bukusuba (2009) reported that, there was a significance association between dietary diversity score and undernutrition (HAZ, WAZ and WHZ) in his studied population. Low dietary diversity leads to the consumption of low protein and micronutrients to meet the individual dietary needs which in turn may lead undernutrition (Goris *et al.,* 2016).

4.7 Demographic and Socio-economic Status of the Respondents

Table 3 shows that, 13% of the mothers/caregivers had no ability to read and write. There was a strong association (p = 0.022) between illiterate mothers and undernutrition, it shows that, mothers who could not read and write had highest influence on children's undernutrion, mean score 11.28. A study conducted in Nairobi (Abuya and Kimani, 2012), indicated that, uneducated women had higher percent of undernourished children compared to educated women. A study conducted by Mishra and Retherford (2000) showed that, children of mothers who had the lowest grades at school were more undernourished than children of mothers who had the highest grade at school. Poor education level reduces the ability of caregivers to take care of their children as required

4.8 Programme Participation in the Community

Table 3 shows that, 82.8% of the respondents did not participate in any community programme. The rest partcipated in fisheries group, community chicken's group, MwanzoBora intervention programme, Malezi na Makuzi intervention programmes, Orphan Organization and Credit association/Saccos groups. Only 3.5% of the respondents participated in nutrition intervention programs namely Mwanzo Bora and Malezi na Makuzi. There was significant association (p = 0.04) between the programme participated by the mothers in the community and undernutrition. Table 3 shows that, all the programmes had the same effects on causing undernutrition for children aged 24 - 47

months. Malezi na Makuzi programme whichwas supported by UNICEF promoted proper breastfeeding practices such as early initiation of breastfeeding immediately after delivery, continued exclusive breastfeeding for the first six months of life, continued breastfeeding up to two years, introduction of safe, adequate and appropriate complementary feeding from six months and above, child and caregiver interaction during feeding as well as good sanitation practices and access to clean drinking water (UNICEF, 2015). Mwanzo Bora programme used 1000 days kit which promoted nutrition practices in the first 1000 days of a child's life from conception up to two years of age. Dietary diversity kit promotes household food production and consumption, hygiene and joint household decision making (MBNP, 2015). Both programmes were conducted by combined individual and community group counseling (Bhutta *et al.,* 2013). Malekafzali (2000) reported that, community based nutritional intervention programs help to eliminate undernutrition. In his study incidence of undernutrition based on WAZ and WHZ decreased by 27% after nutrition intervention in the studied sample. In this study children below 24 months were not significantly associated with undernutrion. It could be due to the fact that, these children were born when the programmes were introduced in community nearly two years ago.

4.9 Source of Drinking Water and Presence of Chicken in Premises

Table 3 shows a strong association ($p = 0.048$) between water sources and undernutrition (HAZ, WAZ and WHZ), unimproved water source is one of the major cause of undernutrition as it had higher mean score (1.48) than improved water source. The association of water source and child nutritional status observed in this study differ from that reported by Spears *et al.* (2013), Rah *et al.* (2015) and Merchant *et al.* (2003). These authors reported that, unimproved water source was associated with HAZ. To minimize

health risks for underfive children, households should safely manage the drinking water and improve sanitation services (WHO and UNICEF, 2017).

Table 4 shows that, presence of chicken around the premises was also strongly associated with child wasting (low WHZ) ($p = 0.025$). According to Headey *et al.* (2017), presence of chicken around the premises strongly influences the environmental contamination by faecal matter. Children could ingest faecal matter leading to environmental enteric disorders (EED), diarrhea and respiratory tract infections which interfere with uptake of nutrients (Headey *et al.,* 2017). Presence of wasted children in this studied sample could be associated with ingestion of chicken faecal matter that resulted in many episodes of illness like EED, diarrhea and respiratory tract infections.

4.10 Breastfeeding Practices among the Children

Table 4 shows that, breastfeeding status was a strong predictor of stunting ($p = 0.048$). Scherbaum and Srour (2016) reported that, children who were never breastfed or stopped breastfed before one or two years of age were at higher risk of being stunted than their peers who breastfed up to two years. Scherbaum and Srour (2016) report, support the observation of this study that, those children who were never breastfed and with short period breastfeeding were also likely to be stunted. Child breastfeeding status gave the information of whether the child was exclusively and fully breastfed and for how long.

