Household deprivation and its relationship to food intake and nutritional status of children 6-13 years in rural Queenstown, Eastern Cape, South Africa

Submitted in fulfilment of the requirements of the Master of Applied Science in Food and Nutrition Consumer Sciences in the Faculty of Applied Sciences at the Durban University of Technology

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Date: December 2020

DECLARATION

This work has not been previously accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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This dissertation is being submitted in fulfilment of the requirement for the degree of Master of Applied Science.

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This dissertation is the result of my own independent work and investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references. A comprehensive bibliography is appended. I hereby declare that I did not commit plagiarism.

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The Lord is my shepherd; I shall not want. To God my saviour, my stronghold, my provider, my redeemer. For, I am here because of your mercy and love, and I only praise your name.

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ABSTRACT

Background:

The study was conducted among 200 children aged six to 13 years in rural Komani, formerly known as Queenstown within the district of the Enoch Mgijima local municipality in South Africa which includes Lesseyton, Birch Farm and Machibini.

Three hundred and eighty five million children worldwide lived in extremely poor households, and 19.5% of children who live in developing countries lived on less than $1.90 a day. Children who lived in extremely poor households were found mostly in developing countries. Sub-Saharan Africa had the highest rates of children that lived in extreme poverty-stricken circumstances at just below 49.0%. Poverty in children results in many adverse effects such as stunted growth, lack of education, limited access to healthcare and nutrition.

Aim:

This research aimed to evaluate household deprivation using the acute multidimensional poverty index (AMDPI) and its relationship to the food intake and nutritional status of children aged 6-13 years.

Methods:

A valid and relevant socio-economic demographic questionnaire was completed in a face-to-face interview situation with the children's parents and caregivers to determine the socio-economic demographic background of the participants. A valid and reliable food frequency questionnaire was also completed where the parents/ caregivers and the children were asked to identify foods that the children had consumed in the last seven days to determine the dietary diversity of the participants. In addition, the participant's average anthropometric measurements were obtained by measuring the child's weight and height in order to determine each participant''s height-for-age and BMI-for-age and analysed using the WHO Anthroplus.

Results:

It was discovered that the majority (37.0%) of the households in the three rural areas of Komani (Queenstown) were headed by the grandmothers followed by the mothers (27.5%) and the fathers (20.0%). Food insecurity was prevalent in 83.6% of the households where the parent's/ caregivers explained that they sometimes did not have money to purchase food.

The low per capita income of the households of R12 07.94 - R18 030.00 per annum, compared to South Africa's GDP per capita of $6.100 (R107 970) income, indicated that the households lived below the poverty line. These households achieved a mean acute multi-dimensional poverty index (AMPI) score of 24.72 out of the 30.0% cut-off point set by Alkire and Santos (2010), indicating that 82.4% of the households were poor.

The mean energy intake for boys and girls (six to eight years) of 5474.23kJ was inadequate compared to the recommended Estimated Energy Requirement (EER) of 7316kJ and 6896kJ, whilst both boys and girls ages nine to 13 years met their EER. In addition, all the children exceeded the Recommended Dietary Allowance (RDA) for both protein and carbohydrate. However, none of the children met the Adequate Intake (AI) for total dietary fibre. This was evident in the top 20 foods consumed by the children with the cereal group food items, namely meal, samp and beans, rice and bread all being in the top ten most consumed foods, with fat-containing food items being evident in all three age categories; indicating that the children's diets were mainly energy-dense. Overall, the total fruit and vegetable intake of the children was substantially poor measured against the recommended goal set by the WHO of ≥400g/day, with a per capita intake per day of 60.7g (children six to eight years), 51.1g (girls nine to 13 years), and 38.3g (boys nine to 13 years).

Conclusion

Factors such as unemployment, lack of education and poverty all contributed to household food insecurity and poor dietary intake. This was also evident in the children's low fruit and vegetable intake with a high intake in carbohydrate-based food items such as maize, bread, potatoes, samp and beans, indicating that the group consumed a low food variety. Although only a low prevalence of malnutrition was found in the children, many of the households were food insecure, this was further indicated by the low per capita income and low AMPI score achieved by the households, which meant that, according to the Alkire-Foster method, the households were acute multi-dimensionally poor.

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LIST OF ABBREVIATIONS	
AI	Adequate Intake
AMDPI	Acute-Multidimensional Poverty Index
AMDR	Acceptable Macronutrient Distribution Range
BMI	Body Mass Index
CDI	City Development Index
DD	Dietary Diversity
DoH	Department of Health
EAR	Estimated Average Requirement
EC	Eastern Cape
EER	Estimated Energy Requirement
FAO	Food and Agricultural Organisation
FGDS	Food Group Diversity Score
FFQ	Food Frequency Questionnaire
FRAC	Food Research and Action Center
FVS	Food Variety Score
GDP	Gross Domestic Product
HDI	Human Development Index
KZN	Kwa-Zulu Natal
MPI	Multidimensional Poverty Index
NFCS-FB-I	National Food Consumption Survey-Fortification Baseline
RDA	Recommended Dietary Allowance
SA	South Africa
SAMPI	South African Multidimensional Poverty Index
SANHANES	South African National Health and Nutrition Examination Survey

SDGs	Sustainable Development Goals
SDI	Service Deprivation Index
SERO	Socio-Economic Review and Outlook
STATSA	Statistics South Africa
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Programme
WHO	World Health Organisation

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CHAPTER ONE: THE PROBLEM AND ITS SETTING

1.1 INTRODUCTION

One of the Sustainable Development Goals (SDGs) is to end extreme poverty by the year 2030, which is a centralised vision of both the United Nations Children's Fund (UNICEF) and the World Bank Group. Children raised in extreme conditions of poverty need special attention as they are affected by poverty in dissimilar ways from adults. Poverty in children results in many adverse effects such as stunted growth, lack of education, limited access to healthcare and nutrition, and being more susceptible to abuse and exploitation. There were about 385 million children worldwide who were living in extremely poor households, and 19.5% of children living in developing countries were living on less than $1.90 a day compared to 9.2% of adults (UNICEF and World Bank Group 2016: 3). According to UNICEF and the World Bank Group (2016: 2) reported that eight out of 10 children living in extremely poor households were more likely to live in rural areas than in urban areas in comparison to 9.0% of children in urban areas. UNICEF (2016: 1) reported that unless the world addressed the injustices amongst our communities by the year 2030, a new level of deprivation would be reached with statistics indicating that 167 million children were at risk of living in extreme poverty.

Africa is considered to be one of the poorest continents in the world, particularly the sub-Saharan Africa, with 59 million children in this region between five to 17 years found to be working instead of going to school with the aim to assist their families by bringing in food (SOS Children's Villages 2020: para. 4 line 9-10). STATSA (2021: para. 8 line1-3) reported that more than six out of 10 (62.1%) children aged between zero and 17 years were multidimensionally poor. The report further elucidated that amongst the population groups, black African children were more probably to be multidimensional poor with a difference of almost 57% of the multidimensional poverty rate of black African children compared to white children with 11.5%, whilst asian/ indian children at 16.8% and coloured children at 37.9% respectively.

The Food Research and Action Center (FRAC) (2017: 2) brought arguments previously made by Black and Dewey (2014: 1) that myriad factors that were associated with child deprivation which had serious implications for the child through to adulthood and these include food insecurity caused by childhood poverty, socioeconomic inequalities resulting in poor nutrition, inaccessible to healthcare and compromised education as well as housing instability. The consequential negative outcomes of children living in poverty and food deprivation could result in complexities of future stability in economic development and social well-being of the child as the situation tends to maximise the risk for the child dropping out of school, and as a result having to accept menial, and low paying jobs.

Scotland's Census mentioned that for a household to be deprived, it had to meet one or more of the following conditions, namely: low employment status, low level of education, poor health and disability and low-quality housing (National Records of Scotland 2017: 1). Aber, Bennet, Conley and Li (1997: 11) indicated that children who were extremely poor were faced with many adverse situations such as poor cognitive and socioeconomic development. Hurley, Yousafza and Lopez-Boo (2016: 1)

supported this statement by stating that poor nutrition and inadequate learning opportunities affected children's development and academic progress leading to lifelong health and economic disparities. Strong associations exist between poverty in early childhood and problem behaviour later in life as emphasized by Mark, Lambert, O'Loughlin, and Gray-Donald (2012: 1) explained that older children who came from disadvantaged communities were more at risk of being exposed to unsafe situations such as smoking, poor diet and inappropriate behaviour which might contribute to chronic diseases in their adult lives.

1.2 BACKGROUND TO THE PROBLEM: GLOBAL PERSPECTIVE

The Food and Agriculture Organisation of the United Nations (FAO) (2019: 1) explained that food security occurred when all people, at all times, and had physical, social and economic access to sufficient safe and nutritious food that met their dietary needs and food preferences for an active and healthy life.

The Global Nutrition report (2016: 48) explained that children who resided in rural areas were more likely to display stunted growth. In over 13 countries an estimated 30% of children who lived in urban areas indicated signs of stunting. Lehohla (2017: 18) highlighted that women and children who resided in developing countries were most vulnerable to be affected by hunger. The Global Nutrition report further mentioned articles by Goularte, Ferreira (2012: 1512) and Mkhize and Sibanda (2020: 2) that explained that in terms of health and nutrition indicators, regression was prevalent amongst the impoverished groups with common factors including inadequate sanitation facilities, low income and poor access to education.

1.3 BACKGROUND TO THE PROBLEM: THE AFRICAN CONTINENT PERSPECTIVE

A more recent study by FAO of the United Nations (2019: 17-18) indicated that over the past 10 years there had been a decline in the prevalence of undernutrition worldwide, which indicated that hunger was gradually decreasing. This indicated a slow progression towards the goal set of eradicating poverty by the year 2030. However, statistics showed that Africa had made the least amount of progress in combating the prevalence of stunting since 2012, with more than 9 out of 10 cases of stunting globally found in the African continent.

Akombi, Agho, Merom, Renzaho and Hall (2017: 64) explained that undernutrition in children was a serious public health issue which contributed to the economic and social complexities of many countries, and which mostly affected middle to low-income countries. UNICEF (2016: 3) reported that children from rural areas were twice as likely to die before they reached the age of five years compared to children born in urban areas. It further elucidated that this might be due to a lack of basic health services which were required to be available and accessible. Besides the special nature of child poverty, children were more at risk of living in poverty compared to adults; this was due to the fact that there were increasing statistics of children born to the poorest families, compared to middle and upper class families, and in addition, about 500 million children could still be living in poor socioeconomic households by 2030.

Insufficient diet and malnutrition were the forces of the global double burden of disease; furthermore, the gross domestic product (GDP) losses per year occurring from wasting, stunted growth and micronutrient deficiencies were most prevalent in Africa (Global Nutrition Report 2016: 48). UNICEF (2016: 5) reported that a household's wealth was a contributor to the chances of a child's survival rate. The report further explained that in sub-Saharan Africa, mothers who had no form of education were three times more likely to experience child mortality in their households, and this was due to their lack of knowledge of maternal care, and child healthcare and treatment.

Children who lived in extremely poor households were found mostly in developing countries. Sub-Saharan Africa had the highest rates of children who lived in extreme poverty-stricken circumstances at just below 49%; while the remaining 51% of children who resided in extreme poor socioeconomic conditions were spread across the world (UNICEF 2016: 3). Kings (2018: para. 12 line 1-7) added that a third of all people in sub-Saharan Africa faced severe food insecurity. They did not have sufficient resources and financial capacity which resulted in people regularly going for more than a day without food. Furthermore, children were the most affected by dietary probems, with one to two-year-old children in Zimbabwe who survived the drought pandemic experienced by the country, showing significantly stunted growth. Furthermore, 230 million people were undernourshed in 2017, indicating an increase of 10 million from 2016.

According to Akombi *et al* (2017: 8), under-nutrition was the underlying cause of child mortality. It further indicated that Africa was one of the continents reported to have the highest prevalence of under-nutrition. In an effort to eradicate this issue there has been some urgency for a holistic inter-organisation and inter-agency conference to be held aimed at achieving food security, adequate nutrition and reduction of poverty over a long period.

1.4 BACKGROUND TO THE PROBLEM: NATIONAL AND PROVINCIAL PERSPECTIVE

A report on poverty trends in South Africa stated that insecurity occurs when people lack access to physical and economically sustainable foods that are nutritious for healthy and productive health (Lehohla 2017: 25).

The report of the South African Department of Agriculture, Forestry and Fisheries (DAFF) (2014: 8) defined food and nutrition security as having food available and accessible with control over the physical, social and financial means in order to ensure food was safe for consumption, sufficient for all and provided the nutrients needed by the whole country at all times. Food security on a national level was measured by a country's ability to remain above the poverty line in terms of the minimum per capita nutritional standards (Labadarios, David, Mciza and Weir-Smith 2009 cited in Joubert 2018: 1). Govender, Pillay, Siwela, Modi and Mabhaudhi (2017: 15) also emphasized that as a country, South Africa was food insecure; however, food insecurity affected one in five households, with the majority being located in rural communities. In addition, most rural dwellers consumed a diet that had limited food variety and was inadequate in terms of fruits and vegetables.

A number of underlying causes of malnutrition in South African households contributed to 53.0% of black South Africans being affected by poverty (Govender *et al.* 2017: 14). Ronquest-Ross, Vink and Sigge (2015: 1) explained that food consumption was affected by the availability and accessibility of food and food choices; while food choices were influenced by various factors which included cultural background, religion, ethnicity, geographical location, education, demographics, household income, government and other determinants.

According to Lehohla (2017: 19) food insecurity occurred when individuals had insufficient access to physically and economically sustainable, adequate, nutritious and socially acceptable food for a healthy and active life. Malnutrition caused an increase in the number of infectious diseases that people were exposed to and which affected the development of children or even resulted in child deaths. The Eastern Cape and Limpopo provinces were amongst the poorest provinces in the country and had been since 2001, with the highest rate of 12.7% of households identified as multi-dimensionally poor in the Eastern Cape (EC) in 2016. Furthermore, there was still a notable gap in the levels of poverty between the various racial backgrounds and the gender of individuals. In essence, black African females, children below the age of 17 years, uneducated adults and those who resided in rural areas, particularly in the Eastern Cape and Limpopo provinces, were mostly affected by poverty (Lehohla 2017: 19). The World Bank (2018: 14-19) explained that poverty in South Africa was caused by the country's high unemployment rate due to socioeconomic difficulties, which had resulted in some South African families, particularly those headed by single mothers as well as those without a fixed income, being most vulnerable.

Statistics South Africa (STATSA 2019) reported a decrease of 0.7% in the gross domestic product (GDP) in 2017 and the country was declared to be in recession mode. In 2016, the unemployment rate in South Africa was 26.33%, reflecting an increase from the 25.77% quoted in the 2006 report and which contributed to the incidence of high poverty levels. According to the Eastern Cape Socio-Economic Consultative Council (2017: 1), an estimated 18.59% of households in the Enoch Mgijima Local Municipality lived on an income of less than R30 000 per annum. Furthermore, the Eastern Cape Socio-Economic Review and Outlook (SERO) (2017: 19) indicated that in the entire province of the Eastern Cape, the Chris Hani district had the highest rate of unemployment of 42.5% in 2015 (South African Department of Economic Development and Tourism 2017: 19), and according to STATSA (2016:1), which used the South African Multidimensional Poverty Index (SAMPI) to measure the poverty levels within the country, the Chris Hani district in the Eastern Cape was the only province which had remained unchanged since the poverty headcount of 0.8% in 2011 and had remained so again in 2016, which indicated no improvement in terms of reducing poverty levels in this district. The report noted that new strategies needed to be implemented to combat the issue in order to achieve a low or even zero percentage of the population living below the national poverty line.

1.5 MOTIVATION

The UNICEF and the World Bank Group (2016: 4) reported that children were at risk of living in extreme poverty in countries that had experienced unjust diplomacy where the livelihoods of citizens were threatened by a number of factors such as poor financial management, lack of policies to combat inequity and a weak civil society; the report further stated that close to 58.0% of children who resided in countries that were affected by such factors lived in extremely poor households. Addressing these multidimensional aspects of child poverty was of importance to ensure that the set global target for 2030, which was to eradicate extreme poverty in children, was achieved.

This study aimed to report on the levels of deprivation within households in rural communities that influenced a children's food intake and nutritional status. Mushapi, Dannhauser, Walsh, Mbhenyane and van Rooyen (2015: 98), reporting on the nutritional status of children in South Africa, elucidated that the diets which were given to children in most rural areas lacked variety and therefore contributed to under-nutrition in children. It further explained that indigenous foods resulting from crop farming could play a vital role in improving dietary restrictions within the rural populations.

Numerous studies (Annexure F) have adopted the Alkire-Foster method of the Multidimensional Poverty Index (MPI), including the South African Multidimensional Poverty Index (SAMPI) that also adopted the Alkire-Foster method of the MPI to measure deprivation and poverty levels in South Africa; however, no analysis in South Africa shows to measure the three dimensions at the same time health, education and living standards and also looking at the impact of a household income. These methods are unable to determine a complete index of poverty levels within the country. Therefore, this research study strategically adopted the Akire-Foster method measuring instrument and presented the findings of the MPI as well as the results of the household income, and extended the investigation by determining the relationship between the MPI and household income and the effect they have on a child's nutritional status and food intake; thereby providing in greater detail an Acute Multi-dimensional Poverty Index (AMPI) of households in the sub-local municipal area of Enoch Mgijima Local Municipality in the three rural areas of Lesseyton, Machibini and Birch Farm, Eastern Cape.

The purpose of this study is to inform the local government of issues faced within households, and the impact these disparities have on a child's overall wellbeing. In addition, it is to educate parents, caregivers and the communities overall, on methods they can make use of to assist them in reducing food insecurity within households. The findings of the study will enable policy makers, government and non-government organizations to determine policy actions with the aim of reducing child poverty within the three particular rural areas of Komani in the Eastern Cape.

1.6 RESEARCH AIMS AND OBJECTIVES

1.6.1 Research aim

The main aim of the study was to evaluate household deprivation using the acute multi-dimensional poverty index (AMPI) and its relationship to the food intake and nutritional status of children 6-13 years in the rural areas of Queenstown, Eastern Cape.

1.6.2 Research objectives

The objectives of the study were to:

- Determine the deprivation level or extent of the household
- Determine the actual food intake of the children in the households
- To assess the dietary diversity of the children
- Determine the nutritional indicators of the children by weighing and measuring each child
- Determine the relationship of the MPI score of the households to the food intake and nutritional status of the children.

1.7 FRAMEWORK OF THE STUDY

Formulation of study and proposal (Writing the research proposal in 2017)
Ethics clearance (Obtaining ethical clearance from the Research Ethics Committee at Durban University of Technology in 2017)
Obtaining permission to conduct research from the councillors (2017)
Councillors sign agreement form to conduct research in their designated areas (2018)
Permission from the participants (signing of the consent forms by both parents/ legal guardians and the children in 2018)
Data collection and fieldwork ✓ Train fieldworkers ✓ Data collection conducted in May and June 2018 ✓ Collected data was checked for completeness and accuracy by the researcher and n=200 x4 questionnaires were deemed usable
Data capturing, analysis and interpretation (Data was captured using an Excel spreadsheet and analysed using an SPSS version 23,in 2019; 2020)
Writing of dissertation (2019 and 2020)
Submission of the dissertation (December 2020)

Figure 1.1: Framework of the study

1.8 STRUCTURE OF THE DISSERTATION

Chapter one introduces the problem statement and highlights on literature findings on a global, African, national and provincial perspective. Indicators on measuring instruments are included as Annexure F. The research aims and objectives are provided in detail to provide an understanding of the research purpose. Study's framework is included to give an indication on the commencement of this research study. Chapter two outlines a conceptual model adopted from the UNICEF (2016) and the Lancet framework, with literature encompassing the conceptual model as indicated in the table of contents. Chapter three includes the methodology of the study. A geographical area of the study is indicated to provide information on the study's municipal area within its District. Ethical considerations of the study are explained as well as the research design of the study. Chapter four provides an analysis on data collected, the study's results are presented in tables and graphs and a discussion of the results is included with reference to literature. Chapter five summarizes the findings of the study and provides conclusion with recommendations of the study's results.

1.9 CONCLUSION

If one of the global targets set according to the SDGs were to be met by reducing the global MPI target of children who live in poverty in all its dimensions to 18.5%, it would create a better living environment for children worldwide (UNICEF 2019).This would reduce the child mortality rates caused by nutritional inadequacies and improve the educational capacities of children in schools therefore contributing to a better educated and skilled future generation. It is important that these set goals are achieved to diminish poverty in all its forms everywhere in order to create a better standard of living for all individuals world-wide. The literature reviewed in this chapter has highlighted the various factors and influences that have contributed to the poor food intake and nutritional inadequacies of children particularly in SA and specifically within the province of the Eastern Cape in the specified rural areas of Queenstown.

CHAPTER TWO - LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews the degree of distinctness in outline of household deprivation; and presents an in-depth review of literature on the Multi-dimensional Poverty Index (MPI). It also presents an analysis on how each of the indicators within the MPI impact children's food intake and nutritional status and reviews the available literature on dietary intake and dietary diversity.

The purpose of the research study was to evaluate deprivation at household level. Therefore, the Multidimensional Poverty Index (MPI) adopted from the Alkire and Foster (2010) method identifies multi-dimensional deprivation experienced in a household and at an individual level at the same time within three dimensions, namely: health, education and standard of living. It uses data constructed from the same survey, and in this research study a socio-demographic questionnaire was used to determine the multidimensional deprivation levels of each household by use of the MPI. Each individual in a household was classified as either poor or non-poor depending on the weighted cut-off point of deprivations a household experienced. The second part of this study was to establish whether the results of the MPI had any direct consequences or influences on a child's food intake and nutritional status, thus a conceptual model from the UNICEF (2016) and the Lancet framework were adopted for this study to indicate factors that had detrimental effects on the children's development and growth, thus resulting in children being reported to be multi-dimensionally poor when measured using the AMDPI by Alkire and Foster (2010).

A child's health status is determined by many factors as explained by the UNICEF model and Lancet (WHO) framework which highlight on the causes of malnutrition, and the different levels at which these causes produce different factors and how much they affect a child's health status, namely poverty, poor sanitation, education, limited access to food. The factors which are highlighted interlink with the MPI's mission which is to determine the poverty levels within a household and how the indicators of the MPI affect the child's overall health status. In order to be able to determine the level of deprivation; factors or indicators which contribute to the health status need to be established by use of the UNICEF and Lancet model. Therefore, a cohort argument of this framework is established.

Below is a revised model of the dimensions of deprivation of the MPI adopted from the Alkire-Foster method (Alkire and Foster 2010) and the relationship they have on the causes of malnutrition adopted from the UNICEF (2016) conceptual model by Black, Allen, Bhutta, Caulfield, de Onis, and Ezzati, (2008).

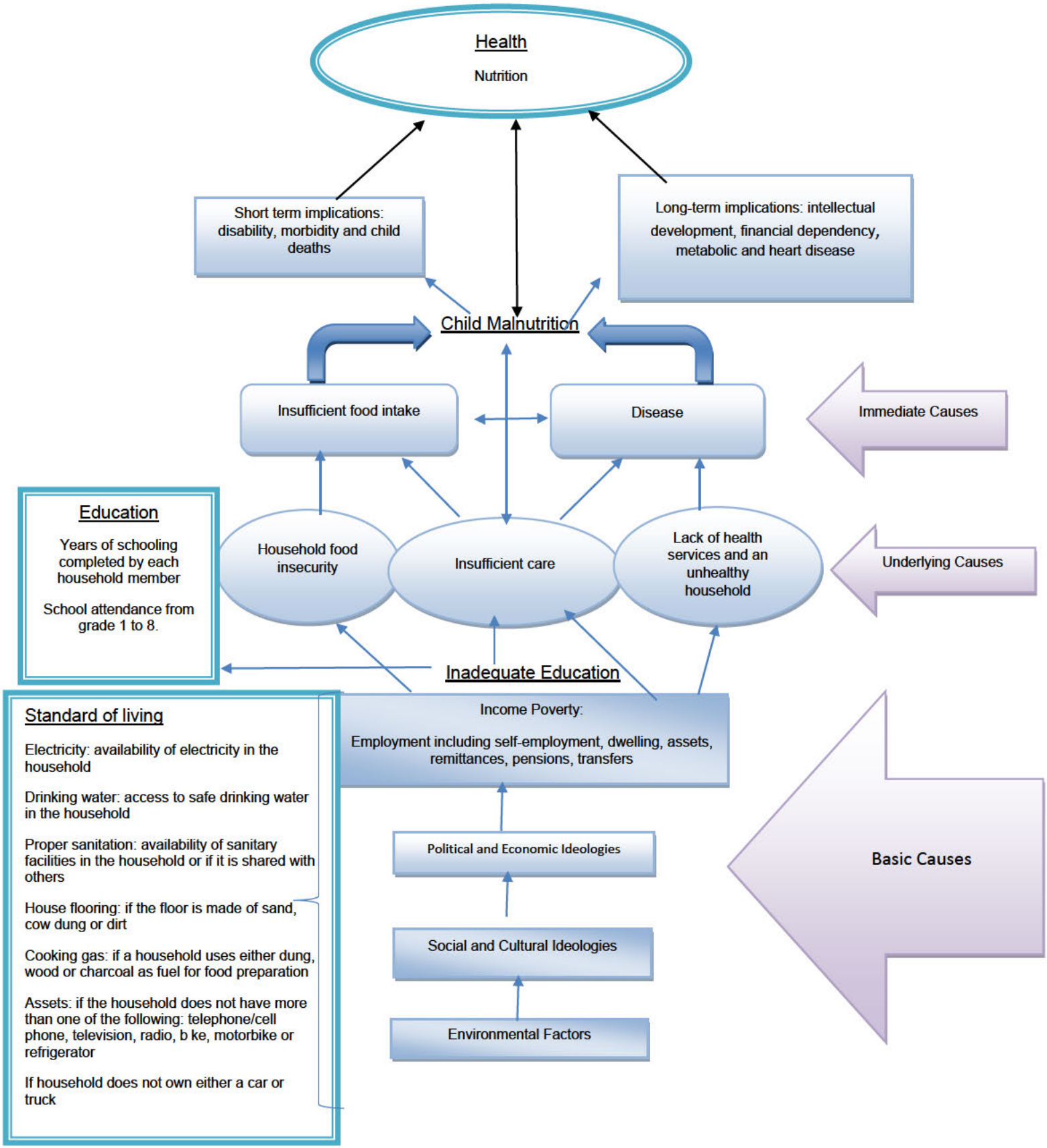

Figure 2.1: Adopted from the model on the dimensions of deprivation and the relationship they have on the causes of malnutrition (Alkire and Foster 2010, UNICEF 2016 and Black *et al*. 2008)

2.2 CAUSES OF MALNUTRITION

2.2.1 Immediate causes

2.2.1.1 Inadequate dietary Intake

According to Harrington, Lutomski, Molcho and Perry (2009: 16) and Drewnowski and Eichelsdoerfer (2010: 246) households with a low household income relied on purchasing foods that were energy-dense but lacked nutrients, and foods with a high salt and sugar content instead of purchasing foods that were rich in nutrients due to their inability to afford nutrient-rich foods. This resulted in many detrimental health outcomes which mostly affected the poorest in the communities. In a recent study by UNICEF (2019: 19) it was reported that in poorer families there was an increase in the consumption of energy-dense foods which consisted of highly processed foods, large amounts of saturated fats and sugar and a high salt intake; as a result foods mostly found to be missing in poor households included whole grains, fruits, nuts and seeds, vegetables and omega-3 fatty acids. The Food Research and Action Center (FRAC) (2017: 5) and Herman, Afulani, Coleman-Jense and Harrison (2015: 50) explained that the implications of restrained financial resources had a direct impact on those who were food insecure and as a coping mechanism many families adopted strategies that would stretch their budget, such as purchasing mainly low-cost foods which were energy-dense and including limited or no fruit or vegetables in their groceries, diluting infant formula, and excluding foods recommended by health practitioners in medical diets such as diabetic diets, which then had serious implications for their health.

UNICEF (1998) indicated that inadequate dietary intake contributed to child morbidity and mortality cases which were most prevalent in developing countries. It further stated that as a result of a child not having enough food to eat for proper growth and development, they developed a weakened immune system, consequently prolonging the duration of sicknesses and diseases. A study conducted in developing countries which focused on school-aged children showed that children predominately consumed food items such as cereals and cereal products, tubers and roots with very small amounts of animal food sources. In addition, Ochola and Masibo (2014: 34) explained that children who lived in rural areas often skipped breakfast or hardly ate breakfast before going to school.

2.2.1.2 Diseases

The World Health Organisation (WHO) (2012: 21) and Wang, Chen, Sheng, Wang, Yang, Zhou and Bergquist, (2017: 1) reported that poverty-related outcomes including the unavailability of food, lack of adequate shelter, financial insecurity and lack of safety and social protection exposed individuals to several infections that contributed to a number of fatality reports. Bhutta, Sommerfeld, Lassi, Salam and Das (2014: 1) further clarified that the infectious disease of poverty (IDOP) had relatively affected the poorest parts of the world and as a result a cycle of poverty had spread long-term illnesses, disability and social stigma.

