University of Venda

The influence of caregivers' nutrition knowledge and feeding practices on the nutritional status of children 2 to 5 years old in the Makhuduthamaga Municipality, South Africa

A mini dissertation submitted to the Department of Nutrition in partial fulfilment of the requirement for the award of Master of Science Degree in Public Nutrition, University of Venda.

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2016

DECLARATION

I, Tubake Tinny Motebejana (11543156), hereby declare that this research project, titled “The influence of caregivers’ nutrition knowledge and feeding practices on the nutritional status of children 2 to 5 years old in the Makhuduthamaga, Municipality, South Africa”, submitted to the University of Venda for a Master of Science Degree in Public Nutrition, is my own independent work and has not been submitted before to any institution by myself in fulfillment of the requirements for attainment of any qualification. I further declare that all the reference material contained therein has been duly acknowledged.

Signature: _____ Date: _____

DEDICATION

This Master's dissertation is dedicated to the following people:

- My beloved husband, John: without your continuous support and patience I would not have managed to complete my study.
- My niece, Itumeleng: you always tracked my progress and believed in me thank for your trust.
- Mafefe Church of the Nazarene members: I have made it because of your prayers.

ACKNOWLEDGEMENTS

- First and foremost praise and honour be unto the Lord my God for his grace, strength and protection until this far.

- My supervisors, Prof. XG Mbhenyane and Dr. CN Nesamvuni, for their patience, support, encouragement, dedication and intelligence they put in this work to enable me to graduate.

- Mr Tjale Cloupas Mahopo, lecturer in the Department of Nutrition, for the valuable inputs regarding the statistical analysis of the data and the tireless assistance in putting up the dissertation document.

- My fellow students in the Department of Nutrition for their encouragement and support that kept me going throughout my study period.

- Makhuduthamaga Municipality and the participants for giving me permission and consent to go on with the study.

- My family, the local church members and friends for their prayers and moral support, especially my husband, Rev. MJ Motebejana, my pastor Rev. HF Mahlaba, Church of the Nazarene, my niece Itumeleng Manailana, who always encouraged me and believed in me.

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ABBREVIATIONS

ACC/SCC	Administrative Committee on Coordination/Subcommittee on Nutrition
BMI	Body Mass Index
BMI/A	Body Mass Index-for-age
EBF	Exclusive Breast Feeding
FAO	Food and Agriculture Organization
FBDG	Food Based Dietary Guidelines
FFQ	Food Frequency Questionnaire
HAZ	Height-for-Age z-scores
IFPRI	International Food Policy Research Institute
IYCFP	Infant and Young Child Feeding Practices
IZINCG	International Zinc Nutrition Consultative Group
MBFI	Mother Baby Friendly Initiative
MDGs	Millennium Development Goals
MUAC	Mid-Upper Arm Circumference
MUACZ	Mid-Upper Arm Circumference z-score
MTCT	Mother to Child Transmission
NDoH	National Department of Health
NFCS	National Food Consumption Survey
NFCS:FB-I	National Food Consumption Survey: Fortification Baseline
PEM	Protein Energy Malnutrition
PFBDG	Paediatric Food Based Dietary Guidelines
PMTCT	Prevention of Mother to Child Transmission
RtHB	Road to Health Booklet
RtHC	Road to Health Chart
SADHS	South African Demographic Household Survey
SANHANES	South African National Health and Nutrition Examination Survey
SAVACG	South African Vitamin A Consultative Group
SCN	Standing Committee on Nutrition
SD	Standard Deviation
SHDC	School Higher Degrees Committee

SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
UHDC	University Higher Degrees Committee
UNICEF	United Nations Children's Fund
WAZ	Weight-for-age z-scores
WHO	World Health Organization
WHZ	Weight-for-height z-scores

DEFINITION OF OPERATIONAL TERMS

Caregiver refers to the person, above the age of 16 years, mainly responsible for the child care particularly feeding. The person can be a biological mother, father, grandmother, domestic worker or a sibling.

Caregivers' nutrition knowledge refers to knowledge of the caregiver on breastfeeding, complementary feeding, feeding variety of nutritious food, and frequency of feeding.

Feeding practices of children refers to the way the caregiver feeds the child. Feeding practices in this study refer to breastfeeding, complementary feeding, feeding variety of food, and frequency of feeding.

Nutritional status of children refers to the nutrition outcomes as determined by anthropometric measurements including underweight, wasting, stunting and overweight/obesity and feeding practices.

ABSTRACT

Malnutrition is a problem facing virtually every country in the world. Inappropriate feeding practices such as bottle feeding, early introduction of weaning foods, lack of variety in the diet are a known major cause of the onset of malnutrition in young children. Lack of nutrition knowledge, particularly about feeding practices, is critical as it affects the nutritional status of children. The purpose of this study was to determine the influence of caregivers' nutrition knowledge and feeding practices on the nutritional status of 2 to 5 years old children in the Makhuduthamaga Municipality, South Africa. A cross-sectional study with an analytical component was carried out in the Makhuduthamaga Municipality in the Limpopo Province, South Africa. One hundred and twenty children aged 2 to 5 years and their caregivers were conveniently sampled from four villages. A validated questionnaire was used to gather demographic information, caregivers' nutritional knowledge and feeding practices. Anthropometric measurements taken were weight, height and mid-upper arm circumference (MUAC) of the children as well as weight and height of the caregivers. Descriptive and inferential statistics were utilized. Chi-square was used to determine the influence of caregiver's nutrition knowledge and feeding practices on the nutritional status of children. The significance level was set at $p < 0.05$.

Most caregivers (66.7%) were between the ages of 19 and 35 years. More than half (54.2%) of the children were male. Most of the caregivers (70%) had attended school up to secondary level and only 4.2% had obtained a tertiary qualification. Most of the caregivers (85%) were unemployed. Children were mostly (70.2%) cared for by their biological mothers. Some caregivers reported not to have any source of nutrition education (41.7%), while 43.3% reported that health professionals were their source of nutrition education. Both nutrition knowledge and feeding practices were not satisfactory in the current study. Almost all children (94.2%) were breastfed at some stage in their lives. However, 47.5% were given infant formula while they were still less than six months old. It was found that more than half of the caregivers (62.5%) introduced solids foods before 6 months.

Maize meal soft porridge was reported as the main solid food first introduced to 66.7% of the children, followed by infant cereals (25%). Stunting was found in 41.7% of children. Prevalence of overweight and obesity was observed amongst both caregivers and children. Overweight and obesity prevalent of caregivers was at 30.8%. No significant correlation was observed between the caregivers' nutrition knowledge, the feeding practices and the nutritional status of children. However, family income showed positive correlation with the nutritional status of children. Nutrition education strategies intertwined with economic empowerment of mothers should be enforced to capacitate caregivers to voluntarily make proper feeding practices.

Key words: Caregivers, nutritional knowledge, feeding practices, nutritional status.

CHAPTER ONE: INTRODUCTION

1.1 Background and Motivation of the study

Malnutrition, encompassing both undernutrition and overweight, is a problem facing virtually every country in the world (Haddad et al., 2015). Nearly half of all deaths in children under the age of 5 years are attributable to undernutrition (United Nations Children's Fund - UNICEF, 2017). This challenge translates into the unnecessary loss of about 3 million young lives a year. Stunting (low height-for-age) is much more common than underweight (low weight-for-age), and wasting (low weight-for-height) globally (World Health Organization - WHO, 2010), affecting about 171 million (27%) of all children aged 0 to 5 years. Global statistics indicated that 51 million (8%) children under the age of 5 years were wasted and 17 million (3%) were severely wasted (UNICEF / WHO / The World Bank, 2013). The UNICEF (2013) further stated that 42 million children under the age of 5 were overweight, having increased from 32 million in 2000.

The development of childhood malnutrition is believed to be multi-factorial. According to the UNICEF's conceptual framework for the development of child malnutrition (UNICEF, 1990), an interplay of basic, underlying and immediate factors determine the child's nutritional outcome. Basic factors include societal issues like cultural, political, economic and societal systems. Underlying factors are household issues like household food security, maternal and child care practices, water and sanitation while immediate factors are dietary intake and disease state. Poor linear growth, or stunting (low length- or height-for-age), in young children is the result of multiple circumstances and determinants, including antenatal, intra-uterine and postnatal malnutrition (Waterlow, 1994). Poor nutrition in the first 1000 days of a child's life can also lead to stunted growth, which is irreversible and associated with impaired cognitive ability and reduced school and work performance. The mothers' nutrition knowledge and feeding practices affect the nutritional status of children (UNICEF, 1990).

Undernutrition mainly affects developing countries with stunting and it is deeply rooted in poverty and deprivation. The highest rates of stunting are found in Eastern, Middle and Western Africa, where 45%, 39% and 38% of preschoolers, respectively, were affected in 2010 (De Onis et al., 2012). Approximately two thirds of all wasted children in 2013 lived in Asia and almost one third in Africa, with similar proportions for severely wasted children (UNICEF, 2013). Furthermore, UNICEF (2013) reports that between 2000 and 2013 the prevalence of overweight in children under the age of 5 years increased from 1% to 19%, in Southern Africa.

Nutritional status, especially of young children, is generally accepted as a sound indicator of overall development and distribution of available resources within a society (Kwena et al., 2003). Furthermore, the nutrition of a child is increasingly recognized as crucial for present and future health, as there is increasing evidence that childhood nutrition influences adult health (Cesar et al., 2008). Undernutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and contributes to delayed recovery from illness. In addition, the interaction between undernutrition and infection can create a potentially lethal cycle of worsening illness and deteriorating nutritional status. Stunting in early life is associated with adverse functional consequences, including poor cognition and educational performance, low adult wages and lost productivity. Stunting is also accompanied by excessive weight gain later in childhood (WHO, 2017a) and increased risk of nutrition-related chronic diseases. Gorstein et al. (1994) summarize the anthropometric results of children from several countries and indicate that the severity of the prevalence of underweight in children 24 months and older was medium (10.0-19.9%) and high (20.0-29.9%) for children in the age group 120 to 215 months. For wasting, the severity of the prevalence was low (<5%) in the age group 12 to 23 months and medium (5.0-9.9%), in the age groups 24 to 71 months and 72 to 119 months.

In South Africa, undernutrition is reported to be a public health problem and stunting still persists at a significant level (Said-Mohamed, 2015). Children aged 1 to 3 years are reported to be the most affected (Steyn et al., 2005). National nutritional data is mainly comprehensively found in four national studies, namely, the South African Vitamin A Consultative Group (SAVACG) study done in 1995, the National Food

Consumption Survey (NFCS) in 1999, the NFCS fortification baseline study (NFCS:FB-I) in 2005 and the South African National Health Examination (SANHANES-1) in 2013. Results from SAVACG (1995) showed a prevalence of 22.9% stunting, 9.3% underweight and 2.6% wasting in children aged 6 to 71 months. The NFCS, five years later reported similar results with 19.3% stunting, 8.8% underweight and 3.3% wasting in 1 to 9 year-old children (Labadarios et al., 2005). The NFCS: FB-I reports 18% stunting in 1 to 9 year-old children (Labadarios et al., 2008). The SANHANES-1 study results indicate the prevalence of 21.6% stunting, 5.5% underweight and 2.5% wasting for children less than five years (Shisana et al., 2013), which, when compared to the previous national survey in 2005 (Labadarios et al., 2008), shows a slight increase in stunting, but a clear decrease in wasting and underweight among children under five years of age.

South Africa is believed to be undergoing nutrition transition as evidenced by co-existence of under and overnutrition (Jinabhai et al., 2005; Kimani-Murage, 2013). Secondary analysis of NFCS data indicates a prevalence of 17.1% combined overweight and obesity in children aged 1 to 9 years. Children living in formal urban areas were found to be most affected (Steyn et al., 2005). Labadarios et al. (2008, in the NFCS: FB-I) report a prevalence of 10% overweight and 4% obesity in children aged 1 to 9 years. These NFCS results show that overweight/obesity was the second most prevalent adverse nutritional condition, after stunting, in South African children. This challenge calls for concerted efforts, addressing both forms of malnutrition simultaneously in line with recommendations by international bodies like the World Bank (World Bank, 2006).

The SAVACG survey showed that the prevalence of stunting in the Limpopo Province was higher (34.2%) than the national prevalence (22.9%), but comparable (36.6%) to the prevalence of stunting in the Sekhukhune District as reported by the livelihood survey in 2004 (Rule et al., 2005). For the Makhuduthamaga Municipality, the prevalence of stunting was even higher (>40%). Although the survey indicates a low prevalence of wasting (<5%) for Greater Tubatse, it was very high (17.1%) for Fetakgomo Municipality. Overweight in Sekhukhune district is reported to be at 8.9% (Rule et al., 2005). These findings suggest that the Sekhukhune District is one of the most vulnerable areas in terms of chronic child malnutrition.

Child survival, growth and development depend not only on food intake and health, but also on the caregiver's behavior and knowledge (Jacquier et al., 2016). One of the components of the caregiver's behaviors is the feeding of young children (Ickes et al., 2015). Inappropriate feeding practices are a known major cause of the onset of malnutrition in young children (WHO, 2002a; Jones et al., 2005; Kilaru et al., 2005). Imdad et al. (2011) has shown that the caregiver's level of nutritional knowledge is a predictor of feeding practices and consequently affects the nutritional status of children. Lack of nutritional knowledge on child feeding among caregivers contributes significantly to poor dietary practices of children under-five years of age (Williams et al., 2012). Hence, this study sought to determine the influence of caregivers' nutrition knowledge and feeding practices on the nutritional status of children in the Makhuduthamaga Municipality.

1.2 Problem statement

Children under five years of age in the Sekhukhune District are vulnerable to chronic malnutrition, presenting with both over- and undernutrition (Rule et al., 2005) Malnutrition affects human dignity and productivity in life. It further puts a financial burden on the country through hospital costs. High prevalence of stunting was particularly reported amongst children in the Makhuduthamaga Municipality. Stunting affects cognitive development and subsequently school performance. The nutritional status can be improved by proper feeding practices. Proper feeding practices which are influenced by the caregivers' nutritional knowledge. However, there has been no study done to determine whether the poor nutritional status of children reported in the Sekhukhune District, is influenced by the nutrition knowledge and feeding practices of caregivers.

1.3 Aim of the study

The aim of the study was to determine the influence of caregivers' nutrition knowledge and feeding practices on the nutritional status of children 2 to 5 years old in the Makhuduthamaga Municipality, South Africa.

1.4 Objectives of the study

The objectives of the study were:

1.4.1 To determine the nutritional status of children aged 2 to 5 years old using anthropometric measurements and caregivers' body mass index (BMI).

1.4.2 To determine caregivers' nutritional knowledge.

1.4.3 To determine the feeding practices of children aged 2 to 5 years old.

1.4.4 To determine the influence of caregivers' nutrition knowledge on the nutritional status of children aged 2 to 5 years old.

1.4.5 To determine the influence of caregivers' feeding practices on the nutritional status of children aged 2 to 5 years old.

1.5 Significance of the study

The results of the study will indicate if the high prevalence of malnutrition in the Sekhukhune District is due to the caregivers' level of nutrition knowledge and feeding practices. The information will assist in nutrition strategic planning and serve as the base for future studies in the area. For instance, if nutrition knowledge and feeding practices are found to influence the poor nutritional status, intervention would need to be channeled to focus on educating caregivers. In the absence of such influence, the study would be indicating that there is a need to look into other possible reasons for malnutrition in the study area.

1.6 Structure of the dissertation

- Chapter 1 outlines the motivation for the study and the problem statement. It also presents the aim, objectives and the significance of the study.
- Chapter 2 focuses on the literature review on the nutritional status of children, feeding practices and nutrition knowledge of caregivers worldwide, in South Africa and in the study area. It also presents the literature on other factors that may influence the nutritional status of children
- Chapter 3 presents the research design, study area and population, sampling design and procedure, ethical aspects, data collection procedure, validity and reliability and pilot study and data analysis.
- Chapter 4 presents the results of the study which include sociodemographic characteristics, anthropometric measurements, mother's nutrition knowledge,

feeding practices and their association with nutritional status of children aged 2 to 5 years old.

- Chapter 5 presents the discussion of the results. The discussion is on sample characteristics (sociodemographic data), nutritional status of children, nutrition knowledge and feeding practices of the caregivers and the influence of sample characteristics, caregivers' nutrition knowledge and feeding practices on the nutritional status of children.
- Chapter 6 gives the conclusions and recommendations of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview

The literature was reviewed focusing on the description of nutritional status of children and how it is assessed. The influence of nutrition knowledge and the feeding practices on the nutritional status of children was also reviewed and outlined. Other factors related to caregivers' nutrition knowledge, feeding practices and nutritional status of children are also reviewed.

2.2 Nutritional status of children

Nutritional status is defined as "a person's physiological level of nourishment in terms of energy and protein stores, micronutrient status and metabolic functioning" (FAO, 2005). The most widely used indicator of nutritional status is child growth which is assessed by anthropometric measurements. The indicators of malnutrition which are underweight, stunting, wasting and overweight/obesity will be discussed.

2.2.1 Growth of children

Child growth is the most widely used indicator of nutritional status, and is internationally recognized as an important public health indicator (Otgonjargal et al., 2013). The growth rate slows considerably after the first year of life. In contrast to the tripling of birth weight that occurs in the first 12 months, another year passes before birth weight is quadrupled (Mahan et al., 2012). Likewise, birth length increases by 50% in the first year, but is not doubled until approximately the age of 4 years. The actual increments of change are small in children compared with those of infancy and adolescence (Mahan et al., 2012).

In general, growth is steady and slow during the preschool and school age years and the body proportions of young children change significantly after the first year (Mahan et al., 2012). There is little head growth, trunk growth slows substantially, and the limbs lengthen considerably, all of which impact on a more matured body proportion. Body composition in preschool and school aged children remains relatively constant. Fat gradually decreases during the early childhood years, reaching a minimum at approximately 6 years of age (Mahan et al., 2012).

The most common immediate causes of poor growth of children in developing countries include poor maternal nutritional status at conception and underweight, inadequate breastfeeding, delayed complementary feeding, inadequate quality or quantity of complementary feeding, impaired absorption of nutrients due to intestinal infections or parasites, or a combination of these problems (Allen and Gillespie, 2001). The potential for catch-up growth among stunted children is thought to be limited after the age of two, particularly when children remain in poor environments (ACC/SCN, 2000). These include poor food consumption patterns, illness, lack of sanitation, and poor health and hygiene practices (ACC/SCN, 2000).

2.2.2 Nutritional assessment of children

The assessment of nutritional status is defined as “the science of determining nutrition status by analyzing an individual’s medical, dietary, and social history, anthropometric data, biochemical data, clinical data and drug-nutrient interactions” (Hammond, 2008). However, it is universally accepted that anthropometry is the most useful tool for assessing the nutritional status and risks of poor health and survival of infants and young children (Allen and Gillespie, 2001). For the purpose of this discussion, the anthropometric nutritional status of children and caregivers will be emphasized.

2.2.2.1 Anthropometric status of children

Anthropometry is the “science of measuring the size, weight and proportions of the human body” (Hammond, 2008). Assessment of anthropometric nutritional status includes measuring body size (weight and height), body composition (skin-fold thickness, waist circumference, head circumference and mid-upper arm circumference), body density (underwater weighing), air-displacement plethysmography and bioelectrical impedance (to estimate the percentage of fat and lean tissue in the body) (Lee & Nieman, 2007). The basic measurements, height (length) and weight are used in all nutritional studies, because they give the simplest measure of attained skeletal size (height/length) and of soft tissue mass (weight) (Bates et al., 2005). Length measurements are taken until two years of age and thereafter height is measured (Duggan and Golden, 2005).