Results in Table 5 indicate the distribution of breastfeeding practices among the children in the studied sample, few percent (0.3%) of children in the studied sample were never breastfeed, 3.6% of the children stopped breastfeeding before one year of age while 60.3% stopped breastfeeding before 2 years of age.

Table 5: Breastfeeding practices among the children

Variables	n	(%)
Child ever breastfed		
Yes	364	99.7
No	1	0.3
Initiation of breastfeeding		
Within one hour of birth	195	53.4
More than one hour of birth	170	46.6
Prevalence of exclusive breastfeeding		
Exclusive	208	57
Non exclusive	157	43
Child continued breastfeeding at one year		
Yes	352	96.4
No	13	3.6
Child continued breastfeeding at two years		
Yes	145	39.7
No	220	60.3
Consumption of colostrum		
Yes	342	93.7
No	23	6.3

Most of the children (99.7%) were breastfed. These results were in agreement with the study conducted in Kenya by Muchina and Waithaka (2010) who reported that, 99% of mothers had breastfed their children during the study period. Other observations with similar results were also reported in Ethiopia and Myanmar where the prevalence of breastfed children were 98.7% (Setegn *et al.*, 2012) and 96.5% (Thet *et al.,* 2016).

4.11 Initiation of Breastfeeding after Birth

Data in Table 5 indicate that, the proportion of mothers in the study who initiated breastfeeding within the first hour was 53.4%. Similar observations were reported in Gujarat where 56.4% of the infants were breastfed within one hour of birth (Gandhi *et al.*, 2014). Lower proportions of mothers initiating breastfeeding within the first hour have been reported by Yilmaz *et al.* (2016) (45.5%) and Samad *et al.* (2017) (44%). According to WHO, proportion of mothers initiating breastfeeding within one hour after delivery was

regarded as poor if it ranged between 0 - 29%, fair if ranged between 30 - 49%, good if ranged between 50 - 89% and very good if it ranged between 90 - 100%. During this survey, some of the mothers reported that, delay in initiating breastfeeding early was caused by absence of breast milk immediately after delivery especially for those who are delivered by caesarean section. Such reasons factors were also reported by authors in other studies (Mukunya *et al.*, 2017 and Khanal *et al.*, 2015).

4.12 Exclusive Breastfeeding

Table 5 shows that, 57% of mothers breastfed their babies exclusively for six months. Globally, the level of exclusive breastfeeding was 43% (UNICEF, 2016). Results of this survey showed higher level of exclusive breastfeeding practice in Ileje district compared to the global level. It was also higher than those reported from Malawi (43%) (Kuchenbecker *et al.*, 2015) and Mauritius (17.9%) (Motee *et al.*, 2013).

4.13 Extended Breastfeeding

Table 5 data show that, 96.4% of the children in this study continued to be breastfed at one year of age. The proportion decreased to 39.7% when they reached the age of 23 months. One of the breastfeeding indicators was to assess the percentage of children breastfeeding at 12 - 15 months and 20 - 23 months (UNICEF, 2011). Extended breastfeeding is one of the very important childcare practices as it reduces the risk of illnesses which could accelerate undernutrition (Chika *et al.*, 2014).

4.14 Introduction of Solid, Semi-solid and Soft Foods

Results in Table 6 summarizes the percentage distribution of introduction of solid, semisolid and soft foods to underfive children. It shows that, 44% of the caregivers initiated complementary feeding early (below 6 months of age), 50% initiated

supplementary feeding timely (at 6 months of age) while 6% initiated supplementary feeding late (above six months of age).

Table 6: Initiation of complementary feeding and meal frequency distribution

Variables	n	(%)
Time of starting complementary feeding (months)		
< 6	160	43.8
At 6	183	50.1
> 6	22	6.1
Meal frequency (per day) for 6-8 months children		
≥ 2	11	57.8
< 2	8	42.2
9-11 months children		
≥ 3	8	36.4
< 3	14	63.6
12-24 months children		
≥ 3	59	68.5
< 3	27	31.5

According to WHO (2001), initiation of complementary feeding to infants should start at 6 months because breast milk alone is not sufficient to meet their nutritional requirements. In this survey, initiation of complementary feeding to infants differed from the time recommended by WHO (2001). The proportion of children who received complementary foods timely in this study was lower than proportions reported in other studies. A study by Rao *et al.* (2011) indicated that, more than half of the population (77.5%) initiated complementary feeding timely. In another study by Ubeysekara *et al.* (2015), 75.2% of the caregivers initiated complementary feeding at appropriate time. At this study, there was no significant association between the time of initiation of complementary feeding and undernutrition. Similar observations were reported by Pokharel *et al.* (2017). In his study, 41.7% of the caregivers did not initiate complementary feeding on time.