A recent study by UNICEF (2019: 18) stated that children found in the poorest countries who were not growing adequately were exposed to the triple burden of malnutrition. Malnutrition has been found to

be a result of inadequate dietary and nutrient intake needed to combat specific diseases in the body (Prell and Perner 2018: 1). Moreover, Walson and Berkley (2018: 232) explained that children who experienced malnutrition suffered from severe diseases and increased acute morbidity and mortality when exposed to infections. The most common diseases associated with malnutrition included diarrhoea, pneumonia, measles, malaria and HIV and AIDS (Walson and Berkley 2018: 235 and Fenn 2009: 5). According to UNICEF (2018), over 200 deaths of children in South Africa below the age of five years were reported to have resulted from preventable diseases such as HIV and AIDS, pneumonia and acute diarrhoea which are the most common causes of child fatality.

2.2.2 Underlying causes

2.2.2.1 Inadequate access to food

On a national level South Africa is food secure; however, at household level, the country is food insecure. This has resulted in widespread hunger both in rural and urban areas, leading to evidence of wasting, stunting and micronutrient deficiencies in children (Crush and Tawodzera 2016: 1). According to the South African Human Rights Commission (SAHRC) (2016: 1), one of the basic human rights, which was recognised both nationally and internationally, was to protect the right of people to have access to food and feed themselves, either by producing their own food or purchasing it. Vorster (2010: 435) explained that a disproportionate number of people who lived in hunger also suffered from malnutrition because they were unable to afford enough food needed for proper maintenance of their health. The report further illustrated that rural households were mostly affected by the devastation of poverty and hunger which hindered the development of the community. A study conducted in Pakistan revealed that poverty strongly contributed to food insecurity, with malnutrition mostly affecting both women and children. It further indicated that poverty was worse in the rural areas (Sleet 2019: 9).

According to the United Nations (UN) report (2012), approximately 870 million (12.5%) people globally were undernourished between the years 2010-2012. Of those people who were undernourished, the majority of the population were found in the regions of Africa, where a significant estimate of 14.9% of the population was found to be undernourished. Furthermore, the report stated that on a yearly basis, nearly six million child mortality cases were recorded from malnutrition and other related diseases. The report further elaborated that the bulk of those individuals who suffered from hunger and malnutrition were predominantly small farm owners and those owning no land, mostly women and children. The South African National Health and Nutrition Examination Survey (SANHANES-1) report (2013), indicated that 50% of South African citizens were living in hunger and a further 28% were most at risk of experiencing hunger; moreover, the study indicated that hunger was most prevalent in the Eastern Cape and Limpopo provinces, with an estimated more than 30% being affected (Maluleke, Shisana, Labadarios, Rehle, Simbayi, Zuma, Dhansay, Reddy 2013:5). Black South Africans experienced the highest rate (30%) of hunger, followed by Coloured people at 13.1%. A large percentage (28.5%) of the Indian population was also at risk of experiencing hunger (Human Sciences and Research Council (HSRC) and Medical Research Council (MRC) 2013: 3).

2.2.2.2 Inadequate care for women and children

Detrimental health implications mainly affected the poor, especially women and children from poor financial backgrounds with either little or no form of education and unemployment (Shah 2013: para. 8 lines 1-3). Women and children were most at risk of suffering from protein energy malnutrition (PEM), as well as micronutrient deficiencies, more specifically iron, iodine, Vitamin A and Zinc (Ritchie and Roser 2017: para 7 line 1-5). In addition, poverty was described as hunger, lack of shelter, inaccessibility of school facilities leading to illiteracy, and lack of medical assistance (Compassion International 2015: para 5 line 1-2). The World Health Organisation (WHO) (2019: 1) reported that the most common causes of child mortality resulted from inadequate or unhygienic facilities, lack of competent and motivated healthcare workers, lack of available medical treatment or poor quality of medication provided, including lack of clinical interventions and clinical practices, and poor record-keeping. An article by Atassi (2019: para. 1 line 1-6) reported that a staggering number of children were found to be at risk of acute malnutrition resulting in an extreme skeletal appearance, whilst other findings included 40 million children who were at risk of being overweight.

UNICEF (2019: 18) stated that in a study done in 53 countries, 20% of children below the age of five years in low to middle income homes were left alone or in the care of someone who was not deemed reliable for such a responsibility, such as a sibling who was below the age of 10 years. This was due to mothers who needed to go to work to financially sustain themselves and their children. The report further explained that lack of child care by people of a reliable nature such as a parent was one of the factors contributing to child injuries, poisoning and drowning, resulting in child deaths.

In 2010 UNICEF published a report with figures indicating that close to 40% of all child deaths occurred during the neonatal period, which is the first 28 days of the child's life. Statistics released in 2005 by UNICEF indicated that for every 100,000 children, about 410 child mortality cases were recorded. The report indicated that these deaths mostly occurred where pregnant women went for antenatal care and delivery of their babies at maternity clinics and hospitals in the care of skilled workers (UNICEF 2010: 14). In 2017, approximately 4300 mothers died due to complications with pregnancy and child birth, with an alarming 20,000 stillborn babies and 23,000 babies died in their first year of life, thus making a total of 75,000 children who did not reach the age of five years in 2017. UNICEF further indicated what the causes of the child deaths in South Africa were, and the results were as follows: HIV and Aids accounted for 35%, neonatal causes were responsible for 30% of deaths whilst diarrhoea claimed 11% of the children's lives and pneumonia caused 6% of the children's deaths (UNICEF 2018: 1).

Cherish, Luchters, Blaauw, Scorgie, Kern, van den Heever, Rees, Peach, Kharad, and Fonn (2016: 1) flagged South Africa as one of the countries which recognised this prevalence since it had developed initiatives aimed at reducing child poverty and mortality cases by offering a Child Grant, which was instituted in 1998. This was aimed for parents or caregivers of children between 0 to 18 years who were not working or were unable to sustain the financial needs of the child (South African Social Security Agency (SASSA) 2014: 1).

2.2.2.3 Unhealthy environment and inadequate health services

The unavailability of medical or health services is one of the factors which affect the health status of people worldwide. According to a paper from the University of the Western Cape (UWC), health and wellbeing may be affected by social, economic and political factors. Roberts (2018: 1) from the Health Poverty Action group, a non-government organization, also elucidated that the causes of poverty on a global margin were widely affected by political, social and economic injustices; furthermore, the article highlighted the link between poverty and poor health systems which impacted the impoverished as follows:

- Economic and political structures which sustained poverty and discrimination needed to be transformed from poverty and poor health to a healthy and sustainable environment.
- Marginalised groups and vulnerable individuals were most affected as they were deprived of information and had insufficient access to health services and money, which prevented them from being treated for diseases.
- Vulnerable individuals who did not understand the potential consequences of neglecting their health, might end up putting their own health at risk by prioritising the provision of food for their families over paying for medical treatment that they may need.
- The influence of cultural and social determinants might prevent vulnerable or marginalised groups from seeking medical assistance.
- In most cases the burden of taking care of a sick family member usually fell to the female children, requiring them to leave school and seek wage-paying work.
- Overcrowding, poor living conditions, shortage of food and inadequate access to clean, safe water contributeed to the pandemic of air-borne diseases such as Tuberculosis (TB), and respiratory infections such as pneumonia.

2.2.2.4 Education

According to the late Nelson Rolihlahla Mandela, education was the most powerful weapon which you could use to change the world. South Africa's Bill of Rights emphasizes 'the right to basic education' which obligates the government to provide the necessary resources to honour one of the basic human rights (Mtwesi 2013: para.1 lines 1-4). An article on child poverty indicated that children born of mothers who lacked any form of education or were illiterate were twice as likely to die before reaching five years of age than children whose mothers had a secondary or higher education (Child Poverty and Action Group 2016: para. 1 line 2). This was because of the lack of knowledge uneducated or illiterate parents had in respect of good nutritional foods needed for the growth and development of the child. In cases where government-based schools did not require fee payment, families still needed to incur costs in respect of books, uniforms and transportation, which might cause undesirable stress to the family which was unable to cover the required costs to send the child to school, therefore resulting in a number of poor households removing the child from school. According to Child Fund International (2019: para 1-4. line 1-10), access to education or schooling improved food security and

decreased malnutrition; it also reduced the spread of non-communicable diseases, improved the standard of living and health care and improved gender equality.

Based on the General Household survey conducted in 2017, on a national level in South Africa approximately 32.3% of children from the age of five years and older attended school, with over 80% of the children attaining either an elementary and secondary level of schooling, while 4.5% attained higher or tertiary education. Macha and Kadakia (2017: 1) explained that according to the 2015 survey, the results indicated a split in the rural to urban education process by noting that 41% of grade six pupils in rural areas were reportedly illiterate compared to only 13% of illiterate pupils in urban areas. In addition, Writer (2017: 1) elucidated that almost half of South African individuals between the ages of 25 and 34 did not possess an upper secondary education qualification. Moreover, educational tools and facilities differed depending on the locality, as many schools in the rural areas lacked basic resources such as electricity and sanitary facilities with running water and there was also insufficient availability of learning material. Education has been seen as the solution to economic growth, reduced income disparity, reduced child and maternal mortality cases, reduced stunted growth amongst children, a decreased rate of HIV and AIDS and reduced cases of gender based violence in households and in our communities. The United States of America, Department of Economic and Social Affairs (2017: 1) stated that in low income countries, if all school-age children were to attend school, a projected 171 million individuals would not be victims of extreme poverty; moreover, if all adults were to complete their secondary education level, a global poverty rate reduction of over 50% would be achieved.

SAHRC and UNICEF (2014: 18) explained that poor South African children in particular were predominantly black and coloured as their parents were the product of the historically disadvantaged sector of the low-performing education system. It further elucidated that most black and coloured children that entered the school-system were found to be at a disadvantage because they had less educated parents with fewer resources compared to their white peers.

2.2.3 Basic causes

The global increase in the price of food has affected communities' worldwide and enforced people to re-evaluate and prioritise their financial spending. The availability of economic and human resources affected a child's food intake and nutritional status. Donald, Wendderburn, Barnett, Nhapi, Rehman, Stadler, Hoffman, Koen, Zar, and Stein (2019: 14) explained that children both in households and communities were subjected to risk factors at some point in their lives. Multiple resources were available to support children's development as well as to play a part in instilling knowledge and beliefs in individuals. All of this affected children's lives, including the things they learned, and whom they looked up to for direction and assistance; all of which contributed to the developmental challenges and opportunities which children experienced.

2.2.3.1 Political and economic ideologies

Erikson and Tendin (2003: 1) and Rabinowitz (2018: 4) explained that political ideologies were a way of having a strong influence on political attitudes and behaviours. In sub-regions the gross domestic product (GDP) per capita growth on average declined, which amounted to 263 million people being affected. In 2018 more than 96 million people who lived across 33 countries suffered from severe food insecurity due to the prevalence of unemployment, inflation and currency depreciation which increased the prevalence of poverty (FAO 2019: 1). The global financial burden affected many developing countries particularly those in sub-Saharan Africa.

2.2.3.2 Social and cultural ideologies

Poverty causes many families to be unable to buy sufficient food. This has resulted in many men leaving their families in search of work opportunities and sufficient income to satisfy their family's financial needs. Thus many homes are now headed by women (mothers and grandmothers), and often it is the children who find themselves forced by circumstances to take care of the household's needs. Poverty can lead to family friction and the abuse of children in the household. In many instances, women do not have access to sufficient money, land and other resources to financially sustain the household; in addition they also have less control than the men over the decisions affecting the family. Furthermore, food choices made by households are dependent on resources such as access to transport and location of food outlets. Reddy and Anitha (2015: para. 3 line1-3) explained that cultural influences affected foods consumed by people due to their different cultural and traditional backgrounds, which caused diet restrictions such as the exclusion of, inter alia, meat products and milk from their diets.

2.2.3.3 Environmental factors

The WHO (2015: 9) elucidated that in South Africa, environmental factors were associated with the accounted for child mortality cases of 124 in 100,000 children below the age of five years. The most hazardous environmental settings which were detrimental to a child's health were found in and around places they mostly spent their time at, which was either at home or at school. Bayat, Louw and Rena (2014: 4) indicated that inadequate access to basic services and housing had a direct impact on the hygiene levels and overall health status of household members, especially children. The South African Health Review (SAHR) (2016: 46) emphasized the importance of the availability of clean, safe water which was essential for a person's health. Approximately 88% of waterborne diseases were caused by unclean water and the unavailability of adequate sanitary facilities, resulting in waterborne diseases including diarrhoea, cholera, typhoid fever, shigellosis or even death. Statistics South Africa (STATS) (2018) further stated that the population growth, particularly in the number of smaller households in South Africa, was causing pressure on the environment as there was an increased need for basic household items such as stoves and fridges and access to services including water and electricity thereby increasing the demand for more resources. Transport was another factor contributing to pollution as the demand for transportation resulted in the increased usage of non-renewable resources such as diesel, oil and petrol manufactured from oil, gas and coal, which are all

non-renewable. The South African Health Review (SAHR) (2016: 36) elucidated that dietary diversity played an important role in the prevention of under-nutrition as well as overweight and obesity; however, in the report it indicated a decrease in the diversity of foods consumed by South Africans, with people opting for inexpensive and unhealthy food choices.

2.3 MULTIDIMENSIONAL POVERTY INDEX (MPI)

The Oxford Poverty and Human Development Initiative (OPHI 2017) explained the Multidimensional Poverty Index (MPI) as an index of Acute Multi-dimensional Poverty. The MPI consisted of the following dimensions including Living Standard conditions, and Education and Health and were weighed using ten indicators. Each of the indicators within each dimension was weighted equally. The MPI outlined the amalgamation of deprivations which affected a household at the same time.

2.3.1 MPI dimensions indicators and deprivation

Table 2.1 illustrates the MPI dimensions and indicators which are used to measure the deprivation levels at an individual and household level (Oxford Poverty and Human Development Initiative OPHI) 2017: 1).

Dimensions	Indicator	Cut-off points
1. Health status	1. Child mortality: any child that has passed on in the family 2. Nutritional status: if a child or adult has been diagnosed with malnutrition in the past	The indicators are equally weighted at 1/6
2. Education background	1. Number of school years: any member in the home that did not complete grade 9. 2. School attendance: if a child is within school-age and is not attending school from grade one to eight.	The indicators are equally weighted at 1/6
3. Living standard conditions	1. Fuel : if a home has no source of electricity 2. Sanitary conditions: if the home lacks hygienic sanitary facilities or the toilet is shared 3. Water: If the home lacks sufficient access to safe, potable water or clean water is 30 minutes or further away from the home. 4. Floor: if the household has an earthen floor, sand floor or dung-finished floor 5. Food preparation fuel: if the household uses either dung, wood or charcoal as fuel for food preparation 6. Household resources: the household does not have more than one of the following household assets: radio, television, cell phone, bicycle, motorcycle or fridge and does not have ownership of a motor vehicle or tractor.	The indicators are equally weighted at 1/18

2.3.2 Analysis of the Multidimensional Poverty Index (MPI) of the Alkire-Foster Method

The first indicator of poverty was known as the Human Poverty Index (HPI), which was adopted so as to develop the MPI and was initially developed to ensure that the HPI was effective. Calderon and Kovacevic (2015: 3) explained that the global Multidimensional Poverty Index, also known as the MPI, was a method designed to determine the deprivation level against the global measurement. The Alkire and Foster method, which used the MPI to develop the OPHI framework, was the most recent tool for assessing poverty on a household level.

Gabel and Zhang (2017: 1) highlighted that the Alkire and Foster MPI (2010: 5) measured a household's experience of deprivation in any of the ten global MPI indicators, namely: nutrition, child deaths, number of schooling years, being present at school, cooking gas, sanitary conditions, access to safe consumable water, electric power, flooring and goods, including the measurements of poverty, namely: health status, living standards and education. Alkire and Foster (2010: 5) explained that income alone did not give a clear indication of whether people were deprived or not. This tool identified the different levels of deprivation experienced in households at any given time.

Table 2.2 illustrates the cut-off points for each indicator within the dimensions set by Alkire and Foster (OPHI 2017: 5)

Dimensions	**Indicators**	**Deprived**	**Weight of each indicator**
Educational background	Number of school years	If any member in the home did not complete grade 9	0.167%
	School attendance of child	If a child was within school-age and was not attending school from grade one to eight	0.167%
Health status	Child mortality	If any child had passed on in the family	0.167%
	Nutritional status	If a child or adult in the family had been diagnosed with malnutrition in the past	0.167%
Living standard conditions	Electricity (fuel)	If a household had no source of electricity	0.56%
	Sanitary conditions	If the home lacked hygienic sanitary facilities or their toilet is shared	0.56%

	Water	If the household lacked sufficient access to safe, consumable water or clean water was 30 minutes or further away from home.	0.56%
	Floor	If the household had an earthen floor, sanded floor or dung-finished floor	0.56%
	Food preparation fuel	If the household used either dung, wood or charcoal as fuel for food preparation	0.56%
	Household resources	If the household did not have more than one of the following household assets: radio, television, telephone, bicycle, motorcycle or fridge and did not have ownership of a motor vehicle or tractor	0.56%

2.4 HOUSEHOLD INCOME

The Child Poverty and Action Group (2019: para.5 line 1-3) stated that children who came from the poorest households were twice as likely to die before they reached five years of age, compared to those who came from financially stable households.

National Records of Scotland (2018: para.1-2 line 1-9) explained that household deprivation was classified according to indicators and there were four household characteristics or dimensions. A household was considered to be multi-dimensionally poor if they did not meet any of these characteristics, namely:

- Employment: if any member of the household was not a full-time student and neither employed nor had any long-term illnesses.
- Education: if any person in the household had at least level 2 education, also known as the elementary schooling (completion of grade R to grade 6) (Macha and Kadakia 2017), and if there was a school-aged child not attending school.
- Health and disability: if any person in the household had suffered from poor or very poor health or any long-term health problems.
- Housing: if the household's accommodation was overcrowded, or the family members lived in a shared dwelling or the dwelling had no central heating.

The South African Human Rights Commission (SAHRC) and UNICEF (2016) elucidated that poverty levels amongst children were most prevalent in rural areas and the former homelands areas. It further

stated that poverty was most prevalent among black South African children compared to other race groups. Section 28 of the Bill of Rights (Republic of South Africa 2019: para.4 line 1-4) stated that children have the basic right to be given a name, a place of origin and some form of care. Children require food and warmth and should be protected from any form of abuse, neglect and degradation. No child is permitted to work when under-age, or do work that would interfere with his or her primary source of education and development.

2.5 HOUSEHOLD FOOD INSECURITY

People who were experiencing food insecurity were in doubt about their ability to obtain food. Unfortunately they were forced to reduce the quality as well as the quantity of food they consumed because of insufficient financial capacity. Therefore, this resulted in inconsistent access to food which disrupted their daily dietary intake (FAO 2019).

The Food and Agricultural Organisation (FAO) (2010: para. 1 line 1-8) explained that households who were food secure had access to enough food and a variety of safe foods all year round for the household members' needs in order to live wholesome lives. Moreover, at household level, food security was referred to as the ability of members of the household to be able to provide, either from their own manufacturing such as farming, or by purchasing sufficient food to cover the dietary needs of all the household members. Tantu, Gamebo, Sheno and Kabalo (2017: 2) highlighted that household food insecurity was one of the biggest public health issues of consequence affecting both developed and developing countries. The FAO (2019:para.1 line 1) reported that in 2017, 821 million people globally were hungry and over 150 million children were stunted. In addition, climate change was one of the factors contributing to hunger. There was widespread undernourishment of people in countries which were most exposed to climate extremities.

Oxford (2018: para. 4 Line 1-6) stated that people who struggled to find employment, especially amongst the youth, caused a prevalence of food insecurity in their homes. The Human Sciences Research Council (2013: 333) indicated that approximately 50% of the country's population were found to be food deprived or at risk of experiencing food insecurity.

Statistics South Africa (STATSA) (2019: 14; 24) confirmed that of the 16.2 million households in the country surveyed in the country in 2017, 12.7 million were reported to have sufficient access to food, an estimated 15.8% indicated they had inadequate access to food, and almost 5.5% of households explained that they had severely inadequate access to food. Even though South Africa was food secure at national level, almost 20% of households in South Africa experienced severely insufficient access to food in 2017. This was dependent on their regional location; head of the household and the number of permanent residents in the household. North-West province at 64% and Northern Cape province at 66.5% were recorded to have the least number of households which had sufficient access to food, and these two provinces were seen as being the least food secure provinces in the country. Black and coloured households experienced more inadequate food accessibility than Indian/Asian and white households. In addition, overcrowded households with permanent residents were more

likely to experience inadequate food access compared to families with a small number of permanent residents.

2.6 POVERTY IN CHILDREN

Poverty was a severe and constant constraint, limiting the child's ability to reach their full potential. Although unexpected outcomes such as drought, inflation, earthquakes, death of livestock or conflicts affected the whole family, unfortunately children from these families ended up dropping out of school to go out to work. Approximately 145 million children between 10 and 17 years of age lived in extremely poor households (Save the Children Resource Centre 2017: 5). Short (2016: 47) explained that the first measure of poverty included income-based poverty measures which referred to the minimum amount of income needed to purchase necessary goods and services, as represented in a standard budget. The second measure of poverty included non-monetary sources, such as clothing, shelter, furniture, transportation and access to necessary health services, clean and safe water and sanitation.

The South African Human Rights Commission (SAHRC) and UNICEF (2014: 4) further explained that poverty did not only affect children's growth and well-being but it also affected the opportunity for them to develop into productive citizens. Pretorius (2016: para.1 line 1-2) reported that 63% of South African children were living in poverty, which caused impairment of their physical, cognitive and emotional development. The Children's Society (2019: para.10 line 1-7) further elaborated that children who were exposed to poverty were more likely to have poor grades at school, struggle to find employment in their adult life, experience social anxiety and exclusion, feel unsafe and be subjected to social stigmatisation and bullying at school.

2.7 FOOD INSECURITY

Tantu *et al.* (2017: 1) also highlighted the definition previously provided by the Food and Agricultural Organization (FAO) (2010:8) which explained that food security resulted in everyone at the same time having unlimited access to any physical, social and economic means to provide for sufficient, safe and nutritious foods that met the dietary requirements and food preferences for an active and healthy lifestyle.

Section 27(1) (b) of the Constitution of the Republic of South Africa states under the 'Basic right to food' that everyone has the right to adequate food and water. The right to food requires resources to be available at all times as well as to be sufficient to meet the needs of everyone without prejudice.

Fawole, Ilbasmis, and Ozkan (2015: 2) stated that the main reason for food insecurity in emerging nations was that people were unable to have access to food as a result of poverty. Food insecurity occurred when people were deficient either physically or economically, and were unable to access enough safe, nutritious and socially acceptable foods.

2.8 HEALTH

Health, as explained by the WHO (2019: para. 1 line 1-2), was a state of complete physical, mental and social well-being and not solely the absence of disease, sickness or frailty.

2.8.1 Child mortality

The South African Health Review (SAHR) (2016: 46) explained that reduced child mortality provided a very important representation of the health sector at both national and global level. The United Nations Inter-agency Group for Child Mortality Estimation (UN IGME 2018: 1) reported in 2017 that close to a million child mortality cases were of children between the ages of five to 14 years, and the majority of these mortality cases were due to preventable and treatable causes such as infectious diseases, injuries and drowning. UNICEF (2018: 12) further explained that these mortality cases were an indication of limited access to basic health services needed by children in remote or rural areas.

SAHR and UNICEF (2014: 2) reported that children continued to face regional and income disparities in terms of their chances of survival. On a global scale, measures of child mortality and morbidity indicated notable inequalities of poverty, social exclusion, discrimination, gender bias and the neglect of basic human rights.

The WHO (2015: 9-10) elucidated that between 1990 and 2017 the child mortality rate in children between the ages of five to 14 years declined by 52%, from 1.7 million to 0.9 million, and this indicated that child mortality cases had been reduced by half. The majority of child and adolescent deaths occurred in their first years of life with 85% (25 million) occurring in 2017.

2.8.2 Nutrition

2.8.2.1 Malnutrition

The WHO (2019: 1) defined malnutrition as a lack of, excessive amounts of, or imbalances in an individual's dietary intake. Malnutrition was most prevalent amongst women, infants, children and adolescents. Poor individuals were at notable risk of being affected by different forms of malnutrition. Therefore, malnutrition increased health costs, thus reducing productivity and retarding economic growth, thereby continuously repeating a cycle of poverty and illness.

2.8.3 Macronutrient malnutrition

Macronutrients, namely carbohydrates, protein and fats were needed in large amounts for energy. These nutrients complemented one another to meet the body's energy requirements. Children were required to consume a diet consisting of 45-65% carbohydrates, 25-35% fats and 10-30% protein (NICUS 2003: 13). Excessive intake of these nutrients was linked to health-related diseases such as obesity, diabetes, cancers, coronary heart disease and skeletal health problems (Alfadhi 2016: 194).

2.8.4 Various forms of malnutrition that affect a child:

2.8.4.1 Protein-Energy Malnutrition (PEM)

Mehta (2018: 1) elucidated that PEM was an indication of either marasmus, a disease caused by wasting due to insufficient intake of macronutrients and micronutrients, or kwashiorkor, a form of

malnutrition due to insufficient protein intake. Furthermore, PEM could result in loss of muscular size and strength and general symptoms included dehydration, iron deficiency and multiple vitamin deficiencies. This form of malnutrition was most common in infants and children in developing countries and described as either kwashiorkor or marasmus.

2.8.4.2 Acute malnutrition

Nordqvist (2017: para.1 line 1) highlighted that acute malnutrition was the result of reduced intake of food. Statistics provided by the Action Against Hunger foundation stated that 55 million children globally under the age of five years suffered from acute malnutrition and approximately 19 million children suffered from severe acute malnutrition; and of those children, 3.1 million children annually were reported mortality cases.

2.8.4.2.1 Severe Acute Malnutrition (SAM) - kwashiorkor

UNICEF (2015: para.1 line 1) described kwashiorkor as displaying the most evident signs of under-nutrition. According to the WHO (2015), severe acute malnutrition was indicated by extremely low weight-for-height (below the -3z score of the median WHO growth standards), and with visible severe wasting or by swelling caused by fluid retention. Furthermore, SAM was a leading cause of child mortality cases, with an estimated 16 million children below the ages of five years who had succumbed to it. Butler (2016: 1) reported that having a diet that was mainly comprised of carbohydrates could lead to kwashiorkor, and symptoms of this disease included oedema, which includes a puffy or swollen appearance caused by water retention, bulging of the abdomen, and an inability to grow or gain weight.

2.8.4.2.2 Severe Acute Malnutrition (SAM) - wasting/marasmus

An article on 'Action against hunger' stated that with SAM particularly, wasting is distinguished by severe loss of body fat and muscle tissue. Moreover, these children almost had adult features and were extremely thin and had skeletal body structures (Cullinan 2018: para. 10 line 1-7). Mehta (2018: 1) reported that marasmus could affect both adults and children; however, it was most predominant amongst young children. UNICEF (2016: para.2 line 1-2) estimated that almost fifty percent of all mortalities in children below the age of five years were due to a lack of adequate nutrition.

2.8.4.2.3 Chronic malnutrition (stunting)

According to Reinhardt and Fanzo (2014: 1), chronic malnutrition indicated growth failure, and this resulted from both physical and cognitive impairment due to poor nutrition. The study further explained that stunting was the most apparent symptom of chronic malnutrition, measured as height- or length-for-age. Based on the WHO (2019: 2) report, the degree of chronic malnutrition (stunting) was most prevalent amongst children in the poorest regions, accounting for 20% of households in Africa and Asia-Pacific. UNICEF noted that children in the poorest households were three times more at risk of being stunted compared to children from privileged households.

2.8.4.2.4 Underweight

Luka and Mena (2015: 8) stated that under-nutrition, a very important phenomenon of illness and mortality rates in Africa, was most prevalent amongst women and young children. Marcus (2013: 1)

elucidated that under-nutrition resulted from insufficient food intake, poor absorption of nutrients or excessive loss of nutrients.

2.8.4.2.5 Overweight and obesity

In 2016 the prevalence of children under the age of five years who were above the normal weight range was estimated at 41 million. Individuals who suffered from overweight and obesity in their childhood years were more likely to become obese in their adult years, resulting in a number of serious implications such as suffering from non-communicable diseases like diabetes, heart disease and some cancers (WHO 2019).

The Centers for Disease Control and Prevention CDC (2018: 1) explained that the consequences of obesity in children might be the following:

- High blood pressure and high cholesterol, which are risk factors for cardiovascular disease (CVD).
- Psychological stress issues, namely depression, behavioural problems, and learning problems at school
- Suffering from type 2 diabetes.
- Suffering from asthma due to breathing problems
- Gallstones and heartburn
- Low self-esteem
- Join problems

2.8.5 Micronutrient malnutrition (MNM)

According to the Centers for Disease Control and Prevention (CDC 2018: 1), micronutrients existed as dietary components which were referred to as vitamins and minerals, and even though they were only required in small amounts in the body, they contributed to the prevention of diseases and restore well-being. They were the important building blocks of the whole body. Micronutrient deficiency could affect cognitive development. The Food and Agricultural Organization FAO of the United Nations (2019: 5) further explained that micronutrient malnutrition (MNM) was most prevalent in developing countries and affected all age groups, especially women and children who were most at risk of developing micronutrient deficiencies. Typical micronutrient deficiencies included iron, vitamin A, and iodine deficiency. Over two billion people worldwide were anaemic resulting from iron deficiency, and 254 million preschool children were vitamin A deficient, and just below two billion had an inadequate iodine intake.

2.8.5.1 Strategies set to address micronutrient deficiencies

The FAO of the United Nations (2017: 1) explained that the control of vitamin and mineral deficiencies was an important part of the overall effort to fight off hunger and malnutrition. Actions were needed to educate parents/ caregivers about the utilization of a variety of foods, and ensure adequate access to, and availability and consumption of all foods for all population groups.