Besides assessing nutritional status and growth retardation, anthropometry is also used to differentiate between acute and chronic malnutrition. The other nutritional assessment methods, clinical findings and biochemical criteria, are not effective in such classification if the disease is not advanced, but can help to confirm a diagnosis (Torún and Chew, 1994; Torún, 2006). Anthropometry is limited, however, when measurement error influences the interpretation of nutritional status. The three indices of anthropometric measurements that are usually used to categorize malnutrition are low weight-for-age, an indicator of underweight; low height-for-age, an indicator of stunting; and low weight-for-height, an indicator of wasting (WHO, 1995). High weight-for-height, an indicator of overweight and obesity will also be discussed.

a. Underweight

Underweight is defined as a weight for age below -2 Standard Deviation (SD) of the reference population, while a weight for age of below -3SD of the reference population is classified as severe underweight (WHO, 2000). Furthermore, WHO classifications for assessing the public health significance of malnutrition indicates that a prevalence of underweight - that is less than 10% - indicates a low prevalence of malnutrition, whereas 10 to 19% indicates a medium prevalence (WHO, 1995). In addition, 20 to 29% indicates a high prevalence, while 30% and above indicates a very high prevalence of underweight (WHO, 1995).

Weight-for-age is used to measure a child's weight in relation to the age. It helps to identify children who are underweight (WHO, 2005). Weight is the first parameter to be affected by dietary intake or disease in young children. Weight is measured, while the age of the child is determined from the records or by asking the mother. In situations where the child's age cannot be determined accurately, it becomes difficult to interpret weight-for-age accurately using estimated age (WHO, 2005). Studies use birth records, growth chart or birth certificates to confirm the correct birth date (Shisana et al., 2013).

Underweight in children is common and is an important presentation of Protein Energy Malnutrition (PEM), which is often missed (Wittenberg, 2004). When a diet is

insufficient in protein and/or energy there will be a failure to gain weight or even weight loss (Wittenberg, 2004). This is seen when the child is exposed to an acute food shortage (Golden and Golden, 2000). These children are then underweight, while at the same time they have relatively normal body proportions, e.g. weight-to-height ratios (Golden and Golden, 2000; Wittenberg, 2004). Underweight children can also be stunted, wasted or both (UNICEF, 2009).

Underweight children must be identified early through regular growth monitoring of weight, as they can easily be missed when both weight and age are not shown on the Road to Health Chart (RtHC) (Wittenberg, 2004; UNICEF, 2009). When growth monitoring is done and a child presents with a weight for age below the third percentile, then malnutrition is suspected (Wittenberg, 2004).

Underweight children have a dietary deficiency that is not severe and therefore, do not present with signs or symptoms. There are no real physical signs and the serum albumin is only slightly reduced (Wittenberg, 2004). They are, however, still very susceptible to infections, such as gastro-enteritis, respiratory disease, measles and tuberculosis (TB) (Wittenberg, 2004). In the developing world, 129 million children younger than five years of age are underweight and 10% are severely underweight. Underweight is more prevalent in Asia than in Africa, with rates of 27% and 21% respectively. Progress is slow and South Africa is not meeting the Millennium Development Goals (MDGs) with the prevalence being 25% in 2008, whereas it was 28% in 1990 (UNICEF, 2009).

The NFCS (1999) claims that 12.6% of the children in the Limpopo Province were underweight, and 2.6% were severely underweight. In addition, 14% of children in the Limpopo Province aged 12 to 36 months were underweight (Labadarios et al., 2005). The NFCS-FB (2005) (Labadarios et al., 2008) indicates that 12.3% of children in the Limpopo Province were underweight. After six years, a similar prevalence rate of underweight in Limpopo Province was observed. With regards to wasting, 7.5% and 11.0% of children aged one to nine years and aged one to three years, respectively were affected (NFCS, 1999). The SANHANES-1 study results indicated a prevalence of 5.5% underweight for children less than five years (Shisana et al., 2013).

b. Stunting

Stunting is defined as a height-for-age below -2SD of the reference population. Height-for-age is a measure of how tall or short the child is, relative to age (WHO, 1995). Height does not increase rapidly in children and a low height-for-age reflects chronic malnutrition, which is due to long-term starvation or shortage of food or repeated illness (WHO, 1995). Height-for-age helps to identify children who are stunted or those who are very tall or have above normal height. In addition, a height-for-age of below -3SD of the reference population is classified as severe stunting (WHO, 2000). The WHO (1995) classification for assessing the public health significance of malnutrition indicates that the prevalence rate of stunting among children is considered low, when it is less than 20%, whereas 20 to 29% indicates a medium prevalence of stunting. Furthermore, 30 to 39% indicates a high prevalence, while more than 40% indicates a very high prevalence of stunting among children (WHO, 1995).

Stunting is a greater problem than underweight and wasting, globally. It is an indicator of nutritional deficiencies and illness that occurred during times of growth and development, usually in infants and children younger than five years (Shetty, 2002; UNICEF, 2009). Stunting is the first clinical sign of chronic malnutrition (Piercecchi-Marti et al., 2006), and affects about 195 million children younger than five years in the developing world, while it affects about one in three children in Africa (UNICEF, 2009).

Stunting can also be called failure to thrive or growth faltering, which refers to slow or inadequate growth in the infant and young child and long-term insufficient diet because of a chronic energy deficiency (Müller and Krawinkel, 2005; Williams, 2005; Duggan and Golden, 2006).

As stunting is due to long-term undernutrition, it takes time to develop and for recovery to occur (Baker-Henningham and Grantham-McGregor, 2004). Stunting is a cumulative process that starts *in utero*, and there is substantial evidence that intrauterine growth is a strong predictor of postnatal growth (De Onis et al., 2000). Stunting is an indication of the height of the child compared to the height of a normal child of the same age (Golden and Golden, 2000). A “stunted” child is small for his or

her appropriate height-for-age. A height-for-age smaller than 85% of the median represents an SD score of minus (-) 3SD and is classified as severe stunting (Williams, 2005). A stunted child living in a population with similarly sized children can appear to be thriving. Biological and cultural adaptations cause the body to look the same as the other children in the same environment. Children appear normal, but when the age is considered, it becomes apparent that the child is short. A severely stunted child who is underweight may even appear plump (Duggan and Golden, 2005). Stunting is also associated with poor school outcome, where stunted children usually start school later, do not complete all grades and do not perform as well as children of the same age (UNICEF, 2009). Children in rural communities are at a greater risk of becoming stunted than children living in urban areas (UNICEF, 2009). Children living in informal housing have the highest prevalence of stunting and the lowest is seen in children whose mothers are well educated (UNICEF, 2009). In South Africa, the prevalence of stunting was the highest in children living in traditional or informal housing, with poorly educated mothers (NDoH, 2003). South Africa is currently the developing country with the 24th highest prevalence of stunting (UNICEF, 2009).

Prevalence of stunting in the developing world has declined from 40% in 1990, to 29% in 2008. The decline was small in Africa and went from 38% in 1990 to 34% in 2008. This was due to the population growth of children younger than five years who were stunted, which increased from 43 million in 1990 to 52 million in 2008 (UNICEF, 2009). According to the 1999 NFCS, 34.2% of children aged one to nine years in the Limpopo Province were stunted, while 13% were severely stunted, which indicates chronic malnutrition. The SANHANES-1 study results indicate a prevalence of 21.6% stunting for children under five years (Shisana et al., 2013). The prevalence rate of stunting in the Limpopo Province was thus higher than the national average of 23.1%. A study by Mamabolo et al. (2005) found a high prevalence of stunting (48%) amongst three year olds in the Limpopo Province, South Africa. The study also found that the length and weight attained at one year of age could predict the nutritional status of the child at three years of age. If children had a higher length at one year, they were more protected against stunting (Mamabolo et al., 2005).

c. Wasting

Wasting is an indicator of acute malnutrition. Acute malnutrition refers to recent and severe malnutrition and can be effectively used to determine the immediate impact of intervention programmes (Müller and Krawinkel, 2005). Wasting is defined as the percentage of children aged 0 to 59 months whose weight for height is minus two standard deviations (moderate and severe wasting) and minus three standard deviations (severe wasting) below the median of the WHO Child Growth Standards (UNICEF, 2013). Weight-for-height is a good indicator of short-term effects, such as seasonal changes in food supply or short-term nutritional stress brought about by illness (Cogill, 2001). Weight-for-height reflects body weight in proportion to attained growth in height (WHO, 1995). The WHO (2006) indicates that weight-for-height also helps to identify children who may be at risk of becoming overweight or obese. As weight-for-height is a good indicator of severe-acute undernutrition. Weight-for-height is not recommended for the evaluation of change in a population because it is highly susceptible to seasonal changes (Cogill, 2001).

In cases where the age of the child is unknown, weight-for-height is used to measure how thin or fat a child is compared to height and is useful in determining whether a child is wasted or not (WHO, 1995). The index is simple and convenient to use, but it is difficult to detect a shift from muscle to fat.
It may also underestimate obesity trends because it is difficult to distinguish between fat mass and muscle mass (Cole, 2002).

It is important to note if the child has oedema, because this can influence the weight-for-height interpretation (Cogill, 2001). If the child is severely stunted it could affect the weight-for-height measurement and may lead to the child being erroneously classified as well nourished. The WHO (1995) classification for assessing the public health significance of malnutrition indicates that the prevalence rate of wasting among children is considered low, when the prevalence is less than 5%, whereas 5 to 9.9% indicates a medium prevalence of wasting. Furthermore, 10 to 14% indicates a high prevalence, while 15% and more indicates a very high prevalence of wasting among children (WHO, 1995).

A child is wasted when the weight-for-height is less than 70% of the median and is equal to a standard deviation score of –3SD (Williams, 2005). Of the children younger than five years old in the developing countries, 13% are wasted and 5% are severely wasted (about 26 million). Africa and Asia are the two countries with high rates of wasting and exceed 15%. Out of 134 countries, 32 have wasting prevalence of 10%. In South Africa the prevalence of wasting is 5 to 9.9% (UNICEF, 2009).

The NFCS-FB (2005) indicates that 4.4% of the children aged one to nine years in the Limpopo Province were wasted (Labadarios et al., 2005). The prevalence of wasting was high amongst children aged one to three years, which indicates that acute-severe malnutrition is a challenge. In both the NFCS (1999) and the NFCS-FB (2005), children residing in rural areas together with commercial farm areas, had higher prevalence rates of malnutrition when compared to other parts of the country.

The SANHANES-1 study reported a 2.6% prevalence of wasting in children under five years (Shisana et al. 2013), which shows a clear decrease, in comparison to previous national studies.

d. Overweight and obesity

The World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that may impair health. Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings. Overweight and obesity are linked to more deaths worldwide than underweight. Globally there are more people who are obese than underweight – this occurs in every region except parts of sub-Saharan Africa and Asia (WHO, 2014). Body mass index (BMI) is a simple index of weight-for-height, which is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of their height in meters (kg/m^2) (WHO, 2014). The BMI for children, unlike that for adults, considers gender and age because, as children grow, the amount of fat changes and the amount of body fat differs between girls and boys (WHO, 2006).

Body mass index-for-age (BMI/A) is a useful screening tool for assessing possible weight problems or risk of illness related to excess body fat in children aged two

years and above (Gibson, 2005). In children under 5 years of age, overweight is weight-for-height greater than 2 standard deviations above the WHO Child Growth Standards median. Obesity is weight-for-height greater than 3 standard deviations above the WHO Child Growth Standards median (WHO, 2014). In 2014, an estimated 41 million children under the age of 5 years were overweight or obese. In Africa, the number of overweight or obese children has nearly doubled from 5.4 million in 1990, to 10.6 million in 2014. Nearly half of the children under 5 years who were overweight or obese in 2014 lived in Asia (WHO, 2014). A study by Mendez and Popkin (2004) indicates that overweight in rural areas of South Africa is higher than underweight. Similar results were reported in the SANHANES-1, which reported higher prevalence of overweight (18.1%) compared to the NFCS–2005 study (10.6%). The prevalence of obesity was 4.6%, compared to 4.5% in the NFCS-2005.

The livelihood survey done in Sekhukhune district (Rule et al., 2005), has reported 8.9% of overweight among children. A study by Kimani-Murage et al. (2010) has found that the co-existence of stunting and overweight/obesity in the same child was common in children younger than five years of age. This presents evidence of a worrying double burden of malnutrition in South African community.

Childhood obesity is associated with a higher chance of adult obesity, premature death and disability. However, in addition to increased future risks, obese children experience breathing difficulties, increased risk of fractures, hypertension, and early markers of cardiovascular disease, insulin resistance and psychological effects (WHO, 2014).

The WHO (2017c) defines classification of adult underweight, overweight and obesity as outlined below in Table 2.1.

Table 2.1: The International Classification of adult underweight, overweight and obesity according to BMI

Classification	BMI(kg/m^2)	
	Principal cut-off points	Additional cut-off points
Underweight	**<18.50**	**<18.50**
Severe thinness	<16.00	<16.00
Moderate thinness	16.00 - 16.99	16.00 - 16.99
Mild thinness	17.00 - 18.49	17.00 - 18.49
Normal range	**18.50 - 24.99**	**18.50 - 22.99**
		23.00 - 24.99
Overweight	**≥25.00**	**≥25.00**
Pre-obese	25.00 - 29.99	25.00 - 27.49
		27.50 - 29.99
Obese	**≥30.00**	**≥30.00**
Obese class I	30.00 - 34.99	30.00 - 32.49
		32.50 - 34.99
Obese class II	35.00 - 39.99	35.00 - 37.49
		37.50 - 39.99
Obese class III	≥40.00	≥40.00

Source: Adapted from WHO, 1995, WHO, 2000 and WHO 2004.

In South Africa, over 56% of adult black African females are either overweight or obese compared to 29% of males (DoH, 2008). A comparison of data from the SANHANES-1 survey with the South African 2003 DHS (DoH, 2008), showed that there were major changes across all BMI categories. The percentage of underweight and normal weight decreased, while overweight and obesity increased. Obesity increased very dramatically from 27.0% to 39.2% among females. Mean BMI increased across all age categories, provinces, and race groups. The greatest increase in mean BMI was seen in females in the group 55–64 years of age (28.5 kg/m^2 to 31.3 kg/m^2), and in the Free State (26.4 kg/m^2 to 29.6 kg/m^2 (Shisana et al., 2013). Maimela et al. (2016) report a high prevalence of overweight and obesity among adults in the rural area of the Limpopo Province. The results indicated that overall prevalence of overweight was 27.1% of the total population and a high prevalence of overweight was observed in older females ($p<0.001$).

The study further states that in females, obesity was highest in the age group 45–64 years. The prevalence of obesity in females showed an increasing trend from 13.6% in age group 15–25 years to 41.9% in age group 55–64 years (Maimela et al., 2016).

Obesity has long been recognized as a significant contributing factor in the development of various chronic diseases such as cardiovascular disease, hypertension, type 2 diabetes mellitus, stroke, osteoarthritis and certain cancers (Asfaw, 2006; Cappuccio et al., 2008). As the burden of overweight and obesity is increasing and being recognised as a significant risk factor for non-communicable diseases, more attention should be assigned to it in order to minimise the burden of chronic diseases.

2.3. Feeding practices

The importance of feeding practices for child growth has long been documented (WHO, 1995). Feeding practices is one of the various dimensions of childcare that is now increasingly recognized as a key determinant of child growth, along with food security and the availability of health services. Inappropriate feeding practices are a major cause of the onset of malnutrition in young children (WHO, 2002a).

In a study conducted in Latin America by Ruel and Menon (2002) better child feeding practices were associated with lower stunting levels among 12-36 month old children. Improper feeding practices are fraught with dangers of diarrhoea due to infection from unhygienic preparation, poor nutrition related to inadequate energy intake due to low frequency of feeding, and poor nutritional quality of meals (Tontisirin et al., 1999).

For years, caregivers have been breastfeeding their babies and it was considered a natural way of feeding. However, breastfeeding has declined with a movement towards bottle feeding with different milks including cow, goat and formulated milk (Stevens et al., 2009). This trend is evident throughout the world (Torún and Chew, 1994; NDoH, 2003).

Exclusive breastfeeding (EBF) means that the infant receives only breast milk. No other liquids or solids are given – not even water – with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines (WHO, 2016). The WHO recommends that infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. Thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods, while continuing to breastfeed for up to two years or beyond (WHO, 2016). When exclusive breastfeeding is not practiced it can contribute to a high prevalence of malnutrition (NDoH, 2005). Demographic and South African Health Surveys of 1998 and 2003 show that only 10% and 12%, respectively, of infants aged 0–3 months were exclusively breastfed. EBF was even lower in 4–6-month-old infants, at 1% and 2%, respectively (NDoH, 2003). In the rural area of Limpopo, the practice of exclusive breastfeeding was reported to be only 7.6%, even though the prevalence of breastfeeding in general was reported to be at 97 % (Mushaphi et al., 2008). According to the South African National Health and Nutrition Examination Survey (SANHANES-1), only 7% of children aged ≤ 6 months were exclusively breastfed (Shisana et al., 2013).

Breastfed children usually grow more quickly than non-breastfed children during the first three months of their lives, and then go through a period of slower growth (Hediger et al., 2000). Children who are not breastfed have repeated infections, grow less well, and are almost six times more likely to die by the age of one month than children who receive at least some breastmilk (WHO, 2002b). From six months onwards, when breastmilk alone is no longer sufficient to meet nutritional requirements, infants enter a particularly vulnerable period of complementary feeding. Complementary feeding is defined as the process starting, when breast milk alone, is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk (WHO, 2016). As a general rule, the nutrient intake of young children deteriorates when complementary foods start to substitute breastmilk. Complementary feeding is poorly done in many developing countries, due to lack of information regarding what foods are appropriate, how much should be given and their inadequacy in quantity and quality (Allen and Gillespie, 2001) resulting in malnutrition. The incidence of

malnutrition rises sharply during the period from 6 to 18 months of age in most countries, and the deficits acquired at this age are difficult to compensate for later in childhood (WHO, 2002b).

Low rates of exclusive breastfeeding imply that complementary foods are initiated before the sixth month. In China it was found that only 25% of mothers introduced solid foods at six months of age (Chen & Taren, 1995). In the Moretele village of the Limpopo Province (South Africa) mothers introduced solid food before four to six months of age (Kruger et al., 2008).

Complementary feeds need to be introduced at six months to provide good nutrition to the growing child. According to a study done by Kapur (2005), growth curves falter by the fourth month of life due to the early introduction of weaning foods. It has been reported that over 56% of infants in the peri-urban Western Cape (Sibeko et al., 2005), 61% in rural areas of Kwazulu-Natal (Faber & Benade, 2007) and 73% in rural areas of Limpopo (Mushaphi et al., 2008), received food before four months of age.

The average age of the introduction of solids foods is reported to be between two to three months of age (Faber & Benade, 2007). Soft maize meal porridge is the first solid food that is introduced in rural areas (Sibeko et al., 2005; Mushaphi et al., 2008).