4.15 Minimum Meal Frequency

Table 6 shows that, 57.8% of the children aged 6 - 8 months were fed 2 - 3 times per day, while 36.4% of 9 - 11 months and 68.5% of 12 - 23 months children were fed 3 - 4 times a day. Children between 6 - 8 months should be fed 2 - 3 times a day, 9 - 11 and 12 - 24 months children should be fed 3 - 4 times per day with addition of 1 - 2 nutritious snacks per day (WHO, 2010). The trend of meal frequencies per day in the study sample was increasing as the children grew older but declined at age 9 - 11 months. There was no significant association ($p > 0.05$) between minimum meal frequency and child undernutrition. In this study, the minimum meal frequency taken by the children and its association with the nutritional status was slightly different from the study conducted by Oyda *et al.* (2017) who reported that, as the child age increased the number of meal frequency were decreasing at the rate of 76.5%, 53.7% and 51.5% for children aged 6 - 11, 9 - 11 and 12 - 23 months, respectively. There was also a significant association ($p < 0.05$) between the minimum meal frequency and the WAZ and HAZ of the children.

4.16 Food Groups Consumed by the Children

Table 7 indicates the most and least food group consumed by the children. Starchy staple foods were the most consumed food group while the least consumed food group was eggs. Cereals, roots and tubers were the most common staple foods in the studied community and it had the highest score of 98.5%, whereas eggs scored 5.1%.

Table 7: Frequency of foods consumption in the past seven days

Food groups/ times per week	6-7	3-5	1-2	Never
	n (%)	n (%)	n (%)	n (%)
Cereals, roots and tubers	326(98.5)	0	0	5(1.5)
Vitamin A rich fruits and vegetables	143(43.2)	136(41.1)	20(6)	32(9.7)
Other fruits and vegetables	256(77.3)	38(11.5)	7(2.1)	30(9.1)
Eggs	5(1.5)	8(2.4)	11(3.3)	307(92.7)
Milk and Dairy products	21(6.3)	15(4.5)	38(11.5)	257(77.6)
Flesh foods	12(3.6)	50(15.1)	98(29.6)	171(51.7)
Legumes, nuts and seeds	202(61)	96(29)	14(4.2)	19(5.7)

These results were similar to the study conducted in Uganda whereby there was high consumption of cereal staple foods (88.3%), low consumption of eggs (16%) and more than 50% of the respondents had low dietary diversity (59%).

Results in Table 8 indicate the proportion of children who consumed < 4, 4 - 5 and 6 - 7 food groups were 66.2%, 33.2% and 0.6%, respectively. More than 50% of the children were not able to meet the minimum dietary diversity score (MDDS).

Table 8: Individual dietary diversity score of the children

Individual dietary diversity score	Age groups (months)					n (%)
	6-11	12-23	24-35	36-47	48-59	
0	2	2	0	0	0	4(1.2)
1	9	16	6	2	2	35(10.6)
2	11	19	14	20	12	76(23)
3	9	20	21	25	29	104(31.4)
4	6	24	26	26	16	98(29.6)
5	2	5	0	0	2	12(3.6)
6	2	0	0	0	0	2(0.6)
7	0	0	0	0	0	0
Total	41	86	67	76	61	331
MDDS (%)	24.3	33.7	38.8	34.2	29.2	33.8

These results differed from those reported by Badake *et al.* (2014) who revealed that, more than 58% of the children in their study met the recommended MDDS. The minimum dietary diversity score was used to determine if the children were given adequate diet with good quality. Children with high dietary diversity usually have low risk of undernutrion and good growth (Busert *et al.,* 2016). In this study, dietary diversity was assessed to observe its association with children's nutritional status. According to the dietary score classification, children receiving ≥ 4 food groups in the previous days were classified as meeting the minimum dietary diversity (WHO, 2010). In this study, if the child received a food group more than five days in the previous week she/he scored one point for that

particular food group. The lowest score was 0 while the highest score was 7 (Bandoh *et al.,* 2017). There were seven food groups recommended by WHO (2009), namely (1) cereals, roots and tubers (2) legumes and nuts (3) milk and dairy products (4) flesh foods (5) eggs (6) vitamin A rich foods and vegetables (7) other fruits and vegetables.