Strategies set in place for the prevention and treatment of micronutrient deficiencies in women and children by UNICEF (2018) included:

- Dietary diversification, which was intended to assist families to have access to a variety of nutrient-rich foods. This was done by educating caregivers on correct feeding and care practices of infants and young children.
- Food supplementation implementation, including folic acid and iron supplementation for pregnant women.
- Mass food fortification.
- Home fortification alternatives to add to foods during food preparation for children at home.

Table 2.3 Micronutrient requirements for children (Nutrition Information Centre at the University of Stellenbosch, NICUS (2003), Bradford Nutrition and Dietetics Service (2013).

Fat soluble vitamin requirements for children					
Nutrient	**Gender**	**Age**	**Dietary Reference Intakes (DRI's)**	**Function in the body**	**Food sources**
Vitamin A	All Boys Girls	4-8 years 9-13 years 9-13	400ug/day 600ug/day 600ug/day	• Vitamin A is essential to support healthy eyesight and functioning of the body's defences. Children who lack this nutrient are at risk of blindness as well as child fatality from infections such as measles and diarrhoea	Carrots, yellow and dark green leafy produce, liver, egg yolk, fish, milk and dairy products and fortified foods
Vitamin D	All Boys Girls	4-8 years 9-13 years 9-13 years	50ug/day 50ug/day 50ug/day	• It provides the ability to absorb calcium and phosphate for strong, healthy bones and teeth	Milk (fortified), and dairy products (fortified), salmon, liver, cheese and whole eggs
Water Soluble Vitamin requirements for children					
Folic Acid (Vitamin B9)	All Boys	4-8 years 9-13 years	200ug/day 300ug/day	• Folate is necessary in the early days of foetal growth for cognitive development	Dark green leafy vegetables, liver, kidney, whole grain cereals and cereal products, nuts and legumes

	Girls	9-13 years	300ug/day		
Thiamine (Vitamin B1)	All Boys Girls	4-8 years 9-13 years 9-13 years	0.6mg/day 0.9mg/day 0.9g/day	• Helps the body to function properly, including the nervous system, heart and muscles	Beef, liver, powdered milk, nuts, dried oats, pork, eggs, seeds, legumes, peas and yeast
Riboflavin (Vitamin B2)	All Boys Girls	4-8 years 9-13 years 9-13 years	0.6mg/day 0.9mg/day 0.9mg/day	• Needed for energy conservation, to build muscle and tissue, and supports good vision.	Dairy products, meat, grains, turnips, green produce
Niacin (Vitamin B3)	All Boys Girls	4-8 years 9-13 years 9-13 years	8.0 NE/day 12 12	• Helps in the proper functioning of the digestive system, including the skin and the nervous system	Mushrooms, cereals and cereal products, eggs, meat and meat products, green produce, nuts and seeds
Vitamin C	All Boys Girls	4-8 years 9-13 years 9-13 years	25mg/day 45mg/day 45m/day	• An antioxidant needed for the growth of connective tissue and for strong and healthy teeth and gums	Green produce, pineapples, strawberries, citrus fruits
Trace elements requirements for children					
Iron	All Boys Girls	4-8 years 9-13 years 9-13 years	10mg/day 8.0mg/day 8.0mg/day	• Iron is an important mineral for brain development.	Fortified maize meal and bread baked from fortified flour, meat and meat products, spinach, and enriched foods
Iodine	All Boys Girls	4-8 years 9-13 years 9-13 years	90ug/day 120ug/day 120ug/day	• It is required by the growing foetus for development of the brain.	Fortified salt
Zinc	All Boys	4-8 years 9-13 years	5.0mg/day 8.0mg/day	• It improves immunity, helps to fight off infections and promotes	Meat and meat products, fish, poultry, milk products, cereal and cereal products and fortified foods

	Girls	9-13 years	8.0mg/day	development of the central nervous system.	

2.8.5.2 Food fortification

Food fortification is the inclusion of essential vitamins and minerals in foods in order to increase their nutritional value. A moderate amount of micronutrient deficiency is concealed because habitually the signs of deficiency are not transparent and neither can they be felt. More than two billion people globally suffer from micronutrient deficiencies caused by insufficient nutrient intake; other factors include parasites, malaria and poor sanitation. In 2003, South Africa introduced food fortification R504 with iron, zinc retinol, Vitamin B1, B2, B3 and B6 of certain types of maize meal (Food Advisory Consumer Science (FACS) 2019: para. 1 line 1-3).

The WHO (2019: para.4 line1-3) explained that a lack of vitamin A in children resulted in severe visual impairment and blindness, with an increased risk of infectious illnesses such as diarrhoeal diseases and measles, that might even result in child mortality. Research numbers indicated that approximately 250 million preschool children were Vitamin A deficient and approximately 250 000 to 500 000 children became blind every 12 months, with fifty percent of fatalities due to loss of eyesight.

2.8.5.3 Food supplementation

Food supplements were high in vitamins and minerals and administered as part of intervention measures in health care or specific nutrition programmes (Federal Ministry for Economic Cooperation and Development 2012: 2). The European Food Safety Authority (EFSA) (2016: 3) elucidated that food supplements were intended to rectify nutrient deficiencies and to maintain sufficient intake of nutrients needed by the body to promote and maintain good health.

2.9 PROGRAMMES IMPLEMENTED TO ERADICATE CHILD POVERTY IN SOUTH AFRICA

2.9.1 Government grants

The ANC-led South African government elected post 1994 established a social welfare system aimed at improving standards of living for the people of this country and to redistribute wealth to create an equitable society. The implementation of social grants was aimed at people were at risk of or who were suffering from poverty; this included the elderly, people with disabilities and children (Kelly 2017: para.5 line 2-5). In 2001 it was estimated that one million people were receiving the Child Support Grant; but this statistic has significantly increased since then.

2.9.2 Child support grant

The child support grant was aimed at lower income households to assist parents with the cost of the basic nutritional needs of their children; it was ultimately intended to offset the high cost of living with a monthly allowance of R420 (Kelly 2017: para.7 line 1-3). Saunders, Reynolds and Lake (2017: para.16 line 2-3) explained that the child support grant did provide some form of relief; however, the minimal allowance received did not cover the child's nutritional needs.

2.9.3 Foster child grant

A monthly allowance of R1000 was given to the foster parent(s) of a child (South African Social Support Agency (SASSA) 2019: para.1 line 2-5).

2.9.4 Disability grant

The care dependency (or disability) grant covers disabled children from birth until the age of 18 years with a monthly allowance of R1780 per month (South African Social Support Agency (SASSA) 2019: para.1 line 1-2).

The government has implemented strategies that will assist children who are eligible to receive government grants to receive them; however, no strategies have been put in place to address the issue of parents who are unemployed, as this is one of the factors that results in child poverty. This has resulted in many households being dependent on the child's disability grant to help sustain the family even though it barely, or not at all, covers the household's living expenses.

2.9.5 Nutrition education

Mushapi, Dannhauster, Walsh, Mbhenyana, and Van Rooyan (2015: 98-99) suggested that nutrition education might play an important part to better educate parents on proper nutrition-feeding which could help to improve the nutritional status of children. In addition, promoting the use of indigenous and traditional food systems in poor and rural communities would help in combating the global problem of poverty, hunger and malnutrition.

2.10 STANDARD OF LIVING

According to South African Broadcasting Corporation (SABC) 2019 news report, the standard of living of South African households had improved since 2002. By 2018, formal housing had increased by over 5 million units since 2002. Moreover, electricity had become more accessible so that the use of paraffin and wood for food preparation had declined. In addition, over 15 million South Africans were now the beneficiaries of social grants. Writer (2019: 1) further elaborated that results released by STATSA indicated that South African households prioritised the following household basics:

- Food and domestic and personal hygiene products.
- Education for the children
- Electricity to cook, for warmth, and for safety and security
- Transport to go to work, to transport children to school, to go grocery shopping, and to access to public health care services
- Debt repayments

2.12 CONCLUSION

SAHR (2016: 1) elucidated that notwithstanding the government's commitment to provide sufficient accessibility to clean, safe water and sanitation by 2014, the country was still faced with a lack of adequate potable water and hygienic sanitation in many rural areas of the country, which continued to have an adverse effect on the health status of children. In addition climate change conditions affected the supply of water to rural areas, and this could have a detrimental effect on the children's health and development.

The literature reviewed in this chapter has provided an in-depth focus on the various underlying factors resulting in deprivation and the effects they have on children's food intake and nutritional status.

CHAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

This chapter provides a detailed description of the research design and methodology used in this study. A description of the participants and sampling procedure is provided, including an overview of the procedures that were undertaken to gather the data. The processes which were followed to complete the research and the data analysis of the study are elaborated on. The rationale of the study determined the AMPI score of each household by using a socioeconomic demographic questionnaire as well as assessing the household income and comparing it against the South African National Poverty Lines (STATS SA 2019) to determine the Acute Multi-dimensional poverty lines of the study's population and how they influenced the children's food intake and nutritional status. A 24-Hour Food Recall questionnaire was used to determine the dietary diversity of the children in the household by comparing it to the Dietary Reference Intakes (DRIs) of the Nutrition Information Centre at the University of Stellenbosch (NICUS) (2003). A brief overview of the measures used to collect the data is included to obtain the following objectives:

- Determine the deprivation level or extent of the household
- Determine the actual food intake of the children in the households
- To assess the dietary diversity of the children
- Determine the nutritional indicators of the children by weighing and measuring each child
- Determine the relationship of the MPI score of the households to the food intake and nutritional status of the children

A quantitative, descriptive research design was applied to evaluate the nutritional status and food intake of the children in rural Queenstown, Eastern Cape. The participants comprised of a purposive sampling technique. A total of 200 children were included in the study.

3.2 RESEARCH DESIGN

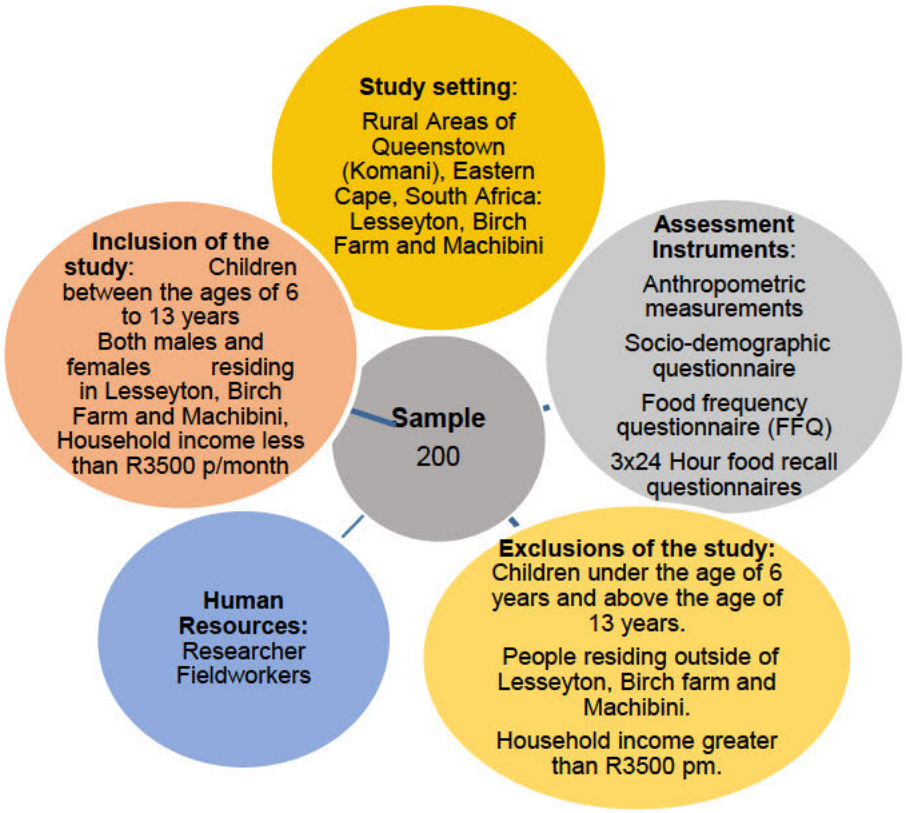

Figure 3.1: Framework of the research design

3.3 GEOGRAPHICAL AREA OF THE STUDY

Komani, formerly known as Queenstown, was established in 1853 and is situated in the heart of the Eastern Cape, a province dominated by Xhosa-speaking South Africans (Lukhanji Municipality Queenstown 2017).Enoch Mgijima Local Municipality was established in 2016 and is formally known as the Lukhanji local municipality, theTsolwana local municipality and the Inkwanca local municipality. It is situated within the Chris Hani district municipality and is the largest of the six municipalities within the district, thus making up a third of its geographical area and covers approximately 13 584 km² in extent of the geographical position within the Chris Hani district. It is made up of Queenstown, Tarkastad, Sterkstroom, Sada and other surrounding towns, farms and villages mainly situated on tribal land with an estimated population size of 267 011. There were a total of 72 000 households in the municipality, with an average household size of 3.7 persons per household. Eighty five point four percent of the population spoke IsiXhosa followed by Afrikaans spoken by 5.4% and English spoken by 4.4%, whilst 4.8% spoke other languages (Enoch Mgijima Local Municipality 2018).

The sustainability of the sub-district's economy came from its livestock, manufacturing of office furniture, engineering, steel works and various other resources (STATSSA 2011: 1). According to

STATSSA (2016: 15-27) the unemployment rate in the Eastern Cape within the non-metro areas for the first quarter of 2016 was estimated at 50.9%. Furthermore, levels of unemployment nationally indicated that there was an increase in unemployment of over a half a million since the 2015 statistics were recorded.

A report released on the Chris Hani District Municipality Growth and Development Summit in 2003 revealed that there were more than 900 000 people living in the Chris Hani district, with poverty levels estimated to be more than 70.0% and an unemployment rate of over 58.0%. In addition there were over 27.0% of employed people in the district who did not earn more than R400 a month, and only 6.0% of the people residing within the district earned more than R6000 a month; moreover, it further stated that there were households within the Enoch Mgijima local municipality that lived on R30 000 or less annually, which amounted to R2500 or less per month (Eastern Cape Socio Economic Consultative Council 2017: 6); this revealed how poverty-stricken the people within this district were, with these conditions directly affecting the children's food intake and nutritional status.

3.2: Geographical area of the study

Figure 3.2: Map of Enoch Mgijima Local Municipality (EC139) and other local municipalities within the Chris Hani district of the Eastern Cape province (Enoch Mgijima Local Municipality 2018).

3.4 ETHICAL CONSIDERATIONS

The research proposal was submitted and approved in 2017 by the Institutional Research Ethics Committee (IREC 58/17) at the Durban University of Technology (DUT) prior to the commencement of the study (Annexure A). The researcher approached the councillors of the three rural areas of Queenstown to request permission to conduct research in households in Birch Farm, Machibini and Lesseyton on children aged six to 13 years. There was a lack of published information on the nutritional status and food intake of the children in households within the district of Queenstown and surrounding rural areas. All three councillors granted permission for the research to be conducted in each of their communities. A letter of approval was obtained from each councillor to conduct the study (Annexure B). A meeting was held at the church hall in Birch Farm with the parents/ caregivers of the children in the area, and the researcher explained the purpose of the research study; it was also explained that participation in the research study was to be on a voluntary basis and that they could

withdraw from the study at any time. The parents/ caregivers of the children were notified by the researcher that all information collected during the data collection would be confidential as no names would be used.

It was further explained that there would not be any form of remuneration for participating in the research study. The researcher requested their consent to participate after explaining the aims and objectives of the research study. A letter of information was given to each parent/ caregiver of the selected children that explained the purpose of the study (Annexure C) and signed consent was requested from the parents/ caregiver of each child and the child prior to commencing with the data collection (Annexure D).

The parents/ caregivers and the children were assured that the children would only have to remove shoes and any heavy clothing such as jerseys or jackets if necessary; and weighing and measuring would take place in the privacy of their homes. All the participants were made aware that all information collected would be confidential and stored at the Department of Food and Nutrition Consumer Science in a locked cupboard for a period of five years and after this period it would be disposed of by shredding. Electronic data would be password protected and deleted after five years. Only the researcher and the supervisor would have access to this information.

3.5 SAMPLING CRITERIA

Inclusion criteria of the study:

- Children between the ages of 6-13 years
- Children residing in households of Lesseyton, Machibini and Birch Farm
- Both male and female children
- Children of all races
- Household income <R3500 p/month

Exclusion criteria of the study:

- Children under the age of 6 years
- Children above the age of 13 years
- Children residing outside of Lesseyton, Machibini and Birch Farm
- Household income >R3500 p/month

3.6 SELECTION PROCESS

The population consisted of +-887 children between the ages of 0 and 14 years residing in Lesseyton (Ndlovukazi), +−285 in Machibini, and +/-100 in Birch Farm (National Department of Health 2015). An estimated average of (n=1272) potential recruits for the study was determined. The households were chosen according to the criteria of the study. A purposive sampling was used in this study. Households were selected based on questions asked by both the researcher and fieldworkers to verify eligibility for the study. Questions asked included whether there was/were a child/children in the household between the ages of six and 13 years who permanently resided there, and whether the

total household income was less than R3500 per month (South Africa, Department of Labour 2017: 10).

3.6.1 Sample size

The sample size was calculated using the sample size calculator by SurveySystem.com with a confidence interval of 6.3, therefore expressed as a sample size of 203 participants, concluding with a 200 sample size inclusion (Creative Research Systems 2012: 1).

$$ss = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)
p = percentage picking a choice, expressed as decimal
(.5 used for sample size needed)
c = confidence interval, expressed as decimal
(.06 = ±6)

3.7 DATA ENUMERATORS

Fieldworkers were recruited with the assistance of the councillors in each designated area. Each fieldworker resided in the targeted areas of study which were Lesseyton (Ndlovukazi), Birch Farm and Machibini. An additional fieldworker who resided in Queenstown was also recruited. All the fieldworkers were fluent in English and IsiXhosa. The fieldworkers were varsity and college graduates in their respective fields of study.The fieldworkers were trained (Annexure H) prior to commencing with the data collection so as to be able to assist the researcher in administering the questionnaires. The fieldworkers were trained on how to administer the questionnaires, which included the Socio-demographic questionnaire, 3 x 24-Hour Food Recalls and a Food Frequency questionnaire. The fieldworker training also included a demonstration on how to capture correct anthropometric measurements with the use of the weight scale and stadiometer. Various facilitating methods were used such as role-play, case studies and discussions to assist the fieldworkers to understand the importance of correctly capturing data during data collection.

3.8 RESEARCH DESIGN AND DATA COLLECTION PROCESS

The study design was a cross-sectional observational study. Different variables were used to measure the study objectives. A quantitative research design was used by asking all the participants the same questions in order to obtain a fair conclusion. Different types of questionnaires were used to determine the descriptive design approach of the study and correlation design approach by

determining the relationship between variables using data collected. Below is the process of how data was collected for this study.

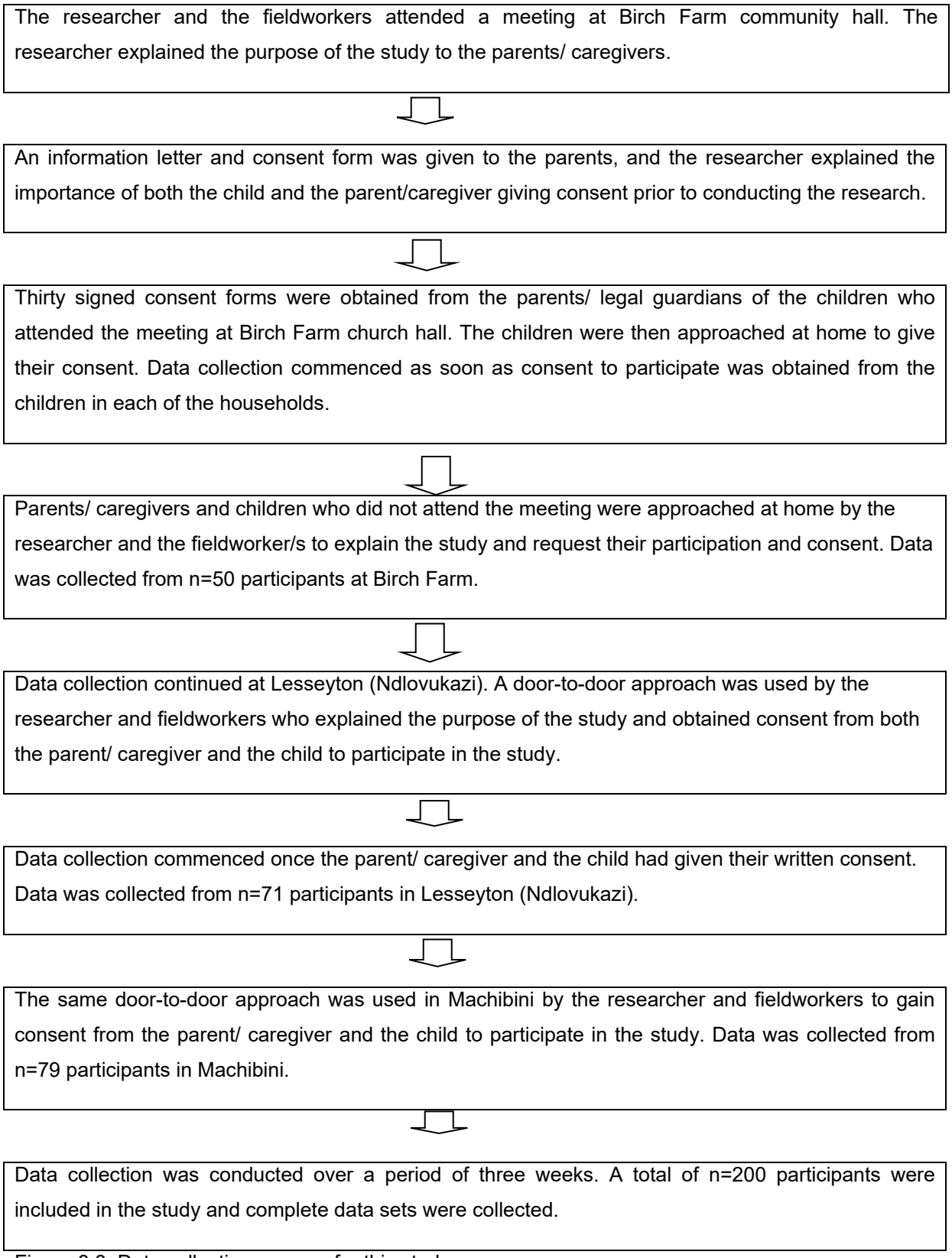

Figure 3.3: Data collection process for this study

3.9 MEASURING INSTRUMENTS

A variety of questionnaires were used to achieve the study objectives. A socio-demographic questionnaire which covered certain aspects of the caregiver's life, including personal and employment details, information on their health status and illnesses suffered, as well as details on lifestyle and social life relevant to the health status of the household. The Food Frequency Questionnaire provided information about foods consumed by the child in the past seven days. Twenty-four-Hour Food Recall questionnaires provided information on quantities of food consumed by the child over 3x24-hour periods. The researcher checked all the questionnaires and anthropometric measurements for completeness and accuracy daily after the fieldwork was completed.

3.10 DATA GATHERING TECHNIQUES

A variety of questionnaires were used to determine the socio-demographic information, the dietary intake and nutritional status of the participants.

Prior to commencement of the research, the researcher conducted a pilot study which included seven community members of Birch Farm together with the trained fieldworkers to check for feasibility and validity of the questionnaires for the community and the intended purpose of the study. The purpose of the focus group was to determine whether the questionnaires had been translated correctly and were easily understood. Feedback was given by the focus group on how well they understood and interpreted each question. Required corrections to the questions were implemented. Data collection was then administered to n=200 participants.

3.10.1 Socio-Demographic Questionnaire

A validated socio-demographic questionnaire (Annexure E) was adapted for this specific study in an interview situation (Napier 2006). The questionnaire was revised so as to be relevant to the study. A household composition question was included to obtain information on the age, gender and total number of people living in the household. The income range and amount spent on food was revised. The education and language questions were modified to include details of the highest education level of all household members and the number of children attending school, and their grade was included as well to identify any school-age children not attending school. Furthermore, a Health and Nutrition section was included in the questionnaire, which included questions that would help in identifying whether any household member had been diagnosed with malnutrition or was malnourished. The questionnaire included questions to elicit personal information, information on accommodation and family composition, employment status and income, level of education, language(s) spoken and household assets. The questionnaire was checked for relevancy to establish the multidimensional poverty index (MPI) by Alkire and Foster (2010) to determine the Acute Multi-dimensional Poverty levels of the study's population. The index used household surveys (socioeconomic demographic questionnaires) to determine the deprivation levels in each household. Questionnaires were conducted in an interview setting and all interviews were conducted by a trained fieldworker and a total of 200 questionnaires were completed.

3.10.2 Food Frequency Questionnaire (FFQ)

The food frequency questionnaires (FFQ) developed by Barrett and Gibson (2010) were sorted and checked for completeness and accuracy and n=200 completed questionnaires were found to be usable. The food frequency questionnaire was adapted by the researcher for the communities of Birch Farm, Machibini and Lesseyton (Ndlovukazi) in the Eastern Cape. A pilot study was conducted by the researcher with the trained fieldworkers and seven community members from Birch Farm who were not part of the study prior to the commencement of data collection. The purpose of the pilot study was to remove any food items not commonly consumed by the community so as to achieve a valid questionnaire for the communities of Birch Farm, Machibini and Lesseyton (Ndlovukazi). This questionnaire was used to establish whether particular foods were consumed over a period of seven days as well as to determine the food groups that were most consumed in order to measure dietary diversity and frequency. This interview was conducted in an interview setting at the participants' homes. The questionnaire was administered by trained fieldworkers and the researcher. The FFQ took approximately five minutes to complete. Both the caregiver and child were asked to identify foods that the child had consumed in the last seven days.

The nine nutritious food groups recommended by the Food and Agriculture Organization (FAO) were used for the classification of broad food intakes (Oldewage-Theron and Kruger 2008). A low variety was indicated when less than 30 foods were consumed in a period of seven days, compared to a medium variety with 30 to 60 foods or a high variety with more than 60 foods consumed in the same period (Matla 2008).

3.10.3 24-Hour Food Recall

Three 24-Hour Food Recall questionnaires (Annexure F) were used to identify foods consumed by each child over the previous 24 hours, and to establish the meal patterns and food intake of the child. The researcher and the fieldworkers conducted the interviews with the parent/ caregiver and child and used various food models and illustrations to help them to identify the correct food portion size estimates consumed by the child. The questionnaire was administered on two weekdays and one recall was used to record the actual foods consumed on a weekend day to identify any differences in meals consumed by the child on weekdays and on weekend days.

3.10.4 Anthropometry

3.10.4.1 Body mass index (BMI)-for-age

The child's average height-for-age and weight-for-age (Annexure H) were calculated, and the child's body mass index (BMI)-for-age was then calculated using the WHO Anthroplus software for children and teenagers aged from five years to 19 years (WHO 2018).

3.10.4.2 Weight-for-age

The child's average weight-for-age was calculated using the WHO Anthroplus to determine whether the child's body mass was in proportion to the chronological age (WHO 2018).

3.10.4.2.1 Procedures for weight measurements (weight-for-age)

The researcher and fieldworkers explained the weight-taking procedure to the parent/ caregiver and the child. It was explained to the parent/ caregiver and the child that it was a harmless procedure and would not cause any discomfort to the child. The weight of all the participants was taken on a PPS Scales 2000 digital scale. Weight measurement of the participants was taken twice and an average of the two recordings was used to ensure the accuracy of the measurements taken. The average reading was rounded off to the nearest two decimal places in kilograms (kg). Weight measurements were taken using the WHO guidelines (WHO 2008).

Step1: The scale was placed on flat, hard and even flooring.

Step 2: When turning on the scale, the display screen was covered for a few seconds until the number 0.0 appeared.

Step 3: The fieldworker or researcher asked the child to remove their shoes, jacket or jersey as well as any cell phones, gadgets or toys (prior consent to do so was given by the child).

Step 4: The child was asked to step onto the centre of the digital scale with feet slightly apart and arms at the sides. The child was asked to remain still while on the scale until the weight was displayed on the screen.

Step 5: The child was asked to step off the scale, wait for the reading to return to 0.0 and then step back onto the scale to obtain a second reading. The difference between the two readings should not be more than 2g and an average was calculated to ensure accuracy. The child's weight was recorded to the nearest 0.1kg.

3.10.4.3 Height-for-age

The child's average height-for-age was calculated using the WHO Anthroplus to determine whether the child's age coincided with the child's height on the growth chart.

3.10.4.3.1 Procedures for height measurements (height-for-age)

The researcher and fieldworkers explained the height measurement procedure to the parent/ caregiver and the child. It was explained to the parent/ caregiver and the child that the procedure was harmless and would not cause any discomfort to the child. The height of the participant (child) was measured using a portable SECA stadiometer. The reading was recorded in centimeters (cm). Height measurements were taken using the WHO guidelines (WHO 2007).

Step 1: The stadiometer (height board) was placed on flat, hard and even flooring.

Step 2: The fieldworker or researcher asked the child to remove shoes and any headgear or hair ornaments and they were assisted if necessary.

Step 3: The child was assisted to stand on the middle of the stadiometer base with feet slightly apart. The back of the head, shoulders, buttocks, calves and heels had to touch the vertical board.

Step 4: Either the parent/ caregiver or fieldworker held the child's knees and ankles to help keep their legs straight, and the feet flat.