Delaying the introduction of complementary food beyond the age of 26 weeks is associated with the risk of nutritional insufficiency, particularly in low-income populations, and such delays may be associated with an increased risk for disorders connected with the immune system (Przyrembel, 2012). Even though breast milk is rich in high quality protein (Monckeberg, 1991; Torún and Chew, 1994; Golden and Golden, 2000; Torún, 2006), prolonged breastfeeding causes a delay in the

introduction of complementary foods and can result in micronutrient deficiencies, as human milk is low in iron and zinc (Kalanda et al., 2006).

Infants who are offered a wide variety of vegetables in the complementary feeding period may be more accepting of vegetables and fruits (Mennella et al., 2008). Studies have also indicated that seeking a variety of foods at age two to three years was a predictor of the same behaviour until early in adult life, highlighting the importance of establishing a varied food intake in infancy (Caton et al., 2011).

While HIV can be transmitted from a mother to her child during pregnancy, labour or delivery, and also through breast-milk, the evidence on HIV and infant feeding shows that giving antiretroviral treatment (ART) to mothers living with HIV significantly reduces the risk of transmission through breastfeeding and also improves her health (WHO, 2016). The WHO further recommends that mothers living in settings where morbidity and mortality due to diarrhoea, pneumonia and malnutrition are prevalent and national health authorities endorse breastfeeding, should exclusively breastfeed their babies for 6 months, then introduce appropriate complementary foods and continue breastfeeding up to at least the child's first birthday.

In the programme of prevention of mother to child transmission (PMTCT), mothers that opted for exclusive breastfeeding had a mean duration of exclusive breastfeeding of less than one month (UNICEF, 2007).

In low-income countries, most infants are still breastfed at one year, compared with less than 20% in many high-income countries and less than 1% in the UK. The reasons why women avoid or stop breastfeeding range from medical, cultural, and psychological, to physical discomfort and inconvenience (Lancet, 2016). On the other hand, babies are sometimes weaned too early because of another birth, causing the mother to cease the breastfeeding of the first baby (Monckeberg, 1991; Torún and Chew, 1994). A study by Serventi et al. (1995), undertaken amongst children younger than two years, shows that 62% of children were weaned before two years of age and after weaning there was a drop in their growth curve. However, Martin

(2001) found a positive association between prolonged breastfeeding (longer than one year) and malnutrition. Other studies reported that prolonged breastfeeding could be detrimental to children due to a reduction in the consumption of complementary foods (Brakohiapa et al., 1988), linear growth faltering (Caulfied et al., 1996) and increased risk of mother to child HIV transmission (Coutsoudis et al., 2001). Children have a high risk of developing micronutrient deficiencies due to human milk having a low concentration of iron and zinc (Brown et al., 1998).

The WHO recommends that any liquids other than breast milk should be fed by cup rather than by bottle (WHO, 2008). The initiation of feeding food with a spoon or cup involves a number of important changes, including oral motor development, new taste, new textures and new interactions between the infant and the caregiver (Przyrembel, 2012). Feeding-bottles with artificial nipples and pacifiers may cause nipple confusion and infants may refuse to breastfeed after their use. Feeding-bottles are more difficult to keep clean than cups, and the ingestion of pathogens can lead to illnesses and even death. Pacifiers can also easily become contaminated leading to infections (WHO, 2010).

The frequency of feeding is one of the important factors that affects nutritional status. Young children need to be fed frequently to ensure adequate food consumption. In urbanized Asian and African societies, especially in disadvantaged communities such as urban slums, mothers are often at work, away from the home. In such situations, the child is likely to take foods such as sweets, candies, soft drinks, and other non-nutritious snacks, and fried foods, which are found tempting to most children. These foods may interfere with the child's appetite. Sometimes the caregiver might not be knowledgeable on how to adequately feed the child, or the child may be in the care of a sibling. Commercial advertisements of candies and non-nutritious snacks and other foods also greatly influence children's food habits. It was shown that these practices can adversely interfere with the formation of healthy dietary practices, as well as contribute in the long-term to the development of malnutrition (Tontisirin et al., 1999). The results of a systematic review show that the

consumption of sugar-sweetened beverages in the first five years of life, is associated with overweight and obesity (Monasta et al., 2010).

Attention to feeding patterns such as the number and times of meals and snacks and responsiveness of the caregiver to the child feeding times, are as important as attention to the food the child is being fed (SCN News, 2003). The livelihood survey (2005) indicated that household members in the Sekhukhune District often skipped meals because of a lack of food (53%); children ate less than they needed to because of a shortage of food (51%) and that they sometimes went to bed hungry because of a lack of money to buy food (36%) (Rule et al., 2005).

2.4 Caregivers' nutritional knowledge

The caregivers' nutritional knowledge affects the way they feed the children and consequently affects the nutritional status of the children (Mushaphi et al., 2015). Poor nutritional knowledge plays a role in most of the multi-sectoral factors, such as inadequate food intake and unhygienic dietary practices, involved in the development of malnutrition (UNICEF, 1990).

Lack of awareness and a lack of nutrition knowledge about required feeding amounts, frequency of feeding, types of foods and a balanced diet contributes significantly to a poor nutritional status of children younger than five years of age, even in families where adults meet their daily requirements (Jones et al., 2005; Kilaru et al., 2005, Levitt et al., 2009, Manu and Khetarpaul, 2006). Nankumbi et al. (2015) also reported that in rural areas, primary caregivers are unable to implement the Infant and Young Child Feeding Policy (IYCFP) recommendations to enhance the nutritional status of the children because of a lack of knowledge.

Malnutrition is worsened by lack of nutritional information and knowledge, especially maternal nutrition education (NDoH, 2003), which leads to unhealthy dietary habits, poor nutrition related practices, attitudes and perceptions and socio-cultural influences. All of these issues can negatively influence the child's nutritional status.

For families to be healthy with a good nutritional status, they need knowledge regarding growth, purchasing, processing, and preparation and feeding a variety of food, in the right quantities and combinations (NDoH, 2005a). Lack of nutritional knowledge can also lead to misconceptions about food and negative food traditions that are passed on from generation to generation (NDoH, 2005a). Bhat et al. (1992) report that mothers whose infants were well nourished had higher levels of breast-feeding knowledge than those whose infants were moderately to severely malnourished.

The main constraint to the timeous introduction of solid food (from six months of age) is the mother's lack of knowledge (Du Plessis, 2013). Mothers perceive the inadequate production of breastmilk, and the belief that breastmilk alone is not enough to satisfy the infant, as the primary reasons for the early introduction of solid foods (Sibeko et al., 2005; Ghuman et al., 2009). In a study by Yue et al. (2016), caregivers cited ceasing to provide breast milk to their children around one year-of-age under the reasoning that the milk was not as nutritious after one year, and would instead switch to formula feeding in some cases (or a completely solid food diet in other cases).

The UNICEF 2011 programming report recommended the need to strengthen the quality of counseling given to mothers and caregivers, and the importance of appropriate behavioral change communication to other family and community decision-makers, in order to improve infant and young child feeding practices (UNICEF, 2011). A study done by Ladzani indicated that nutrition education programmes undertaken by trained local women improved maternal knowledge of Vitamin A and infant feeding practices (Ladzani et al., 2000). The majority (76%) of mothers in a study in Limpopo said they had not been taught which foods were good for their babies, and 13.5% were informed in this regard by health workers or nurses and 7% by mothers or mother-in-law. Three percent were influenced by radio, television or magazine (Mushaphi et al., 2008).

2.5 Factors related to caregivers' nutrition knowledge, feeding practices and nutritional status of children

There are a number of factors that are shown to affect the nutrition knowledge, feeding practices and nutritional status of children. Such factors include caregivers' educational qualification, household income, cultural practices and family size. These factors are discussed in this section.

2.5.1 Caregivers' education qualification

The education level of caregivers of children, mainly women, influences the quality of care, because more educated women are more capable of processing information on nutrition, acquiring skills and displaying positive caring behaviours than less educated women, and this is reflected in the child's nutritional status (Liaqat et al., 2006). According to the International Food Policy Research Institute (IFPRI, 2000), improved education levels in women were found to be responsible for almost 43% of the total reduction in child malnutrition that took place from 1970 to 1995. Several studies have shown that children of mothers with no formal education or only primary education were more likely to be stunted than their counterparts with mothers, who had secondary or college education (Tharakan & Suchindran, 1999; Wamani et al., 2004; Hendricks et al., 2006; Sakisaka et al., 2006; Chen and Li, 2009; Semba et al., 2008).

There are three ways in which school education can influence the child's health and nutritional status: (1) formal education leads directly to a higher knowledge in mothers; (2) literacy acquired in school ensures that mothers are more capable of identifying health problems in children; and (3) when mothers have attended school they are more aware of modern diseases and where to get help and information (Chen and Li, 2009). Maternal formal education and nutrition knowledge are crucial as they influence access, preparation, procurement and selection of nutritious foods for themselves and their children. Several studies, including the two national surveys (NFCS; NFCS -FB: I) found child undernutrition decreasing with increasing maternal education while child obesity increased (Labadarios et al., 2005; Kruger et al., 2008). The study by Armar-Klevesu et al. (2000) reports poor maternal education as a limiting factor in good child practices, health seeking behaviour and hygiene.

Community-based growth promotion programs may provide maternal formal education and/or counselling on child-care practices and growth monitoring. Such a specific intervention would help empower the caregivers to provide better care for the children (Walsh et al., 2001; Alderman, 2007). Even though nutrition knowledge is not gained in the classroom, the school education that mothers would receive can help with caring for children and the household. Knowledge can lead to a higher household income and better nutritional status when the education is linked with strategies to improve both. Maternal nutrition knowledge matters even more when the child falls within the high-risk group of younger than three years (Alderman, 2007). Better maternal knowledge leads to better childcare practices, as maternal education is associated with breastfeeding for longer than six months and the delayed introduction of solids (Kalanda et al., 2006). Uneducated mothers with a low socio-economic status have trouble preparing infant formula correctly and the milk is too expensive to give sufficient amounts. Finances “force the mothers to use diluted cow’s milk” (Monckeberg, 1991; Berdanier, 1995). These findings suggest that as much as we are advocating for improvement in the educational level of the caregivers, purchasing power of the family should not be neglected as both have the potential to influence the nutritional status of children.

The low prevalence rate of stunting in children of caregivers with higher education levels could also be attributed to the fact that literate mothers have fewer children, which enables them to provide better care. They also have access to health information, leading them to adopt improved behaviour related to maternal and child health care, feeding and eating practices, which ultimately influences the nutritional status of children. In addition, women with less education are more likely to embrace the traditional status quo and be less open to changes for better health and family practices, which may influence the way they feed their children.

2.5.2 Household income

Household income is a determinant in child care and the resultant nutritional status outcome. When income decreases, the quality and quantity of food also decreases. Evidence shows that when unemployment and low wages are presenting factors, families eat cheaper foods, which are less nutritious, leading to weight loss and malnutrition (UNICEF, 2009). As food products such as the ones derived from

animals are usually more expensive, children's intake of animal proteins decreases with poverty (Alderman, 2007).

In a systematic review that investigates the determinants of early introduction (i.e. before four to six months of age) of solid food and the use of unmodified cow's milk in infants, it was found that low socio-economic status, together with low maternal education were strong determinants of the early introduction, before 12 months (Wijndaele et al. 2009). Senarath et al. (2010) found that in Sri Lanka, working mothers were the ones who mostly gave their infants formula, more than those who were not working. This implies that household income has an effect on the quantity and quality of food to be fed to infants and young children.

2.5.3 Cultural practices

Cultural practices often result from the influence of respected members of the community or family. Cultural practices often allow or prohibit the intake of certain food items by children. Such practices also stand out as significant barriers to the use of appropriate infant and young child-feeding practices (Nankumbi et al., 2015). For instance, some cultural practices are barriers to the timely introduction of solids. The practice of introducing *tshiunza* (a traditional dish prepared from maize and roots, and fermented to make a soft sour porridge) immediately after birth was noted by Mushaphi et al. (2008) in a study conducted in the Limpopo Province. They further reported that more than one third (36%) of all mothers indicated that they gave their infants foods for cultural and medical reasons, specifically naming *tshiunza*. This practice was encouraged by grandparents and was based upon the belief that the infants were not receiving enough breastmilk and *tshiunza* gave babies energy and helped them to pass stools and grow well.

Religious practices and cultural taboos such as restrictions on feeding some protein containing food may also be a constraint to the intake of food derived from animal sources (Pachón et al., 2007).

A study conducted in the Moretele District in the North-West Province has identified that cultural factors and taboos have a powerful influence on feeding practices and

eating patterns, mainly because of inadequate nutrition knowledge (Kruger and Gericke, 2003). Cultural practices often go together with religious practices. Along with acceptable taboos do have an effect on feeding practices

2.5.4 Family size

Family size is one of the factors that has a relationship with child care and with the nutritional status of children. In South Africa about 56% of all households have a size of five to nine people (Kleynhans et al., 2006). The average number of individuals in the households in the Sekhukhune District and in the Makhuduthamaga Municipality has been reported to be four (Rule et al., 2005).

In this country stunted children often live in households that are bigger or have more people (Kleynhans et al., 2006) and the risk for stunting has been found to be highest in households with nine or more people in the household (Mamabolo et al., 2005). In South Africa, the size of a household can therefore be a predictor of malnutrition (Kleynhans et al., 2006). The risk of children from a household in Zimbabwe and Ethiopia being stunted increased from 7%, when it was only one child younger than 10 years old, to 38% when the average household number increased to seven children (James et al., 1999). In Ethiopian communities, 24% of households with more than four children were malnourished. Furthermore the study by Kassa et al. (2016) found that mothers with a smaller family size (1–3 persons/head) practiced appropriate complementary feeding practices more, than those mothers with larger family size (≥ 7 persons/head).

2.6 Conclusion

Child growth is the most widely used indicator of nutritional status, and is internationally recognized as an important public-health indicator (Black et al., 2008). Inappropriate feeding practices are a major cause of the onset of malnutrition in young children. Children who are not breastfed appropriately have repeated infections, grow less well, and are almost six times more likely to die by the age of one month, than children who receive at least some breast milk (WHO, 2002a).

The caregivers' nutritional knowledge affects the way they feed children and consequently affects the nutritional status of the children (Mushaphi et al., 2015). There are a number of factors that were shown to affect the nutrition knowledge, feeding practices and nutritional status of children. Such factors include caregivers' educational qualification, household income, cultural practices and family size. Mothers of infants and young children require much education, as the available research shows that effects on linear growth seem to be best with interventions that also provide specific educational messages (Black et al., 2008; Bhutta et al., 2013). This will improve the nutritional knowledge and feeding practices of children which in turn will contribute towards improved nutritional status of children.

CHAPTER THREE: METHODOLOGY

3.1 Study design

The study design was cross-sectional with an analytical component. It was a cross-sectional study as the data on caregivers' nutrition knowledge, feeding practices and children's nutritional status were collected simultaneously. It was also an analytical study, as the influence of the mother's nutrition knowledge and feeding practices on children's nutritional status were correlated. According to Leedy and Ormrod (2010), a correlational study examines the extent to which differences in one characteristic or variable is related to differences in one or more other characteristics or variables, at a particular point in time. The research methods used were quantitative. The variables for data collection yielded quantitative data that was subjected to statistical analysis.

3.2 Study area and population

The study was carried out in the Makhuduthamaga local municipality which is one of the five municipalities in the Greater Sekhukhune District of the Limpopo Province (Statistics South Africa, 2007). The municipality is completely rural in nature, dominated by traditional land ownership. It comprises a land area of approximately 2 096 km². It is made up of 189 settlements with a population of 274 358 people and 65 217 households, which amounts to more than 24% of the district census (Statistics SA, 2011). Like most rural municipalities, Makhuduthamaga is characterised by a weak economic base, poor infrastructure, major service delivery backlogs, dispersed human settlements and high poverty levels (Statistics South Africa, 2011). The study population comprised children 2 to 5 years old and their caregivers from the Makhuduthamaga local municipality.

3.3 Study setting

The data was collected from the households of the caregivers in four villages.

3.4 Exclusion criteria

Households with a caregiver of children aged 2 to 5 years that refused to participate in the study were excluded. Households without children aged 2-5 years, were also excluded.

3.5 Sampling

Households were selected from the villages in the municipality. Two-stage sampling was done to select villages and households. The first stage was convenience sampling to select the four largest villages. Convenience sampling was on the basis of selecting villages with many households and only four villages were selected due to time constraint and limited resources for the study.

Sampling of households involved obtaining a sample frame of households from the municipal offices. Systematic sampling was used to select households in each village. Households were selected in order to get the caregivers and the children that would qualify to participate in the study. The first house was the fifth one on the Western side of the Chief or Induna's place, as the point of entry in each village was the Traditional leader's residence. Every other fifth house with a caregiver and a child of 2 to 5 years was selected until a total of 30 caregivers and 30 children was reached. Only one child between the ages of two and five years was selected for participation from each household. In the case where there was more than one child within this age group in the same household, simple random sampling was used to select one child. The children were allocated numbers. One number was blindly selected and the corresponding child was the one included in the study. The targeted sample size was 120 children aged 2-5 years and their caregivers. The sample size was deemed sufficient because it comprised more than 100 participants (Leedy and Ormrod, 2010). The final sample was 120 children and 120 caregivers.

3.6 Data collection

The data were collected using a valid questionnaire (Appendix D). The questionnaire had four sections namely, demographic information (section A), caregivers' nutritional knowledge (section B), feeding practices (section B) and an anthropometric record sheet (section D). The questionnaire comprised open and closed ended questions. The questionnaire was developed in English and translated to the local language, Sesotho sa Leboa, by the Centre for African languages at the University of Venda. Reverse translation was done to ensure that meaning was not lost.

The researcher, whose mother tongue is Sesotho sa Leboa, administered the questionnaire due to low literacy levels of the people in the study area.

The administration of the questionnaire by the researcher was also done to ensure accuracy of responses. The caregivers were asked the age of the child in months and this was verified by checking the Road to Health Booklet (RtHB). Anthropometric measurements taken included weight, height and mid-upper-arm circumference (MUAC) of the children as well as weight and height of the caregivers. Procedures followed when taking anthropometric measurements is discussed next.

3.6.1 Weight

The caregivers and children were individually weighed on a calibrated solar digital scale (Tanita model HS-301) to the nearest 0.1 kg. The scale was placed on a hard leveled surface. Each participant stood in the middle of the scale with minimal clothing and without shoes and kept still until the measurement was taken. Three weight measurements were taken and the average determined. The average weight was recorded on the record sheet (Section C). Weight was measured separately for both child and caregiver. The accuracy of the weighing scales was checked daily against known weights, as recommended by Lee and Nieman (2007: 171-173).

3.6.2 Height

Height measurements were taken for both children and caregivers using a stadiometer (portable height measuring 2 m tape – model: PHT) to the nearest 0.1cm. Participants were required to remove their shoes. Heels, buttocks, scapulae (shoulder blades) and back of the head were against the vertical surface of the stadiometer. Just before the measurement was taken, participants were asked to inhale deeply, hold the breath and maintain an erect posture while the headboard was lowered to the highest point of the head with enough pressure to compress the hair. Measurements were taken at eye level while the head in Frankfort Horizontal Plane (looking straight ahead) (Lee and Nieman, 2007: 171-173). The procedure was repeated three times, and the average was calculated to ensure accuracy. The average height was recorded on the record sheet (Section C). Height was measured for both child and caregiver.