4.17 Health Seeking Behaviours

Table 9 shows the health seeking behaviors of the studied sample. During pregnancy, women were receiving antenatal care from the health facilities. These maternal health care services consisted of antenatal care (ANC), delivery care and postnatal care (PNC) (Kifle *et al.,* 2017). All these care services influenced the child nutritional status (WHO 2014 and 2016). Mothers who took their children to the growth monitoring facilities and received nutrition and health education services were able to improve the nutritional status of their children, compared to mothers who did not (Ashworth *et al.,* 2008).

Table 9: Health seeking behavior characteristics of the respondents

Variables	n	%	P-value
Timing of first antenatal clinic			
First trimester	202	55	0.555
Second trimester	127	34.7	
Third trimester	35	10	
No visit	1	0.3	
Frequency of Antenatal care during pregnancy			
≥4	235	64.4	0.427
<4	128	35.1	
No visit	2	0.5	
Place of delivery			
Institutional delivery	296	81.1	0.851
Home delivery	58	15.9	
On the way	11	3	
Received Tetanus Toxoid during pregnancy			
Yes	330	90.4	0.926
No	35	9.6	
Received Iron-Folate			
Yes	330	90.4	0.857
No	35	9.6	
Postnatal care support			
Received vitamin A after delivery			
Yes	105	28.8	0.882
No	260	71.2	
Received practical support to start breastfeeding			
Yes	363	99.5	0.518
No	2	0.5	
Child growth monitoring in past three months			
Measured weight			
Yes	313	85.8	0.535
No	52	14.2	
Measured Mid-Upper Arm Circumference			
Yes	48	14.3	0.301
No	288	85.7	
Measured length/height			
Yes	20	5.5	0.969
No	345	94.5	
Received Infant and Young Child Feeding education in past three months			
Yes	102	27.9	0.751
No	263	72.1	

*P≤0.05

4.18 Antenatal Care

Results in Table 9 indicate that, 99.7% of the pregnant women attended ANC, 90.4 % received Iron-Folate (FeFo) supplements during pregnancy while 64.4% of the women visited ANC at least four or more times. Similar results were reported in a study conducted in Sudan which that, high number of antenatal care visits caused good consumption of FeFo supplements by the pregnant women. About 92.4% of the respondents attended antenatal care while 92.1% received FeFo supplements (Abdullahi *et al.,* 2014). Other studies reported in Ethiopia reported that, 100% of pregnant women attended antenatal clinics, 99% received FeFo supplements while 47% made four or more antenatal clinic visits during their gestational period (Gebreamlak *et al.,* 2017). The frequency of antenatal visits observed in Gebreamlak *et al.* (2017) for this study was lower than that observed in our study. The frequency of ANC visitation reported in both studies did not seem to influence the proportion of pregnant women who received FeFo. Majority of the pregnant women around Sub- Saharan Africa usually start ANC in the second or third trimester (Abou-Zahr *et al.,* 2003).

Other observations reported in the Ministry of Health (2016) report indicated that, 84% of pregnant women in Tanzania usually start ANC in the second or third trimester. These findings contradict the results of this study which indicated that, only 44.2% of the pregnant women started ANC in the second or third trimester.

ANC services provided during pregnancy comprised nutrition interventions such as dietary interventions as well as Iron and Folate supplementation. ANC consisted of at least four visits to the ANC centers and pregnant women were supposed to report to the ANC in the first trimester in order to manage iron deficiency anemia and other medical caomplications which may have impact on the pregnant outcome (WHO, 2016).

There was no significant association between ANC practices and children's nutritional status. This observation was similar to that reported by Ramirez *et al.* (2012) in Bolivia.