Step 5: The fieldworker checked that the child's head was in the correct position and gently pulled down the headboard to rest firmly on top of the head and compress the hair.

Step 6: The child was asked to move away from the scale. The child was then asked to stand on the middle of the stadiometer again to get a second reading. The difference between the two readings should not be more than 2cm and an average was calculated to ensure accuracy. The child's height was recorded to the nearest cm reading

3.11 DATA ANALYSIS AND STATISTICS

Data was obtained from all 200 child participants. All 200 data sets were found to be complete and were included in the study. The researcher, together with the trained fieldworkers administered the study and all the questionnaires were completed in an interview setting with the parent/ caregiver and child present. The following questionnaires were included: the socio-demographic questionnaire, the food frequency questionnaire and 3x24-hour food recalls and the child's height and weight were recorded.

3.11.1Socio-demographic questionnaire

All the completed data was checked for completeness and accuracy by the researcher and n=200 were found to be usable. Data was captured on an Excel® Spreadsheet 2010 by the researcher and analysed for descriptive statistics using the Statistical Package for Social Sciences (SPSS) version 23. The results were represented in tables and graphs in the form of percentages and frequencies. The results gathered from the socio-demographic questionnaire were used to calculate the AMDPI.

3.11.1.1 Acute Multi-dimensional Poverty Index (AMPI) method

Levels of deprivation experienced by each household were calculated using the Alkire and Santos (2010) method. The three dimensions and the 10 indicators used to determine the deprivation levels are shown below.

3.4 Global Acute Multidimensional Poverty Index

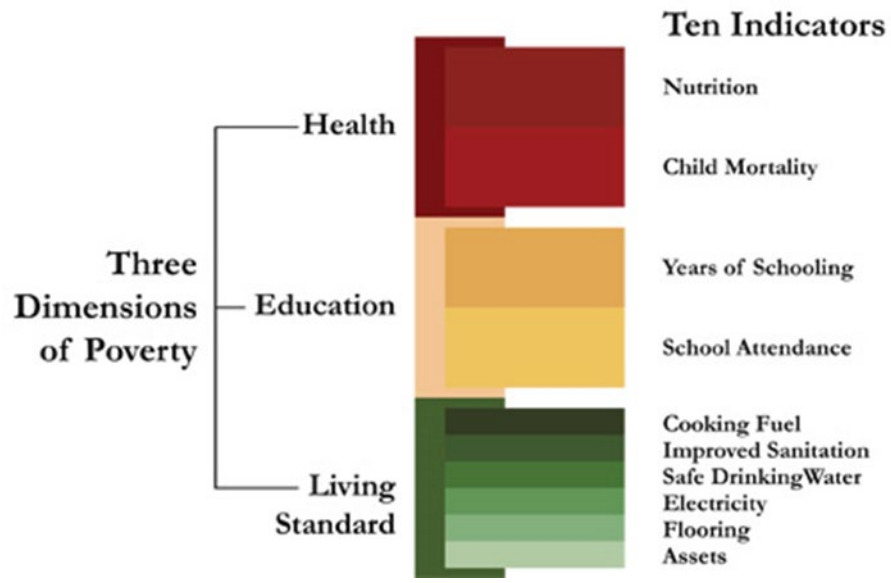

Figure 3.4: The global AMPI and the three main dimensions with each of the indicators (Oxford Poverty and Human Development Initiative (OPHI) 2017).

Alkire and Santos (2010) included ten indicators to score the deprivation levels in households and they are as follows:

1. Health
    - Child mortality: Deprived if any child has died in the family.
    - Nutrition: Deprived if any adult or child has a history of being malnourished.
2. Education
    - Years of schooling: Deprived if no household member has completed five years of schooling.
    - School attendance: Deprived if any school-age child is not attending school in years 6-14 (grade 1 to 8).

3. Living standards
    - Electricity: Deprived if the household has no electricity.
    - Drinking water: Deprived if the household does not have access to safe, clean drinking water or clean water is 30 minutes or more away from home.
    - Sanitation: Deprived if the household lacks adequate sanitation or their toilet is shared.
    - Flooring: Deprived if the household has either a dirt, sand or dung floor.
    - Cooking fuel: Deprived if the household cooks using wood, charcoal or dung as fuel.

- Asset ownership: Deprived if the household does not own more than one of the following: radio, television, telephone, cell phone, bicycle, motorcycle or refrigerator and does not own a car or tractor.

Interpretation of the AMPI calculations:

The AMPI consists of three dimensions and each of these dimensions has a weight of 3.33. A total of 10 indicators are in the AMPI and are as follows:

Weight of Health = 3.33 divided by 2 indicators

= 1.6 weight of each indicator under the health dimension

= therefore counts as 1/6 of the 10 indicators

Weight of Education = 3.33 divided by 2 indicators

= 1.6 weight of each indicator under the education dimension

= therefore counts as 1/6 of the 10 indicators

Weight of Standard of Living = 3.33 divided by 6 indicators

= 0.55 weight of each indicator under the standard of living

= therefore counts as 1/18 of the 10 indicators

Furthermore, the standard of living has six indicators; however, the 6th indicator 'Assets' contains variables of its own, which is constituted as follows:

Asset indicates as = 1/18 of the 6 cut-off variable

Therefore = 1/18 divided by 6

= 0.009

= 1/108 as a fraction (of the 10 indicators)

Weights were based on the criteria that a household had to be deprived in at least the equivalent of 30.0% of the indicators in order to be considered multi-dimensionally poor.

Therefore, the calculation for each indicator was as follows:

Table 3.1: Evaluation of how each indicator was calculated and projected for the AMPI

Dimension	**Findings in respect of households in the discussed rural areas of Queenstown (Birch Farm, Machibini and Lesseyton)**	**Weight of each indicator**	**Cut-off point**	**Score=ci (it is the sum of each deprivation mulitiplied by its weight**
Health				
Nutrition	% if any household member had been diagnosed with malnutrition.	1 x **1/6**=0.167	0.333 x 100= **33.3%**	
Mortality	% if any child in the household had died.	1 x **1/6**=0.167		
Education				
Years of schooling	% of household members who had completed five years of schooling.	1 x **1/6**= 0.167	0.333 x 100= **33.3%**	
Child enrolment	% of school age children not attending school in years 6-14 (grades 1 to 8).	1 x **1/6**= 0.167		
Living standards				
Electricity	% of households with no access to electricity	1 x**1/18**=0.056	0.333 x 100= **33.3%**	
Water	% of households with no access to safe, clean drinking water or clean water was 30 minutes or more away from home.	1 x **1/18**=0.056		
Sanitation	% of households that lacked adequate sanitation or their toilet was shared	1 x**1/18**=0.056		
Floor	% of households that had either dirt, sand or dung floors	1 x **1/18=**0.056		
Cooking fuel	% of households that cooked food using wood, charcoal or dung as fuel.	1 x **1/18**=0.056		

Assets:	**% Owning ≤2**			
Radio	%	1 x 1/108=0.009		
Television	%	1 x 1/108=0.009		
Telephone	%	1 x 1/108=0.009		
Bicycle	%	1 x 1/108=0.009		
Refrigerator	%	1 x 1/108=0.009		
Assets:	**% Not owning**			
Car/tractor	%	1 x 1/108=0.009		
Total				

The sum of the calculations (%) was used to compare deprivation levels against the 30.0% cut-off point. The calculations were used to calculate the percentage contribution of each dimension to multi-dimensional poverty.

3.11.1 Food Frequency Questionnaire (FFQ)

The questionnaires were captured by the researcher on an Excel Spreadsheet and data was analysed using the Statistical Package for the Social Sciences (SPSS) for Windows version 23.0 software program. The nine food groups recommended by the Food and Agricultural Organization (FAO) were used for the broader classification of dietary intakes (Matla 2008). A 'low variety' was indicated when less than 30 foods were consumed over a period of seven days, compared to a 'medium variety' with 30-60 foods consumed, and a 'high variety' had more than 60 food items consumed over the same period.

All the dietary scores namely, Dietary Diversity (DD), Food Variety Score (FVS) and Food Group Dietary Score (FGDS) were calculated over a period of seven days using the FFQ, with a sample size of 200. Descriptive statistics, which reflected the means, standard deviation (SD) and frequencies, were determined and all data was presented in tables to represent the food group dietary scores (FGDS).

3.11.2 24-Hour Food Recall

Data was captured by the researcher using the web-based MRC Food Finder® software developed by the South African Medical Research Council (SAMRC)© (2020).The nutrient intake and top 20 foods consumed by the participants were determined and compared to the DRIs. The mean nutrient intake for the three days was calculated and the nutrient adequacy ratio (NARs) was calculated and the relationship with the dietary diversity score determined.The top 20 foods were presented with analysed information on the average number of times a food item was consumed in a day by the child

and how much each child consumed per day (mean intake), and the amount each child would have consumed if all the participants had that specific food (per capita intake). Macronutrient intake was used to determine the Acceptable Micronutrient Distribution Ranges (AMDRs) and fruit and vegetable intakes were also calculated from the 24-hour food recall data. The AMDRs were used to correlate the DRIs for children aged five to eight years and nine to 14 years for both girls and boys in relation to energy, carbohydrate and fat. Moreover, a comparison of the children's nutritional status to the DRIs (NICUS 2003) with the association of the intake of vitamins and minerals was made.

3.11.3.1 Dietary Reference Intake (DRIs)

According to the Institute of Medicine, Food and Nutrition Boards in the United States of America (USA) (1998) and Nutrition Information Centre University of Stellenbosch (NICUS 2003), the DRIs represented the most current scientific knowledge on nutrient needs of healthy populations. The nutrient intakes of the children were compared to the DRIs for the age group to determine their actual intakes against the recommended intake. The DRIs contributed to the promotion of health by providing important guidelines aimed at specific groups and individuals to help reduce the risk of them developing diseases.

The DRIs are grouped into four nutrient-based reference values, with each referring to the average daily nutrient intake. The four nutrient-based reference values form part of the DRIs and are as follows:

- Estimated Average Requirement (EAR) is the average daily dietary intake level estimated to meet the nutrient requirements of half of the healthy individuals in a group. If there is no sufficient evidence available to establish an EAR, no RDA is set.
- Recommended Dietary Allowance (RDA) is the average daily dietary intake level sufficient to meet the nutrient requirements of nearly all healthy individuals or groups.
- Adequate Intake (AI) is used in a case where the scientific evidence is inadequate to set an EAR and when a RDA cannot be recommended. It is the recommended average daily intake level based on observed or experimentally determined approximations or estimates of nutrient intake by a healthy individual or groups (NICUS 2003).

3.11.4 Anthropometry

The child's weight-for-age and height-for-age were captured and the BMI-for-age was calculated on the web-based WHO AnthroPlus software (WHO 2009) (n=200) to detect any severe abnormality in the child's growth by growth ranges namely, length/height-for-age and BMI-for-age. The purpose of the BMI-for-age percentile was to assess a child's physical growth against other children of the same age and gender (Brazier 2018). It is determined by a child's height and weight and furthermore, in a case where a child has high amounts of body fat, this can lead to an increased risk of weight-related diseases and other health problems, whereas being underweight in children can increase the risk of the child suffering from other health issues.

The WHO (2019) highlighted the classification of children into the following categories: new-born (1-28 days), infants (up to 12 months), children (one to nine years) and adolescents (10 years to 19 years). Factors considered when determining the measurement of a child's growth include age and gender. With reference to the WHO global database on child growth and malnutrition, height-for-age and weight-for-age were determined by the Z-score classification system which highlighted the anthropometric value as a number of the standard deviations (SD) or Z-score, either below (≤SD) or above (≥SD) the mean (WHO 2019).

Table 3.2: WHO classification and cut-off points of nutrition conditions in children and adolescents based on anthropometric indices (de Onis 2020).

Classification	Condition	Indicator and cut-off point
According to BMI-for-age (5 to 19 years)	Overweight	BMI-for–age ≥+1 SD (equivalent to BMI 25kg/m²at 19 years)
	Obese	BMI-for-age ≥+2 SD (equivalent to BMI 30kg/m²at 19 years)
	Thinness	BMI-for-age ≤-2 to 3 SD
	Severity	BMI-for-age ≤-3 SD
According to height-for-age (5 to 19 years)	Stunted	Height-for-age ≤-2SD to -3SD
	Severely stunted	Height-for-age ≤-3SD

3.12 RELIABILITY AND VALIDITY

Mohajan (2017: 1) explained reliability as the degree to which an assessment tool produced stable and consistent results, and validity referred to how well a test measured what it was intended to measure. Validity was explained as the extent to which an idea was correctly measured in a quantitative study (Heale and Twycross 2015: 66).

All questionnaires adopted in the study were checked for validity for the study's population. All dietary assessment tools used in the study were checked for validity and reliability. Prior to commencement of the research, the researcher conducted a pilot study which included seven community members of Birch Farm together with the trained fieldworkers to check for feasibility and validity of the questionnaires for the community and the intended purpose of the study. The Participants thereafter provided feedback, and certain questions were amended for suitability for the study's population.

3.13 DATA CORRELATIONS

Bivariate correlations were carried out using the Pearson statistical test program (2-tailed). In the Pearson correlation coefficient, r has a value from +1, which indicates a positive relationship to -1 indicating a negative relationship.

A value or r=0 indicates no relationship between the variables (Cohen 2013).

3.14 CONCLUSION

This chapter has provided an outline of the approach undertaken for the research study to identify the children's nutritional status and their food intake. The use of the study's questionnaires, namely the socio-demographic questionnaire, the food frequency questionnaire (FFQ), and the 24-Hour food recall questionnaire provided an indication of the dietary diversity and food intake of the children. Procedures on how to determine the deprivation levels of households by using the MPI calculations adopted from Alkire and Santos (2010) were described. A detailed analysis of the procedures taken to conduct the study was provided as well as a description of the measuring apparatus used. A detailed analysis in the following chapter will provide an in-depth interpretation of the data captured in the study.

CHAPTER FOUR: RESULTS AND DISCUSSON

4.1 INTRODUCTION

Chapter four presents the study results obtained from the socio-demographic, food frequency (FFQ) and 24-hour food recall questionnaires as well as the anthropometric measurements of the children aged between six and 13 years.

4.2 STUDY RESULTS OF BIRCH FARM, MACHIBINI AND LESSEYTON IN QUEENSTOWN (KOMANI), EASTERN CAPE, SOUTH AFRICA

A total of 200 children between the ages of six and 13 years participated in the study and included 109 girls and 91 boys. The parents/ caregivers of the children gave consent for them to be part of the study and also provided some of the information.

4.3 SOCIOECONOMIC DEMOGRAPHIC RESULTS

The socio-demographic questionnaire provided data on the composition of the household and type of accommodation, as well as personal information on the home language, education level and employment status, income and assets of the parent/ caregiver of the child as provided by the parent/ caregiver of the child. The data are presented in tables and graphs.

4.3.1 Family composition and accommodation

According to table 4.1 the parent/ caregiver in the family can be described as follows: 40.0% (n=80) took the role of the mother, 30.5% (n=61) were grandmothers, 2.5% (n=5) were fathers, 1.0% (n=2) were grandfathers and 26.0% (n=52) were others which included a sister, cousin, aunt or uncle. Seventy-nine point five percent lived with other people in the house. Seventy-five percent (n=150) of the participants lived in the rural village areas, and the rest (25.0%; n=50) in farm areas. This was due to the total child population size in the farm area being lower compared to the village areas as explained in Chapter One. Results obtained about the number of years the participants had lived in the same house indicated that 84.0% (n=168) of the participants had lived in the same house for more than three years, whilst 13.0% (n=26) had lived in the same house for periods of one to five years, and 3.0% (n=6) for less than a year. Furthermore, results about the type of house lived in showed that 90.0% (n=180) of the participants lived in brick houses, while 9.5% (n=19) lived in clay houses and only 0.5% (n=1) lived in a zinc shack house. Moreover, 42.5% (n=85) lived in houses with five or more rooms, followed by 27.5% (n=55) that lived in houses with three rooms, and 16.0% (n=32) lived in a four-room house. In addition, 72.5% (n=145) of the participants indicated that they occupied a shack/ house in the same yard as the main house. Results for the type of flooring in the houses showed that 51.0% (n=102) had carpets on the floor, with 30.5% (n=61) having tiled floors, 14.0% (n=28) having cement floors, 3.5% (n=7) having a sand/mud floor and 1.0% (n=2) having a dirt floor.

Table 4.1: Status in the family and accommodation type

Variable	Number (200)	Percentage (%)
Role in the family		
Mother	80	40.0%
Grandmother	61	30.5%
Father	5	2.5%
Grandfather	2	1.0%
Other (e.g. sister, cousin, aunt, uncle)	52	26.0%
Are there other people living in the house?		
Yes	159	79.5%
No	41	20.5%
Type of living area		
Farm	50	25.0%
Rural village	150	75.0%
Type of accommodation		
Rented house/flat	10	5.0%
Own house/flat	190	95.0%
Number of years residing in the same house		
≤1 year	6	3.0%
≥1 - ≤3 years	26	13.0%
≥3 years	168	84.0%
Type of house construction		
Brick	180	90.0%
Clay	19	9.5%
Zinc/shack	1	0.5%
Flooring type in the house		
Cement	28	14.0%
Tiles	61	30.5%
Carpet	102	51.0%
Dirt (earthen floor)	2	1.0%
Sand/mud	7	3.5%
Number of rooms in the house		
1 room	9	4.5%
2 rooms	19	9.5%

3 rooms	55	27.5%
4 rooms	32	16.0%
5 + rooms	85	42.5%
Any other houses/shacks in the same yard as the main house?		
Yes	145	72.5%

Twenty-one point five percent (n=43) of the households had two to four people, 54% (n=108) had five to eight people and 31% (n=63) had nine or more people living in the house.

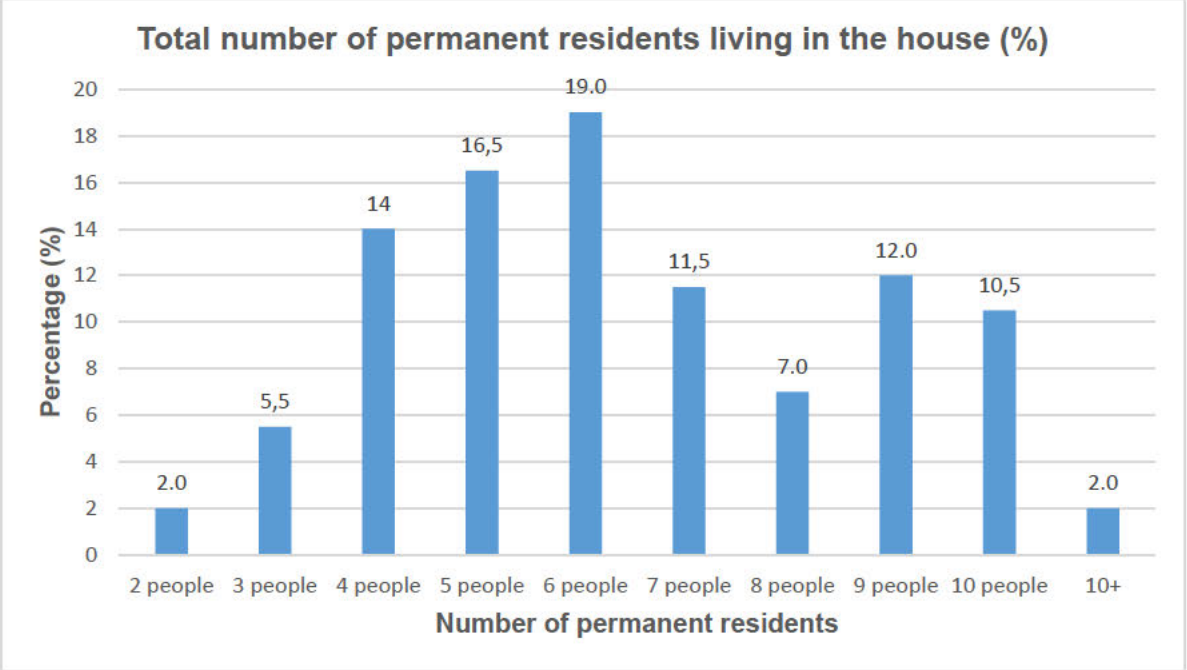

Figure 4.1: Total number of permanent residents in the household

Figure 4.2 illustrates that 22.5% (n=45) of the households had four children, and this was the most common number of children found in the households surveyed in the study. Forty-two percent (n=84) had one to three children, 33.0% (n=66) had five to seven children and 2.0% (n=4) had eight or more children.

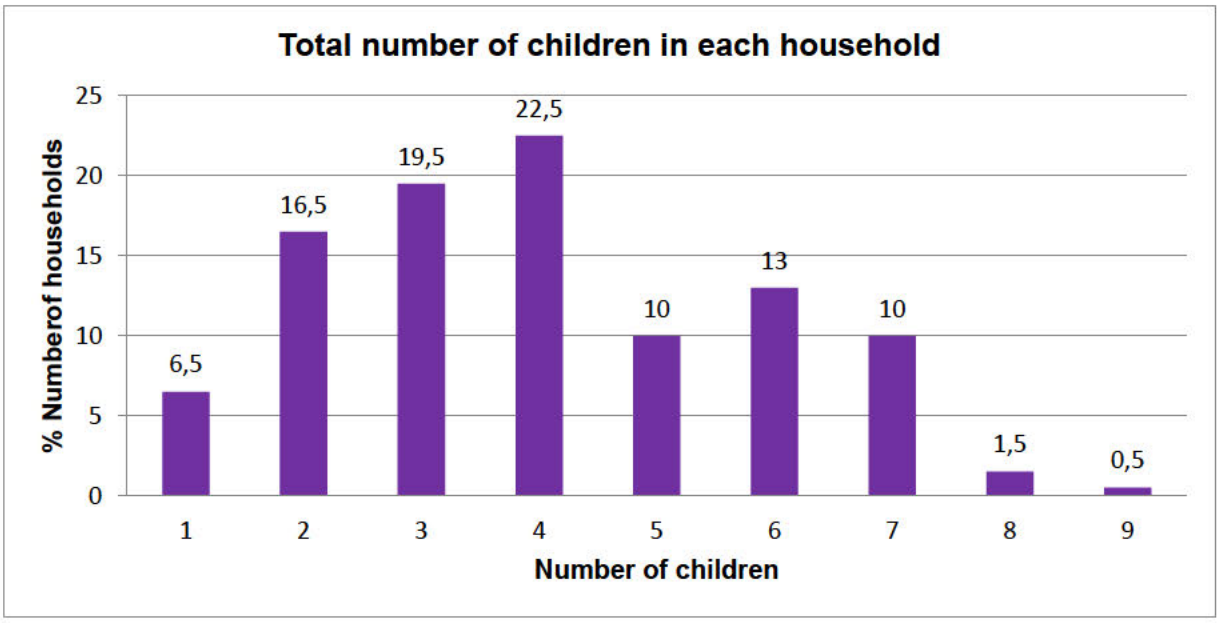

Figure 4.2: Total number of children in each household

Table 4.2 illustrates the availability and accessibility of services within close proximity to their homes. A majority of 74.5% (n=149) of households had to fetch water from elsewhere, while 23.5% (n=47) had a tap outside their house in the yard, and only 2.0% (n=4) of households had access to a tap inside the house. Furthermore, results indicated that 100.0% (n=200) of the households had access to electricity; however, there was no waste removal service provided for these households, and 100.0% (n=200) of the households had gravel roads in front of their houses. Furthermore, 93.0% (n=186) of the participants had access to a pit latrine, and only 7.0% (n=14) had a flush toilet facility in their house. In addition, the number of participants who indicated structural problems in their house were as follows: 8.5% (n=17) had problems with the size of the house, 3.0% (n=6) needed repairs done, 1.0% (n=2) of the participants indicated that they lived in an unstable house and needed a brick house as the houses they were living in were made of clay; and 0.5% (n=1) indicated they needed fencing, while 87.0% (n=174) had no problems with the house they lived in.

Table 4.2: Amenities

Variable	Number (n=200)	Percentage (%)
Water facilities		
Tap in the house	4	2.0%
Tap outside the house (in yard)	47	23.5%
Fetch water from elsewhere	149	74.5%
Toilet facilities		
Pit latrine	186	93%
Flush toilet/ water-borne	14	7.0%

sewerage		
Waste removal facilities		
No	200	100.0%
Tarred road in front of house		
No	200	100.0%
Gravel road in front of house		
Yes	200	100.0%
Access to electricity		
Yes	200	100.0%
Problems with the house		
House construction	2	1.0%
Repairs needed	6	3.0%
Size of the house	17	8.5%
Broken fencing	1	0.5%
No problems with the house	174	87.0%

Mosquitoes (68.0%; n=136), mice/rats (64.0%; n=128) and flees (55.0%; n=112) were the most common pest problems the households experienced, while bed bugs (15.5%; n=31), frogs (11.5%; n=23) and geckos (7.5%; n=15) were the least pest infestation experienced by the households (refer to Table 4.3).

Table 4.3: Pest problems

Variable	Number (n=200)	Percentage (%) *
Mosquitoes	136	68.0%
Mice/rats	128	64.0%
Flees	112	56.0%
Cockroaches	69	34.5%
Ants	39	19.5%
Snakes	35	17.5%
Bed bugs	31	15.5%
Frogs	23	11.5%
Geckos	15	7.5%

* More than one option could be selected

4.3.2 Work status and income

Table 4.4 shows that only 5.5% (n=11) of the parents/ caregivers were currently employed. Of the rest of the participants, 15.3% (n=29) were retired, 1.6% (n=3) were housewives and 1.6% (n=3) were students. A total of 57.5% (n=115) of the parents/ caregivers were currently looking for employment, and 37.0% (n=74) were not looking for employment. Furthermore, 61.5% (n=123) of the parents/ caregivers had been looking for work for more than three years, while 7.5% (n=15) had been looking for work for a period of one to three years, and 7.5% (n=15) had been job searching for a period of six to twelve months, whilst 18.0% (n=36) had been job searching for less than six months. A total of 3.0% (n=6) of the parents/ caregivers had a fixed-term work contract, and 2.5% (n=5) had temporary employment.

Table 4.4: Employment status

Variable	**Number (n=200)**	**Percentage (%)**
Currently employed	11	5.5%
Currently unemployed	189	94.5%
Current status of unemployed people (n=189)		
Unemployed	154	81.5%
Retired	29	15.3%
Housewife	3	1.6%
Student	3	1.6%
Are you currently looking for employment? (n=189)		
Yes	115	57.5%
No	74	37.0%
Period of unemployment (n=189)		
Less than 6 months	36	18.0%
6-12 months	15	7.5%
1-3 years	15	7.5%
More than 3 years	123	61.5%
Type of employment (n=11)		
Temporary position	5	2.5%
Fixed term contract	6	3.0%

Table 4.5 provides a breakdown of household income. Thirty point five percent (n=61) of the households had an income of between R501-R1000; 42.0% (n=84) of the households had a household income of between R1001-R1500, 23.5% (n=47) earned R1501-R2000, 2.0% (n=4) earned R2001-R2500, and 2.0% (n=4) earned R2501-R3000. All of the households received some

form of government grant, either a child grant, foster grant, disability grant or old age grant. Some of the households received more than one government grant based on their eligibility for the grant, and that is the reason for the total sum being more than the 200 households. The majority (95.5%; n=191) of the participants received a South African child grant of R440, 33.5% (n=67) received an old age grant of R1860, and 4.0% (n=8) received a foster grant of R1000. With regard to the number of people that contributed to the household income, 56.0% (n=112) of the households had three to four people who contributed to the household income, 22.5% (n=45) had five to six people who contributed, 12.0% (n=24) had one to two people who contributed, and 9.5% (n=19) of the households had more than seven people who contributed to the household income.

Table 4.5: Household income

Variety	**Number (n=200)**	**Percentage (%)**
Total household income including grants per month		
R501-R1000	61	30.5%
R1001-R1500	84	42.0%
R1501-R2000	47	23.5%
R2001-R2500	4	2.0%
R2501-R3000	4	2.0%
Number of households receiving SA government grant (n=200)		
South African government grants received	**Total households (households could select more than one option)**	**% (of grants received by households) ***
Old age grant	67	33.5%
Child grant	191	95.5%
Foster grant	8	4.0%
Number of people who contribute to household income (n=200)		
1-2 people	24	12.0%
3-4 people	112	56.0%
5-6 people	45	22.5%
More than 7 people	19	9.5%

*More than one option could be selected

According to table 4.6, 0.5% (n=1) of the households always did not have money to buy food, while 83.55% (n=167) indicated that they sometimes did not have money to buy food, while 4.5% (n=9) indicated that they seldom did not have money to buy food, and only 0.5% (n=1) never had a problem of not having money to buy food. Furthermore, 73.0% (n=146) of households indicated that they purchased food once a month, and 27.0% (n=54) purchased food twice a month. The most common

form of transportation used by the households to get around was a (minibus) taxi with 98.5% (n=197) doing so, and only 1.5% (n=3) used their own cars. Based on how much money the households spent on food, 39.5% (n=79) of the households spent between R801-R1000 on food per month, followed by 22.0% (n=44) that spent between R1401-R1600 per month. Only 1.0% (n=2) of the households spent between R501-R600 and 3.5% (n=7) households spent more than R2000 a month on food. The results indicated that three meals a day were eaten by 75.0% (n=150) of the parents/ caregivers, with only one person 0.5% (n=1) eating one meal a day. In addition, all the parents/ caregivers stated that they ate most of their meals at home, as did their children.