3.6.3 Mid upper arm circumference

The researcher used a non-stretchable measuring tape to the nearest 1mm, to measure MUAC. MUAC was measured on children only. The left arm was bent at the elbow. MUAC was measured at the mid-point between the uppermost edge of the posterior border of the acromion process and the tip of the olecranon process. A mark was made on the skin at this position and circumference was measured horizontally while the arm is hanging down the side of the body and relaxed. The measuring tape fitted tightly, but did not make a dent in the upper arm (Gibson, 2005). The arm was kept in a relaxed position along the side of the body. Measurements were taken three times, and the average was calculated to ensure accuracy. The average length was recorded numerically on the record sheet (Section C).

3.7 Pilot study

The pilot study was done to test the data collection process, to determine whether the participants would understand the questions correctly, to assess the feasibility and time taken to collect data. It was conducted in Sephaku village in the Groblersdal Municipality in the Sekhukhune District. Hence similarity of the villages was assumed. The pilot was conducted on 12 caregivers (10% of the main study sample), which yielded a total of 24 individuals. The same procedure that would be used in the main study was followed to collect data. The researcher filled in the questionnaire. The results of the pilot were analyzed and interpreted. There were no difficulties experienced when the interviews were conducted. The administration of each questionnaire and taking of measurements took about 30-40 minutes. The following changes were made:

- Reason for stating the answer was added on knowledge questionnaires. The question was phrased as " why do you say so".
- The question on when solid foods were introduced was rephrased and an optional answer was created.
- The food item of fruit juice under food frequency questionnaire was rephrased and 'specify' was added.

3.8 Validity and Reliability

3.8.1 Validity

Validity is defined as “the ability of the instrument to measure what it is designed to measure” (Kumar, 2011: 166). The questionnaire was based on the aims and objectives of the study as well as literature related to the caregivers’ nutrition knowledge and feeding practices, as well as other factors relating to children’s nutritional status. The researcher personally administered the questionnaire. A pilot study was also done to test if the questionnaire was suitable for the study and whether it would be able to measure what it was intended for. Local language (Sesotho sa Leboa) was used to ensure that participants would understand the questions and would answer appropriately. Content validity was also ensured by having the academics in the Department input and correct during presentation of proposal.

3.8.2 Reliability

Reliability is defined as “the ability of a research to provide similar results when used repeatedly under similar conditions” (Kumar, 2011: 168). The sample size was large enough to ensure representation of caregivers and children 2 to 5 years old in the study area. The selection of villages, however, was convenient meaning that not all villages were given equal chance to be selected. The study was biased towards the residents of the Makhuduthamaga local municipality, especially for smaller villages. A solar digital scale (Tanita model HS-301) was used to measure weight and a stadiometer (portable height measuring 2 m tape – model: PHT) was used to measure height. The anthropometric measurements were taken three times and the mean value was calculated. The caregivers were asked the age of the child in months and this was verified by checking the Road to Health Booklet (RtHB).

3.9 Ethical aspects

Approval for the research was obtained from the School Higher Degrees Committee (SHDC) and the University Higher Degrees Committee (UHDC) (Appendix A). Ethical approval was granted by the University of Venda ethics committee.

Permission to conduct research in the villages was granted by the municipal Manager of Makhuduthamaga and by traditional leaders in the selected villages (Appendix B). Written informed consent (Appendix C) was obtained from the caregivers after the aims and the objectives of the study as well as the procedures of data collection were explained in detail. Anonymity was ensured by using codes instead of names. Participation was voluntary and all participants were informed that they had the right to withdraw from the study at any time without suffering any adverse consequence.

3.10 Data analysis

The Statistical Package for Social Sciences (SPSS) version 21 was used to analyze data. Descriptive and inferential statistics were utilized. The descriptive statistics that were used included frequency distribution, mean, standard deviation, ranges and percentiles.

Anthropometric measurements were analysed by calculating standard deviation from the median of the National Centre for Health Statistics/WHO references growth curves (z-scores), to determine weight-for-age, height-for-age and weight-for-height variables. The z-scores were calculated using computer software (WHO Anthro version 2.0). The t-test was used to determine the significance of the mean weight, height and difference between standard means of different by age groups. Chi–square was used to get the association between sociodemographic data, the mother's nutrition knowledge, and feeding practices against the nutritional status of children. The significance level was set at $p< 0.05$.

3.11 Problems encountered during data collection

3.11.1 Refusal to give consent for the study by the caregiver

A total of five caregivers refused to give consent and the households were not included in the study. This did not affect the results of the study as other households were included following the sampling procedure until the targeted number of 120 children and their caregivers each was reached.

3.11.2 Insufficient time to collect data

Data collection was planned to take place within the study leave period of four weeks. The data collection period took more time than expected as the households in each village were far apart from each other and used gravel roads. An additional one week was used to ensure that the targeted number of children and their caregivers was reached.

CHAPTER FOUR: RESULTS

4.1 Overview

The chapter reports the results of sociodemographic characteristics, caregivers' nutritional knowledge and feeding practices as well as the anthropometric measurements of both the children and their caregivers. The association between the caregiver's nutrition knowledge and feeding practices and the nutritional status of children will also be reported in this chapter.

4.2 Socio-demographic characteristics

The study comprised 120 children aged 2 to 5 years and their caregivers from four villages in the Makhuduthamaga local municipality. Table 4.1a shows socio-demographic characteristics of the children. Gender distribution was 65 (54.2%) males and 55 (45.8%) females. A large proportion of children (42%) were between the ages of 36 to 48 months.

Table 4.1a Socio-demographic characteristics of children

Characteristic	**n=120**	**%**
Gender distribution		
Male	65	54.2
Female	55	45.8
Age distribution	**n=120**	**%**
24-36 months	45	37.5%
36-48 months	50	41.7%
49-60 months	25	20.8%

Table 4.1b shows the sociodemographic characteristics of the caregivers. Most caregivers (66.7%) were between ages of 19 to 35 years. There was only one caregiver (0.8%) whose age was between 16 to 18 years old. Just above half of the caregivers were single parents (55.8%) and only one (0.8%) was separated. Most caregivers (70%) had attended school up to secondary level and only 4.2% had obtained a tertiary qualification. Some of the caregivers (11.7%) had no formal education. Most of the caregivers (85%) were unemployed and were the biological mothers of the children (70.2%).

Table 4.1b Sociodemographic characteristics of caregivers

Characteristic	n=120	%
Age ranges		
16-18 years	1	0.8
19-25 years	35	29.2
26-35 years	45	37.5
Above 35 years	39	32.5
		Marital status
Single	67	55.8
Marriage	39	32.5
Separated	1	0.8
Live together	7	5.8
Widowed	6	5.0
		Education level
None	14	11.7
Primary	17	14.2
Secondary	84	70.0
Tertiary	5	4.2
		Employment status
Employed	6	5.0
Unemployed	102	85.0
Retired	7	5.8
Student	3	2.5
Volunteer	2	1.7
Caregivers' relation to the children		
Biological mother	85	70.8
Other (Grandmother, domestic worker, sibling)	35	29.2

Table 4.2 presents the sociodemographic characteristics of the households where the children lived. Most households (55%) had more than six members, followed by those who had 4-6 members (42.5%). Forty eight percent of the households had 1-2 children below the age of 12 years and only 12.5% had more than 4 children below 12 years of age. 36.7% households did not have any employed people living in the household. Those who had one employed person were 45.8%. Households with a monthly income between R1100-R2000 were 34.2%, followed by income between R2100-R3000 (30%). Some families (8.3%) received income of less than R500 per month. Households with income from a combination of salary and child support grant were 26.7%, followed by child support grant (22.5%), then only salary 17.5%. In a large proportion of households (80.8%) either child support grant and/or pension were the sole source of income or a part thereof. Only 15.8% of household children were not on a child support grant.

Table 4.2 Households characteristics

Characteristic	n=120	%
Family size (Number of people in each household)		
2-3	3	2.5
4-6	51	42.5
>6	66	55.0
Number of children below 12 years old		
1-2	58	48.3
3-4	47	39.2
>4	15	12.5
Number of people working per household		
None	44	36.7
1	55	45.8
2-3	19	15.8
>3	2	1.7
Household monthly income		
< R500	10	8.3
R600-R1000	15	12.5
R1100-R2000	41	34.2
R2100-R3000	36	30.0
R3100-R5000	13	10.8
>R5000	5	4.2
Household source of income		
Salary and grant	32	26.7
Child support Grant	27	22.5
Salary	21	17.5
Salary, grant and pension	13	10.8
Wage and grant	9	7.5
Child support grant and pension	9	7.5
Wage, grant and pension	3	2.5
Wage	2	1.7
Wage, salary and pension	2	1.7
Salary and pension	2	1.7
Child on support grant		
Yes	113	94.2
No	7	5.8

4.3 Nutrition knowledge

The caregivers' nutrition knowledge was assessed through a questionnaire and the results are presented.

Table 4.3 reports on caregivers' source of nutrition education. 41.7% of the caregivers reported not to have any source of nutrition education while 43.3% reported health professionals as the source of nutrition education.

Media (13.3%) and family members (6.7%) were also cited as the sources of nutrition education by some of the caregivers.

Table 4.3 Caregivers' source of nutritional education

Source	Number		Percentage	
	Yes	No	Yes	No
Health professional	52	68	43.3	56.7
Media	16	104	13.3	86.7
Family member	8	112	6.7	93.3
Formal school	5	115	4.2	95.8
Community health worker	3	117	2.5	97.5
Crèche	1	119	0.8	99.2
None	50	70	41.7	58.3

Table 4.4 indicates caregivers' nutritional knowledge on type of food to be given to children 2-5 years starting from birth. Only 23% of the caregivers regarded breastmilk as the best food for children less than 6 months. Some of the caregivers (15.8%) did not know which food was best for children less than six months. When caregivers were asked about the recommended duration of breastfeeding, 35% and 34.2% reported 24 months and above and 12-18 months, respectively. Some caregivers (19.2%) reported that they did not know the duration recommended for breastfeeding.

Caregivers were asked about alternative foods to porridge. With respect to food substitutes for porridge, most caregivers mentioned rice, bread and samp (82.5%), followed by cabbage and pumpkin (2.5%), while 15% reported that they did not know what to substitute porridge with. Only 27.5% of the caregivers indicated that either legumes, meat products, fish and/soya soup could be given as alternatives to meat. Some mentioned potatoes (22.5%) or spinach (20.9%) as alternatives while others did not know (25%).

The majority of the caregivers (82.5%) reported that they did not know the amount of milk needed per day for children 2-5 years. Only 7.5% of the caregivers reported 2 cups of milk per day. When asked about alternative foods that could be given instead of milk they mentioned the following: cheese (27.5%), peanut butter (25%), cheese and peanut butter (0.8%), coffee creamer (14.2%) while 32.5% did not know what alternatives could be given.

The most of the caregivers (74.2%) reported that they did not know the amount of fruits recommended for children aged 2-5 years per day. Only 5.0% said it was 1-1 ½ cup of fruits. When asked about the amount of vegetables recommended to be eaten by the child of 2 to 5 years per day, most caregivers (82.5%) reported that they did not know. Only 14.2% reported an amount of 1-1 ½ cups per day. Most of the caregivers (70.8%) mentioned that the child should be given meals three times or more per day, followed by 6.7 % who said twice per day. Twenty seven (22.5%) of the caregivers did not know the number of meals to be given to the child, per day.

Table 4.4 Caregivers' knowledge on types of food and feeding of children

Knowledge item	n=120	%
Best food for children <6 months		
Breastmilk only	28	23.3
Breastmilk and other foods	48	40.0
Infant formula only	4	3.3
Infant formula and other foods	21	17.5
Don't know	19	15.8
Recommended breastfeeding duration		
6-12 months	10	8.3
12-18 months	41	34.2
19-23 months	4	3.3
24 months and above	42	35.0
Do not know	23	19.2
Alternative foods to porridge		
Rice, bread or samp	99	82.5
Cabbage or pumpkin	3	2.5
Don't know	18	15.0
Alternative foods to meat		
Legumes, meat products, fish, soya soup	33	27.5
Spinach	25	20.8
Potatoes	27	22.5
Both legumes and vegetables	1	0.8
None of the above	1	0.8

Table 4.4 Caregivers' knowledge on types of food and feeding of children continued		
Knowledge item	**n=120**	**%**
All of the above	3	2.5
Don't know	30	25.0
Milk requirement for children 2-5 years		
½-1 cup	10	8.3
2 cups	9	7.5
One liter	2	1.7
Don't know	99	82.5
Amount of fruits to be eaten by children 2-5 years		
½ cup	1	0.8
1-1 ½ cup	6	5.0
2-3 cups	18	15.0
4-5 cups	6	5.0
Don't know	89	74.2
Amount of vegetables eaten per day by the children 2-5 years		
None	1	0.8
1-2 tablespoons	6	5.0
¼ cup	5	4.2
⅓-½ cup	2	1.7
1-1 ½ cups	5	4.2
Small bowl (300 ml)	1	0.8
Occasionally	1	0.8
Don't know	99	82.5
Number of meals per day for a child		
Once	0	0.0
Twice	8	6.7
Three times and more	85	70.8
Don't know	27	22.5

4.4 Feeding practices

4.4.1 Breastfeeding

Figure 4.1 below shows breastfeeding duration of the children in the study. More than two third of the children (94.2%) were breastfed at one stage in their lives. Forty five percent of the children were breastfed for up to 13-18 months, followed by 28.3% who were breastfed for up to 19-24 months. Few children were breastfed for more than 24 months (2.5%).

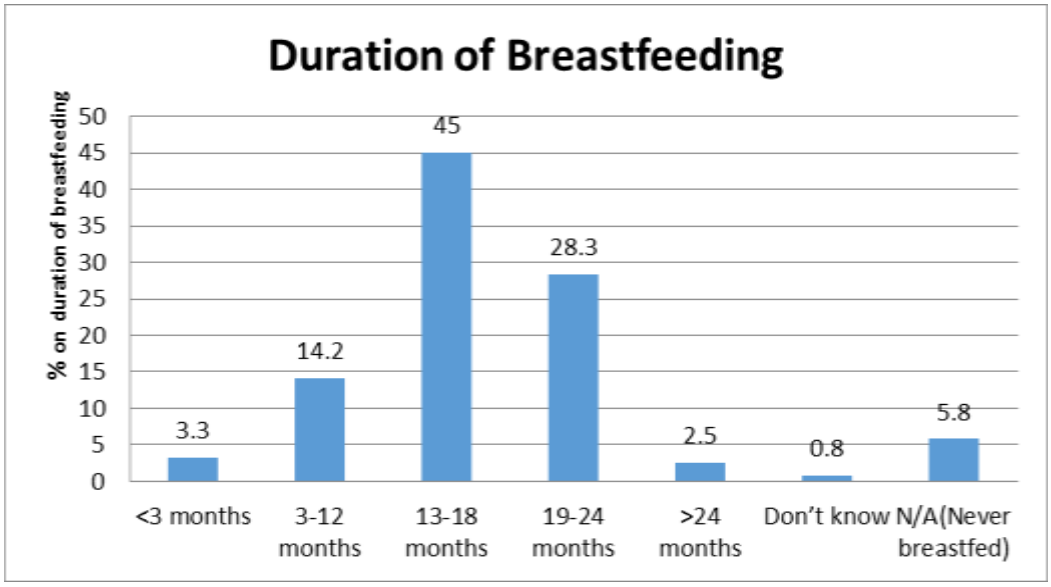

Figure 4.1 Duration of breastfeeding (n=120)

4.4.2 Formula Feeding

Figure 4.2 below indicates children who were given infant formula. Most of the caregivers (65.8%) reported that their children were given infant formula, 32.5% reported that children were never given formula while, 1.7% did not know if the child had ever received any formula.

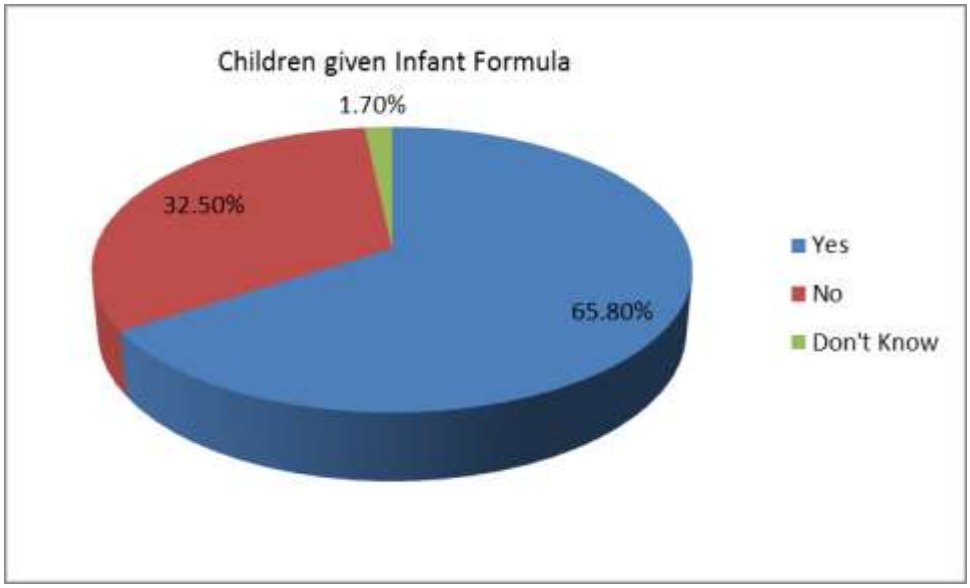

Figure 4.2 Giving of infant formula

Figure 4.3 below shows the age at which formula milk was given to children. Almost half of the children (47.5%) were given infant formula while they were still less than

six months old. Only 18.3% of children were introduced to infant formula from six months of age. Some were never given infant formula (34.2%).

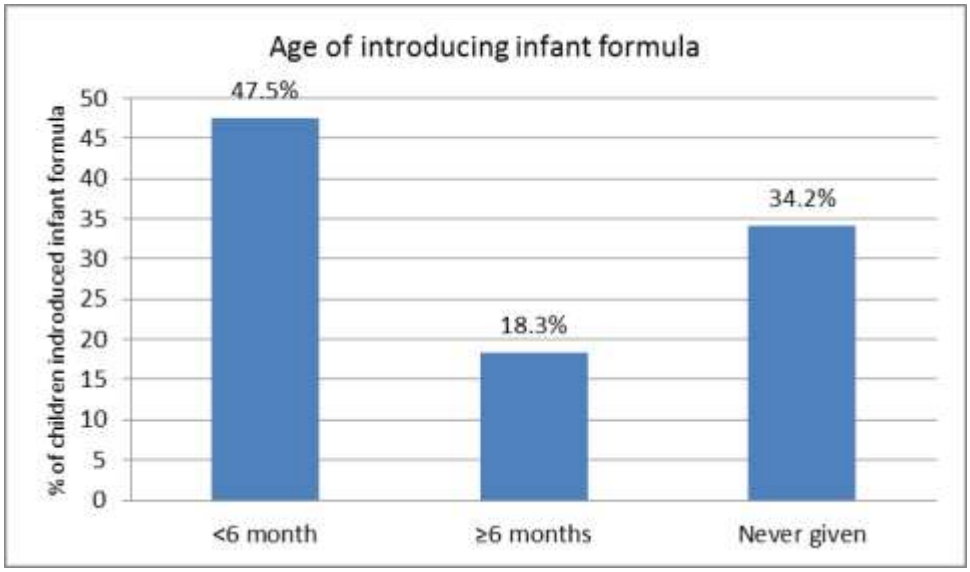

Figure 4.3 Age at which infant formula was introduced to the children

Table 4.5 below indicates the method used to give infant formula to children. Some of the caregivers (42.5%) used bottles to give their children formula milk, while 19.1% added it in the cereal. Only three (2.5%) used either a cup or spoon.