4.19 Tetanus Toxoid Vaccination

Results in Table 9 indicated that, 90.4% of the pregnant women received Tetanus toxoid vaccine. This proportion was similar to the national coverage (90%), but it was also higher than the African region coverage (77%) (Ridpath *et al.*, 2017). Tetanus toxoid vaccination coverage of the studied pregnant women was higher compared to other studies which reported coverage rate of 78.6 - 81.6% (Abir *et al.*, 2017; Mosiour, 2008). TT vaccine is usually given to pregnant women to protect them from tetanus. If this vaccination is not administered to pregnant women, there may be neonatal tetanus during or after child birth (Rahman *et al.*, 2010). Child illness is the major cause of undernutrition due to depletion of micronutrients (Ferdous *et al.*, 2013). There was no significant association ($p > 0.05$) between the proportion of mothers who received TT vaccination and the nutritional status of children who were born.

4.20 Postnatal Care

Table 9 indicates that, 99.5% of the lactating mothers received practical support on breastfeeding practices within two to three days after delivery. This proportion was higher than that reported in studies by Varma *et al.* (2010) and Bwalya *et al.* (2017). Both studies showed that, only 16% of the lactating mothers received breastfeeding support within two days of delivery. WHO (2014) recommends that, within two to three days of PNC the breastfeeding progress should be assessed at each contact and mothers should to be counseled and given support for exclusive breastfeeding, postnatal support to encourage mothers to breastfeed their babies exclusively should be promoted and maintained.

Exclusive breastfeeding should be maintained up to six months of age (Su *et al.,* 2007 and Ambike *et al.,* 2017).

4.21 Child Growth Monitoring

Growth monitoring was used to assess the growth status of the children and determined whether there was a need to initiate intervention and make impact on reducing undernutrition (Mangasaryan *et al.,* 2011). Weight, height and MUAC were assessed and compared with the WHO (2006) growth reference values for children of the same age and sex in order to identify children who needed intervention or treatment (Abul *et al.,* 2010). Using weight, height and MUAC indicators enabled the health workers to identify children with severe acute malnutrition and took them to health centres for treatment. This helps to reduce the rate of undernutrition among children in the community (Hammond *et al.,* 2016). In this study, mothers/caregivers were asked if they took their children to health facilities or community based clinics for growth monitoring.

Results shown in Table 9 indicated that, 85.8% of mothers took their children for weight assessment, 5.5% took their children for MUAC assessment while 27.9% took their children for height assessment. These observations were incontrary to those reported in South Africa whereby 94.7%, 19.7% and 16.4% of children were assessed for weight, MUAC and height respectively (Blaauw *et al.,* 2017). In the current study, there was low coverage in the assessment of MUAC and height, which could be due to heavy workload of health workers, inadequate tools to assess the children and/or lack of skills on how to use and interpret the measurements. Lack of MUAC and height assessments in the studied mothers did not show significant association with undernutrition. Earlier identification of children with severely acute malnutrition was beneficial because immediately treatment of children with severe acute malnutrition reduces prevalence of chronic undernutrition (Hammond *et al.,* 2016).

4.22 Water, Sanitation and Hygiene

Table 10 presents data for WASH characteristics of the respondents. This factor had linkage with child's nutritional status because lack of it may cause infections and diseases which influence health status of a child (Dodos *et al.,* 2017). Investigation of WASH practices were done in the study population and revealed strong association with child's nutritional status.

Table 10 shows that, 46% of the study sample used improved water sources while 15% used improved sanitation facilities. These proportions were slightly lower than those reported in Sub-Saharan African region whereby 68% and 30% of the people have been reported used improved water sources and sanitation facilities, respectively. These values were similar to the national average which indicates that, 55% and 15.4% of the population are using improved water sources and sanitation facilities respectively, (Kamara *et al.,* 2017). A study conducted in Senegal had better coverage of WASH services than the study community. In the Senegal study, the proportion of the sample using improved water sources and sanitation facilities were 76.04% and 50.2%, respectively (Novak, 2014). Improved qualities of water and sanitation services reduce ingestion of pathogens from water that causes diarrhoea (Bosch *et al.,* 2002).