Table 4.6: Food insecurity/ security

Variety	Number (n=200)	Percentage (%)
How often is there not enough money in the household to buy food?		
Always	1	0.5%
Often	22	11.0%
Sometimes	167	83.5%
Seldom	9	4.5%
Never	1	0.5%
How often do you buy food?		
Once a month	146	73.0%
Other (twice a month)	54	27.0%
Where do you buy food?		
Tuck shop	14	7.0%
Supermarket	186	93.0%
Type of transportation used		
Taxi	197	98.5%
Own car	3	1.5%
How much money is spent on food monthly?		
R501-R600	2	1.0%
R601-R700	8	4.0%
R701-R800	13	6.5%
R801-R1000	79	39.5%
R1001-R1200	22	11.0%
R1201-R1400	5	2.5%
R1401-R1600	44	22.0%
R1601-R1800	4	2.0%
R1801-R2000	16	8.0%

≥R2001	7	3.5%
How many meals do you eat per day		
1 meal	1	0.5%
2 meals	12	6.0%
3 meals	150	75.0%
More than 3 meals	37	18.5%
Where do you eat most of your meals?		
Home	200	100.0%
Where do your children eat most of their meals?		
Home	200	100.0%

Table 4.7 illustrates that most of the household duties were carried out by either the mother or the grandmother. Forty-four point five percent (n=89) of the mothers in the household prepared the food, and in 30.5% (n=61) of the households the grandmothers prepared the food. The mothers (49.0%; n=98) were responsible for deciding which foods were purchased and 31.0% (n=62) of the grandmothers had that responsibility. Both the mothers (47.5%; n=95) and grandmothers (30.5%; n=61) in the households had the responsibility of either feeding or serving food to the children; followed by the aunt (17.0%; n=34). In relation to the person who decided on how much money was spent on food, the most common response was both the mothers (48.0%; n=96) and the grandmothers (37.5%; n=75). The majority of households were headed by grandmothers (37.0%; n=74), followed by mothers (27.5%; n=55), and fathers at 20.0% (n=40).

Table 4.7: Household duties

Variety	Number (n=200)	Percentage (%)
Person responsible for food preparation		
Father	5	2.5%
Mother	89	44.5%
Sibling	3	1.5%
Grandma	61	30.5%
Aunt	37	18.5%
Cousin	4	2.0%
Other	1	0.5%
Person in the household who decides on food bought		
Father	2	1.0%
Mother	98	49.0%

Sibling	2	1.0%
Grandmother	62	31.0%
Grandfather	1	0.5%
Aunt	30	15.0%
Cousin	4	2.0%
Other	1	0.5%
Person responsible for feeding/serving children		
Father	2	1.0%
Mother	95	47.5%
Sibling	2	1.0%
Grandmother	61	30.5%
Grandfather	1	0.5%
Aunt	34	17.0%
Cousin	4	2.0%
Other	1	0.5%
Head of the household		
Father	40	20.0%
Mother	55	27.5%
Grandmother	74	37.0%
Grandfather	19	9.5%
Aunt	7	3.5%
Cousin	4	2.0%
Other	1	0.5%
Person who decides on how much is spent on food		
Father	5	2.5%
Mother	96	48.0%
Grandmother	75	37.5%
Grandfather	9	4.5%
Aunt	10	5.0%
Cousin	4	2.0%
Other	1	0.5%

4.3.3 Education and language

Table 4.8 provides details about the highest level of education obtained by the parent/ caregiver of the child. Five point five percent (n=11) of the caregivers did not have any form of education, 27.0% (n=54) had a primary school education, 33.0% (n=66) had a standard eight education, 30.0% (n=60) had a standard ten education, and 4.5% (n=9) had a college/ FET level of education. Furthermore, the results showed that 3.5% (n=7) of the households had a school-age child not attending school.

Table 4.8: Education

Variety	Number (n=200)	Percentage (%)
Highest level of education of the parent/ caregiver		
None	11	5.5%
Primary school	54	27.0%
Standard 8	66	33.0%
Standard 10	60	30.0%
College/ FET	9	4.5%
Are there any school age children not attending school?		
Yes	7	3.5%
No	193	96.5%
Home language		
IsiXhosa	200	100.0%

Figure 4.3 indicates that of the children in the households 368 girls were in primary school and 318 boys were at the same school level. There were nine boys in junior high school (grades eight to nine) while 19 girls were at the same school level. Only one boy and no girls were found to be in high school. There were no children found to be at university.

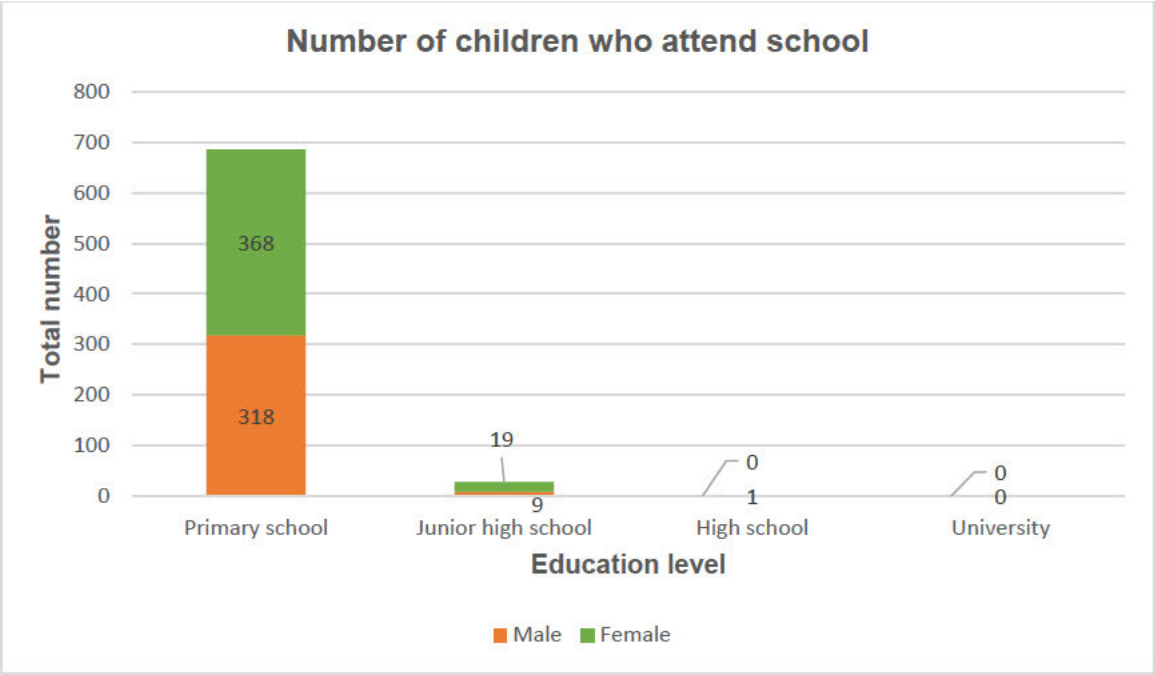

Figure 4.3 Number of children in the household who attend school

Figure 4.4 includes the education level of everyone living in the household. Of the total of 1278 household members, 148 household members had no level of education, 593 had a primary school education, 255 had a junior high school education, 264 had a high school education and 18 household members had a higher education certificate (university or college of education). This indication of the level of education of household members is required when calculating the AMPI score, which will be indicated later in this chapter.

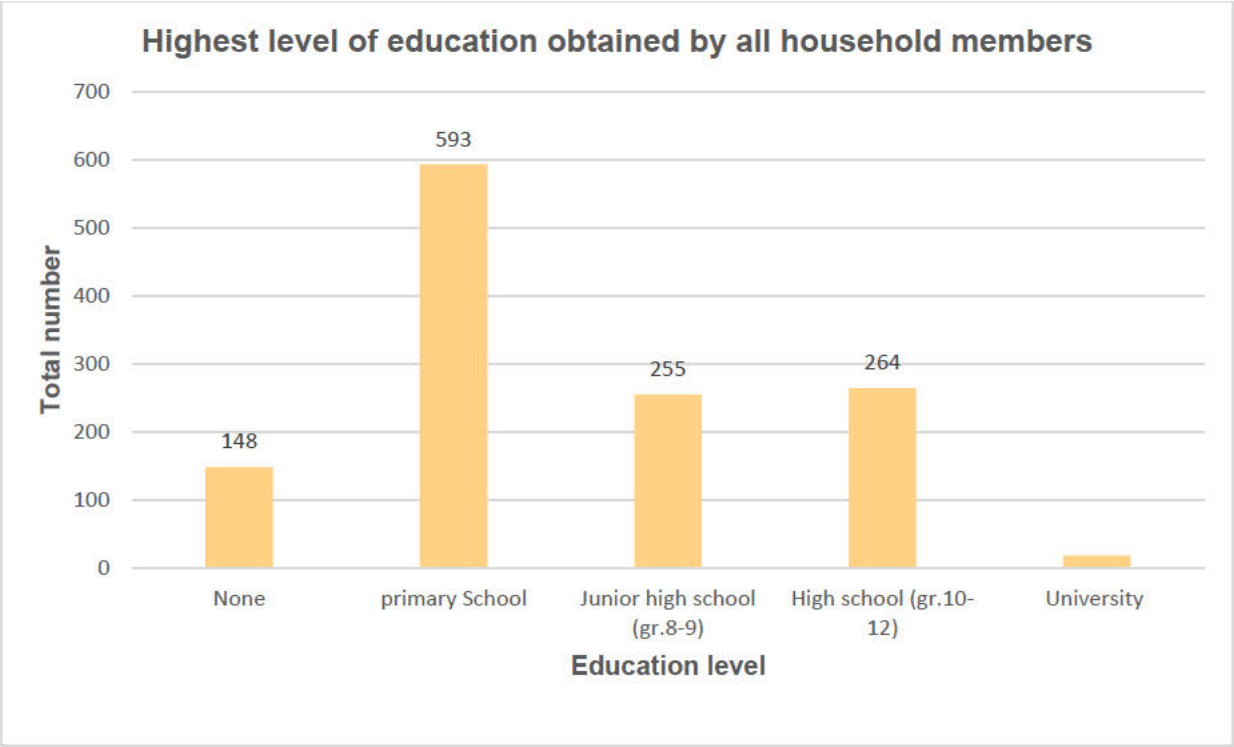

Figure 4.4 Highest level of education obtained by all the family members

4.3.4 Immunisation history and nutrition

Table 4.9 illustrates that 94.5% (n=189) of the participants indicated that all their children had completed their immunisation schedules.

Table 4.9: Birth certificates and immunisation history

Variety	Number (n=200)	Percentage (%)
Number of children with birth certificates		
1 child	9	4.5%
2 children	34	17.0%
3 children	51	25.5%
4 children	44	22.0%
5 children	29	14.5%
6 children	13	6.5%
7 children	20	10.0%
Number of children who completed immunisation programmes		
None	2	1.0%
1 child	2	1.0%
2 children	5	2.5%
3 children	1	0.5%

4 children	1	0.5%
All children in household	189	94.5%

In table 4.10 the results illustrate that 11.0% (n=22) of the households indicated that a child had died. In addition, 3.0% (n=6) had either a child or an adult in the family who had been diagnosed with malnutrition.

Table 4.10: Nutrition

Variety	Number (n=200)	Percentage (%)
Has any child in the household died?		
Yes	22	11.0%
No	178	89.0%
Has any child or adult in the household been diagnosed with malnutrition?		
Yes	6	3.0%
No	194	97.0%

4.3.5 Assets

The results in table 4.11 show that a telephone/ cell phone and a bed with mattress was owned by 98.0% (n=196) of the households, 95.0% (n=190) owned a television, 90.5% (n=181) owned a refrigerator and 87.5% (n=175) owned an electric iron.

Table 4.11: Household assets

Variety	Frequency	Percentage (%) *
Telephone/ cell phone	196	98.0%
Bed with mattress	196	98.0%
Television	190	95.0%
Refrigerator	181	90.5%
Electric iron	175	87.5%
Primus/ paraffin stove	134	67.0%
Microwave	134	67.0%
Lounge suite	131	65.5%
Radio	127	63.5%
Electric kettle	125	62.5%
Electric stove	123	61.5%
Hot plate	121	60.5%
Mattress only	104	52.0%
Dining room suite	67	33.5%

Freezer	40	20.0%
Gas stove	28	14.0%
Car	26	13.0%
Bicycle	11	5.5%

*More than one option could be selected

Table 4.12 indicates that the majority of households used electricity (91%; n=182) to cook food, followed by 39.5% (n=79) who used a wood fire, 18.5% (n=37) used paraffin, 8.5% (n=17) used gas and 1.0% (n=2) used coal/ charcoal. Stainless steel was the most common material for cooking pots used, with 94% (188) of households using this type of pot.

Table 4.12: Type of fuel used and material of pots used to cook food

Variety	**Frequency**	**Percentage (%)**
Type of fuel		
Wood fire	79	39.5%
Paraffin	37	18.5%
Electricity	182	91.0%
Gas	17	8.5%
Coal/ charcoal	2	1.0%
Material		
Cast iron	6	3.0%
Aluminium	70	35.0%
Stainless steel	188	94.0%

4.3.6 Household income

Table 4.13 shows all households' (n=200) per capita income to be below the national GDP per capita of $6.100 (R107 970) for 2020, which indicated the households to be income poor. The annual per capita income earned by the households ranged between R12 071.94 and R18 030.00. In order to determine how acutely deprived the households were, the MPI was used to further determine the households' deprivation levels.

Table 4.13: Per capita Income of the households (n=200) annually:

Households' monthly income (multiplied by number of households)	**Total households' monthly income (multiplied by 12 months) (x12)**	**Annual total range per capita income of households (n=200)**
R501- R1000 * 61=	R30 561- R61 000	R366 732 - R732 000
R1001- R1500 * 84=	R84 084- R126 000	R1 009 008 - R1 512 000
R1501- R2000 * 47=	R70 547- R94 000	R846 564 - R1 128 000
R2001- R2500 * 3=	R6003- R7500	R72 036 - R90 000
R2501- R3000 * 4=	R10 004- R12 000	R120 048 - R144 000
		R12 071.94 - R18 030 Households per capita income

4.3.6.1 Acute-Multidimensional Poverty Index

Data was obtained from the socio-demographic questionnaire to calculate the dimensions used to determine the deprivation levels, which included health, education and standard of living. Indicators included child mortality, nutrition, years of schooling, child enrolments, electricity, water, sanitation, type of floor, cooking fuel and assets (which was comprised of its own variants). Table 4.14 illustrates how the selected communities of the three rural areas of Queenstown performed when compared against these criteria.

According to the Acute-multi Dimensional Poverty Index (AMPI), the dimensions were calculated to determine the deprivation levels of the group. The results showed that the three rural areas in Queenstown had an MPI score of 24.72 out of 30.0%. The score obtained by the households showed that they were living in poverty. Overall, the per capita income and the AMPI score of the households indicated that the households had a low per capita income and obtained a very low AMPI score, therefore indicating the households to be Acute Multi-dimensionally poor.

Table 4.14: AMDPI score of the three rural areas in Queenstown (Birch Farm, Machibini and Lesseyton)

Dimension	**Findings about households in the rural areas of Queenstown (Birch Farm, Machibini and Lesseyton)**	**Weight of each indicator**	**AMPI score**
Health			**2.33**
Nutrition	3.0% of household members had been diagnosed with malnutrition.	x 1/6	0.5
Child mortality	11% of households indicated that a child had died in the past.	x 1/6	1.83
Education			**0.76**
Years of schooling	5.5% of household members had no form of education	x **1/6**	0.18
Child enrolment	3.5% of school age children were not attending school in years 6-14 (grade 1 to 8)	x **1/6**	0.58
Standard of living			**17.03**
Electricity	9.0% of households had no access to electricity	x**1/18**	0.5
Water	74.5% of households had no access to safe, clean drinking water inside the house or access to a tap inside the yard.	x**1/18**	4.14
Sanitation	93% of households lacked adequate sanitation or their toilet was shared	x**1/18**	5.17
Floor	4.5% of households had either a dirt, sand or dung floor	x**1/18**	0.25
Cooking fuel	40.5% of households cooked using wood, charcoal or dung as fuel	x**1/18**	2.25
Assets:	**% Owning less than 2**	**X1/18**	**4.6**
Radio	100% owned less than 2	X1/108	0.93
Television	100% owned less than 2	X1/108	0.93
Telephone	7.9% owned less than 2	X1/108	0.07
Bicycle	100% owned less than 2	X1/108	0.93
Refrigeraton	100% owned less than 2	X1/108	0.93

Assets:	**% Not owning a vehicle**		
Car/tractor	88%	X1/108	0.81%
Total			**24.72**

4.4. ANTHROPOMETRIC AND HEALTH INDICATORS

Anthropometric data was used to determine the height/ length-for-age and BMI-for-age for children six to 13 years. The data was used to determine whether the participants were within the acceptable range for children one to nine years and 10-19 years as recommended by the WHO (2019).

The results of a total of 200 participants were captured on WHO AnthroPlus (2020) and a total of 91 boys and 109 girls were included for analysis. The results are presented independently for boys and girls and in age specific categories (six to nine years) and (10 to 13 years) to obtain the correct nutrient analyses that will be discussed later in this chapter.

Table 4.15 illustrates the height-for-age of children for each age group between five to nine years and 10 to 14 years. The results gathered from the analyses indicated that of the 53 boys in the age group of five to nine years, 1.9% (n=1) was stunted and 98.1% (n=52) of the boys were of normal height-for-age. An analysis of results gathered from 62 girls in the age group of five to nine years indicated that 6.5% (n=4) of the girls indicated stunted growth whilst 93.5% (n=58) of the girls indicated a normal height-for-age. In this age group of five to nine years, the results showed that the boys had more cases of stunted growth in comparison to the girls. No severity of stunting in both boys and girls in this age category was shown. A total of 38 boys were analysed in the age group of 10-14 years and the results indicated that 5.3% (n=2) were severely stunted and 18.4% (n=7) indicated stunting; however, 76.3% (n=29) were in the normal range; in comparison to the girls in the same age category 10-14 years and the results illustrated that of the 47 girls analysed, 4.3% (n=2) were severely stunted, while 8.5% (n=4) were stunted and 87.2% (n=41) were in the normal range. The data in this age category of 10-14 years indicated that boys had the most stunted cases in comparison to the girls. Overall, the results showed that 10% (n=20) of the 200 children surveyed were stunted.

Table 4.15: Anthropometric data of children's Height-for-age (stunting) (n=200) (WHO 2019).

Z-score	Boys 5-9 years (n=53)	Class	Girls 5-9 years (n=62)	Class	Boys 10-14 years (n=38)	Class	Girls 10-14 years (n=47)	Class
≤-3SD	0.0%	Severely stunted	0.0%	Severely stunted	5.3% (n=2)	Severely stunted	4.3% (n=2)	Severely stunted
≤-2SD	1.9% (n=1)	Stunted	6.5% (n=4)	Stunted	18.4% (n=7)	Stunted	8.5% (n=4)	Stunted
≤-1SD to +3SD	98.1% (n=52)	Normal	93.5% (n=58)	Normal	76.3% (n=29)	Normal	87.2% (n=41)	Normal

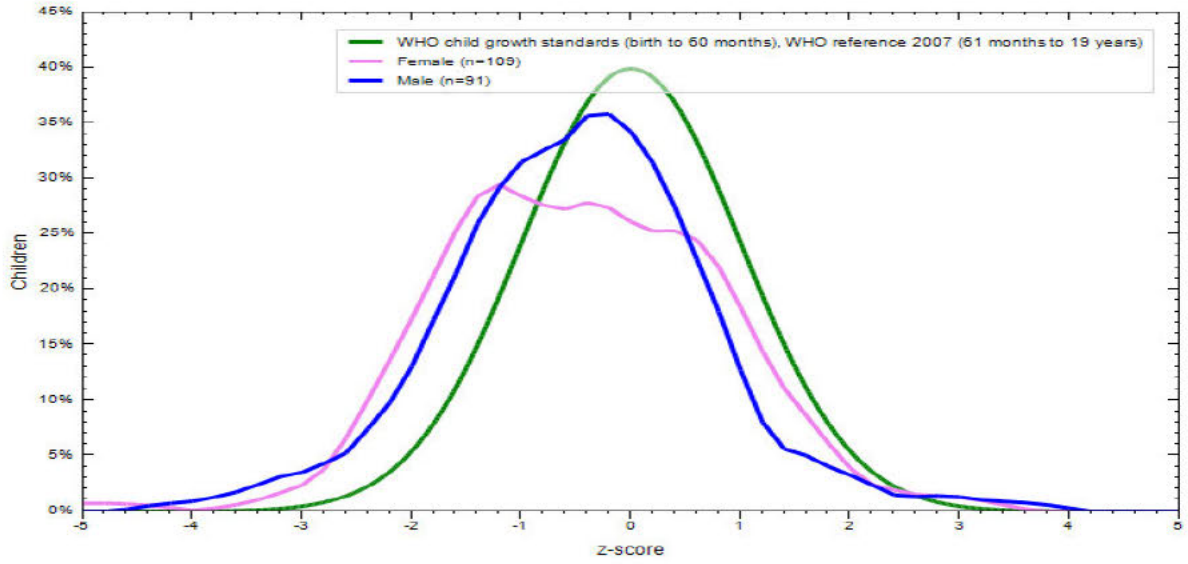

Figure 4.6: Height-for-age graph for children six to 13 years for both females and males analysed through the WHO AnthroPlus (2020).

Table 4.16 summarizes the BMI-for-age results of n=200 children (for boys and 109 girls) that were included for analysis. Boys aged five to nine years indicated that 5.7% (n=3) were obese, 7.5% (n=4) were overweight and 1.9% (n=1) was wasted. Similarly for girls in the same age group, the results indicated that 4.8% (n=3) were obese and one girl (1.6%) was wasted; however, more girls were found to be overweight with 14.5% (n=9) being so. There was no indication of obesity in girls between the ages of 10-14 years, whilst the data for boys indicated that one boy (2.6%) was obese. Both sexes between the ages of 10 and 14 years had cases of children who were overweight, with 7.9% (n=3) of boys and 10.6% (n=5) of girls being so. Furthermore, data for both sexes indicated children who were at possible risk of being overweight with 21.1% (n=8) of boys and 19.1% (n=9) of girls being so. There was no severity of wasting amongst the boys in this age category; however 4.3% (n=2) of the girls in this age category were wasted, and one girl (2.1%) was severely wasted.

Table 4.16: Anthropometric data of children's BMI-for-age (overweight) and wasting (n=200) (WHO 2019).

Z-score	Boys 5-9 years (n=53)	Class	Girls 5-9 years (n=62)	Class	Boys 10-14 years (n=38)	Class	Girls 10-14 years (n=47)	Class
≥+3SD	5.7% (n=3)	Obese	4.8% (n=3)	Obese	2.6% (n=1)	Obese	0.0%	Obese
≥+2SD	7.5% (n=4)	Overweight	14.5% (n=9)	Overweight	7.9% (n=3)	Overweight	10.6% (n=5)	Overweight
≥+1SD	24.5% (n=13)	Possible risk of overweight	35.5% (n=22)	Possible risk of overweight	21.1% (n=8)	Possible risk of overweight	19.1% (n=9)	Possible risk of overweight
≥-1SD to ≤+1SD	60.4% (n=32)	Normal	43.5% (n=27)	Normal	68.4% (n=26)	Normal	64% (n=30)	Normal
≤-2SD	1.9% (n=1)	Wasted	1.6% (n=1)	Wasted	0.0%	Wasted	4.3% (n=2)	Wasted
≤-3SD	0.0%	Severely wasted	0.0%	Severely wasted	0.0%	Severely wasted	2.1% (n=1)	Severely wasted

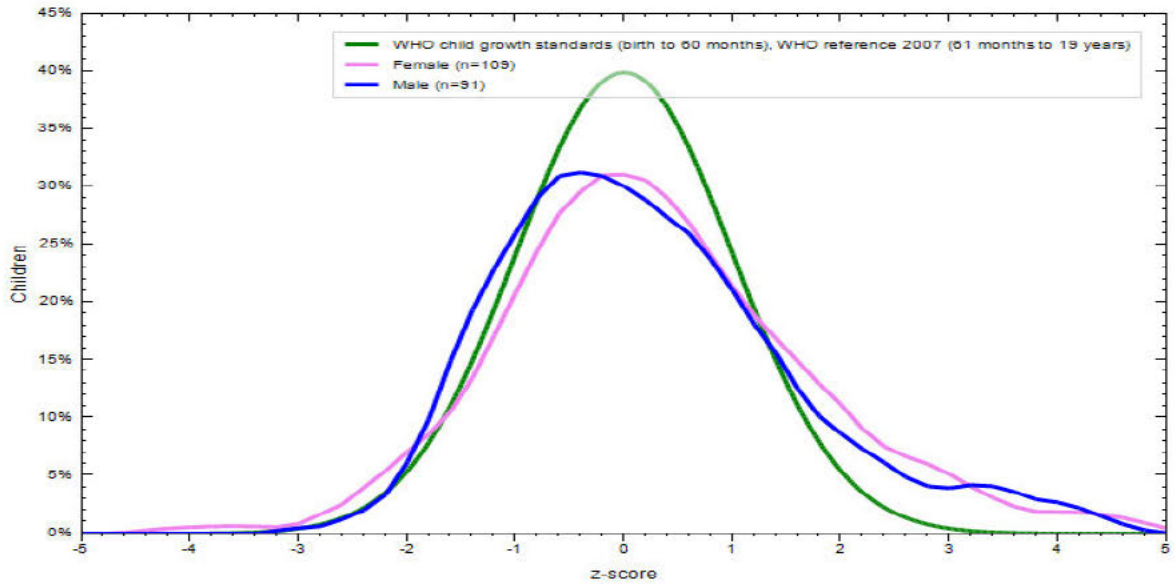

Figure 4.7: BMI-for-age graph for children six to 13 years for both females and males analysed through the WHO AnthroPlus (2020).

4.5 DIETARY INTAKE: NUTRIENT ANALYSIS AND TOP 20 FOODS CONSUMED

In table 4.17 the mean of three x24-Hour Food recall nutrient analyses was used to determine the children's dietary intake according to the recommended dietary reference intakes (DRIs) of the macronutrients and micronutrients. The children have been specified in three groups based on their age and gender, namely: six to eight years (boys and girls) (n=37), nine to 13 years (boys) (n=73) and nine to 13 years (girls) (n=90) (NICUS 2003).

The mean estimated energy requirement (EER) for energy of 7316kJ (boys) and 6896kJ (girls) was not met by 83.8% of the children of this group. The recommended dietary allowance (RDA) for protein and carbohydrate was met by this group with a mean protein intake of 43.8g; SD±18.0 per day and a mean carbohydrate consumption of 195.9g; SD±41.6 per day. The total dietary fibre was lower than the recommended adequate intake (AI) of 25g per day with a mean intake of 15.9g; SD±6.6 per day. The mean intake of calcium was lower than the recommended AI of 800mg per day with a mean intake of 303.0mg; SD±158.0 per day. Only one child (2.7%; n=1) in this group did not meet the estimated average requirement (EAR) for iron of 4.1mg per day, and for magnesium of 110mg per day. Only 8.1% of the children in this group did not meet the recommended EAR for phosphorus of 405mg per day, and only 2.7% (n=1) did not meet the recommended EAR for zinc of 4.0mg per day. None of the children in this group met the recommended EAR for iodine of 65mg per day with a mean intake of 10.9mg; SD±10.9 per day. Eighteen point nine percent of the children did not meet the recommended EAR for vitamin A of 275ug per day. An adequate micronutrient intake was met by all the children for thiamine with a mean intake of 1.2mg; SD±0.5, for niacin with a mean intake of 15.9mg; SD±6.9, and for vitamin B6 with a mean intake of 2.0mg; SD±0.8. The following micronutrients were not met in adequate quantities by the children of this group: folic acid with 21.6% (n=8) who did not meet the nutrient requirement per day, 27.0% (n=10) of children who did not meet the vitamin B12, biotin and vitamin C nutrient intake requirement per day. Forty-one point fifty percent (n=15) did not meet the EAR per day for vitamin E, and the majority of the children failed to meet the nutrient intake requirement per day for the following micronutrients: pantothenic acid with a mean intake of 2.7mg; SD±1.0, vitamin D with a mean intake of 2.4ug; SD±2.1 per day, and vitamin K with a mean intake of 22.1ug; SD±43.2 per day.

The mean EER for energy of 8698kJ for girls (nine to 13years), and for boys (nine to 13years) of 9572kJ was met by both of these groups; however, the RDA for protein of 34g per day was not met by 21.1% of the girls and 31.5% of the boys. The RDA for carbohydrate of 100g for both groups was met by both girls and boys. The total dietary fibre intake of 26g for girls per day was not met by 83.3% (n=75) of the girls and the total dietary fibre intake of 31g per day for boys was not met by 94.5% (n=69) of the boys.

Both groups failed to meet the AI for calcium of 1300mg per day, with a mean intake of 406.7mg; SD±207.7 for girls and a mean intake of 361.1mg; SD±149.0 for boys. An EAR of 5.7mg for iron was met by all the girls, whilst an EAR of 5.9mg per day for iron was not met by 9.6% (n=7) of the boys. More than 50% of both girls and boys did not meet the daily intake requirements for the following

micronutrients: magnesium with 50.0% of girls and 60.3% of boys who did not meet the daily intake requirement of 200mg; phosphorus with 98.9% of girls and 100.0% of boys failing to meet the daily intake of 1055mg per day and iodine with 100.0% of girls and 100.0% for the daily intake of 73mg. Furthermore, for the pantothenic acid 94.4% of the girls and 95.9% of the boys did not meet the daily requirement of 4.0mg; for biotin 72.2% of the girls and 86.3% of the boys did not meet the nutrient requirement of 20ug per day and for vitamin C 88.9% of the girls and 89.0% of the boys did not meet the required intake of 39mg per day. In addition, for vitamin D 85.6% of girls and 95.9% boys failed to meet the nutrient intake of 5.0ug per day, and for vitamin E 53.3% of the girls and 67.1% of the boys did not meet the required nutrient intake; in addition, for vitamin K, 93.3% of the girls and 95.9% of the boys also failed to meet the nutrient intake of 60ug per day.