Table 4.5 Method used to give formula milk to the children

Method of giving infant formula	n=120	%
Bottle feeding	51	42.5
Added in cereal	23	19.2
Spoon feeding	2	1.7
Both spoon and bottle feeding	2	1.7
Cup feeding	1	0.8
N/A*	41	34.2

*N/A refers to children who were never given formula milk.

4.4.3 Introduction of complementary feeds

Table 4.6 shows the age at which the children were introduced to solid foods. It was found that most of the caregivers (62.5%) introduced solids foods before 6 months.

Table 4.6 Initiation age of complementary foods

Initiation age of complementary foods	n=120	%
<6 months	75	62.5
≥ 6 months	42	35.0
Don't know	3	2.5

Figure 4.4 shows the type of complementary foods first introduced to children. Maize meal soft porridge was reported as the main solid food first introduced to the children (66.7%), followed by infant cereals (25%).

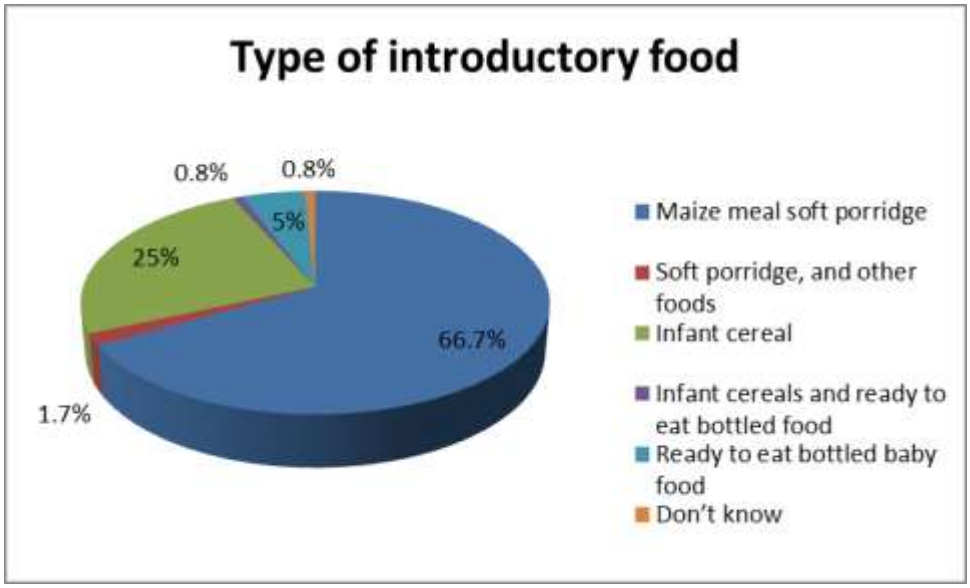

Figure 4.4 Types of complementary food first introduced to the children

When asked about their feeding practices, 97.5% reported that they gave the children three or more meals per day and 2.5% gave only two meals per day. The majority of the children (92.5%) fed themselves, 5.8% were fed by the mother and for 1.7% it was both the child and the mother.

4.4.4 Feeding variety of food to children

Table 4.7 indicates data on the number of days per week in which the children ate vegetables, fruits and meat products. 56.7% of the children ate vegetables 2-3 days per week and only 5.8% of the children ate vegetables daily. Information on the number of days per week the children ate fruits is shown in Table 4.7. The results indicated that only 12.5% of the children ate fruits daily. Forty percent ate fruits 2-3

days per week. Meat products were eaten 2-3 days per week by half of the children (50%).

Table 4.7 Number of days in which children ate vegetables, fruits and meat products

Number of days the children ate vegetables	**n=120**	**%**
2-3 days/week	68	56.7
Once/week	21	17.5
4-6 days/week	10	8.3
Daily	7	5.8
None	6	5.0
Once per month	4	3.3
Uncertain	4	3.3
Number of days the children ate fruits		
2-3 days/week	48	40.0
Once per week	30	25.0
4-6 days/week	18	15.0
Daily	15	12.5
Once per month	7	5.8
None	2	1.7
Number of days the children ate meat products		
2-3 days/week	60	50.0
Daily	26	21.7
Once per week	18	15.0
4-6 days/week	11	9.2
1-2 times per month	4	3.3
None	1	0.8

Table 4.8 summarizes the results of type of milk that was added in the children's tea/coffee beside sugar. Milk was not added in tea/coffee for 43.3% of the children, while coffee creamer was put in tea/coffee of 35.8% of children. It was only in few children's tea/coffee where fresh cow's milk (1.7%) or pasteurized long life milk (3.3%) was used.

Table 4.8 Type of milk added in tea/coffee

Type of milk	n=120	%
None	53	44.2
Coffee creamer*	43	35.8
Powdered milk (e.g. Nespray, Klim)	17	14.2
Untreated cow's milk	2	1.7
Pasteurized (Long life fresh milk)	4	3.3
Coffee creamer and powdered milk	1	0.8

*Coffee creamer is listed with types of milk as in most community is regarded as type of milk

Figure 4.5 shows food items usually given to the children between meals. The results show that most of the children (92.4%) were given potatoes/maize/corn snack chips, sweets (61.7%) and biscuits (51.7%). Less than half of the children were given fruits (30.8%), yoghurt (15.8%) and bread (3.3%) as snacks.

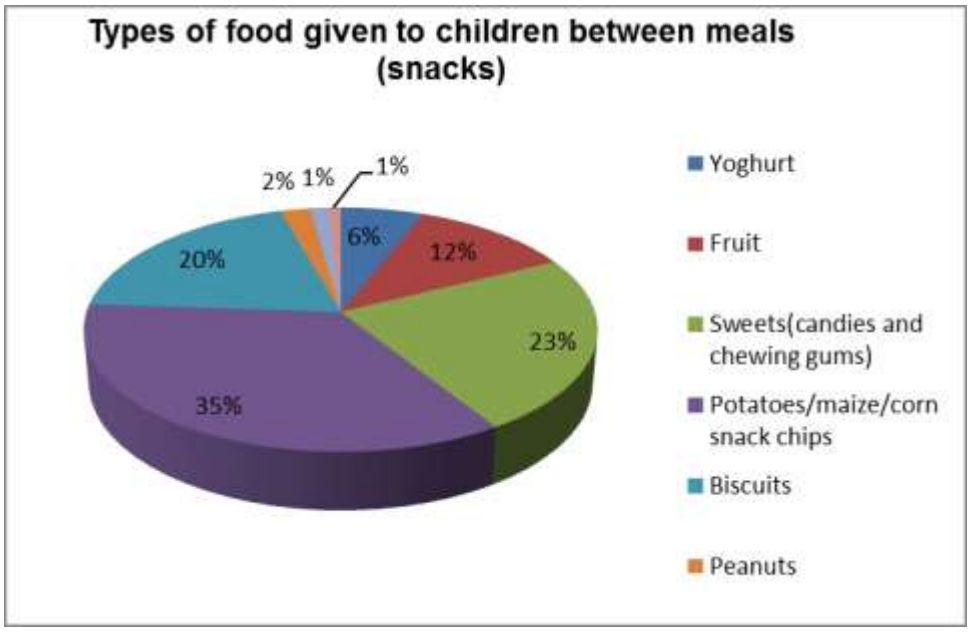

Figure 4.5 Type of food given to children between meals (snacks)

4.4.5. Frequency of food consumption by the children

The caregivers were also asked about the consumption frequency of food items that were given to the children aged 2-5 years. The food items were classified according to the category of starchy food, protein rich food, fruits and vegetables, legumes and beverages.

Table 4.9 shows the results of frequency of consumption of starchy food and protein rich food. The results showed that maize meal porridge (87.5%) and bread (54.2%) were consumed 5-7 times per week by most of the children. Breakfast cereals like corn flakes were never eaten by two third of the children (67.5%). Rice was eaten 1-2 times per week by 40.8% of the children. Almost two third of the children (65.0%) were given potatoes 3-4 times per week.

Full cream milk powder was consumed 5-7 times per week by 20% of the children. Chicken was consumed 3-4 times per week by 48.3% of the children although there were some (6.7%) who ate it 5-7 times per week. Animal products were consumed 3-4 times per week by most children (56.7%) and these were mainly chicken heads and feet. Peanut butter was eaten daily by 5.8% of children, while beans were consumed occasionally by 36.6% and 1-2 times per week by 24.2% of the children. Cheese, mopani worms, chicken livers and pork were mostly never consumed.

Table 4.9 Frequency of consuming starch and protein foods by the children

Food items	**Consumption frequency (=120)**				
	5-7x/wk %	**3-4x/wk %**	**1-2x/wk %**	**Occasionally %**	**Never %**
Cereals/starches					
Stiff porridge	92.5	5.8	0.0	0.8	0.8
Soft porridge	25.0	17.5	10.0	6.7	40.8
Breakfast cereal e.g. corn flakes	5.8	5.8	3.3	17.6	67.5
Rice	0.8	25.8	40.8	31.7	0.8
Bread	55.0	26.7	10.0	7.5	0.8
Samp	0.0	4.2	18.3	39.2	38.3
Potatoes	1.7	65.0	14.2	11.6	7.5
Dairy products					
Eggs	6.7	35.8	11.7	31.6	14.2
Fresh milk	10.8	15.0	8.3	15.0	50.8
Full cream Milk powder e.g. Nespray	20.0	10.0	2.5	9.2	58.3
Cheese	0.0	0.8	0.8	18.4	80.0
Animal foods					
Polony/Viennas	2.5	14.2	9.2	43.4	30.7
Mopani worms	0.8	2.5	3.3	19.1	74.2
Chicken	10.9	48.3	16.7	23.3	0.8
Chicken feet and	3.3	56.7	15.0	10.8	14.2

heads					
Chicken Livers	0.0	3.3	4.2	3.3	89.2
Chicken offal	0.0	31.7	19.2	17.5	31.7
Pork	0.0	2.5	0.0	3.3	94.2
Fish	0.8	18.3	18.3	43.3	19.2
Legumes					
Beans	2.5	20.0	24.2	36.6	16.7
Soya products	2.5	20.0	14.2	15.8	47.5
Peanuts	0.8	6.7	4.2	15.0	73.3
Peanut butter	11.6	16.7	14.2	34.7	22.5

*Occasional consumption frequency refers to foods not eaten often, it includes once per month, once in 3 months. or only eaten during functions, or seasonally.

Table 4.10 shows the frequency of consuming fruits and vegetables by the children. Oranges, apples and bananas were reported to be eaten 1-4 times per week. The fruits that were reported to be consumed 5-7 times per week by few children were oranges (2.5%) and bananas (0.8%). Concentrated juice was reported to be taken daily by 5% of the children. Cabbage, spinach and traditional vegetables were consumed 3-4 times per week by 24.7% of the children while carrots, beetroots and pumpkin were consumed 3-4 times by only 4.4% of the children. Almost half of the children consumed tomatoes 3-4 times per week.

Table 4.10 Frequency of eating fruits and vegetables by the children

Food items	**Consumption frequency (n=120)**				
	5-7x/wk %	**3-4x/wk %**	**1-2x/wk %**	**Occasionally %**	**Never %**
Fruit					
Apple	0.8	30.8	25.0	30.8	12.5
Avocado	0.0	12.5	13.3	47.5	26.7
Banana	2.5	31.7	24.2	30.0	11.7
Fruit juice, concentrated	9.2	27.5	18.3	29.9	15.0
Grapes	0.0	0.8	0.8	55.0	43.3
Guava	1.7	12.5	7.5	49.1	29.2
Mango	0.0	1.7	0.8	58.4	39.2
Naartjie	0.8	2.5	2.5	20.0	74.2
Orange	5.8	40.8	20.0	27.5	5.8
Pawpaw	0.0	0.0	3.3	26.6	70.0

Peaches	0.8	3.3	2.5	74.1	19.2
Pear	0.0	6.7	6.7	14.9	71.7
Vegetables					
Cabbage/spinach/ Traditional vegetable	1.1	24.7	26.1	31.7	16.4
Pumpkin/carrot/ Beetroot	0.0	4.2	22.7	40.3	32.8
Sweet potatoes	0.8	2.5	5.8	53.4	37.5
Tomatoes	20.0	59.2	10.0	5.0	5.8

*Occasional consumption frequency refers to foods not eaten often, it includes once per month, once in 3 months or only eaten during functions, or seasonally.

Table 4.11 shows the frequency of consuming other foods items by the children. Potatoes crisps/maize/corn chips snacks (21.7%), followed by margarine (13.4%), sweets (10%), biscuits (9.2%), and yoghurt (5.8%), which were eaten 5-7 times per week by some children. More than one third of the children (42.5%) ate potatoes crisps/maize/corn chips snacks 3-4 times per week, followed by 35.8% of children who ate biscuits, then sweets at 25.8 %.

Table 4.11 Frequency of consuming other foods by the children

Food items	5-7x/week %	3-4x/wk %	1-2x/wk %	Occasionally* %	Never %
Miscellaneous					
Fat cakes	0.0	12.5	9.2	39.1	39.2
Cold drinks	2.5	12.5	16.7	57.5	10.8
Sweets	10	25.8	20.8	31.6	11.7
Potatoes crisps/ maize/corn chips snacks	21.7	42.5	16.7	15.9	3.3
Biscuits	9.2	35.8	24.2	21.7	9.2
Ice cream	0.0	0.8	2.5	27.5	69.2
Margarine	13.4	16.7	9.2	30.1	30.8
Jam	3.3	7.5	5.8	21.7	61.7
Yoghurt	5.8	16.7	13.3	50.0	14.2

*Occasional consumption frequency refers to foods not eaten often, it includes once per month, once in 3 months or only eaten during functions, or seasonally.

Table 4.12 below indicates the top ten foods that were eaten by the children. The top ten foods that were most frequently consumed were stiff maize meal porridge (98.3%), bread (81.7%), tomatoes (79.2%), potatoes (66.7%), Potatoes crisps/maize/corn chips snacks) (64.2%), chicken heads and feet (60%), chicken (59.2%), oranges (46.6%), biscuits (45%), and eggs (41.7%).

Table 4.12 Top ten foods eaten by the children*

Food item	n	%
Maize meal	118	98.3
Bread	98	81.7
Tomatoes	95	79.2
Potatoes	80	66.7
Potatoes crisps/maize/corn chips snacks	77	64.2
Chicken heads and feet	72	60.0
Chicken	71	59.2
Orange	56	46.7
Biscuits	54	45.0
Eggs	50	41.7

*The top ten food were selected based on the frequency of being eaten 3-7 times per week.

4.5 Nutritional status of children and caregivers

Nutritional status of both the children and caregivers ware explained below.

Table 4.13 gives the mean and standard deviations of the children's and caregivers, age of the children and anthropometric characteristics. The mean and standards deviations of children's age 3.33±0.76. The mean BMI of the caregivers was high at 27.6kg/m. This indicate that the prevalence of overweight and even obesity among the caregiver.

Table 4. 13 Anthropometric data of the children and their caregivers

Variable	Total	Female	Male
	Mean (± SD)	**Mean (**± SD)	**Mean (**± SD)
Children			
Age(years)	3.33 ± 0.76	3.33 ± 0.76	3.34 ± 0.77
Birth weight (kg)	3.18 ± 0.44	3.23 ± 0.41	3.14 ± 0.46
Birth height (cm)	50.31 ± 2.62	50.28 ± 2.85	50.33 ± 2.43
Birth head circumference (cm)	34.89 ± 1.18	35.04 ± 1.25	34.76 ± 1.12
Weight (kg)	13.88 ± 2.08	13.63 ± 2.04	14.08 ± 2.09
Height (cm)	90.52 ± 7.56	90.54 ± 7.48	90.50 ± 7.68
WHZ	0.78 ± 1.09	0.65 ± 1.19	0.89 ± 0.99
HAZ	-1.89 ± 1.3	-1.73 ± 1.26	2.04 ± 1.45
WAZ	-0.56 ± 0.97	-0.55 ± 0.93	0.56 ± 1.01
BAZ	1.00 ± 1.19	0.79 ± 1.29	1.18 ± 1.07
MUAC (cm)	15.7 ± 1.12	15.58 ± 1.11	15.59 ± 1.13
MUACZ	-0.023 ± 0.88	-0.21 ± 0.87	2.45 ± 0.89
Caregiver			
BMI (kg/m^2)	27.75 ± 7.23	27.75 ± 7.23	0

WHZ-weight-for-height z score HAZ-height-for-age z score BMI-body mass index

WAZ-weight-for-age z score BAZ-body mass index-for-age z score

MUAC- mid-upper arm circumference MUACZ- mid-upper arm circumference z score

Table 4.14 shows the nutritional status of the children as classified by the new WHO standards as well as that of their caregivers. Most children were stunted (41.7%), followed by overweight (35%) and obese (18.3%). Underweight was not common in this study population (0.8%). With respect to the caregivers, overweight (30.8%) and obesity (30.8%) were highly prevalent, while underweight was not (0.8%).

Table 4.14 Classification of children and their care givers' nutritional status

Variable	Total	Female	Male
Children			
Stunted (HAZ< -2 SD)	50 (41.7%)	23 (41.8%)	27 (41.5%)
Risk of stunting (HAZ -1- -2 SD)	39 (32.5%)	16 (29.1%)	23 (35.4%)
Normal Height	31 (25.8%)	16 (29.1%)	15 (23.1%)
Underweight (WAZ <-2 SD)	1 (0.8%)	1 (1.8%)	0%
Overweight WHZ (>+1 SD)	42 (35.0%)	17 (30.9%)	25 (38.5%)
Obese (WHZ >2 SD)	22 (18.3%)	9 (16.4%)	13 (20.0%)
Normal Weight	55 (45.8%)	28 (50.9%)	27 (41.5%)
Caregivers			
Underweight (BMI<18.50 kg/m^2)	1 (0.8%)	1 (0.8%)	0%
Normal (18.50-24.99 kg/m$^{2)}$	45 (37.5%)	45 (37.5%)	0%
Overweight (BMI 25-29.99 kg/m^2)	37 (30.9%)	37 (30.9%)	0%
Obese (≥ 30 kg/m^2)	37 (30.8%)	37 (30.8%)	0%

4.6 INFLUENCE OF SOCIO-DEMOGRAPHIC DATA, CAREGIVERS' NUTRITION KNOWLEDGE AND FEEDING PRACTICES ON NUTRITIONAL STATUS OF CHILDREN

This section presents the results of the influence sociodemographic data, caregivers' nutrition knowledge and feeding practices on nutritional status of children.

4.6.1. Influence of socio-demographic data on nutritional status of children

The nutritional status variables that were analyzed for association with socio-demographic data were weight-for-age, weight-for-height, height-for-age and MUAC.