According to WHO (2017), improved water sources include provision of piped water, boreholes or tube wells, protected dug wells, protected springs, rain water and packaged or delivered water. Unimproved water sources consist of unprotected dug wells or springs, river water, dams, lake ponds and stream canal/irrigation water. Improved sanitation services include flush/poor flush, piped sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, composting toilets or pit latrines with slabs.

Table 10 indicates that, 4.1% of mothers/caregivers were fetching water from a distance taking more than 30 minutes. This proportion was lower than that observed by Usman *et al.* (2016) who reported that, 34% of the studied mothers/caregivers fetched water from a distance of more than 30 minutes. Short travelling time to water sources has been associated with decrease in of diarrhea episodes and improved child nutritional status. There was a relationship between the time taken to fetch water and the quantity of water used in the household (Kumie *et al.*, 2005). Children exposed to an environment with lack of water could not be washed often while using dirty water for washing hands resulted in infectious diseases.

Table 10: Water, Sanitation and Hygiene characteristics of the respondents

Variables	n	%
Presence of chicken in the premises		
Yes	276	77.1
No	82	22.9
Water source based on WHO guidelines		
Improved source (piped water, boreholes, tube wells)	167	45.9
Unimproved source (River water, dams, ponds)	197	54.1
Water treatment		
Yes	234	65.2
No	125	34.8
Water collection time (minutes)		
≤ 5	132	43
6-30	162	52.8
> 30	13	4.2
Sanitation services based on WHO guidelines		
Improved sanitation services	55	15
Unimproved sanitation services	311	85

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The purpose of the study was to investigate the influence of childcare practices on the nutritional status of underfive children. From the study, 33.5% of the children were stunted, 10.6% were underweight while 1.1% were wasted.

Presence of undernourished children in the study sample was caused by poor childcare practices in the community such as poor caregivers/mothers interaction during feeding of the children, poor dietary diversity, lack of safe drinking water (use of unimproved water source for drinking water), inability of mothers/caregivers to read and write as well as poor participation in the nutrition intervention programmes. Presence of stunting (low HAZ) was strongly associated with poor breastfeeding practices while wasting (low WHZ) was strongly associated with the presence of chicken around the premises which indicated poor environment sanitation. Recognition of fullness by the child during feeding was strongly associated with underweight (low WAZ).

From these findings, we reject the null hypothesis which stated that, poor childcare practices do not have any influence on the anthropometric status of underfive children and accept the alternative hypothesis that poor childcare practices have positive influence on the anthropometric status of underfive children.

5.2 Recommendations

Nutrition interventions programmes should be strengthened in the community so as to cover all beneficiaries. These programmes should cover all the aspects of child care

practices (hygiene practices, psychosocial care, child feeding practices and health seeking practices). Provision of individual and group counseling through these programmes may increase the awareness on child care practices to mothers/caregivers hence improving the nutritional status of the children.

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APPENDICES

Appendix 1: Sample size formula

$N = Z^2 pq / d^2$

$N = 1.96^2 * 0.377 * 0.63 / 0.05^2$

$N = 365$

Where; N = sample size

Z = the risk of error

p = prevalence of stunting

q = non-prevalence of stunting

d = relative desired precision

Appendix 2: Questionnaire

QUESTIONARE FOR INVESTIGATING THE INFLUENCE OF CHILDCARE PRACTICES ON NUTRITION STATUS OF UNDERFIVE CHILDREN IN ILEJE DC, SONGWE REGION

SECTION A

I come from Sokoine University of Agriculture and would like some information that will help us improve health of the children. The questions will take a short time and I would like to speak with the care giver of the child. I would also like to measure your children's size. The measurements of the weight and height will help to find children who are undernourished and those who are not. The information will not be given to other people.

REGION: SONGWE

DISTRICT: ILEJE

DIVISION: …….

VILLAGE: ……..

HOUSEHOLD No.: ……

DATE OF INTERVIEW: …….

SECTION B – HEALTH SEEKING BEHAVIOUR		
1.	When did you make the first visit to the antenatal clinic when you were last pregnant?	1. 1th month 2. 2th month 3. 4th month 4. 9th month 5. Not at all
2.	During pregnancy, how many times did you visit a health care center/a midwife for a prenatal visit?	Number of visits…….. Does not know……
3.	How long does it take to move to health facility on foot?	Number of minutes……...