An EAR of 7.0mg for zinc for both groups was not met by 22.2% of the girls and 38.4% of the boys, while all the girls met their nutrient thiamine daily intake of 0.7mg and 1.4% (n=1) boy did not meet the daily intake. Furthermore, the vitamin A nutrient intake of 420ug per day was not met by 17.8% of the girls and a nutrient requirement of 445ug per day for boys was not met by 35.6% of the boys. An EAR intake for riboflavin of 0.8ug per day was not met by 42.2% of the girls and 56.2% of the boys, while the niacin daily intake of 9.0mg was not met by 4.1% of the boys whilst all the girls met their daily intake for this nutrient. Moreover, the EAR intake for folic acid of 250ug per day was not met by either group, with 41.1% of the girls and 49.3% of the boys not doing so, and the nutrient daily requirement of 1.5ug for vitamin B12 was not met by 22.2% of the girls and 37.0% of the boys. Furthermore, an EAR for vitamin B6 of 0.8mg per day was met by both groups.

Table 4.17: The dietary intake nutrient analysis measured using the average of three 24-Hour Food Recall questionnaires (n=200)

	Children 6-8 years old				Girls 9-13 years old				Boys 9-13 years old			
Nutrients p/day	**DRIs ♀ and♂**	**Mean ±SD**	**Mean % of the DRIs**	**% consuming <100% DRIs (n=37)**	**DRIs (♀)**	**Mean ±SD**	**Mean % of the DRIs**	**% consuming <100% DRIs (n=90)**	**DRIs (♂)**	**Mean ±SD**	**Mean % of the DRIs**	**% consuming <100% DRIs (n=73)**
Energy (kJ) **EER**	7316 Boys (♂)	5474.2 ±1489.2	74.8%	83.8% (31.00)	8698	5851.1 ±865.2	67.3%	100.0% (n=90)	9572	5263.5 ±855.9	55.0%	100.0% (n=73)
	6896 Girls (♀)	5474.2 ±1489.2	74.8%	83.8% (31.00)								
Protein (g) **RDA**	19	43.8 ±18.0	230.5%	0.0% (n=0)	34	42.50 ±8.8	125.0%	21.1% (n=19)	34	37.8 ±7.7	111.2%	31.5% (n=23)
Carbohydrate (g) **RDA**	100	195.9 ±41.6	195.9%	0.0% (n=0)	100	222.7 ±37.5	227.7%	0.0% (n=0)	100	200.8 ±40.4	200.8%	0.0% (n=0)
Total Dietary Fibre (g) **AI**	25	15.9 ±6.6	63.7%	89.2% (33.00)	26	19.0 ±7.4	72.9%	83.3% (n=75)	31	17.2 ±7.3	55.4%	94.5% (n=69)
Calcium (mg) **AI**	800	303.0 ±158.0	37.9%	100.0% (37.00)	1300	406.7 ±207.7	31.3%	98.9% (n=89)	1300	361.1 ±149.0	27.8%	100.0% (n=73)
Iron (mg) **EAR**	4.1	8.8 ±3.9	214.8%	2.7% (1.00)	5.7	9.8 ±1.6	171.1%	0.0% (n=0)	5.9	8.7 ±2.3	146.6%	9.6% (n=7)

Magnesium (mg) **EA**	110	168.8 ±39.6	153.5%	2.7% (1.00)	200	203.1 ±42.7	101.5%	50.0% (n=45)	200	187.6 ±41.0	93.8%	60.3% (n=44)
Phosphorus (mg) **EAR**	405	572.4 ±127.7	141.3%	8.1% (3.00)	1055	694.8 ±159.1	65.9%	98.9% (n=89)	1055	629.5 ±127.0	59.7%	100.0% (n=73)
Zinc (mg) **EAR**	4.0	6.7 ± 1.5	167.4%	2.7% (1.00)	7.0	8.3 ±1.6	119.0%	22.2% (n=20)	7.0	7.5 ±1.6	107.5%	38.4% (n=28)
Iodine (mg) **EAR**	65	10.9 ±10.9	16.8%	100.0% (37.00)	73	14.9 ±14.4	20.4%	100.0% (n=90)	73	11.1 ±10.8	15.7%	100.0% (n=73)
Vitamin A (ug) **EAR**	275	657.9 ±449.5	239.3%	18.9% (7.00)	420	821.4 ±438.0	195.6%	17.8% (n=16)	445	628.1 ±316.7	141.2%	35.6% (n=26)
Thiamine (mg) **EAR**	0.5	1.2 ±0.5	238.6%	0.0% (n=0)	0.7	1.4 ±0.3	198.9%	0.0% (n=0)	0.7	1.2 ±0.3	174.4%	1.4% (n=1)
Riboflavin (mg) **EAR**	0.5	0.8 ±0.6	164.4%	27.0% (10.00)	0.8	0.9 ±0.3	115.0%	42.2% (n=38)	0.8	0.8 ±0.3	103.6%	56.2% (n=41)
Niacin (mg) **EAR**	6.0	15.9 ±6.9	265.4%	0.0% (n=0)	9.0	14.5 ±2.6	160.9%	0.0% (n=0)	9.0	14.4 ±3.5	160.0%	4.1% (n=3)
Vitamin B6 (mg) **EAR**	0.5	2.0 ±0.8	397.1%	0.0% (n=0)	0.8	2.1 ±0.5	261.6%	0.0% (n=0)	0.8	2.0 ±0.5	248.0%	0.0% (n=0)

Folic acid dietary FE (ug) **EAR**	160	232.7 ±107.9	145.1%	21.6% (8.00)	250	262.6 ±83.4	105.1%	41.1% (n=37)	250	254.1 ±76.2	101.7%	49.0% (n=36)
Vitamin B12 (ug) **EAR**	1.0	2.5 ±1.9	245.9%	27.0% (10.00)	1.5	2.9 ±1.7	194.8%	22.2% (n=20)	1.5	2.5 ±1.7	164.3%	37.0% (n=27)
Pantothenic Acid (mg) **AI**	3.0	2.7 ±1.0	90.7%	70.3% (26.00)	4.0	2.7 ±0.8	66.8%	94.4% (n=85)	4.0	2.7 ±0.8	68.3%	95.9% (n=70)
Biotin (ug) **AI**	12	14.8 ±5.6	123.4%	27.0% (10.00)	20	17.1 ±6.2	85.6%	72.2% (n=65)	20	16.0 ±4.9	80.2%	86.3% (n=63)
Vitamin C (mg) EAR	22	34.6 ±23.4	157.0%	27.0% (10.00)	39	24.7 ±14.6	63.3%	88.9% (n=80)	39	26.6 ±15.8	68.1%	89.0% (n=65)
Vitamin D (ug) **AI**	5.0	2.4 ±2.0	47.6%	89.2% (33.00)	5.0	2.4 ±2.1	56.6%	85.6% (n=77)	5.0	2.1 ±1.7	42.0%	95.9% (n=70)
Vitamin E (ug) **EAR**	6.0	7.6% ±2.7	127.3%	41.5% (15.00)	9.0	8.7 ±3.3	97.1%	53.3% (n=48)	9.0	8.3 ±3.3	92.1%	67.1% (n=49
Vitamin K (ug) **AI**	55	22.1 ±43.2	40.2%	91.9% (34.00)	60	17.3 ±24.0	28.9%	93.3% (n=84)	60	21.8 ±21.6	36.3%	95.9% (n=70)

♀-girl ♂-boy
EER: Estimated Energy Requirement
EAR: Estimated Average Requirement
AI: Adequate Intake
RDA: Recommended Dietary Allowance

Table 4.18, shows that the mean fat contribution to energy intake for children six to eight years was 25.8%, which was within the acceptable range, girls nine to 13 years achieved a mean percentage energy contribution of 23.0%, which was below the acceptable range of 25-35%, and boys nine to 13 years achieved 25.8% which was within the acceptable range of 25-35%. The mean protein contribution to energy intake for all three groups was within the AMDR of 10-30%, within similar ranges of 13.6%, 12.4% and 12.2% respectively. However, the mean carbohydrate and fibre contribution to energy intake of 45-65% was slightly exceeded by all three groups, with 65.8%, 70.2% and 70.9% respectively.

Table 4.18: The Acceptable Macronutrient Distribution Ranges (AMDR) from the average of three 24-hour food recalls (n=200)

Macronutrients	**Mean ±SD**	**Mean % energy contribution**	**AMDR**
6-8 years children (n=37)			
Total fat (g)	38.2±17.8	25.8%	25-35%
Protein (g)	43.8 ±18.0	13.6%	10-30%
Carbohydrate and fibre (g)	211.9 ±48.1	65.8%	45-65%
9-13 years girls (n=90)			
Total fat (g)	36.3 ±12.4	23.0%	25-35%
Protein (g)	42.5 ±8.8	12.4%	10-30%
Carbohydrate and fibre (g)	241.6 ±44.9	70.2%	45-65%
9-13 years boys (n=73)			
Total fat (g)	32.6 ±9.6	25.8%	25-35%
Protein (g)	37.8 ±7.7	12.4%	10-30%
Carbohydrate and fibre (g)	217.9 ±47.7	70.4%	45-65%

Table 4.19 indicates that the per capita intake per day for all three age groups was significantly lower than the WHO goal of ≥400g/day. Children aged six to eight years reached a per capita intake per day of 60.7g, with girls nine to 13 years consuming (51.1g) and boys nine to 13 years consuming (38.3g) of the required fruits and vegetables intake per day. Having a low consumption of fruits and vegetables increases the chances of micronutrient deficiencies and causes the body to become more susceptible to infectious diseases (Ratan 2020: para. 3 line 1-2).

Table 4.19: Comparison of fruits and vegetables g/day per capita intake with WHO (2003: 3)

Micronutrient	Mean ±SD	Per Capita Intake per day (g)	WHO Goal (g)/day
Fruits and Vegetables (g)	6-8 years children (n=37)		≥400g/day
	55.3 ±5.8	60.7g	
	9-13 years girls (n=90)		≥400g/day
	43.3 ±10.2	51.1g	
	9-13 years boys (n=73)		≥400g/day
	51.9 ±4.8	38.3g	

4.5.1 Top 20 Food Intakes

The top 20 most consumed food items are presented as the mean intake over a three-day period (two weekdays and one weekend day) established from the 24-hour food recall. The top 20 foods are categorised for each age cut-off according to their Dietary Reference Intakes (DRIs) requirements, as presented for both girls and boys (six to eight years), girls (nine to 13 years) and boys (nine to 13 years). The most consumed food items across all groups were maize meal, cold drink (diluted), samp and beans, and maas/sour milk. Tables 4.20; 4.21 and 4.22 reveal the top 20 foods consumed, and the average daily intake of the children.

Table 4.20 indicates that the group consumed more items in the cereal group, with maize meal being the food item most consumed by this age group at 41 times with a per capita intake of 478.1g. Another consumed food item in the enriched cereal group with a plant-based protein was samp and beans, which was ranked third with a per capita intake of 88.7g per day. Rice, ranked fourth, was consumed 19 times, bread/rolls were consumed 20 times and were ranked ninth in the most consumed foods; and potatoes were consumed 17 times with a per capita intake per day of 33.0g. Ranked at number 17 was breakfast cereal corn flakes (plain), which was consumed four times by the group.

Diluted squash/ cold drink was the second most consumed food item in this group (18 times), with a per capita intake per day of 126.9g. In the dairy group, the food items most consumed were full fat maas/sour milk, ranked fifth and consumed 12 times by the group and milk (full fat) ranked sixth in the top 20 consumed foods and consumed 16 times. Food items from the meat group were chicken ranked at number seven and consumed 15 times with a per capita intake of 43.5g and pilchards in tomato sauce which was consumed nine times with a per capita intake per day of 10.5g. Only one food item from the vitamin A vegetable group was consumed by this group over the three day period, with carrots having been consumed nine times and ranked 16th in the most consumed foods list. In the other vegetable group, onions came 18th and cabbage came 20th in the top 20 most consumed foods.

Ranked eighth in the top 20 foods was tea, having been consumed six times over the three-day period, with a per capita intake per day of 40.54g. Soup powder prepared with water was consumed 14 times with a mean intake of 24.86g and a per capita intake per day of 29.0g; coffee was ranked 14th and was consumed three times, and water was ranked at 15th place with a per capita intake per day of 14.4g. In the oils and fats group, milk powder and full cream (full fat) milk was ranked 12th and sugar was ranked 13th.

It was evident that the majority of children in this age category mostly consumed foods that were carbohydrate-based, with some protein foods also evident. However, a significant amount of saturated fats was consumed by the group, with very few vegetables and no fruits consumed by the group over the recorded three-day period.

Table 4.20: Top 20 food items consumed by children six to eight years, ranked by per capita intake per day as measured by three 24-hour food recalls (n-37)

No.	Food item	Total intake (g)	Mean intake for 1 day (g)	Frequency consumed over one day	Per capita intake per day (g)
1.	Maize meal, porridge	17690	47.2	42	159.37
2.	Diluted squash cold drink	14085.3	88.6	18	126.89
3.	Samp and beans	9850	149.2	7	88.74
4.	Rice	8730	51.1	19	78.65
5.	Maas/sour milk, full fat	8400	77.8	12	75.68
6.	Milk, full fat/whole, fresh	5300	37.6	16	47.75
7.	Chicken	4830	35.0	15	43.51
8.	Tea, brewed	4500	88.2	6	40.54
9.	Bread/rolls, brown	4270	23.7	20	38.47
10.	Potatoes	3660	23.0	18	32.97
11.	Soup powder, prepared with water	3207.5	24.9	14	28.90
12.	Milk powder, full cream, high fat	3155	45.7	14	28.42
13.	Sugar	2947.5	9.6	34	26.55
14.	Coffee	2010	74.4	3	18.11

15.	Water	1600	76.2	2	14.41
16.	Carrots	1310	16.8	9	11.80
17.	Breakfast cereal - Corn flakes	1295	33.2	4	11.67
18.	Onions	1200	7.8	17	10.81
19.	Pilchards in tomato sauce	1165	14.4	9	10.50
20.	Cabbage	950	15.8	7	8.56

Table 4.21 shows that the cereal, roots and tubers group was most prevalent in the food items consumed by this group with maize meal being the most frequently consumed at 101 times, with a per capita intake per day of 186.2g; ranked third was a cereal group food item enriched with a plant-based protein item (samp and beans). Bread/rolls ranked eighth were consumed 61 times with a per capita intake per day of 46.5g, rice was ranked tenth, potatoes were ranked 11th, ranked 18th was cooked oats, and vetkoek, homemade with a per capita intake of 11.1g was in 19th position in the foods most consumed.

Diluted squash cold drink was consumed 34 times with a per capita intake of 20.4g. Food items consumed from the dairy group included maas/ sour milk ranked fourth and consumed 33 times and milk, full fat (whole) was ranked seventh and was consumed 53 times. No meat group food items were found in the top ten; chicken, ranked 14th was consumed 15 times and eggs, fried in sunflower oil were ranked 16th and were consumed ten times. Only one vitamin A vegetable group was in the top 20 foods consumed by the group, with carrots being consumed 22 times at 20th place and tomato and onion, stewed with a per capita intake per day of 13.0g was ranked 17th in the foods most consumed.

Soup powder prepared with water with a per capita intake per day of 73.2g was consumed 63 times by the group and tea with a per capita intake per day of 63.3g and water (46.5g) were all in the top 10 of the food items mostly consumed, ranked fifth, sixth and ninth respectively. Fat-containing foods including sugar were consumed 82 times, carbonated cold drinks were consumed six times and coffee was consumed seven times and they were ranked 12th, 13th and 15th respectively in the most consumed foods.

It was apparent that children in this age category mainly consumed dairy products and plant-based protein with a significant amount of fat-containing foods, and very little consumption of vegetables and no fruit items were recorded in the top 20 foods.

Table 4.21: Top 20 food items consumed by girls nine to 13 years, ranked by per capita intake per day as measured by three 24-hour food recalls (n-90)

No.	Food item	Total intake (g)	Mean intake for 1 day (g)	Frequency for 1 day	Per capita intake per day (g)
1.	Maize meal, porridge	50270	55.3	101	186.2
2.	Diluted squash cold drink	39275	35.3	34	145.5
3.	Samp and beans	33700	175.5	1	124.8
4.	Maas, sour milk, full fat	30450	101.5	33	112.8
5.	Soup powder prepared with water	19765	34.9	63	73.2
6.	Tea, brewed	17100	89.1	1	63.3
7.	Milk, full fat, whole	13875	29.1	53	51.4
8.	Bread/Rolls	12630	22.9	61	46.8
9.	Water	12550	102.0	14	46.5
10.	Rice	12420	46.5	30	46
11.	Potatoes	9512.5	24.0	44	35.2
12.	Sugar	7984.5	10.9	82	29.6
13.	Cold drink, carbonated	5500	101.6	6	20.4
14.	Chicken	5125	37.1	15	19.0
15.	Coffee	4525	75.4	7	16.8
16.	Eggs, fried in sunflower oil	3575	42.6	10	13.2
17.	Tomato and onion stew	3520	14.3	27	13.0
18.	Oats, rolled or oatmeal, cooked	3510	43.3	9	13.0
19.	Vetkoek, homemade	2990	45.3	7	11.1
20.	Carrots	2920	14.5	22	10.8

Table 4.22 shows that food items from the cereal group were most apparent in the top 20 foods amongst the boys aged nine to 13 years in the recorded three days. Significantly, maize meal was the most consumed food item, being consumed 97 times, followed in second position by samp and beans, being a plant based protein item and consumed 15 times. Rice was ranked seventh with a frequency consumption of 30 times and a per capita intake per day of 63.0g, bread/rolls with a frequency consumption of 39.33 times was ranked tenth in the foods most consumed and potatoes were in 12th position with a per capita intake per day of 33.0g. Dairy group food items were recorded in the top ten food items with maas/sour milk ranked third and milk (full fat) at sixth place.

Diluted squash cold drink was ranked fourth with a frequency consumption of 26 times. Protein items consumed were chicken at tenth ranking being consumed five times, pilchards in tomato sauce ranked at 18th place, and eggs fried in sunflower oil at 19th place, with a frequency consumption of five times.

Other food items consumed were as follows: tea ranked fifth, soup powder prepared with water at eighth place and water ranked 14th with this item being consumed four times. Ranked 13th, sugar was consumed 73 times, coffee was ranked 14th and at 16th ranking was carbonated cold drink. Only two food items in the vegetable group were recorded in the top 20 foods being tomato and onion stew with an intake of 14 times at 18th place, and onion sautéed in sunflower oil at 20th place.

It was apparent that the majority of boys mostly consumed foods that were carbohydrate and protein based, with a noticeable consumption of fat-containing foods. However, there was very little consumption of vegetables and no fruits were recorded in the top 20.

Table 4.22: Top 20 food items consumed by boys nine to 13 years, ranked by per capita intake per day as measured by three 24-hour food recalls (n-73)

No.	Food item	Total intake (g)	Mean intake for 1 day (g)	Frequency for 1 day	Per capita intake per day (g)
1.	Maize meal porridge	44305	50.9	97	202.3
2.	Samp and beans	22850	169.3	15	104.3
3.	Maas/sour milk, full fat	22500	81.5	31	102.7
4.	Diluted squash cold drink	19750	83.3	26	90.2
5.	Tea	14950	87.4	19	68.3
6.	Milk, full fat/whole	14590	32.2	50	66.6
7.	Rice	13805	50.6	30	63.0

8.	Soup powder, prepared with water	11207.5	34.9	36	51.2
9.	Bread/rolls	8910	25.0	39	40.7
10.	Chicken	7720	34.8	5	35.3
11.	Potatoes	7220	20.9	38	33.0
12.	Sugar, white, granulated	6265	9.5	73	28.6
13.	Coffee	5050	93.5	6	23.1
14.	Water	3400	87.2	4	15.5
15.	Cabbage,	2550	16.7	17	11.6
16.	Cold drink, carbonated	2250	83.3	3	10.3
17.	Tomato and onion, stew	1805	14.0	14	8.2
18.	Pilchards in tomato sauce	1695	13.5	14	7.7
19.	Eggs, fried in sunflower oil	1690	43.3	5	7.7
20.	Onions, sautéed in sunflower oil	1660	7.7	24	7.6

4.6 FOOD VARIETY SCORE (FVS), FOOD GROUP DIVERSITY SCORE (FGDS), DIETARY DIVERSITY (DD) SCORE AND NUTRIENT ADEQUACY

The Food Variety Score (FVS) and the Food Group Diversity Score (FGDS) were calculated over a period of seven days to establish the number of food groups consumed by the total sample over a seven-day period gathered from the FFQ. Table 4.23 outlines the total number of different food items consumed by the participants as measured by the food variety score (FVS).

Hatloy, Torheim and Oshaug (1998: 893) explained the food variety score (FVS) as the number of different individual food items consumed over a period of seven days. The FVS was calculated using seventy-eight individual food items from all nine food groups. Table 4.23 illustrates that the majority of the sample, with (n=124) participants, consumed a low variety of individual food items with less than 30 individual food items being consumed over seven days, and (n=75) had a medium food variety of individual food items as they consumed between 30 to 60 different food items, and only one participant consumed more than 61 different food items and had a high food variety. The mean intake of the FVS was 28.61, which concluded that the data set consumed on average a low food variety of zero to three food groups or less than 30 individual food items.

4.6.1 Food Group Diversity Score (FGDS) – nine food groups

The FGDS was calculated to determine whether the individuals consumed food items in all nine food groups in order to assess the nutrient adequacy of their diet. The food group dietary diversity score varied between 1.00 to 6.68 mean intakes from the nine food groups. The highest food group intakes were as follows: the cereal group had a mean intake of 6.7; ±SD 1.4, followed by the meat group with a 4.5; +SD 1.7 average intake and the other vegetable group with 4.2; ±SD 2.2. The lowest food group intakes were the eggs group with a mean intake of 1.0; ±SD 0.0, the legume group with a mean intake of 1.2; ±SD 0.6, and the dairy group with an average intake of 2.2; ±SD 0.9. Overall, the mean food group diversity score (FGDS) was 28.6; ±SD 8.4, which indicated a low food variety.

Table 4.23: Summary of the food group diversity score (FGDS) (n=200).

Food Group	Mean	±SD	Range
Meat	4.5	1.7	1-9
Eggs	1.0	0.0	1
Dairy	2.2	0.9	1-5
Cereals	6.7	1.4	2-10
Legumes	1.2	0.6	1-5
Vitamin A-rich fruit and vegetables	3.4	1.5	1-8
Other fruits	3.5	2.0	1-15
Other vegetables	4.2	2.2	1-11
Fats and oils	3.4	1.1	1-7
FGDS	**28.6**	**±8.4**	**11-61**
Mean Dietary Diversity (DD) score	**8.1**	**±0.9**	**5-9**

Low food variety=0-3 food groups or <30 individual foods; Medium food variety=4-5 food groups or 30-60 individual foods; High food variety=6-9 food groups or >60 individual foods (Matla 2008).

4.6.2 Dietary Diversity Score

The different dietary diversity measures, referred to as dietary diversity (DD) were calculated as follows: (one) overall variety score (simple count of food items), (two) variety scores from all nine food groups and (three) a variety score within every food group (Hatloy *et al.*1998: 895). These scores were calculated for a reference period of seven days for this study and were used together to reflect the DD in different ways. The dietary diversity score (DDS) consisted of a simple count of single food groups, similar to previous studies conducted in developing countries.

Table 4.24 illustrates that 95.0% of the group had a high food group dietary diversity (DD) score, and only 5.0% of the group had a medium DD score. None of the children consumed food from less than five food groups.

Table 4.24: Summary of the dietary diversity score (DDS) for the total group (n=200)

Number of food groups consumed (n=9)	Frequency	Percentage
5	3	1.5%
6	7	3.5%
7	32	16.0%
8	94	47.0%
9	64	32.0%
Total	200	100.0%

Low DD 1-4 food groups; Medium DD 5-6 food groups; High DD 7-9 food groups (Matla 2008).

4.6.3 Nutrient Adequacy Ratio (NAR) compared to Food Group Diversity Score (FGDS) (n=200)

Figures 4.8 and 4.9 illustrate the relationship between the food group diversity score (FGDS) and the nutrient adequacy ratio (NAR) expressed as a percentage (%) of energy, nutrients and vitamins. The NAR was calculated by working out the % age of the mean intake over the three days in relation to the DRIs. In figure 4.8, the NAR for all the nutrients slightly increased as the FGDS increased. In particular, the NAR for carbohydrate (CHO) and protein increased specifically from food group five to six. Carbohydrate showed a steady linear progression as the FGDS increased, although for protein the NAR showed a non-linear progression as the FGDS increased, with a decline in food groups seven and nine. This was further illustrated in the top 20 foods (tables 4.20, 4.21 and 4.22), which indicated that the cereal group with food items such as maize meal, rice, bread/rolls and potatoes was most consumed by all three age groups. The NAR for Zinc and Iron showed a steady increase from food group five to eight; however, with a slight decrease from food group eight to nine by both nutrients overall, the nutrients remained above 100.0%. In contrast, the NAR for energy and calcium increased slightly as the FGDS increased but remained below 100.0%. This was also explained in the dietary nutrient analysis (table 4.16) which indicated that the majority of children consumed less than 100.0% of the DRIs for energy and calcium.

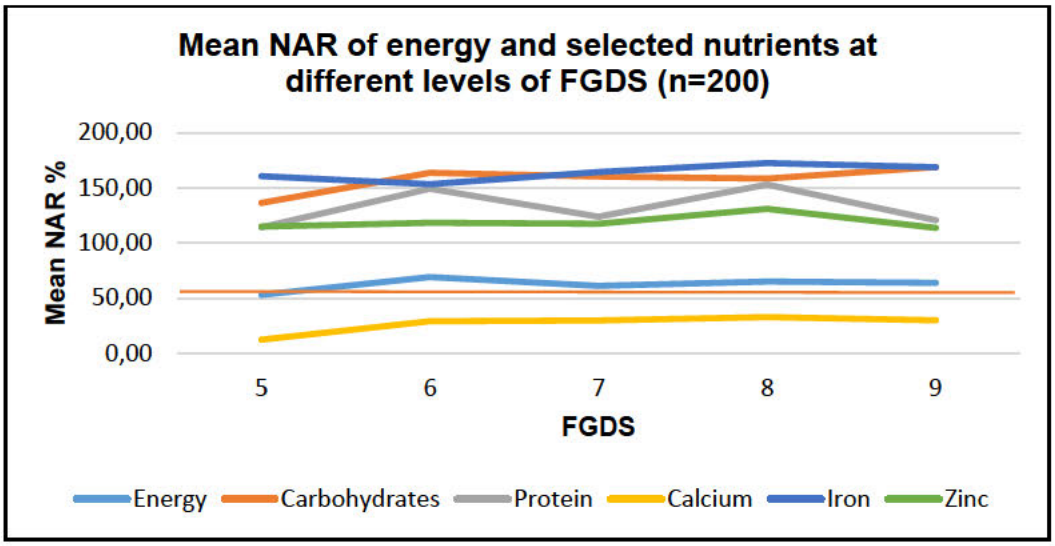

Figure 4.8: Mean Nutrient Adequacy Ratio (NAR) indicated as (%) of energy and nutrients at different levels of the Food Group Diversity Score (FGDS)

According to figure 4.9, the NAR for vitamin A and vitamin B6 remained above 100.0% adequacy; however, there was a decrease in the adequacy of vitamin A from food group six to seven but it increased thereafter, and vitamin B6 indicated a non-linear progression of adequacy from food group five to nine. Riboflavin and folic acid began with a NAR below 100.0% from food group five to seven and increased at food group eight to reach the 100.0% NAR and remained steady until food group nine. The NAR for vitamin C fell below the 100.0% adequacy, showing a non-steady progression of adequacy by a decrease in food groups seven and nine.