Table 4.15 shows the association between nutritional status of children and sociodemographic data. The height-for-age was positively associated with the source of household income as well as household monthly income ($p<0.05$). The source of income was also associated with weight-for-age ($r=.207$, $p<0.05$).

Associations were observed between height-for-age and household source of income ($r=.203^*$, $p=.026$). Moreover positive association was observed between height-for-age and range of household income ($r=.234^*$, $p=.010$). In addition, weight-for-age was associated with source of income ($r=.207^*$, $p=.024$)). Inverse associations were also observed between caregiver's marital status and level of education. Further correlations were observed between marital status and child support grant and between number of people in each household and number of children less than 12 years in each household. The number of people working was associated with source of income, range of household income and child support grant. The range of household income was also associated with the source of income and child support grant. Child support grant was further correlated with the source of income.

Table 4.15: Association between nutritional status of children and sociodemographic data

		WHZ	HAZ	WAZ	MUACZ	MS	LE	ES	No. in HH	NW	SI	RI	CG	<12 yrs. in HH
WHZ	R P N	1	-.239** .009 120	.598** .000 120	.609** .000 120	-.041 .660 120	.080 .383 120	-.084 .360	-.088 -352 120	.107 .247 119	.047 .613 120	-.058 .530 120	.017 .855 120	-.063 .493 120
HAZ	R P N	-.239** .009 120	1	.631** .000 120	.224* .014 120	086 .348 120	-.099 .284 120	-.046 -617	.036 .699 120	.088 .344 119	.203* .026 120	.234* .010 120	-.048 -.600 120	-.039 .673 120
WAZ	R P N	.598** .000 120	.631** .000 120	1	.672** .000 120	.037 .692 120	-.010 .918 120	-.103 .262 120	-.046 .621 120	.161 .080 119	.207* .024 120	.153 .095 120	.054 .558 120	-.079 .394 120
MUACZ	R P N	.609** .000 120	.224* .014 120	.672** .000 120	1	-.017 .853 120	.033 .724 120	-.147 .110 120	-.027 .767 120	.038 .682 119	063 .496 120	-.015 .871 120	-.020 .827 120	-.102 .269 120

WHZ-Wight-for Height z scores, HAZ- Height-for-Age z scores, WAZ- Weight-for-Age z scores, MUACZ- Mid-Upper-Arm Circumference z scores, MS-Marital status, LE-Level of Education, ES – Employment Status, No. in HH-Number of people in each Household, NW-Number working, SI-Source of Income, RI-Range of Household income, CG- Child Support Grant,<12 yrs. in HH-Number of children <12 years in each Household ,R=correlation coefficient, *P*=P-value, N=sample size, **P<0.01; *P<0.05

4.6.2 Influence of caregivers' nutrition knowledge on nutritional status of children

Nutritional status variables that were analyzed for association with caregivers' nutrition knowledge were weight-for-age, weight-for-height, height-for-age and MUAC.

Positive association was observed between caregivers' nutrition knowledge about the amount of water to be taken by the child per day with wasting (r=.282**, p=.002) and stunting (r=.190*, p=.038). An inverse association was observed between best food for child <6 months and amount of vegetables eaten per day. An inverse association was observed between alternative food to meat and amount of fruits to be eaten daily (r=.246**, p=.007) and also between amount of fruits to be eaten daily and amount of vegetables eaten daily (r=-.244**, p=.007). An association was observed between the duration of breastfeeding and alternative food to milk (r=.302**, p=.001), amount of fruits to be eaten daily by the children (r=.197*, p=.031) and number of meals to be eaten daily by the children (r= .284**, p=.048). A positive association was observed between number of meals to be consumed and amount of fruits to be eaten daily (r=.283**, p=.002) Similar results were observed with the amount of water to be taken daily (r=.282**, p=.002).

Table 4.16 [next page] Association between caregivers' nutrition knowledge and nutritional status of children

		Best food <6 mths	Duration of b/feed	Subst for porridge	Alt for meat	Amt of milk	Alt for milk	Amt. of fruits to eat daily	Amt of veg to eat daily	Amt of H_2O	No of meals to eat daily	WHZ	HAZ	WAZ	MUAC Z
Best food <6 mths	R P N	1	-. 029 .750 120	.096 .298 120	-.095 .302 120	-.101 .270 120	-.111 .228 120	.071 .443 120	-.181** .048 120	-.114 .217 120	-.181* .048 120	.064 .486 120	.079 .391 120	.124 .178 120	.078 .400 120
Duration of breastfeeding	R P N	-.029 .750 120	1	.105 .252 120	-.088 .340 120	.030 .741 120	**.302** **.001** **120**	**.197*** **.031** **120**	.070 .450 120	.129 .160 120	.284** .048 120	-.142 .121 120	.145 .115 120	.000 .999 120	.197* .031 120
Substitute for porridge	R P N	.096 .298 120	.105 .252 120	1	.140 .129 120	.041 .657 120	.003 .976 120	-.030 .742 120	-.043 .637 120	.030 .748 120	.001 .994 120	-.128 .163 120	.056 .546 120	.157 .087 120	-.124 .177 120
Alternative for meat	R P N	-.095 .302 120	-.088 .340 120	.140 .129 120	1	-.041 .655 120	.048 .600 120	**-.246**** **.007** **120**	.161 .078 120	.091 .324.12 0	-.160 .080 120	-.092 .318 120	.167 .068 120	.062 .503 120	.001 .988 120
Amount of milk	R P N	-.101 .270 120	.030 .741 120	.041 .657 120	-.041 .655 120	1	.154 .093 120	**.215*** **.018** **120**	-.016 .865 120	.091 .324 120	.166 .080 120	-.052 .575 120	.016 .862 120	-.027 .773 120	.116 .208 120
Alternative for milk	R P N	-.111 .228 120	**.302**** **.001** **120**	.003 .976 120	.048 .600 120	.154 .093 120	1	.085 .355 120	.091 .321 120	.069 .451 120	.152 .097 120	-.113 .220 120	-.031 .738 120	-.122 .185 120	-.108 -.242 120
Amt. of fruits to eat daily	R P N	.071 ..443 120	**.197*** **.031** **120**	-.030 .742 120	**-.246**** **.007** **120**	**.215*** **.018** **120**	.085 .355 120	1	-**.244**** **.007** **120**	.156 .090 120	**.283**** **.002** **120**	.059 .522 120	-.045 .623 120	.011 .903 120	-030 .742 120
Amt of veg to eat daily	R P N	-.181 .048 120	.070 .450 120	-.043 .637 120	.161 .078 120	-.016 .865 120	.091 .321 120	**-.244**** **.007** **120**	1	.037 .691	-.054 .560 120	-.154 .093 120	.077 .404 120	-.053 ‘564 120	.065 .480 120
Amt of H_2O	R P N	-.114 .217 120	.129 .160 120	.030 .748 120	.091 .324 120	**.222*** **.015** **120**	.069 .451 120	.156 .090 120	.037 .691 120	1	**.282**** **.002** **120**	**.282**** **.002** **120**	**.190*** **.038** **120**	-.157 .086 120	-.094 .308 120
No of meals to eat daily	R P N	**-.181*** **.048** **120**	**.284**** **.002** **120**	.001 .994 120	-.160 .080 120	.166 .071 120	.152 .097 120	**.283**** **.002** **120**	-.054 .560 120	**.282**** **.002** **120**	1	-.008.928 120	-.050 .585 120	-.045 .623 120	.103 ,261 120

Amt=amount, mths= months, subst=substitute, veg=vegetable, no=number, H_2O= water, alt=alternative, **P<0.01; *P<0.05

4.6.3 Influence of caregivers' feeding practices on nutritional status of children

Nutritional status variables were analysed for association with caregivers' feeding practices. These included weight-for-age, weight-for-height, height-for-age and MUAC.

There was no positive association observed between the nutritional status of children and caregivers feeding practices in this study. However, an inverse association was observed between weight-for-age and the type of milk used in children's tea (r=-.221*, p=.015). Breastfeeding was associated with the duration of breastfeeding. An inverse correlation was observed between breastfeeding and age of giving infant formula and how the infant formula was given. Further correlations were observed between giving infant formula with the age of giving infant formula and how it was given. Age of giving infant formula was also associated with how the infant formula was given.

Table 4.17: Association between caregivers' feeding practices and nutritional status of children

		Status of child b/fed	Duration of breast feeding	Given of l/formula	Age of introducing infant formula	Method of giving infant formula	Time of solids introduction	Food 1st given	No of meals	Assistance during meals	WHZ	HAZ	WAZ	MUACZ
Status of child breastfed	R P N	1	**.999** **.000** **120**	-.102 .268 120	**-.187*** **.041** **120**	**-.187*** **.041** **120**	-.059 .520 120	-.019 .840 120	.040 .666 120	-.061 .509 120	.074 .422 120	-.101 .274 120	-.025 .784 120	- .029 .753 120
Duration of breastfeeding	R P N	**.999** **.000** **120**	1	-.093 .310 120	-.179 .051 120	-.178 .052 120	-.060 .517 120	-.022 .811 120	.043 .638 120	-.065 .480 120	.075 .416 120	-.099 .282 120	-.023 .803 120	- .034 .715 120
Giving of infant formula	R P N	-.102 .268 120	-.093 .310 120	1	**.898** **.000** **120**	**.898** **.000** **120**	.012 .898. 120	.032 .730 120	.107 .243 120	-.026 .775 120	-.066 .471 120	-.097 .293 120	-.131 .153 120	.015 .868 120
Age of introducing infant formula	R P N	**-.187*** **.041** **120**	-.179 .051 120	**.898** **.000** **120**	1	**.999** **.000** **120**	.104 .256 120	.061 .506 120	.118 .199 120	-.094 .309 120	-.097 .294 120	-.032 -.728 120	-.105 .254 120	- .009 .922 120
Method of giving infant formula	R P N	**-.187*** **.041** **120**	-.178 .052 120	**.898** **.000** **120**	**.999** **.000** **120**	1	.097 .294 120	.065 .477 120	.120. 191 120	-.098 .289 120	-.094 .305 120	-.030 .745 120	-.102 .270 120	- .007 .935 120
Time of solids introduction	R P N	-.059 .520 120	-.060 .517 120	.012 .898 120	.104 .256 120	.097 .294 120	1	.054 .561 120	.069 .451 120	-.054 .554 120	.082 .373 120	-.039 .673 120	.036 .695 120	- .051 .578 120

Table 4.17: Association between caregivers' feeding practices and nutritional status of children continued

		Status of child b/fed	Duration of breast feeding	Given of l/formula	Age of introducing infant formula	Method of giving infant formula	Time of solids introduction	Food 1st given	No of meals	Assistance during meals	WHZ	HAZ	WAZ	MUACZ
Food given 1st	R P N	-.019 .840 120	-.022 .811 120	.032 .730 120	.061 .506 120	.065 .477 120	.054 .561 120	1	.028 .762 120	.069 .456 120	.080 .383 120	-.011 .909 120	.064 .486 120	.072 .432 120
Number of meals given	R P N	.040 .666 120	.043 .638 120	.107 .243 120	.118 .199 120	.120 .191 120	.069 .451 120	.028 .762 120	1	.039 .671 120	.031 .735 120	-.003 .972 120	.020 .829 120	- .155 091 120
Person who assisted during meals	R P N	-.061 .509 120	-.065 .480 120	-.026 .775 120	-.094 .309 120	-.098 .289 120	-.054 .554 120	.069 .456 120	.039 .671 120	1	.083 .367 120	-.065 .479 120	.032 .726 120	.087 .345 120
WHZ	R P N	.074 .422 120	.075 .416 120	-.066 .471 120	-.097 .294 120	-.094 .305 120	.082 .373 120	.080 .383 120	031 .735 120	.083 .367 120	1	**- .239* * .009 120**	**.598* * .000 120**	**.609 ** .000 120**
HAZ	R P N	-.101 .274 120	-.099 .282 120	-.097 .293	-.032 -.728 120	-.030 .745 120	-.039 .673 120	-.011 .909 120	-.003 .972 120	-.065 .479 120	**- .239 ** .009 120**	1	**.631* * .000 120**	**.224 * .014 120**
WAZ	R P N	-.025 .784 120	-.023 .803 120	-.131 .153 120	-.105 .254 120	-.102 .270 120	.036 .695 120	.064 .486 120	.020 .829 120	.032 .726 120	**.598 ** .000 120**	**.631* * .000 120**	1	**.672 ** .000 120**
MUACZ	R P N	-.029 .753 120	-.034 .715 120	.015 .868 120	-.009 .922 120	-.007 .935 120	- .051 .578 120	.072 .432 120	- .155 091 120	087 .345 120	**.609 ** .000 120**	**.224* .014 120**	**.672* * .000 120**	1

Table 4.18: Association between nutritional status of children and caregivers feeding practices continued.

		No/wk eating veg	No/wk. eating fruits	No/wk. eating meat prod	Type of milk in tea	WHZ	HAZ	WAZ	MUACZ
No/wk. eating veg	R P N	1	.009 .921 120	-.004 .964 120	.143 .119 120	.042 .646 120	-.034 .715 120	.013 .891 120	-.056 .541 120
No/wk. eating fruits	R P N	.009 .921 120	1	-.142 .123 120	.015 .874 120	.004 .965 120	-.044 .633 120	-.029 .749 120	-.026 .777 120
No/wk. eating meat prod	R P N	-.004 .964 120	.142 .123 120	1	.012 .894 120	.042 .650 120	.153 .095 120	.151 .101 120	-.032 .730 120
Type of milk in tea	R P N	.143 .119 120	.015 .874 120	.012 .894 120	1	-.104 .256 120	-.162 .077 120	**-.221* .015 120**	.017 .853 120

4.6.4 Influence of caregivers' BMI on nutritional status of children

There was no relationship between anthropometric status of children and caregivers BMI. Significant correlations were observed between wasting and weight for age and MUACZ. However, inverse correlations were observed between wasted children and height-for-age (r=-.239**, p=.009).

Further correlations were observed between stunting and weight-for-age and MUACZ. The association between anthropometric status of children and caregivers BMI is shown in Table 4.19.

Table 4.19: Association between anthropometric status of children and caregivers BMI

		WHZ	HAZ	WAZ	MUAC	MUACZ	C/giver's BMI
WHZ	R P N	1 120	-.239** .009 120	.598** .000 120	.555** .000 120	.609** .000 120	.056 .542 120
HAZ	R P N	-.239** .009 120	1	.631** .000 120	.237** .009 120	.224* .014 120	.021 .821 120
WAZ	R P N	.598** .000 120	.631** .000 120	1 120	.619** .000 120	.672** .000 120	.055 .552 120
MUAC	R P N	.555** .000 120	.238** .009 120	.619** .000 120	1	.941** .000 120	.075 .418 120
MUACZ	R P N	.609** .000 120	.224* .014 120	.672** .000 120	.941** .000 120	1	.056 .543 120
C/giver's BMI	R P N	.056 .542 120	.021 .821 120	.055 .552 120	.0.75 .418 120	.056 .543 120	1

CHAPTER FIVE: DISCUSSION OF RESULTS

5.1 Socio-demographic characteristics

Most children were cared for by their biological mothers in this study. This is a positive factor towards a good upbringing of a child and signifies a critical change because it has mostly been grandmothers who looked after the children, especially in rural areas (Dench & Ogg, 2002). A study done in the Limpopo Province, South Africa, showed that children 12 to 24 months who were cared for by their mothers had a lower risk of stunting (Kleynhans et al., 2006). On the contrary, children who lived in households where grandparents were caregivers, had the highest rate of stunting (Kleynhans et al., 2006).

Almost two third of the caregivers in this study attended school up to secondary level and some had obtained a tertiary qualification. A similar pattern was reported in the SANHANES (2013) survey which indicated that South Africans between the ages of 15 to 55 years had higher levels of educational attainment, with more matric certificates and completed tertiary qualification. As much as the study found out that one in ten of the caregivers had never attended school, the results showed an improved literacy level compared to a previous study that had been done in the Limpopo Province, which had revealed that more than 17% of caregivers had never attended school (Mushaphi et al., 2015). The findings of this study gives hope towards improvement of nutritional status of children as the literature shows that children cared for by educated people compared to those with no or low formal education tend to have a better nutritional status (Liaqat et al., 2006,; Hendricks et al., 2006; Sakisaka et al., 2006; Semba et al., 2008; Chen and Li, 2009).

Most of the households in this study consisted of more than six members. Similarly Kleynhans et al. (2006) reported that 56% of South African households had five to nine members. Statistics SA (2016) results show that the average household size was 3.3. Mamabolo et al. (2005) report that the risk for stunting was found to be highest in households with nine or more people in the household. The study by Olayemi (2012) concludes that a large family size has got a negative impact on household food security. Kleynhans et al. (2006) emphasizes that such households

usually harbour stunted children. Findings from Aguayo et al. (2015) in the Royal Kingdom of Bhutan confirmed that the prevalence of stunting was significantly higher among children from larger households. It is speculated that large families require more food and more money. Thus large households may find it difficult to meet the daily nutrient requirements.

The findings in this study indicate some improvements in household income compared to previous studies, even though the income is still insufficient for households with more than six persons. In this study, 60% earned within the bracket of R1000-R3000 and some received an income of <R500 (8.3%). The NFCS revealed that up to 60% of South African households lived out of the maximum of R1000 per month (Labadaros et al., 2005). Labadarios et al. (2008) further showed that 6% of the informal urban sector had households with no income and 35% with income of ≤R500 per month. Shisana et al. (2013) also reported that 41.9% of households had no formal income. Poor income reduces the potential for access to food.

Almost one in three South Africans and 44% of all households currently receive one or more social grants, rising to over 60% in the poorest provinces of the Eastern Cape and Limpopo (Ferguson, 2015). According to Stats SA (2016), social grants were more common than salaries as a source of income in the Limpopo Province (58.9%). Child support and pension grants were received by more than two thirds of the households in this study. Similar results were reported from the study done in the Limpopo Province on the effect of a nutrition education programme on the nutritional status of children aged 3-5 years. The type of households' income was mainly child support and pension grants (Mushaphi et al., 2015). The livelihood survey done in Sekhukhune also indicated that the old age pension and the child support grant were common sources of household income (Rule et al., 2005). Child support grants and old age pension funds could be the sources contributing towards improvements in households' income, as most of the caregivers (85%) in this study were unemployed and more than a third of households did not have an employed person. Social grant income is not sufficient to ensure sustainable food access in poor households. This makes households to be vulnerable to malnutrition.

5.2 Caregivers' nutrition knowledge

The results of this study indicate that there was still a huge challenge regarding caregiver's nutrition knowledge on the benefits of exclusive breastfeeding, as less than a quarter of the caregivers regarded breastmilk as the only food best for children less than 6 months. Caregivers seemed not to understand the superiority of breastmilk to infant formula and other foods. Only one in four amongst the caregivers was aware of the importance of breastfeeding for up to 24 months and beyond. Similar findings were found in a study conducted in rural China by Yue et al. (2016) which reported that caregivers stopped feeding breast milk to their children around one year-of-age because the milk was not regarded as nutritious after one year, and would instead switch to formula feeding in some cases (or a completely solid food diet in other cases). The main constraint to the timeous introduction of solid food (from six months of age) was the mother's lack of knowledge (Du Plessis et al., 2013). Bhat et al. (1992) report that mothers whose infants were well nourished had higher levels of breast-feeding knowledge than those whose infants were moderately to severely malnourished.