5.	Do women receive iron and folic acid in this area?	1. Yes 2. No
4.	Did you receive the TT vaccine?	. Yes 2. No
6.	During lactation have you ever received vitamin A?	1. Yes 2. No
7.	Where did you get services during delivery?	1. Hospitals 2. Health center 3. Dispensary 4. Traditional midwives
8.	Is your child receiving any vitamin and mineral supplement?	1. Yes (specify)……. 2. No
10.	Is your child immunized for age?	1. Yes 2. No
11.	Vaccination card?	1. Yes 2. No
12.	BCG scar	1. Yes 2. No
13.	Birth weight in Kg	…….
14.	Was your child monitored for weight in past three months?	1. Yes 2. No
15.	Was your child monitored for MUAC in past three months?	1. Yes 2. No
16.	Was your child monitored for Length in past three months?	1. Yes 2. No
17.	Do you participate in any community organizations or social programs?	1.Yes 2.No
SECTION C: INFANT AND YOUNG CHILD FEEDING		
18.	Was your child ever breastfed?	1. Yes 2. No
19.	How many hours after birth were the child breastfed for first time?	1.Within 1 hour 2.Within 2 to 3 hours 3.More than 3 hours 4.Does not know
20.	Was the child fed colostrum?	1. Yes 2. No
21.	Is the child exclusive breastfed?	1. Yes 2. No
22.	If no, how many months was the child exclusively breastfed?	…… months
23.	If the child is no longer breastfeeding, at what age did she stop?	…… months
24.	Is your child currently breastfeeding?	1. Yes 2. No
25.	If the child is no longer breastfeeding, at what age did she stop?	……. months
26.	At what age did you start giving fluids and foods other than breast milk to your child?	…….. months

27.	How many times do you feed your baby per day?		……..	
28.	How often in the past 7 days the child consumed food items from the following food groups?	Food groups	Food items	Freq./wk
		Staple foods		
		Legumes, lentils, nuts		
		Milk and dairy products		
		Flesh foods		
		Poultry products		
		fruits and vegetables		
SECTION D: HYGIENE PRACTICES AND PSYCHOSOCIAL CARE				
Hygiene practices				
29.	What is the main source of drinking water for members of your household?		1.Piped water into dwelling 2. Tube well, bore hole 3.Protected well 4. Unprotected well 5. Protected spring 6. Unprotected spring 7. Rain water collection 8. Surface water (river, stream, dam, lake, pond, canal, irrigation channel) 9. Others…….. 10. Does not know	
30.	How long does it take to go there, get water and come back?		Number of minutes…….. Does not know…….	
31.	Do you do anything to the water to make it safer?		1.Yes 2. No 3. Does not know	
32.	What do you usually do to make the water safer to drink?		1. Boil 2. Add bleach/Chlorine 3. Use water filter 4. Let it settle and stand 5. Others…….	
33.	What kind of toilet facility do members of your household usually use?		1. Pit latrine 2. Communal pit latrine 3. VIP 4. Flush type 5. None 6. Other…….	
34.	How is the refuse in the home disposed?		1.Garbage pit 2.Buried 3.Burnt 4. Others……..	

35.	Does this household own chickens which roaming around the premise?	1. Yes 2. No
Psychosocial care		
36.	Who usually feed your child?	
37.	How do you recognize that your child is hungry?	……..
38.	When feeding your child how do you recognize that he/she is full?	……..
39.	When your child refuses to eat, what do you do?	…….
40.	Do you allow movements for your child during eating?	……..
41.	How do you stimulate your child to be active in verbal communication?	…….
SECTION E: DEMOGRAPHIC INFORMATION AND UNDERFIVE ANTHROPOMETRIC MEASUREMENTS		
Demographic information		
42.	How many people live in the home?	Number……..
43.	How many of them are underfive years of age?	Number…….
44.	How old are you?	Age…….. Does not know……
45.	Marital status	1.Single 2.Married/have a partner 3. Widowed/separated 4. Does not know……..
46.	Do you know how to read and write?	1.Yes 2.No
47.	What is the highest grade/form/year of school that you completed?	1.Grade/form/year 2.Did not study 3.Does not know
48.	What is your occupation, what kind of work do you mainly do?	……..
Anthropometric measurements for underfive		
Birth date	Date……, Month……., Year……	
Sex		
Height		
Weight		