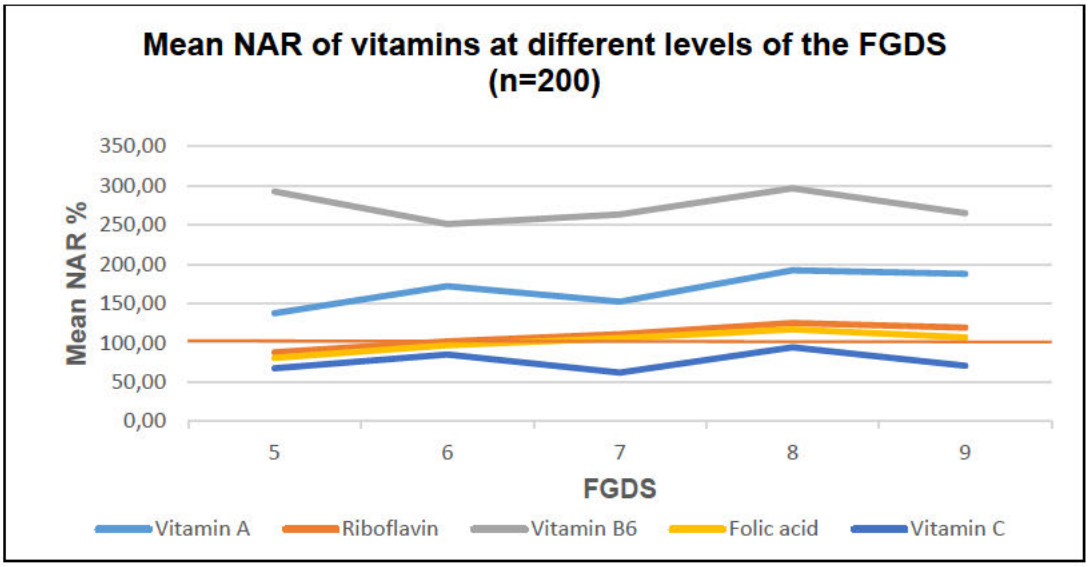

Figure 4.9: Mean Nutrient Adequacy Ratio (NAR) of selected vitamins at different levels of Food Group Diversity Score (FGDS)

4.7 CORRELATIONS

The correlations were carried out using the Pearson correlation analysis to determine whether a statistical significant relationship occurred amongst the sampled variables. When testing the statistical significance of a sample, the *p*-value must reflect less than 0.05, otherwise it can be concluded that there is no statistical significance between the samples. In this study the researcher decided to compare the AMPI scores of the households against the children's nutritional status z-scores (height-for-age and BMI-for-age) as well as against the FGDS. Table 4.25 indicates that there were no statistical relationships between the variables as they all achieved a *p*-value less than 0.05.

Table 4.25: Relationship between variables where statistical significance was indicated

Variables	Significance (*p*-value)
AMPI Score and BMI-for-age	0.49
AMPI Score and Height-for-age	0.26
AMPI Score and FGDS	0.09
FGDS and BMI-for-age	0.10

4.8 DISCUSSION

The socio-demographic questionnaire provides information required to determine the deprivation levels within the dimensions of health, education and living standards. The questionnaire provides information relating to each family's general living conditions, and the parent's/ caregiver's income and education status. This revealed that the majority (90%) of respondents had basic living conditions, as most houses were made of bricks; however, poor sanitation and lack of running water inside the houses indicated that housing conditions were not satisfactory amongst 74.5% of the households, as the households only had access to safe consumable water from taps located distances away from the homes. No form of waste removal service was available in all of the three surveyed rural areas in Komani (Queenstown). Poor sanitary conditions and lack of access to clean and safe water in close proximity to the homes has led to an unhealthy environment, with an increased spread of diseases and infections which may result to diarrhoea and worse, even deaths if the living conditions are not improved. The evidence of pest infestation experienced by many of the households could be the result of the inadequate disposal of refuse, which formed a breeding habitat for these household pests. Statistics South Africa (STATSSA 2019) indicated that in 2015 approximately 18 million people in South Africa lacked adequate access to sanitation. Approximately 44.4% of people had access to water inside their houses, while only 30.0% of households had taps within close proximity to their homes, and the remaining 14.0% used the available community taps and natural water resources from rivers and dams. The Eastern Cape province proved to be the second highest province with households that were still using the bucket toilet system. Overall, there has been some progress made in the reduction of the number of South African households that are

still using the bucket toilet system; however, many of the households are still living without adequate sanitation facilities. Based on the indicators of living standards, the households showed that

Unemployment was prevalent with 94.5% of household members not working and 74.0% of the households were recorded to have a monthly income of less than R3500; this was in line with the current unemployment status of 29.0% that South Africa is faced with, and although the rate is excessively high in comparison to the global scale, the average does not include all the unemployed. According to Belling (2020: para.2 line 2-7) there were a number of South Africans between the ages of 15 to 64 years who were potential job seekers that were seen as economically inactive or had become discouraged and were no longer job searching. This was evident in this study as 57.5% of the parents or caregivers are looking for employment and 37.0% not actively looking for work. Nkanjeni (2019: para.3 line 1) further elucidated that black South African households experienced the highest unemployment and received the lowest wages. Writer (2019: para.7 line1-4) explained that the South African minimum wage was R3300, and in each household there was on average of 3.5 people who relied on that wage to survive. Stats SA (2019) reported that approximately 28.0% of households lived on less than R2500 per month

Three percent (n=6) of households either had a child or an adult who had previously been diagnosed with malnutrition and 11.0% of households have had a child who died. Masquelier, Hug, Sharrow, You, Hogan, Hill, Hiu, Pederson and Alkema (2018: 5) reported that 55.0% of child mortality cases occurred in sub-Saharan Africa, which indicated to be higher in comparison to those in neighbouring regions whilst only 21.0% of child mortality cases were reported globally. Moreover, in 2016, 98.0% of deaths of children aged five to 14 years were reported to be from low to middle income countries. Ibrahim, Zambruni, Melby, and Melby (2017: 919) explained that malnutrition was a critical public health issue that affected millions of people globally and highlighted a link between malnutrition and infections that increased the risk of child morbidity and mortality.

Food insecurity was apparent as 83.6% of the parents/ caregivers indicated that they sometimes did not have money to purchase food for the household, and 0.5% of the participants mentioned that they consistently did not have money to buy food. According to Monyelo (2018 para.1 line 1-7) Africa constituted of 233 million people who lived in hunger and of these 233 million people, 20.0% of them comprised of the African population. Food crisis or food hunger was most prevalent in sub-Saharan African countries. Factors that have contributed to the prevailing situation include poverty and a shortage of food. STATSSA (2019) reported that South Africa was food secure; however the country remained food insecure on household level with a prevalence of rural households to account for more than 14 million people of the country's population, approximately 35.0% of the country's population perceived to be food insecure. Furthermore, the majority of poor people were found in rural areas, therefore making up about 10.5 million people who were chronically poor.

The majority of the household duties, including meal preparation, shopping for food and deciding on how much was spent on food, were carried out by the mother or the grandmother. The majority of the respondents and parent's/ caregiver's meals were consumed at home and they had three meals a

day on average. The grandmother and mother featured as the person responsible for feeding and serving food to the children. According to Kamer (2019) female headed households accounted for more than 41.9% of households in South Africa.

An indication of school-aged children not attending school was found in this study with 3.5% of the school-aged children not attending school. UNICEF (2020) reported on the issues affecting the South African education system and a number of factors reported included poor attendance of pupils at school, a high rate of teacher absenteeism, teenage pregnancy, and abuse or violence in schools. Jour, Mouton Nelda, Louw and Strydom (2012: 12) also emphasized the issues highlighted by UNICEF (2020) citing that the South African school system had negatively evolved as a result of issues such as the poor performance of teachers, as well as a lack of parental and community support. They further indicated that a lack of student morale as a result of violence in schools, absenteeism and the school dropout rate through from grade one to 12 were all factors that had contributed to poor performance in schools. Moreover, students who came from disadvantaged backgrounds plagued by poverty, gangsterism and alcohol and drug abuse contributed to the high number of school dropouts.

To determine whether households were acutely multi-dimensionally deprived, the per capita income of the households of between R12 07.94 - R18 030.00 was measured against the national GDP per capita of $6.10 (R107 970) (Trading Economics 2020). This reflected a very low per capita income in the households, therefore indicating that the households were income poor, thus contributing to the poverty levels indicated by the households. According to Hall (2018: para. 4 line 1-4), income levels only reflected on one measure, with limitations regarding the living conditions, inflation, income inequality and assets. A further measure of deprivation (AMPI), which showed that the households obtained an MPI score of 24.72 out of the 30.0% cut off-point set by Alkire and Santos (2010), indicated that the households were living in poverty.

The macronutrient intake of the mean energy intake for boys and girls (six to eight years) of 5474.23kJ was inadequate compared to the recommended EER of 7316kJ and 6896kJ, whilst both boys and girls aged nine to 13 years met their EER. In addition, all the children exceeded the RDA for protein and carbohydrate. However, none of the children met the AI for total dietary fibre. Overall, there were no insignificant differences in the macronutrient intake of the children besides the lower energy consumption of the children aged six to eight years. This was similar to a study by O'Connor, Ball, Steinbek, Dawes, Wishart, Gaskin and Baur (2001: 645) that reported that there were no significant differences in the macronutrient intake of boys and girls, except that the boys had a much higher protein intake compared to the girls. The carbohydrate and total dietary fibre contribution to energy intake of 45-65% was exceeded with 65.8% (boys and girls six to eight years), 70.2% (girls nine to 13 years) and 70.4% (boys nine to 13 years) respectively being reported. This was evident in the top 20 foods consumed by the children with the cereal group food items, namely: maize meal, samp and beans, rice and bread/ rolls all being in the top ten most consumed foods, with fat-containing food items being evident in all three age categories, therefore reflecting that the children's diet was mainly energy-dense. This correlated with a study by Zhou and Zhang (2014: 1587) which

highlighted that overconsumption of energy-dense foods with poor micronutrient intake in children increased the prevalence of child obesity and other related diseases.

Overall, the total fruit and vegetable intake of the children was substantially poor measured against the recommended goal set by the WHO of ≥400g/day, with a per capita intake per day of 60.7g (children six to eight years), 51.1g (girls nine to 13 years), and 38.3g (boys nine to 13 years). In addition, this was further seen in the lack of fruits and vegetables in the top 20 foods consumed, with only two fruit or vegetable items in each of the top 20 foods consumed and only seen at either 16th, 17th and 20th place of the top 20 foods in all three age-groups. Furthermore, a European study on micronutrient adequacy in children zero to eight years indicated that iron, iodine, folate and vitamin D were inadequately consumed by the group, with further results indicating an inadequate intake of calcium from 12 months onwards (Jordana, Closa-Monasterolo, Luque, Ferre, Grote, Koletzko, Pawellek, Verduci, Redionigi, Socha, Stolarczky, Poncelet, Rousseaux and Escribano 2017: 635). Altogether, the low fruit and vegetable intake by the children indicated a low micronutrient adequacy of calcium, iodine, pantothenic acid, vitamin C, vitamin D and vitamin K compared to the DRIs suggested by NICUS (2003). A low food variety score (FVS) of 28.6 was achieved by the group with indications that the group consumed less than thirty food items. The dietary diversity score in all food groups varied between a 1.0 to 6.7 mean, with the cereal group at 6.7, followed by meat (4.5) and the other vegetable group with a mean of 4.2. The least consumed food group were eggs with a mean of 1.0, legumes (1.2) and the dairy group with an average intake of 2.2. However, the DDs of the group indicated a high food DD score, and none of the children consumed less than five food groups.

Results for BMI-for-age in children aged five to nine years showed that 14.5% (n=9) girls were overweight and 4.8% (n=3) were obese in comparison to boys of the same age with 7.5% (n=4) boys overweight and 5.7% (n=3) obese, whereas both girls and boys in this age group indicated the same number of children who were wasted. Muthuri, Francis, Wachira, LeBlanc, Sampson, Onywera and Tremblay (2014: 14) explained that girls indicated to have a higher body composition than boys. No indication of obesity in girls between the ages of 10-14 years was found; however, 2.6% of boys were found to be obese. This could be explained by looking at the boys' dietary intake (top 20 foods) as they consumed more energy dense foods (carbohydrate and fat containing foods) with a very low intake of fruit and vegetables. The boys in this age category (10-14 years) did not present any cases of wasting, while 4.3% of girls were severely wasted. A study by Medhi, Barua and Mahanta (2017: 83) indicated that the prevalence of stunting, wasting and underweight was lower in children aged six to eight years in comparison to children aged nine to 14 years. In this study, the results for boys aged five to nine years showed a lower prevalence of stunting in comparison to girls in the same age category. However, both boys and girls aged 10 to 14 years showed an equal number of cases of being severe stunted, with 18.4% (n=7) of the boys stunted and 8.5% (n=4) of the girls were stunted. Overall, this study indicated a low prevalence of 10% of children that were stunted in this study in comparison to a study that was conducted in southern Ethiopia, where the results indicated a prevalence of 54.0% of children between the ages of six to 12 years who were stunted (Bogale, Bala, Tadesse, and Asamoah, 2018: 4-6).

Poverty was determined by many factors with unemployment, low income and lack of education all contributing to household food insecurity. Moreover, inadequate healthcare at home, lack of basic public healthcare services and the fact that households were unable to purchase nutritious foods due to a low income resulted in poor diet choices and an increase of diseases that might lead to the prevalence of malnutrition (Black, Allen, Bhutta, Caulfield, de Onis and Ezzati 2008 cited in Unite for Site (UFS) 2015: 3).

4.9 CONCLUSION

This chapter has presented the results of the study conducted on children aged six to 13 years in rural Queenstown (Komani), Eastern Cape.

Based on the socio-demographic results obtained, there were reasonable living conditions as the majority of the households were made of brick, with access to electricity and the availability of tap water in their residential areas. In this current study, a low AMPI score was achieved by the households. This was evident on occasions where the parents/ caregivers did not have money to purchase food, as most of the caregivers were unemployed and relied on government grants to cover all the household expenses. Moreover, most of the households' decision-making around food, including the amount of money spent on purchasing food, was made by either the mother or grandmother of the household who was also responsible for preparing and serving the food, and this was due to the fact that most of these households were female-headed, and therefore the women made most or all of the food-buying decisions for the households.

Overall, the children reported that they consumed a diet with low food dietary diversity as it contained a high content of carbohydrate-based food items such as maize, bread, potatoes, and samp and beans, with a low fruit and vegetable intake; this was evident in the low food variety score and food group diversity score of the group. In addition, the children did not meet some of the macronutrient intakes and several micronutrients including calcium, iron, magnesium, iodine, folic acid, vitamin B12, biotin and vitamin C were deficient. This was because the majority of these households purchased essential foods high in carbohydrates and very few fruits and vegetables. Furthermore, the top 20 foods consumed by the children reflected food items with a high carbohydrate content and very few or no fruits or vegetables appeared in this category.

In general the children's nutritional status proved to be adequate as most of the children were within the normal growth ranges with malnutrition not being as prevalent in this study, as only a few households had a family member who had been previously diagnosed with malnutrition. Finally, due to the disparities experienced by these families, the AMPI score of the households indicated a prevalence of deprivation in this study.

CHAPTER FIVE: MAIN FINDINGS AND RECOMMENDATIONS

5.1 INTRODUCTION

In South Africa, poverty is most prevalent in the Eastern Cape and Limpopo provinces, and constitutes over 30.0% of black South Africans living in poverty. On a household level the country is food insecure, and this was evident in this study, with the households being acutely multi-dimensionally poor. In SA, 1.5 million children were found to be stunted (UNICEF 2020: 1). The developmental, economic and social influences of malnutrition were significant, with lifelong consequences for the individuals, their families and communities (UNICEF 2020: 2). Malnutrition constituted an inadequate dietary and nutrient intake needed by the body to protect itself against potential diseases and infections. WHO (2019) elucidated that malnutrition was most prevalent in women, adolescents, children and infants. Due to the high rate of unemployment in South Africa, many parents in the rural areas were unemployed and this has resulted in many of the households being dependent on child, foster and old age grants in order to feed all the household members.

The aim of this study was to evaluate household deprivation using the Multidimensional Poverty Index (MPI) and its relationship to the food intake and nutritional status of children aged six to 13 years in rural Queenstown (Komani), Eastern Cape. The results of this study will be of assistance in formulating practical intervention programmes that would enable local government, government officials as well as policy-makers to more easily identify poverty levels in households, as well as to address the issue of food insecurity and its effect on child nutrition.

5.2 LIMITATIONS OF THE STUDY

There were no limitations experienced in the study.

5.3 MAIN FINDINGS OF THE STUDY

The literature reviewed has indicated that children that lived in extremely poor households were from developing countries, with sub-Saharan Africa indicated to have the highest rate of child poverty in the world, making the children prone to inadequate dietary intake and the risk of infectious diseases. The economic and social complexities which mostly affected middle to low income countries have contributed to the level of poverty found in many countries. South Africa is a developing country and this study focused on the three rural areas of Komani (Queenstown), situated in one of the poorest provinces in the country, the Eastern Cape. Two hundred children between the ages of six and 13 years, selected from the three rural areas of Komani (Queenstown), namely Birch Farm, Lesseyton (Ndlovukazi) and Machibini, participated in the study.

The purpose of the study was to determine the deprivation levels within their households and to find out how they had affected the children's food intake and nutritional status by using the MPI. Furthermore, a question on income was included in the socio-demographic questionnaire to determine the households' monthly income, and the data was then compared against the national GDP in order to distinguish whether the households' income was below or met the national GDP. The

MPI dimensions used to determine the poverty levels within a household included health, education and standard of living within the 10 indicators namely, nutrition, child mortality, years of schooling, child enrolment, electricity, water, sanitation, type of floor, cooking fuel, and assets.

The main findings were summarized and included information from the socio-demographic questionnaire, the 24-hour food recall questionnaire, the food frequency questionnaire and the anthropometric results. The gathered analysis provided the researcher with the information required to determine the MPI score. Main findings discussed are based on the three dimensions and ten indicators used to determine the poverty levels experience in a household.

Child mortality was recorded in 22 households that indicated that they had a child that had died. In this study there was no indication of macronutrient malnutrition, as the children met the recommended fat and protein intakes, and even exceeded the recommended carbohydrate intake. Results for BMI-for-age showed that some of the children were overweight and obese, while others were at possible risk of being overweight. Furthermore, according to the nutrient analysis results, it was seen that some of the children did not meet the RDA intake for protein, with two children indicated to be wasting. Chronic malnutrition (stunting) was seen amongst a few of the children. Micronutrient deficiencies were also apparent as several micronutrients were not met by the children including iron, iodine, zinc, and vitamin A. This was evident in the top 20 foods consumed by the children as the fruit and vegetable items ranged from 16th place and lower, and only three items of either fruit or vegetables foods were consumed by the children.

The highest level of education obtained by the majority of the family members was below or equivalent to the National Senior Certificate (NCS) (≤ grade 12). Seven households indicated they had a school-age child not attending school.

The majority of the households interviewed had poor sanitation facilities available to them as the pit latrine system was still used and a lack of running water within close proximity to their homes showed that inadequate basic services were available to these household communities from Birch Farm, Machibini and Lesseyton. Most of the households had access to electricity, and a few households continued to use wood, paraffin, gas or coal as their form of cooking fuel. Two households had dirt floors and seven households had sand/mud flooring. The majority of the households owned most of the basic household items including a radio, television, telephone/cell phone and refrigerator; however, most of the households used public transport as their form of transportation and did not own a car/ tractor or bicycle.

The AMPI scored by the households indicated that the households were living in poverty, with a calculated score of 24.7% out of the 30.0% cut-off point; this indicated that 82.4%of the households were poor.

The majority of the parents/ caregivers in this study were unemployed, with all the households relying on government grants as their source of income needed to cover all the household expenses. The majority of the households received a total monthly income of below R3500 per month. Overall, the households' per capita income was between R12 071 and R18 030, which was below the national

GDP per capita R107 970 per annum. In this study, the households had an MPI that indicated they were poor, with a household's total income below the national GDP, therefore making these communities, namely Birch Farm, Lesseyton and Machibini, to be acutely multi-dimensionally poor.

The findings summarized included information from the 24-hour food recall questionnaire and the food frequency questionnaire. The majority of the caregivers indicated that they sometimes did not have money to purchase food for their families. The most consumed food items according to the top 20 foods consumed were carbohydrate-based foods, namely maize meal, samp and beans, bread, rice and potatoes. The least consumed food items were from the dairy foods and fruit and vegetable food groups. A low food variety score of 28.61 was obtained by the group, which indicated that the children consumed fewer than 30 individual food items. The continued increase in food prices has placed a strain on a significant number of South African households, especially those in middle to low income households. The literature reviewed elucidated that food insecurity in households was the result of the inability to access food due to poverty. The continuous increases in the cost of goods and services, and the lack of job opportunities has resulted in many households being forced to purchase foods that are most likely to promote and maintain satiety, while not necessarily considering the nutritional benefits of the foods being consumed.

5.4 CONCLUSION

The three dimensions namely: health status, level of education and living standards have all contributed to assessing whether the households in this study were acutely multi-dimensionally poor. No correlations were found between the AMPI, dietary intake and BMI-for-age and height-for-age of the children; however, the households' indicators revealed that they were living in poverty. The low per capita income obtained by the households also showed the households to be living below the poverty line. The children's' overall dietary intake was also inadequate and there were many factors that dictated the children's food intake and nutritional status as discussed in previous chapters. Although the AMPI did not show any relationship to the children's dietary intake, healthcare disparities, lack of basic services and the low level of education obtained by the households' parents/ caregivers were factors which affected the overall health status of the children, as shown in this study.

Interventions are needed to assist the households interviewed in this study to improve household food security in order to improve their children's food intake and nutritional status.

5.5 RECOMMENDATIONS

5.5.1 Recommendations for local government (Enoch Mgijima Local Municipality)

- Subsistence farming ─ local government could work alongside the Department of Agriculture, Forestry and Fisheries (DAFF) to provide resources such as planting equipment/ tools and vegetable seeds and introduce educational programmes that would enable the community members to practice subsistence farming, such as the use of indigenous and traditional food systems in poor and rural communities to enable them to provide food for themselves, thus combating the issue of food insecurity existing in many households in the community.

- Community feeding programmes ─ local government needs to implement community feeding programmes aimed at assisting households unable to provide sufficient food (three meals a day) for their families. The programmes would need to deliver meals to the different residential areas at least four or five times a week and this would also assist many parents who depend on the NSFP during school holidays.
- Food parcels ─ local government could implement food parcel distribution programmes to assist community members on a monthly basis.

5.5.2 Recommendations for government officials

- National school feeding programmes ─ an observation made by the researcher during the interviews with the respondents was that many of the children were dependent on the meals provided at schools. Only one meal was received by the children at school and it was given to the children at lunch break. The 24-hour recall indicated that many of the children did not consume any meal in the morning before school, and some children would not eat again until the evening meal. It is thus suggested that an additional meal be provided when the children arrive at school in the morning. This would incur additional expense since government would need to pay tender providers of these programmes an additional amount to enable them to provide both breakfast and lunch meals. However, this would greatly assist many poor households since they would then know that their children were receiving breakfast when they arrived at school and before classes resumed in the afternoon they would have eaten lunch. Food intake in the morning before school is essential if children are to concentrate in class and this also leads to improved performance and ultimately a higher pass rate.
- Intervention programmes are needed to combat the issue of unemployment; as the parents who are unemployed also rely on the children's grant for their living expenses. During the Covid pandemic, the national government has introduced the R350 grant for the unemployed youth. This intervention method has assisted many South African households from going to bed hungry; therefore, my suggestion as the researcher is for the grant offered to unemployed youth to continue until job scarcity has been addressed.

5.5.3 Recommendations for policy makers

- To formulate nutrition intervention policies that would equip local government with the tools needed to identify households within the local municipality that are food insecure in order to combat food hunger in households, as well as to provide the households in the communities with information that would assist them to ensure that they were food secure, such as information on community-based projects, subsistence farming, food parcels and any other nutrition intervention information that could be made available.

5.5.4 Recommendations for future research

- This study has identified a small sample within South Africa and has highlighted the issues of food insecurity, poverty and social inequality specifically found in households in rural areas in the Eastern Cape. Further research needs to be conducted to review the poverty levels within South African households, particularly those in other rural areas. More practical interventions need to be implemented by government officials and policy makers to eradicate social inequality and hunger in households as this adversely affects the children's health and wellbeing.
- Further investigation needs to be conducted to determine whether the child support grants or foster grants cater specifically to the children's needs and to evaluate whether in fact any improvements in the children's food intake and nutritional status are observed once the grants have been received.

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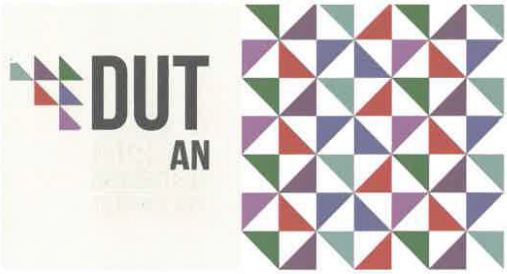
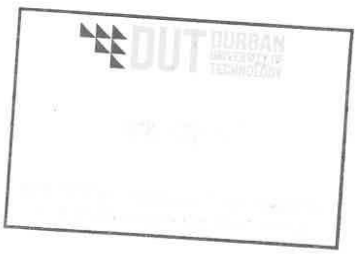
Annexure A: IREC Approval





Annexure B: Letter of Permission from the councillors

Dear Sir/ Madam

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH IN BIRCH, MACHIBINI AND LESSEYTON

I am registered Masters Student of Applied Science Food and Nutrition at the Durban University of Technology.

The proposed topic of my research is: **Household deprivation and its relationship to food intake and nutritional status of children 6-13 years in rural Queenstown, Eastern Cape**

The objectives of my study are:

- To determine the AMDPI score of each household by using a socio-economic demographic questionnaire
- To determine the actual food intake of the children in the household by using the 24hour recall questionnaire
- To assess the dietary diversity of the children by administering a food frequency questionnaire (FFQ)
- To calculate the nutritional indicators of the children by weighing and measuring each child
- To correlate the AMDPI of the household to the food intake and nutritional status of the children.

I hereby seek your consent to conduct research in your council area. My research project will involve children between 6-13 years of age living in households within the rural districts of Queenstown, namely Birch, Machibini and Lesseyton. The estimated sample size is 200 participants.

A letter of information will be given to the parent(s)/caregivers of the child outlining the purpose of the study and its expectation; this letter is translated in IsiXhosa to allow the participants access to information. Approval to take part in the study will be required from both the child and the parent(s) or caregivers. The children and parent(s)/ caregivers will have to sign a consent form to indicate that they agree to participate in the study.

The study will be conducted by myself (researcher) and trained field workers who are fluent both in English and IsiXhosa for data collection. Data collection will be conducted in an interview situation by means of completing a Socio-Economic Demographic Questionnaire, three x 24 Hour Food Recall, and Food Frequency Questionnaire at the privacy of the participants' homes. Photographs will be taken during data collection, and will only be used as attachments.

There will be no risks to the participants who will be involved in the study. Information obtained will be treated with the strictest confidentiality and will be used solely for this research purposes only. Participants will be made aware of the fact that the information gathered will be confidential.

My intent for this study is that the research findings may be used to develop nutritional intervention programmes that will assist in improving the nutritional status and food intake of children within these communities. I (the researcher) will be available to answer any questions related to nutrition or nutritional status after data collection.

Should you require any further information, contact details are as follows:

Researcher: Papama Kupiso BTech: Consumer Science Food and Nutrition.

082 792 9600 kupisopapama@gmail.com

Supervisor: Prof. Carin Napier DTech: Food service Management.

031 373 2326 carinn@dut.ac.za

The Institutional Research Ethics administrator: 031 373 2900

Complaints can be reported to the Director: Research and Postgraduate Support: Prof S Moyo moyos@dut.ac.za or 031 373 2382

Your permission to conduct the study will be greatly appreciated.

Yours sincerely

P.Kupiso

Papama Kupiso

(Researcher)

Please indicate with a signature for approval:

Unathi Mlindazwa _____ 19-2-2018

(NAME OF COUNCILOR) (SIGN) (DATE)

Lessyton

(PLACE AUTHORISED)

My intent for this study is that the research findings may be used to develop nutritional intervention programmes that will assist in improving the nutritional status and food intake of children within these communities. I (the researcher) will be available to answer any questions related to nutrition or nutritional status after data collection.

Should you require any further information, contact details are as follows:

Researcher: Papama Kupiso BTech: Consumer Science Food and Nutrition.

082 792 9600 kupisopapama@gmail.com

Supervisor: Prof. Carin Napier DTech: Food service Management.

031 373 2326 carinn@dut.ac.za

The Institutional Research Ethics administrator: 031 373 2900

Complaints can be reported to the Director: Research and Postgraduate Support: Prof S Moyo moyos@dut.ac.za or 031 373 2382

Your permission to conduct the study will be greatly appreciated.

Yours sincerely

P.Kupiso

Papama Kupiso

(Researcher)

Please indicate with a signature for approval:

Ngesi Mzikabawo — 20/02/2018

(NAME OF COUNCILOR) (SIGN) (DATE)

Birch Farm.

(PLACE AUTHORISED)

My intent for this study is that the research findings may be used to develop nutritional intervention programmes that will assist in improving the nutritional status and food intake of children within these communities. I (the researcher) will be available to answer any questions related to nutrition or nutritional status after data collection.

Should you require any further information, contact details are as follows:

Researcher: Papama Kupiso BTech: Consumer Science Food and Nutrition.

082 792 9600 kupisopapama@gmail.com

Supervisor: Prof. Carin Napier DTech: Food service Management.

031 373 2326 carinn@dut.ac.za

The Institutional Research Ethics administrator: 031 373 2900

Complaints can be reported to the Director: Research and Postgraduate Support: Prof S Moyo moyos@dut.ac.za or 031 373 2382

Your permission to conduct the study will be greatly appreciated.

Yours sincerely

P.Kupiso

Papama Kupiso

(Researcher)

Please indicate with a signature for approval:

Z S NGOMPO (NAME OF COUNCILOR) (SIGN) 20/03/2018 (DATE)

MACHIBINI (PLACE AUTHORISED)

Annexure C1: Letter of Information (English)

Annexure C

LETTER OF INFORMATION

Title of the Research Study: Household deprivation and its relationship to food intake and nutritional status of children 6-13 years in rural Queenstown, Eastern Cape

Through this project the researcher aims to evaluate household deprivation using acute multidimensional poverty index (AMDPI) and its relationship to food intake and nutritional status of children 6-13 years. The research will be conducted in rural Queenstown within the district of Enoch Mgijima Municipality; which includes Lesseyton, Birch and Machibini, and the sample size will include 200 participants. The researcher will determine the level of deprivation within the households in the three specified rural areas and the impact it has on the actual food intake and nutritional status of the children. The outcome of the results may be used to develop nutritional intervention programmes that will assist to improve the nutritional status and food intake of children within these communities.