With regards to general nutrition knowledge, caregivers could not identify foods from the same food groups. For example potatoes were regarded as the alternative for meat by some caregivers. Their knowledge could have been influenced by their traditional practices. Potatoes are mostly eaten with porridge as a relish in African communities. In this study they were listed as one of the ten top foods given to the children. This practice deprives children the benefits of getting sufficient protein and micronutrients like iron and vitamin A from their diets. The mothers' nutrition knowledge was poor even on amount of fruits and vegetables to be eaten. Improvement in combating micronutrient deficiency would still be a challenge if no practical actions were applied to improve consumption of variety of nutritious foods.

In this study 41.7% of the caregivers reported that they were not given any nutrition information, whereas 43.3% of the caregivers reported health professionals as the source of nutrition education and 13.3% cited media as their source of nutrition information. The study done in Limpopo by Mushaphi et al. (2008) reported that the majority of mothers (76%) had not been taught which foods were good for their babies, only 13.5% were informed by health workers or nurses and 7% by mothers

or mothers-in-law. This study indicates some improvement in the number of caregivers visiting health facilities as it is where most of the health professionals are located and are given some nutrition information. The contents of the nutrition education given by health workers were not explored.

A lack of nutrition knowledge of caregivers in this study area may influence the poor nutritional status of children younger than five years of age as other studies indicated such an association (Jones et al., 2005; Kilaru et al., 2005; Manu and Khetarpaul, 2006; Levitt et al., 2009).

5.3 Feeding practices

The breastfeeding pattern reported in this study is similar to the practices reported in the literature as presented. Almost all children in this study have been breastfed at one stage in their lives. However, about half of the children were given infant formula while they were still less than 6 months old. Introduction of solids foods before 6 months seemed to be a common practice. Similarly in the study conducted by Mushaphi et al., 2008 in Mutale, Limpopo Province, exclusive breastfeeding was reported at 7.6% even though the prevalence of breastfeeding in general was reported to be at 97%. Faber and Benadé (2007) also report that 61% of the infants were given solid foods before the age of 4 months in a study conducted in rural KwaZulu-Natal. According to SANHANES-1, only 7% of children aged ≤ 6 months were exclusively breastfed at national level (Shisana et al., 2013). Low rates of exclusive breastfeeding were also observed in a study undertaken by Kalanda (2006) in Malawi, where only 13.3% of infants who were followed up from birth to twelve months, were exclusively breastfed. Although breastfeeding has been a common practice amongst Africans, the WHO (2007) recommendation of exclusive breastfeeding for 6 months has not been complied with by the majority of mothers.

Children in the current study did not consume a great variety of food. Starchy foods are dominant foods commonly consumed. There was a low consumption of fruit, vegetables, animal proteins and alternative protein sources. Very few children were given vegetables daily while only one out of eight children was given fruit daily.

Meat/meat products were given 2 to 3 days per week to half of the children. Similar findings were reported in the study by De Lange (2010) who mentions the same challenge of a lack of variety in children's meals. Smuts et al. (2008) also report that more than half of the children aged 0 to 71 months in rural districts of KwaZulu-Natal and the Eastern Cape seldom or never consumed meat products. Insufficient consumption of meat and meat products by children will lead to low biological protein and micronutrients, such as vitamin A and iron. This further places children in a vulnerable position for acquired malnutrition. Anecdotal evidence shows that in African households meat is given to adults more than to children.

The top ten foods that were most commonly given to the children were stiff porridge, bread, tomatoes, potatoes, potato/maize/corn snack chips, chicken heads and feet, chicken, orange, biscuits and eggs. Labadarios et al. (2005) reported that at the national level, results from the 24-hour recalls indicated that the most commonly consumed food items were maize, sugar, tea, whole milk and brown bread. The SANHANES (2013) indicates that the average South African diet of a child is energy-dense but micronutrient-poor. The households in this study seemed to depend more on less expensive food that are energy-dense. This is supported by Basiotis and Lino (2002) who report that poor people have been found to buy the least expensive foods that are gastronomically the most filling, the so called energy-dense foods. Households may opt for these cheaper foods due to low socioeconomic status. South Africa has now an abundance of such foods in village/township spaza shops.

Low consumption of fruits, vegetables and protein may have adverse nutritional consequences resulting in micronutrients deficiencies such as iron, vitamin A and C, folate and potassium together with dietary fibre. All these nutrients are required for optimal growth and prevention of diseases (Shenkin, 2006). Low consumption of fruits, vegetables and protein may be due to a lack of access, to unemployment and to lack of nutritional knowledge on the benefits and consequence of protein and micronutrients deficiencies. The National Department of Health (NDoH, 2014) promotes the intake of more fruits and vegetables and eating protein sources every day through the food-based dietary guidelines: Eat plenty of vegetables and fruit every day; eat dry beans, split peas, lentils and soya regularly; have milk, maas or yoghurt every day and fish, chicken, lean meat or eggs can be eaten daily. However,

this goal seems to be difficult to reach as the challenge could be lack of access to the market and unavailability of fresh fruits and vegetables in rural areas. Furthermore, less purchasing power to afford protein sources could also be a cause of food insecurity (Tacoliet al., 2013; Garvelink et al., 2013).

5.4 Nutritional status of children

The nutritional status of children aged 2 to 5 years was determined and the findings for underweight, stunting, wasting, and overweight and obesity are discussed below.

5.4.1 Underweight

The prevalence of underweight was < 10%, at 0.8% in this study which indicates a low prevalence of malnutrition. The findings are low in comparison with the SAVACG (1995) study, which reports that in South Africa underweight affected one in ten children, with 1.5% being severely underweight (SAVACG, 1995). The study is supported by the NFCS (Labadarios et al., 2008), which says that despite the national prevalence of underweight remaining statistically unchanged at 9.3%, the prevalence of underweight appeared to have increased in children living in the urban areas, and decreased in the rural areas. The greatest improvement was observed among children living in formal rural areas from 4.9% to 3.8%. The SANHANES (2013) also reported that the prevalence of undernutrition among children younger than 10 years of age decreased from 2005 to 2013 (Shisana et al., 2013).

5.4.2 Stunting

Stunting seems to be a problem of public health concern in the population studied. The prevalence of stunting was high, at 41.7% in this study which is far above the cutoff point of 20%. The WHO (1995) classification for assessing the public health significance of malnutrition indicates that the prevalence rate of stunting among children is considered low when it is less than 20%, whereas 20 to 29% indicates a medium prevalence of stunting. Furthermore, 30 to 39% indicates a high prevalence while more than 40% indicates a very high prevalence of stunting among children (WHO, 1995). The results confirm the high prevalence of stunting in the Limpopo province as stated in a cohort study (n=162) by Mamabolo et al. in 2005, which reveals a 48% prevalence of stunting.

More recently, the SANHANES (2013) reported 16.7% of males and 11.3% of females under 15 years old, to be moderately to severely stunted. A high prevalence of stunting was also reported in the other three nationwide studies, the South African Vitamin A Consultative Group (SAVACG) study done in 1995, the National Food Consumption Survey (NFCS) (1999) and the NFCS fortification baseline study (NFCS:FB-I) (2005).

Stunting reflects chronic undernutrition during the most critical periods of growth and development in early life (UNICEF, 2013). Stunting is associated with an under-developed brain, with long-lasting harmful consequences, including diminished mental ability and learning capacity, poor school performance in childhood, reduced earnings and increased risks of nutrition related chronic diseases, such as diabetes, hypertension, and obesity in future (UNICEF, 2013). Stunting has been considered an indication of chronic malnutrition. The contributing factors in this study may have been diseases, nutrient intake, food security and sanitation, as caregivers' nutrition knowledge and feeding practices were not found to be influencing factors (Rose-Jacobs et al., 2008; Iwanaga et al., 2009). Since stunting tends to have adverse and long lasting consequences such as impaired cognitive ability and reduced productivity later in life (Casale et al., 2014; Crookston et al., 2013) there is a need to establish sustainable interventions to combat chronic undernutrition among children in this age group. Such interventions should fully engage caregivers.

5.4.3 Wasting

None of the children in this study were found to be wasted. The livelihood survey in 2004 (Rule et al., 2005) reported low and high prevalence of wasting in the two municipalities of Sekhukhune districts; <5% in Greater Tubatse and very high in Fetakgomo (17.1%). The NFCS indicated that in the Limpopo Province, 7.5% of children aged one to nine years were wasted and 11.0% of children aged one to three years were wasted (Labadarios et al., 2005). According to the NFCS: FB-1 (2005), 4.4% of children aged one to nine years in Limpopo Province were wasted. Kleynhans et al. (2006) report that the prevalence of wasting was about 2% in the Limpopo Province, amongst children twelve to 24 months old. Wasting, or low weight-for-height, is a strong predictor of mortality among children under five. It is usually the result of acute significant food shortage and/or disease (UNICEF, 2007).

The WHO states that provided there is no severe food shortage, the prevalence of wasting is usually below 5%, even in poor countries (WHO, 2017b). Well researched strategies, as stated in World Health Assembly, Global Nutrition Targets 2025: Wasting Policy Brief (WHO, 2014) need to be strengthened and implementation should be monitored to maintain a low prevalence of wasting. Such strategies include promotion of and support for breastfeeding, nutrition counselling for families regarding complementary feeding practices and the provision of food supplements. For older children, the focus should be on improving family foods (diversity, quality and safety).

5.4.4 Overweight and obesity

In this study, a quarter of children were overweight, while almost one in five was found to be obese. This number of overweight and obese children was high. The statement by the WHO (2014) reveals that the number of children who are overweight or obese in Africa has nearly doubled from 5.4 million in 1990 to 10.6 million in 2014. Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings (WHO, 2014). A study by Mendez and Popkin (2004) indicates that overweight in rural areas of South Africa is higher than underweight. Similar results, for the prevalence of overweight (18.1%), were reported in the SANHANES-1, compared to the report by the NFCS study (10.6%). The prevalence of obesity in the SANHANES-1 findings was 4.6% compared to 4.5% in the NFCS. According to the WHO (2017b), overweight and obese children are more likely to develop non-communicable diseases like diabetes and cardiovascular diseases at a younger age and are likely to stay obese into adulthood. Hence, childhood obesity is associated with a higher chance of premature death and disability in adulthood. At least 2.6 million people die each year as a result of being overweight or obese (WHO, 2017b).

Overweight and obesity co-existed with stunting in this study population. Most of the caregivers (61.6%) were classified as overweight to severely obese while the stunting prevalence amongst children was high. This double burden of malnutrition is caused by inadequate pre-natal, infant and child nutrition, which is then followed by exposure to high-fat, energy-dense, micronutrient-poor foods and a lack of physical activity as the child grows older (WHO, 2017b).

A global shift in diet towards increased intake of foods that are energy-dense, but low in vitamins and minerals, together with decreased physical activities, is one of the contributing factors towards overweight and obesity. Household food distribution, cultural practices of breastfeeding and feeding practices and feeding of a variety of food to children may also have an effect on overweight and obesity prevalence. It is not uncommon to find undernutrition and obesity existing side-by-side within the same country, the same community and even within the same household (WHO, 2017b).

To address the problem of obesity, a routine monitoring of overweight as part of growth monitoring should occur with the same frequency and urgency as monitoring underweight. Height should also be measured to identify stunting at an early stage as it is observed that currently more focus is on undernutrition, especially underweight. Caregivers need to be capacitated concerning the correct infant and young feeding practices and healthy eating habits as mostly they are the decision makers on the quality and quantity of food given to the children.

Bhutta et al. (2013) suggest the promotion of appropriate complementary feeding practices, increasing dietary diversity, and providing multiple micronutrient supplements with iron, as possible methods to improve linear growth without contributing to overweight.

5.5 Influence of caregivers' nutrition knowledge and feeding practices on the nutritional status of the children

The ccaregivers' nutrition knowledge and feeding practices were not found to influence the nutritional status of children in this study. These findings were contrary to what has been reported by other researchers, who indicated that lack of awareness and a lack of nutrition knowledge about required feeding amounts, frequency of feeding, types of foods and a balanced diet contribute significantly to a poor nutritional status of children younger than five years of age, even in families where adults met their daily requirements (Jones et al., 2005; Kilaru et al., 2005; Manu & Khetarpaul, 2006; Levitt et al., 2009).

Nankumbi et al. (2015) also report that in rural areas, primary caregivers were unable to use IYCFP to enhance the nutritional status of the children because of a

lack of knowledge. Mushaphi et al. (2015) also concluded that caregivers' nutritional knowledge affects the way they feed their children and consequently affects the nutritional status of the children. Feeding practices did not influence the nutritional status of children.

Stunting was positively correlated to household income and range of household income. In addition, weight-for-age was positively correlated with the source of income. The statement by UNICEF (2009) indicates that when unemployment and low wages are presenting factors, families eat cheaper foods, which are less nutritious, leading to weight loss and malnutrition. This suggests that in order to improve nutritional status in this population, interventions need to focus on improving the household income. Improving economic growth in rural areas can generate more income, especially for caregivers, and may lead to improvements in health and nutrition status of young children.

5.6. Limitations of the study

Although studies using a heterogeneous sample are necessary to explore possible relationships between knowledge and feeding practices and nutritional status, this sample was homogenous in terms of sociodemographic and household parameters. Thus, their practices were more likely to be similar. The sample also came from a rural setting with mainly households in villages. Nutrient intakes and levels of food security were not determined. Thus, the co-existence of stunting and overweight could not be fully explained.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The socioeconomic status of households in this study was low as indicated by the small number of people employed in the households and a comparatively great dependency on social grant, with more than two thirds of the children receiving grants. Lack of nutrition knowledge and poor trends of feeding practices still prevail in rural settings as shown in this current study. Stunting, overweight and obesity among children were observed in this study. Most of the caregivers were overweight. Co–existence of overweight and stunting was found in the same household. No significant influence was observed between caregivers' nutrition knowledge, feeding practices and nutritional status of children 2 to 5 years old.

6.2 Recommendations

- There is a serious need for appropriate nutrition education to capacitate caregivers to make proper food choices and to be made aware of the importance of eating nutritious indigenous foods. Mass media such as radio and television should be used for disseminating information on nutrition education in general.

- Family members should also be capacitated to serve as supporters and informed advocates of nutrition. Factors like cultural practices that may affect the rate of exclusive breastfeeding in this community need to be identified and be addressed, as these were not known.

- The delivery platforms for counselling caregivers, which include community outreach, Primary Health Care (PHC), hospital services and nutrition campaigns and information on healthy eating and health risks associated with poor diets need to be strengthened at district level.

- Key strategies for the prevention and management of stunting need to be strengthened.
  Such strategies include the use of infant and young child feeding guidelines, micronutrients and food supplementation, food fortification and community

involvement strategies e.g. the use of ward-based outreach teams (WBOTs) and improved referral systems.

- Implementation of strategies for the prevention and control of obesity in South Africa 2015-2020 need to be accelerated. The strategy addresses the drivers of overweight and obesity which are poor diet, poor early childhood feeding practices, lack of knowledge and insufficient physical activities.

- National indicators for routine monitoring of overweight and obesity should be set and form part of the National Indicators Data Elements that are routinely collected, reported and analyzed to track the prevalence of identified data sets. This needs to be done with the same frequency and urgency as it is done for undernutrition.

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8. APPENDICES

Appendix A: Ethical Clearance

RESEARCH AND DEVELOPMENT
OFFICE OF THE DIRECTOR

Ms TT Motebejana
School of Health Sciences
University of Venda
09 March 2006

Application for Ethical Clearance - Ms TT Motebejana

The Health, Safety and Research Ethics Committee has at its meeting on the 24 February 2006, approved Ms Motebejana's project entitled: *"The Influence of Mother's Nutrition Knowledge and Feeding Practices on Nutritional status of Children in Mukhuduthamaga Municipality in Sekhukhune District of Limpopo Province, South Africa"*

Prof OS Fatoki
Director: Research and Development

UNIVERSITY OF VENDA FOR SCIENCE AND TECHNOLOGY
(Statutorily known as the University of Venda)
PRIVATE BAG X5050, THOHOYANDOU, 0950 • LIMPOPO PROVINCE • SOUTH AFRICA
TELEPHONE 015 962 8504 / 8313 / 8484 • FAX 015 962 8439 / 4742

Appendix B: Permission Letter

P O BOX 713
JANE FURSE
1085

MAKHUDUTHAMAGA MUNICIPALITY

TEL: 013 265 1262
FAX: 013 265 1975

Email: makhuduthamaga@mweb.co.za

Enquiries: MK Matlala
Cell: 082 466 9048

To Whom It May Concern:

This is to certify that the Municipality has granted Mrs Motebejane T.T. ID No. 7402280473084 permission to conduct research within Makhuduthamaga. The Municipality wishes to encourage Magoshi and members of the community to welcome her and assist her in whatever way possible.

Kind regards

Matlala M.K.
Director: Corporate Services
27/03/2006

Appendix C

Consent form

Greetings

I am Motebejane Tubake Tinny, a student from the University of Venda for Science and Technology. I am conducting a research for fulfillment of Masters in Public Nutrition. The title of the research is the influence of mother's nutrition knowledge and feeding practices on nutritional status of children in Makhuduthamaga municipality. I request you to participate in the research by providing me with information regarding your demography, knowledge about nutrition and feeding practices. I will also measure your weight and height and that of your child together with Mid Upper Arm Circumference (MUAC). The information that you will provide will be confidential and the result of the study will be used for scientific purposes.

I_____ understand what the researcher explained to me. I understand that by agreeing to participate in the research means that I will provide the information regarding my demography, nutrition knowledge and feeding practices. My weight and height and that of my child together with MUAC will be measured. Therefore, I take an informed decision to participate in the study. If during the study period I choose not to continue with the study, I can withdraw without giving any explanation.

I fully agree to participate in the study

Signature:----------

Witness:----------

Researcher:----------

Place:----------

Date:----------

Appendix D: Questionnaire and anthropometric assessment form

QUESTIONNAIRE
Title of the study: To determine the influence of mothers' nutrition knowledge and feeding practices on nutritional status of children aged 2 to 5 years in Makhuduthamaga Municipality in Sekhukhune District of Limpopo Province, SA.

Researcher: Motebejane T. T
Date: ----------

A. DEMOGRAPHIC DATA

1. What is your name? ----------
2. Are you a biological mother of the child?

Yes	1
No	2

3. If no, where is the mother?

Working	1
Deceased	2
Schooling	3
Far away	4
Don't Know	5
Other, specify----------	6

4. Where is the father of the child?

Working	1
Deceased	2
Schooling	3
Far away	4
Don't know	5
Other, specify----------	6

5. What is the name of the child? ----------
6. What is the age of the child? ----------months
7. How old are you?

12- 18	1
19-25	2
26-35	3
Above 35	4

8. What is your marital status?

Single	1
Married	2
Separated	3
Living as married	4
Divorced	5
Widowed	6
Other, Specify----------	7

9. What is the highest level of formal education you have completed?

None	1
Primary	2
Secondary	3
Technical	4
Diploma	5
Degree	6
Post graduate degree	7
Other, Specify----------	8

10. What is your employment status?

Employed full time	1
Employed part time	2
Unemployed	3
Full time home maker	4
Retired	5
Student	6
Other, specify----------	7

11. In total how many people are staying in this household including yourself?

2-3	1
4-6	2
>6	3

12. How many people are working?

None	1
One	2
2-3	3
>3	4
Other, specify----------	5

13. What is the household source of income? (You can indicate if you have more than one.)

None	1
Wage	2
Salary	3
Grant	4
Pension	5
Other, specify----------	6

14. What is the range of the household monthly income?

None	1
<R500	2
R600 – R1000	3
R1100- R2000	4
R2100- R3000	5

R3100-R5000	6
> R5000	7
Don't know	8
Other,specify----------	9

15. Is the study child getting any grant?

Yes	1
No	2
Other, specify.....	3

16. How many children under 12 years live in this household?

17. What are their ages?

_____

_____

B. MOTHERS NUTRITION KNOWLEDGE AND FEEDING PRACTICES.

18. Which food is best for children less than 6 months?

Breastmilk only	1
Infant formula only	2
Both breastmilk & infant formula	3
Soft porridge	4
Don't know	5
Other: specify----------	6

19. Why do you say so?

---

20. For how long should a child be breastfed?

< 6 month	1
6 to 12 months	2
12 to 18 months	3
19-23 months	4
24 months and above	5
Don't know	6
Other, specify----------	7

21. Why do you say so?

---

22. Which other food can be used as substitute for porridge?

Rice, Bread	1
Meat, Milk	2
Banana, Mango	3
Cabbage, Pumpkin	4
Don't know	5

Other, specify----------	6

23. Why do you say so?

---

24. Which other food can be used as an alternative to meat?

Legumes	1
Spinach	2
Potatoes	3
Don't know	4
Other, specify----------	5

25. Why do you say so?

---

26. How much milk is needed per day for children 2 to 5 years?

None	1
½ - one cup	2
2 cups	3
One liter	
Don't know	4
Other, Specify----------	5

27. Why do you say so?

---

28. Which one of the following can be used as an alternative to milk?

Coffee creamer	1
cheese	2
Peanut butter	3
Don't know	4

29. Why do you say so?

---

30. How much fruit should a child of 2-5 years eat daily?

None	1
½ cup	2
1-11/2 cup	3
2-3 cups	4
4-5 cups	
Don't know	5
Other, specify----------	6

31. Why do you say so?

32. How much of vegetables should a child of 2-5 years eat daily?

None	1

1-2 tablespoons	
¼ cup	2
1/3- ½ cup	3
1-11/2 cups	4
Occasionally	
Don't know	5
Other, specify----------	6

33. Why do you say so?

---

34. What is the importance of drinking water?

_____

35. How many times per day should a child of 2-5 years eat?

Once	1
Twice	2
Three times and more	3
Don't know	4

36. What is your source of nutrition information? (You can indicate if you have more than one.)

Television	1
Clinic	2
Community health worker	3
Friend	4
Family	5
Radio	6
Newspaper/magazines	7
None	8
Other: Specify----------	9

37. Was the study child breastfed?

Yes	1
No	2
Don't know	3

38. If yes, how long was the study child breastfed?

Still breastfeeding	1
<3 months	2
3-12 months	3
13-18 months	4
19-24 months	5
> 24 months	6
Do not know	7

39. Was the study child given infant formula?

Yes	1

No	2
Don't know	3

If the answer to question 39 is yes, answer question 40 and 41; if no go to question

40. From what age was it given?

< 1 month	1
1-3 months	2
4-5 months	3
6 months	4
Not applicable	5
Other: specify----------	6

41. How was it given?

Bottle-feeding	1
Cup feeding	2
Spoon feeding	3
Not applicable	4
Other, specify----------	5

42. When solid foods were first introduced to the child?

Day one	1
1-3 Weeks	2
1-3 months	3
4-5 months	4
6 months	5
Other, Specify----------	6

43. Which solid food was first given?

Maize meal soft porridge	1
Infant cereal	2
Ready to eat bottled baby food	3
Other, Specify----------	4

44. How many meals are presently given to the study child per day?

One	1
Two	2
Three and more	3
Other, specify----------	4

45. Who usually feeds / assists this child during meal times?

Feed him/herself	1
Care giver	2
Other siblings	3
Other: specify----------	4

46. How many days per week does the child eat vegetables?

None	1

One day	2
2-3 days	3
7 days	4
uncertain	5
Other: Specify----------	6

47. How many days per week does the child eat fruits?

None	1
One day	2
2-3 days	3
7 days	4
uncertain	5
Other: Specify----------	6

48. How many days per week does the child eat meat products (e.g. meat, fish or eggs)?

None	1
One day	2
2-3 days	3
7 days	4
Not sure	5
Other: Specify----------	6

49. Which type of milk do you put in the child's tea /coffee?

_____
_____

50. Which food items do you normally give the child between meals?

_____
_____

51. How often do you give the following food to the study child? (Please indicate the amount and frequency)

Food items	5-7x/wk 1	3-4x/wk 2	1-2x/week 3	Occasionally 4	Never 5
Cereals/starches					
51.1. Stiff porridge					
51.2.Soft porridge					
51.3. Breakfast cereal eg corn flakes					
51.4. Rice					
51.5. Bread					
51.6. Samp					
51.7. Potatoes					
Dairy products					
51.8. Eggs					
51.9. Fresh milk					
51.10 Fresh Milk powder e.g. Nespray					
51.11.Cheese					
Animal foods					
51.12.Eggs					
51.13.Polony/Viennas					
51.14. Mopani worms					
51.15 Chicken					
51.16 Chicken feet and heads					
51.17. Chicken Livers					
51.18. Chicken offal					
51.19. Pork					
51.20. Fish					
Legumes					
51.21. Beans					
51.22. Soya products					
51.23. Peanuts					
51.24. Peanut butter					
Fruit					
51.25. Orange					
51.26.Naartjie					
51.27. Apple					
51.28. Pear					
51.29. Banana					
51.30. Mango					
51.31. Grapes					
51.32. Guava					
51.33. Peaches					
51.34 Paw paw					
51.35 Avocado					
51.36. Fruit juice (Specify)					

Food items	5-7x/wk 1	3-4x/wk 2	1-2x/week 3	Occasionally 4	Never 5
Vegetables					
51.37. Pumpkin					
51.38. Cabbage					
51.39. Carrot					
51.40. Beetroot					
51.41. Traditional vegetables					
51.42. Spinach					
51.43.Tomatoes					
51.44. Sweet potatoes					
Miscellaneous					
51.45. Fat cakes					
51.46. Cold drinks					
51.47. Sweets					
51.48. Potatoes crisps/maize/corn snacks					
51.49. Biscuits					
51.50. Ice cream					
51.51. Margarine					
51.52. Jam					
51.53. Other (specify)					

C. ANTHROPOMETRIC RECORD SHEET

52. Gender of the child:----------
53. Child's birth weight:----------
54. Height at birth----------
55. Head circumference at birth----------
56. MUAC of the child : 1----------2----------3----------Average----------
57. Weight of child: 1---------- 2----------3----------Average----------
58. Height of the child: 1---------- 2----------3----------Average----------
59. Weight of the mother: 1---------- 2----------3----------Average---------
60. Height of the mother: 1---------- 2----------3----------Average----------

QUESTIONNAIRE

Thobela

Ke nna Motebejane Tubake Tinny,moithuti wa Masters Universiting ya Venda ya tša mahlale le thabologo.Ke ile go go botšiša dipotšišo mabapi le tša ka gae, tsebo ka tša phepo le ka mokgwa wa go fepa. Ke tlo le tšea botelele le boima gammogo le ngwana wa lena.Ke kgopela gore le lokologeng kage ditaba tše letlago mpotša tšona di ka se utulwe.

Hlogo ya nyakišišo: Go nyakolla khuetšo ya tsebo ka tša phepo ya mmago ngwana le mokgwa wa go fepa go seemo sa tša phepo sa bana ba mengwaga ye mebedi go fihla ka ye mehlano ka mmasepaleng wa Makhuduthamaga ka Sekhukhune district ya Province ya Limpopo, Afrika Borwa.

Letšatši:----------

A. DEMOGRAPHIC DATA

1. Leina la lena ke lefe?----------
2. O motswadi wa ngwana?

Ee	1
Aowa	2

3. Ge eba aowa, motswadi wa ngwana o kae?

O mošomong	1
O hlkofetše	2
O tsena sekolo	3
O kgole	4
Ga ke tsebe	5.
Se sengwe, nepa	6

4. Tatago ngwana o kae?

O mošomong	1
O hlkofetše	2
O tsena sekolo	3
O kgole	4
Ga ke tsebe	5.
Se sengwe, nepa	6

5. Leina la Ngwana ke lefe?----------
6. Mengaga ya ngwana ke e mekae?----------(ka dikgwedi)

7. Mengwaga ya gago ke ye mekae?

12-18	1
18-25	2
26-35	3
> 35	4

8. Maemo a gago a lenyalo ke afe?

Ga ka nyalwa	1
Ke nyetšwe	2
Re kgaogane	3
Re phela bjalo ka banyalani	4
Re hlalane	5
Mohlogadi	6
Sesengwe,nepa	7

9. Mphato wa godimo wo o ofeditšego ke ofe?

Gao gona.	1
Wa Primary	2
Wa Secondary	3
Go tša matsogo	4
Diploma	5
Degree	6
Post graduate degree	7
Sesengwe, nepa	8

10. Maemo a gago a tša mošomo ke afe?

Ke thwetšwe nako ka moka	1
Ke thweše lebakangwana	2
Ga ka thwalwa	3
Ke šoma ka gae lebaka ka moka	4
Ke khutšiše mosomong	5
Ke moithuti	6
Se sengwe, nepa	7

11. Batho bao badulago ka mo gae ka moka ke ba bakae re bala le lena?

2-3	1
4-6	2
>6	3

12. Go šoma ba ba kae?

Ga go šome motho	1
O tee	2
2-3	3
>3	4
Se sengwe,nepa	5

13. Tselete ye e tsenago ka mo gae e tswa kae?(O ka bontša go feta go tee).

Ga gogona.	1
Mogolo wa go epereka	2
Mogolo wa go hirwa	3
Mogolo wa go fiwa ke mmušo	4

Mphiwafela wa batšofadi	5
Se sengwe,nepa	6

14. Botseno bja tšelete ka gae bo magareng ga eng?

Ga bo gona.	1
Ka tlase ga R500	2
R600-R1000	3
R1100-R2000	4
R2100-R3000	5
R3100-R5000	6
Ka godimo ga R5000	7
Ga ke tsebe	8
E nngew,nepa	9

15. Ngwana yo re nyakišišago ka yena o hwetša mphiwafela?

Ee	1
Aowa	2
Se sengwe ,Nepa	3

116. Ka mo gae go na le bana ba bakae ba ka tlase ga mengwaga e lesome pedi?

_____

17.Mengwaga ya bona ke efe?

_____

B. TSEBO YA MMAGO NGWANA KA TšA PHEPO LE MOKGWA WA GO GO FEPA.

18. Ke dife dijo tše di loketšego ngwana wa ka tlase ga mengwaga ye tshelelago?

Maswi a letswele feela	1
Maswi a bana a ka dithining feela	2
Maswi a letswele le aka dithining.	3
Motepa	4
Ga ke tsebe	5
Se sengwe:Nepa	6

19.Ke ka baka la eng o re bjalo?

_____

20.Ngwana o swanetse go mamiswa lebaka le lekae?

Katlase ga kgwedi tše tšhela	1
Kgedi tše 6 go ya go tše 12	2
Kgwedi tše 12 go ya go tse 18	3
Kgwedi tše 19 go iša go tše 23	4
Kgwedi tše masome pedi nne le go feta	5
Ga ke tsebe	6
Se sengwe,nepa	7

21.Ke ka baka la eng o re bjalo?

_____

22 Ke sejo sefe seo o ka se šomišago legating la bogobe?

Rise,borotho	1
Nama,Maswi	2
Banana,manko	3
Khabetše,lephotse	4
Ga ke tsebe	5
Se sengwe:Nepa	6

23.Ke ka baka la eng o re bjalo?

_____

24. Ke sejo sefe seo o ka se šomišago legating la nama?

Dinawa	1
Spinach	2
Matapola	3
Ga ke tsebe	4
Se sengwe:Nepa	5

25. Ke ka baka la eng o re bjalo?

_____

26. Ke maswi a makae ao a nyakegago go ngwana wa ka mengwaga e mebedi go ya go ye mehlano?

Ga a hloke	1
½ go ya go komiki e tee	2
Komiki tše pedi	3
Litre e tee	
Go ke tsebe	4
Se senwe,nepa	5

27.Ke ka baka la eng o re bjalo?

_____

28. Ke efe ya tše di latelago yeo e ka šomišwago legating la maswi?

lerole (Creamer)la go tšela ka kofing	1
Cheese	2
Peanut butter	3
Ga ke tsebe	4

29. Ke ka baka la eng o re bjalo?

_____

30. Ke dikengwa tše kae ka letšatši tšeo ngwana wa mengwaga e mebedi go ya go ye mehlano a swanetšego go dija.?

Ga a di hloke	1
Boripa bja komiki	2
Komiki e tee go iša go e tee le seripa	3
Komiki tše pedi go iša go tše tharo	4
Komiki tše nne go iša go tše hlano	
Go ke tsebe	5
Se senwe,nepa	6

31. Ke ka baka la eng o re bjalo?

_____

32. Ke merogo e mekae ka letšatši tšeo ngwana wa mengwaga e mebedi go ya go ye mehlano a swanetšego go eja.?

Ga a ohloke	1
Lelepola le tee go iša go a mabedi	
¼ ya komiki	2
1/3 go iša go seripa sa komiki	3
Sekotlelwana se tee	4
Go ke tsebe	5
Se senwe,nepa	6

33.Ke ka baka la eng o re bjalo?

_____

34. Bohlokwa bja go nwa metse ke bofe:

---

35. Ngwana ya mengwaga e mebedi go ya go ye mehlano o swanetše go ja ga kae ka letšaši?

Ga tee	1
Ga bedi	2
Ga rarole go feta	3
Gake ke tsebe	5

36. Ke mang a go fago fepago ka tsebo ya tsa phepo? (O ka bontšha ge o na le karabo ya go feta e tee)

TV	1
Kliniki	2
Mosomi wa tša maphelo wa metseng	3
Mogwera	4
Ba ka gae	5
Radio	6
Pampiri ya ditaba/magazine	7
Ga a gona	8
Sesengwe,nepa	9

37. Ngwana yo re nyakisisago ka yena o ile a nyanya le tswele?

Ee	1
Aowa	2
Ga ke tsebe	3

38 Ge oitše ee, o nyantše lebaka le lekae?

Osa mama	1
Katlase ga kgwedi tše tharo	2
Kgwedi tše tharo go iša go tše lesome	3

pedi	
Kgwedi tše lesome tharo go iša go tše lesome seswai	4
Kgwedi tše lesome senyane go iša go tše masome pedi nne	5
Go feta kgwedi tše masome pedi nne	6
Ga ke tsebe	7

39.Nwana yo re nyakišišago ka yena o ile a fiwa maswi a ka tshitswaneng?

Ee	1
Aowa	2
Gake tsebe	3

Karabo ge e le ee araba le putšišo tše pedi tse di latelago (40 le 41, ge e le awa re ya go putšišo 26

40. A filwe go tloga mengwageng efe?

Ka tlase ga kgwedi	1
Kgwedi e tee go iša go tše tharo	2
Kgwedi tše nne go iša go tše hlano	3
Kgwedi tše selelago	4
Ga e amane	5
Se sengwe, nepa	6

41. A be e fiwa bjang?

Ka lebotlelo	1
Ka komiki	2
Ka lelepola	3
Ga e amane	4
Se sengwe ,nepa	5

42. Dijo tše di tiilego dithomilwe go fiwa ngwana neng la mathomo?

Tšaši la mathomo	1
Beke tee go ya go tše boraro	2
Kgwedi e tee go iša go tše tharo	3
Kgwedi tše nne go iša go tse hlano	4
Kgwedi tše tshela	5
Se sengwe,nepa	6

43. Ke dife dijo tse thata tseo a filwego pele?

Motepa	1
Cereal ya bana	2
Dijo tša bana tša go se apewe tša ka mabotlelong	3
Se sengwe,nepa	4

44. Ngwana yo re nyakišišago ka yena o fiwa dijo go kae ka letšaši?

Ga tee	1
Ga bedi	2
Gararo	3
Go feta ga raro	4
Se sengwe,nepa	5

45.Ga ntšhi ke mang yo a lešago ngwana goba a mo thušago nakong tša ge a eja?

O ja ka noši	1
Mohlokomedi wa gagwe	2
Bagolwane ba gagwe	3
Se sengwe,nepa	4

46. Ngwana o ja merogo matšatši a makae mo bekeng?

Ga oje	1
Tšatši le tee	2
Matšatši a mabedi go iša go a mararo	3
Matšatši a šupago	4
Ga ke na bonnete	5
Se sengwe,nepa	6

47. Ngwana o ja dikenywa matšatši a makae mo bekeng?

Ga a dije	1
Tšatši le tee	2
Matšatši a mabedi go iša go a mararo	3
Matšatši a šupago	4
Ga ke na bonnete	5
Se sengwe,nepa	6

48. Ngwana o ja ditswa (nama,hlapi,mae) nameng matšatši a makae ka beke?

Ga re dije	1
Tšatši le tee	2
Matšatši a mabedi go iša go a mararo	3
Matšatši a šupago	4
Ga ke na bonnete	5
Se sengwe,nepa	6

49. Ke mohuta o fe wa maswi wo oo tšhelago ka teeng goba kofing ya ngwana?

_____

50 .Ke mehuta efe ya dijo yeo oe fago ngwana magareng ga dijo?

_____

_____

51. Dijo tše di latelago o di fa go kae ngwana yo re nyakišišago ka yena?

Mohua wa sejo	**5-7x ka beke 1**	**3-4x ka beke 2**	**1-2x ka beke 3**	**Tšatši le lengwe 4**	**Ga nke ke mofa 5**
51.1 Starch					
51.2Motepa					
51.3 Breakfast cereal					
51.4 Rise					
51.5 Borotho					
51.6 Setampa					
51.7 Matapola					
51.8 Mae					
51.9 Maswi					
51.10 Cheese					
51.11Pholony/Viana					
51.12Mašotša					
51.13 Nama ya kgogo					
51.14 Menotlana le dihlogwana					
51.15 Sebete sa kgogo					
51.16 Malana a kgogo					
51.17 Kolobe					
51.18 Hlapi					
51.19 Dinawa					
51.20 Soya products					
51.21Dimake					
51.22Peanut butter					
51.23Margarine					
51.24Jamo					
51.25 Yorgut					
51.26 Namune					
51.27 Apolo					
51.28 Peere					
51.29 Panana					
51.30Manko					
5131 Diterebe					
51.32 Koava					
51.33 Diperekisi					
5134 Fruit Juice (nepa)					
51.35Ice cream					
51.36Lepampune					

Mohua wa sejo	5-7x ka beke 1	3-4x ka beke 2	1-2x ka beke 3	Tšatši le lengwe 4	Ga nke ke mofa 5
51.37 Khabetšhe					
51.38 Spinach					
51.39 Kherotse					
5140 Beetroot					
51.41 Morogo wa gae					
51.42 Dithhotse					
51.43 Tamatie					
51.44 Dipotata					
51.45 Makwinya					
51.46 Soft drink (nepa)					
5147malekere					
51.48 Matšhomtšhom					
51.49 Buiscuits					
51.50 Se sengwe,nepa					