Outline of the procedures:

- The children and parent(s)/ caregivers will have to sign a consent form to indicate that they agree to participate in the study after the researcher has explained all the procedures to them.
- Once the participant agrees to take part in this study, they will be asked to avail themselves for the day of data collection.
- Data collection will be conducted in an interview situation by means of completing a Socio-Economic Demographic Questionnaire, three x 24 Hour Food Recall, and Food Frequency Questionnaire
- Anthropometric measurements will be conducted on the children including height for age, weight of age, body mass index (BMI) for age,
- Data collection will be conducted in the privacy of the participants' homes
- Participants will not be paid to take part in the study.
- Participation is on a voluntary basis and the participant can withdraw from the study at any given time, there will be no penalty.

Risks or Discomforts to the Participant:

- There will be no risks to the participants who will be involved in the study.
- The child will only have to remove shoes and any heavy items such as jerseys or jackets if necessary.

Benefits:

Results gathered from the study may benefit the community by implementing new knowledge to the relevant community members or leaders, to help improve the quality of life and health care by developing nutritional intervention programmes that will assist in improving the nutritional status and food intake of children within these communities. The researcher will be available to answer any questions related to nutrition or nutritional status after data collection. The dissertation will be available at the Durban University of Technology (DUT) library.

Remuneration:

Participants will not receive any monetary remuneration or any other types of remuneration in taking part in the study.

Confidentiality:

All the information obtained will be confidential. Confidentiality will be ensured by issuing of numbers to participants instead of using their personal details. Personal information of the participants will be stored at the Department of Food and Nutrition Consumer Science in a locked cupboard for a period of five years, after this period, it will be disposed of by shredding. Electronic data will be password protected.

Persons to contact in the event of any problems or queries:

Researcher: Papama Kupiso BTech: Consumer Science Food and Nutrition.

082 792 9600 kupisopapama@gmail.com

Supervisor: Prof. Carin Napier DTech: Food service Management.

031 373 2326 carinn@dut.ac.za

The Institutional Research Ethics administrator: 031 373 2900

Complaints can be reported to the Director: Research and Postgraduate Support: Prof S Moyo moyos@dut.ac.za or 031 373 2382

Annexure C2: Letter of Information (IsiXhosa)

Annexure C (2)

INCWADANA YAMANGAKU

Uphando Nkqubo: Ukulambatha kunye nonxulumano kwisondlo nendlela abantwana abondleka ngayo kumaphandle aku Komani, Empuma Koloni

Kule project umphandi uvavanya unxulumano lwabahlali nendlela zokulambatha ngokusebenzisa into ekutiwa yi Acute Multidimensional Poverty Index (AMDPI) nonxulumano lwayo kwindlela ekutyiwa ngayo nesondlo sabantwana abakwiminyaka 6- 13. Olu phando luya kwenziwa kwingingqi Enoch Mgijima Municipality ebandakanya ezi ndawo Lesseyton ne Ndlovukazi, Birch farm kunje nelali zeseMachibini. Umlinigi wabantwana uyakuba 200 yabantwana. Uthando olo luyakusinika umlingi wentlupheko kubahlali bezindawo zikhankanyiweyo ngokwendlu nendlu nezinga lesondlo nokondleka kwabantwana. Iziphumo zoluphando ziya kusetyenziswa uku khulisa izinga lesondlo ezizizo zokuphakamisa izinga lesondlo kubantwana bezilali.

Naku ke ukwenzeka:

- Abantwana, abazali kunye nonompilo kuyakufumanenka besicelela isivumo ukubonakalisa ukuba bayavuma ukuthatha inxaxheba kuluvavanyo emva koku caciselwa ngumphandi konke okuzakwenzeka nokuyakwenziwa kubo.
- Bakube bevumile abathathi nxaxheba bayakucelwa ukuba babekhona ngalomhla kuyakube behlanganiswa ngayo amanqaku.
- Uhlanganiso lwamanqaku luyaku qhutywa ngendlela yokuba abantu bagcwalise iformu enemibizo ephanda izinga lentlupheko.
- Abantwana baya kubekwa ezikalini ukubonwa ubunsima bemizimba yabo buthelekiswe nobume babo nobungakanani bentloko ngokweminyaka yabo umntwana nomntwana uyakwangelwa zonke ezozinto ekhusini hayi esidlangalaleni.
- Abathatha inxaxheba abazuku fumana ntlawulo ngalento.
- Uthabatho nxaxheba ukwenza ngokuqhutywa yintliziyo yakhe xa esiva engasathandi unako ukurhoxa nangawuphi na umzaza akukubakho sohlwayo.
- Umgcipheko okanye ukugaziva mnandi kuba thathi nxaxheba akukubakho mngcipheko kwabo bathi nxanxeba.
- Abantwana bona bokuphungula izinto ezinzima ezifana nezihlangu, ijersey okanye ibhatyi.

Inzuzo

- Xa iziphumo sezihlanganisiwe ziya kunceda abahlali ngokuzisa ulwazi olutsha ngeendlela zokuphakamisa nokuphucula izinga lobomi nemphilo nokuphucula indlela zesondlo nokondleka kwentsapho zabo.
- Umphandi yena uyakuba ukuza kuphendulo yonke imibuzo abantu abanayo mayela noluphando kwaye lona luyakuphononongwa kwi Dyuniversity yase Durban kwi library yakhona.

Holo

Xa ke ngentlahla uthe wathabatha inxaxheba kolu phando akukho ntlawulo eyimali oyakuthi uyifumane ngenxa yoluphando kodwa apha ebuchotsheni uyakube ngamandla uyakuba lulutho kwimeko ezikumile kunje ekhuhlaleni.

Ubungcinasifuba

Konke okuyakwenziwa koluphando kufumaneka kuyimfihlelo umntu angahambi eyichaza nje yonke inqubo eqhutywe apha. Le mfihlelo iyakwenziwa ngokuthi kunikezwe inombolo endaweni yokusebenziza amagama abo, Amagama wona ayokuba selugcinweni kwiziko lwezondlo kunye no Nutrition Consumer Science kwindawo zabo ezitshixwayo kwisithuba seminyaka emihlanu zakuthi ke xa sezitshatyalaliswa zizizwe kwindawo zokundweba amaphepha na imiqulu ephethwe ngobuchwephesha bala maxesha. Iyaku valelwa nge password ezaziwa ngabathile bokwazi oko.

Xa ninengxaki ngako konke oku dibana no:

Umphandi: Papama Kupiso BTech: Consumer Science Food and Nutrition.

082 792 9600 kupisopapama@gmail.com

Umphathi: Prof. Carin Napier DTech: Food service Management.

031 373 2326 carinn@dut.ac.za

The Institutional Research Ethics administrator: 031 373 2900

Izikhalazo dibana no Director: Research and Postgraduate Support: Prof S Moyo moyos@dut.ac.za or 031 373 2382

Annexure D 1: Consent Form

CONSENT

State of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (name of researcher), about the nature, conduct, benefits and risks of this study- Research Ethics Clearance Number: _____.
- I have also received, read and understood the above written information (Letter of Information Annexure B) regarding the study.
- I am aware that the results of the study, including personal details of the child regarding sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of the research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunities to ask any questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of research which may relate to participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant (Child)	**Date**	**Time**	**Signature/ Right thumb**

_____	_____	_____
Full Name of Legal Guardian	**Date**	**Signature**

I, _____ (name of researcher) herewith confirm that above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**

_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**

Annexure D.2: Consent Form (IsiXhosa)

ISIVUME

Isivumelwano kuphando oluzakuqhubeka ngezifundo:

- Ndazisa ukuba kuzakubakho uqulungo uluzakwenziwa ngumphandi _____ (Igama Umphandi), malunga nokuphila nokuziphatha, nempilo yoluntu zoluphando- Research Ethics Clearance Number: _____.
- Ndiyifumene ndayifunda ndayiyqonda imininingwane malunga noluphando lungasentla.
- Ndiqaphele ukuba incukacha zomntu zakuba yimfihlo ngalo eloxesha kwenziwa uphando ngaye umntu ubuni, iminyaka, uxesh lokuzalwa kunye nokufumaneka kwesigulo sakhe sakuba kwingxelo yomphandi
- Ngokwesivumelano nomphandi incukacha zakuqokelwelwas zingcinwe kwi computer ngumphandi.
- Ndivumelekile nanini urhoxa ndingazisanga bani koluphando.
- Ndinamathuba awoneleyo okubuza imibuzo ngendlela yam, ndithembisa kanjalo ngokuzinikela kwesisifundo soluphando
- Ndiyaqonda ukuba iziphumo zoluphando ezintsha ziya kufumaneka kum.

_____	_____	_____	_____
Igama umthathi nxaxeba (umntana)	**Date**	**Xesha**	**Utyikityo**

_____	_____	_____
Igama lomzali/ Nompilo	**Date**	**Utyikityo**

- Mna _____(Umphandi) ndinikeze imvume yokuba ngomnye wabaqulunqi ngoluphando ubume, nokuyenza, nomgciphe ko kwezi zifundo zingentla.

_____	_____	_____
Igama Lomphandi	**Date**	**Utyikityo**

_____	_____	_____
Igama lengqina (xa likhona)	**Date**	**Utyikityo**

Annexure E: Field worker Confidentiality Agreement

Research Assistant Confidentiality Agreement

Title: **Household deprivation and its relationship to food intake and nutritional status of children 6-13 years in rural Queenstown, Eastern Cape**

I, _____(name of field worker) agree to assist the primary investigator with this study by (research tasks)

- To be available for training(s) set by the researcher
- Avail myself for data collection on the set dates, time and places
- To record data using the set questionnaires, namely Socio-economic demographic questionnaire, Food Frequency questionnaire and 3x 24 Hour food recall questionnaires
- To conduct anthropometric measurements on the children including height for age, weight for age, body mass index (BMI) for age
- By verbally translating information from English to IsiXhosa when required for the participant
- To ensure that the participant clearly understands the purpose of the study and letter of information is clearly read to the participant (either in IsiXhosa or English), and a signed consent letter by the parent(s)/ guardian and the child is obtained beforehand.
- To ensure that all data collected is accurately recorded and no foul play
- To maintain professional etiquette throughout the research project

I agree to maintain full confidentiality when performing these tasks. Specifically, I agree to:

1. Keep all research information shared with me confidential by not discussing or sharing the information in any form or format (e.g. disks, tapes, transcripts) with anyone other than the primary researcher;
2. hold in strictest confidence the identification of any individual that may be revealed during the course of performing the research tasks;
3. not make copies of any data in any form or format, unless specifically requested by the primary researcher;
4. keep all data that contains identifying information in any form or format (tapes, transcripts) secure while it is in my possession
5. Give all information obtained during data collection to the primary researcher when I have completed the data collection.

Contact information of field worker:

Full name of field worker: _____

Telephone number: _____

Email address: _____

Signature of fieldworker: _____

Annexure F

MEASURING INSTRUMENTS PREVIOUSLY USED TO MEASURE POVERTY DIMENSIONS NATIONALLY AND PROVINCIALLY

Table 1.1: Studies conducted in South Africa on measuring instruments used to measure poverty dimensions

Author and reference	Measuring Instrument (indicator)	Study Population	Summarized results	Level at which study was conducted
Eastern Cape Socio-Economic Consultative Council (2017) Enoch Mgijma Local Municipality Socio-Economic Review and Outlook, 2017	Human Development Index (HDI) Dimensions measured: • Standard of living • Health • Knowledge	Buffalo City Metropolitan Municipality, South Africa: total population size 848 000. Males - 408 000 Females -441 000	• Made comparisons between Enoch Mgijima Local Municipaliy, Chris Hani District and National level. • The municipality had a higher HDI of 0.6 than the district's HDI (0.558), and provincial (0.594). • On a national level, the municipality measured low on the HDI. • The country's HDI expanded by 1.78%.	Municipal level and National level
Statistics South Africa (2014) The South African MPI: Creating a multidimensional poverty index using census data	South African Multidimensional Poverty Index (SAMPI) Dimensions measured: • Health • Education • Standard of living • Economic activity	South African (all nine) provinces results were by head count	• The SAMPI is based on the Alkire-Foster method of the MPI. • Conducted on a national level. • No analysis done on hunger, food and nutrition, therefore limiting the report on reflecting on the poverty levels of the country. • KwaZulu-Natal (KZN), Eastern Cape (EC), North West and Limpopo reported the highest SAMPI index scores. • On a national level the standard of living dimension contributed to 45.9% in 2001. Contributions to the standard of living had dropped to	National level

			42.6%, and education to 16%. This reflected on the improvements made by the government in the delivery of basic services between the years 2001 to 2011. • An increase of 39.8% in unemployment in 2011 reflected on the situation the country was currently faced with and the reason why households were poor in 2011.	
McIntyre, Muirehead and Gilson (2002) Geographic patterns of deprivation in South Africa: Informing health equity analysis and public resource allocation strategies.	General Index of deprivation using principal component analysis Dimensions measured: • Socioeconomic • Demographic • Physical characteristics of a household	Magisterial districts (354 districts) in South Africa	• Magisterial district level. • Focused on deprivation and health inequalities in the country. • 40% of South Africans lived in the severely deprived quintile. • 76% of the population who resided in quintiles 1 and 2 districts were in KwaZulu-Natal, Eastern Cape and Northern Cape. • Northern Cape and Eastern Cape were found to be the most deprived.	Magisterial district level.
Noble, Babita, Barnes, Dibben, Magasela, Noble, Ntshongwana, Phillips, Rama, Roberts, Wright and Zungu (2006)	1995 IES, 1996 OHS and 2001 Census Dimensions measured: • Household infrastructure index • Household circumstance index	10 national municipalities: calculated the mean of children in a ward. Population size = 4580	• Estimated household expenses below the market indices were indicated to be low.	Municipal level
Hirschowitz, Orkin and Alberts (2000)	Household Infrastructure Index using factor analysis	28 585 households	• Provincial level • Over 25% of the population in each year was living in	Provincial level

	Dimensions measured: 1.Household Infrastructure Index: • State of housing • Access to services • Education • Expenditure 2.Household Circumstances Index: • Unemployment • Household size • Number of children	9 provinces 45 district councils 354 magisterial councils 12 753 towns/place names	households with zero earned income. • Half of all African individuals were shown to be living with no salary or wage income. • Only 19% of African households had at least earned a wage or salary.	
Noble *et al.*(2006)	Composite Deprivation Index (Constructed Deprivation Index) Dimensions measured: • Education • Income • Wealth • Housing • Water • Sanitation • Energy • Employment • Transport • Financial services • Nutrition • Healthcare • Safety and perceived well-being	3799 wards in South Africa	• National level • District municipality had 25% wards. • The most deprived wards were found in Mbizana, Ntabankulu, Port St Johns and Qaukeni municipality.	National level
Bhorat *et al* (2004)	Service and Asset Deprivation Dimensions measured: • Economic activity	Used census data from 1996-2001	• South Africa did not have a data set to indicate deprivation levels for the services and assets.	National level

	• Health and safety			
The South African Human Development Report (2003) (UNDP 2003: 47)	Service Deprivation Index (SDI) Dimensions measured: • Housing • Water • Electricity • Sanitation • Refuse collection City Development Index (CDI) Dimensions measured: The CDI measures a combination of indices: • Education • Infrastructure • Health • Income • Waste removal	South African population	• It's calculated nationally and provincially by race and gender. • Jobs created provided for 11.5% of the 16.81% of the country's population in need of jobs.	National and Provincial level
The Social Research and Population Development Unit of the Department of Health and Social Services in the Western Cape (Western Cape Government 2013)	The Human Development Index) (HDI) Dimensions measured: • Income status • Employment status • Literacy • Water supply	300 sites (152 metro sites and 81 non-metro sites)	• Provincial level • Infant and toddler classes were of a lower standard than those for older children. • There was no difference in classroom quality between sites located in metro and non-metro areas. • Registered sites that were not subsidised had higher classroom quality for both infants and toddlers and early childhood classes when compared with those that were	Provincial level

			unregistered or were both registered and subsidised (or had applications for subsidy pending). • Service integration for children was uniformly poor. Children with problems were rarely identified or referred; indicating that holistic care was not being provided to young children and that their families were not referred to services that could assist them.	

Annexure G: Socio-demographic Questionnaire

Food and Nutrition Consumer Sciences

SOCIO-DEMOGRAPHIC QUESTIONNAIRE

This questionnaire covers certain aspects of your life, including work and personal details, health and illness, lifestyle and social life that is relevant to health. The answers to these questions will be kept strictly confidential and the information will not be identifiable on any reports or publications.

1. GENERAL INFORMATION

Household

Participant number: ……..……. Date: ……

Fieldworker name: ……

Please answer all questions by marking the correct answer with **X,** except where otherwise indicated.

Where do you live?

.....

2. PERSONAL INFORMATION

2.1 Your role in the family

Mother	Grandmother	Father	Grandfather	Other, specify……..

2.2 When were you born? Year: Month: Day:

2.3 How old are you? _____ years

2.4 Gender:

Male		Female	

2.5 Household composition: Age group of all household members

Age (years)	Male	Female	Total number
0-5			
6-13			
14-60			
60+			
Total			

3. ACCOMMODATION AND FAMILY COMPOSITION

3.1 Do you live in?

Town/City	Farm	Squatter camp	Rural village	Hostel	Township	Other, specify……

3.2 How are you currently living?

Homeless	
Living with relatives	
Living with friends	
Hostel accommodation	
Squatter home	
Rented house/flat	
Own house/flat	
Employees Properties	
Other, specify…….	

3.3 Do other people live in the house with you?

Yes		No	

3.4 How many people are permanent residents living in the house with you? (Only if these people eat and sleep in this house at least 4 days a week?)

1	2	3	4	5	6	7	8	9	10	10+

3.5 How many children live in the children?

Male		Female	

3.6 How long have you been staying permanent in this house?

< 1 year	1-5 years	>5 years

3.6 In what type of house are you staying?

Brick	Clay	Grass	Wood	Zinc/shack

3.7 How many rooms does your house have?

1 room	2 rooms	3 rooms	4 room	>5 rooms

3.8 Are there other houses/shacks within the same yard of the main house?

Yes	No

3.9 Do you have the following facilities/ services at home?

3.9.1 Water

Tap in the house	
Tap outside the house (in yard)	
Borehole	
Spring / river / dam water	
Fetch water from elsewhere	

3.9.2 Toilet facilities

None	
Pit latrine	
Flush / sewage	
Bucket system	
Other, specify…….	

Waste removal	Yes	No	3.9.3
Tarred road in front of house	Yes	No	3.9.4
Gravel road in front of house	Yes	No	3.9.5
Access to electricity	Yes	No	3.9.6

3.10 To what extent do you have problems with the state of your house (e.g. size, repairs, damp, etc.)?

……
……

3.11 Do you have problems with the following?

Mice/ Rats	
Cockroaches	
Ants	
Flees	
Mosquitoes	

Geckos	
Frogs	
Snakes	
Bed Bugs	

3.12. What is the floor inside your house made of?

Cement	
Tiles	
Carpet	
Dirt	
Sand/mud	
Dung	
Other, please state	

4. WORK STATUS AND INCOME

4.1. Are you currently employed?

Yes	No

If YES, go to Question 4.5.

4.2. If NO, how would you describe your current status (tick one box only)?

Unemployed	Retired	Housewife	Student	Other, specify……

4.3. Are you actively looking for paid employment at the moment?

Yes	No

4.4. How long have you been unemployed?

< 6 months	6-12 months	1-3 years	> 3 years

4.5. If YES (question 4.1) is your current job a:

Permanent position	Temporary position	Fixed term contract	Other, specify……..

4.6. Are you doing part time jobs as a second job on weekends and school vacations?

Yes	No

4.7 What is the exact title of your current job?
(Including self-employed)

4.8. What is the total income in the household per month?

R0- R500	R501-R1000	R1001-R1500	R1501-R2000	R2001-R2500	R2501-R3000
R3001-R3500	R3501-R4000	R4001-R4500	R4501-R5000	R5001-R6000	R6001- R7000
R7001- R8000	R8001- R9000	R9001- R10 000	>R10 000		

4.9. Please specify the monthly income in the household (if willing)……..

4.10 Do you receive any of the South African Government social grants?

Old age grant	Child grant	Disability grant	Foster grant

4.11. How often does it happen that you do not have enough money to buy food? for you and your family?

Always	Often	Sometimes	Seldom	Never

4.12. How many people e.g. partner, relatives & others (including yourself) contributed to your household income from any source, (including wages/salary from paid employment, money from second or odd jobs income from savings investments, pension, rent or property, benefits and or maintenance etc.) in the last 12 months?

People	0	1	2	3	4	5	6	7	8	9

4.13. How often do you buy food?

Every day	Once a week	Once a month	Other, specify……

4.14. Where do you buy food?

Tuck shop	Street vendor	Wholesalers	Supermarket	Other, specify……

4.15 What type of transport do you use to get around?

Taxi	
Bus	
Train	
Own car	
Bicycle/ Motorbike	
Other Specify	

4.16 How much money is spent on food PER MONTH? (Tick only one box)

R 0 – R 200	R 201 – R 300	R 301 – R 400	R 401 – R 500	R 501 – R 600	R 601 – R 700	R 701- R800	R801- 1000

R1001-R1200	R1201-R1400	R1401-R1600	R1601-R1800	R1801-R2000	>R2001		

5 EDUCATION AND LANGUAGE

5.1. What is your highest education level?

None	Primary School	Standard 8	Standard 10	College/FET	Other post school

5.2 What language is spoken mostly in the house?

Zulu	Xhosa	English	Afrikaans	Other, specify……

5.3 How many children (in the household) have birth certificates?

None	1	2	3	4	5	6	7	8	All

5.4 How many children have completed their immunisation schedule?

None	1	2	3	4	5	6	7	8	All

5.5 Number of children who attend school?

Education Level	**Male**	**Female**
Primary school		
Junior high school		
High school		
University		
Total		

5.6 Highest education level obtained by family members?

	None	**Primary school**	**Junior High school (grade 8-9)**	**High school (grade 10-12)**	**University**
Husband					
Wife					
Son(s)					
Daughter(s)					
Other member(s) ……					

5.7 Number of children attending school

None	1	2	3	4	5	6	7	8	All

5.8 Are there any school aged children who are not attending school?

Yes	No

5.8.1 Only applicable if (5.8) is yes. Age group of children not attending school

Age (years)	**Male**	**Female**	**Total number**
6-13			
14-18			

5.9 How do the children get to school?

Walk	Bus	Taxi	Parents car	Other, specify…….

Food practices in the household

Tick one block for every question:	Father	Mother	Sibling	Grandma	Grandpa	Aunt	Uncle	Cousin	Friend	Other
5.10 Who is mainly responsible for food preparation in the house?										
5.11 Who decides on what type of food is bought for the household?										
5.12 Who is mainly responsible for feeding/serving the children?										
5.13 Who is the head of this household?										
5.14 Who decides how much is spent on food?										

5.15 How many meals do you eat per day?

0	1	2	3	> 3

5.16 Where do you eat most of your meals?

Home	Friends	Work	School	Other, specify…….

5.17 Where do your children eat most of their meals?

Home	Friends	School	Other, specify…….

6. HEALTH AND NUTRITION

6.1 Has any children in your household died in the past?

Yes	No

Reason: ……..

6.2 Has any adult or child in the household been diagnosed with malnutrition?

Yes	No

6.2.1 Age group of family member who is malnourished?

Age (years)	Male	Female	Total number
0-5			
6-13			
14-60			
60+			
Total			

7. ASSETS

7.1 Does your home have the following items and how many?

	Yes
Electrical stove	
Gas stove	
Primus or paraffin stove	
Microwave	
Hot plate	
Radio	
Television	
Refrigerator	
Freezer	
Telephone/ Cell phone	
Bed with mattress	
Mattress only	
Lounge suite	

Dining room suite	
Electrical iron	
Electrical, kettle	
Car	
Bicycle	
Motorbike	

7.2 What type of fuel do you usually use for food preparation?

Wood fire	Paraffin	Electricity	Gas	Coal/Charcoal	Other, specify……

7.3 What type/s of material are your pots made off (tick all relevant options)?

Cast iron	Aluminium	Stainless steel	Clay	Other, specify……

Thank you very much for your co-operation. We appreciate the time.

Annexure H: 24-hour Food Recall

FOOD AND NUTRITION CONSUMER SCIENCE

24 – HOUR RECALL

Interviewer: _____

Subject Number_____ Date: _____ / _____ / _____

Tick what the day was yesterday:

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

Would you describe the food that you ate yesterday as typical of your habitual food intake?

Yes		No	

If not, why? _____

I want to find out about everything you ate or drank yesterday, including food you pick from the veld. Please tell me everything you ate from the time you woke up to the time you went to sleep. I will also ask you where you ate the food and how much you ate.

Time	Place (Home,	Description of food and preparation	Amount	Amount	Code (office

(approximately)	school, etc)	method.		in g (office use Only)	use only)
From waking up to going to work, or starting day's activities					
During the morning at work or at home					

Time (approximately	Place (Home, school, etc)	Description of food and Preparation method.	Amount	Amount in g (office use Only)	Code (office use only)
Middle of the day (Lunch time)					
During the afternoon					

At night (dinner time)					

Time (approximately	Place (Home, school, etc)	Description of food and preparation method.	Amount	Amount in g (office use Only)	Code (office use only)

After dinner, before going to sleep					

* Do you take any vitamins (tablets or syrup)	Yes	1	No	2
Give the brand name and dose of the vitamin/tonic:				
* Do you receive a mealie meal mix (PVM) at the clinic?	Yes	1	No	2
How often do you eat this?		Daily	Weekly	Monthly
How much do you eat at a time?				
* Do you receive PVM drink mix at the clinic?	Yes	1	No	2
How often do you eat this?		Daily	Weekly	Monthly
How much do you eat at a time?				

Annexure I: Food Frequency Questionnaire

FOOD AND NUTRITION CONSUMER SCIENCES

FFQ LIST OF FOODS AND FOOD GROUPS DIVERSITY

Subject number: _____ Interviewer: _____

Date: _____

PLEASE INDICATE THE FOOD YOU ATE DURING THE PAST SEVEN (7) DAYS BY AN (X)

GROUP 1: Flesh Foods (Meat, Poultry, Fish) Diversity	Y	N
Meat (Chicken)		
Meat (Beef)		
Meat (Mutton)		
Meat (Pork)		
Meat (Goat)		
Dried Meat (Biltong)		
All Mince		
All Tribe/Offals/Runners and Heads		
Fish (fresh / whole)		
Tinned Fish (Pilchards/Tuna)		
Processed Meats (Viennas / Polony, Russians, Boerewors Sausage)		
Seafood (Prawns, Mussel's, Calamari, Crab, Shrimp, Crayfish)		

GROUP 2: Eggs Diversity	**Y**	**N**
Eggs		
GROUP 3: Dairy Products Diversity	**Y**	**N**
All Milk		
Evaporated milk (Unsweetened)		
Condensed milk		
Maas/ Inkomasi		
All Cheese		
Custard		
Ice Cream		
GROUP 4: Cereals, Roots and Tubers Diversity	**Y**	**N**
All Rice		
Maize (Pap, Mealie Rice, Mealie Meal, Samp, Porridge, Corn on the cob, Popcorn, Sweet Corn)		
Macaroni/Pasta/Spaghetti		
All Bread (White/ Brown/ Whole Wheat)		
Dumpling/Steamed Bread/Fat Koek		
Scones/Biscuits		
Mageu		
Breakfast Cereals (Corn Flakes, Oats, Weet Bix, Matabela)		
All Tubers/Roots (Amadumbe, Sweet Potato)	**Y**	**N**
Potatoes		
GROUP 5: Legumes and Nuts	**Y**	**N**
All Beans Dried		
Dried Peas		
Lentils		

Peanuts and Nuts		
Soya		
GROUP 6: Vitamin A Rich Fruits and Vegetables Diversity	**Y**	**N**
Pumpkin		
Carrots		
Wild Leafy Vegetables Fresh and Dried		
Spinach		
Butternut		
Apricots (Appelkoos)		
Peach (yellow cling)		
Mango		
GROUP 7: Other Fruits (and juices) Diversity	**Y**	**N**
Deciduous Fruits		
Apple		
Peaches		
Pear		
Grapes (black/green)		
Plum		
Sub – Tropical Fruit	**Y**	**N**
Lemon		
Orange		
Naartjie		
Banana		
Pineapple		
Avocado		
Kiwi fruit		
Watermelon		

Guava		
Paw- Paw		
Juices	**Y**	**N**
Juice (100% pure juice e.g. Ceres/Liquifruit)		
GROUP 8: Other Vegetables Diversity	**Y**	**N**
Onions		
Cabbage		
Beetroot		
Tomatoes	**Y**	**N**
Green beans (fresh)		
Peas (fresh)		
Cauliflower		
Chili (red/green)		
Lettuce		
Green\ Yellow\ Red Pepper		
Frozen Vegetables (Mixed)		
Ginger & Garlic (Fresh)		
GROUP 9: Oils and Fats Diversity	**Y**	**N**
Butter		
Sunflower oil		
Margarine		
Lard		
Salad dressing/oil		
Potato Crisps		
Coffee Creamer (Cremora, Ellis Brown)		

Annexure J: Editors letter