# NUTRITIONAL ADEQUACY OF MENUS OFFERED TO CHILDREN OF 2 TO 5 YEARS IN REGISTERED CHILD CARE FACILITIES IN INANDA

BY

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## DECLARATION

This work has never been previously accepted in substance for any degree and is not concurrently submitted in candidature of any degree.

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## ABSTRACT

**Introduction:**

According to the American Dietetic Association, Child care facilities (CCFs) play an essential role in the nutritional status of children as children typically spend 4-8 hours a day at a facility. As a result, the meals should provide at least 50 – 60% of daily nutritional requirements. Worldwide CCF feeding has been found to be nutritionally inadequate as energy and most micronutrient requirements are not met by the meals provided, due to the lack of nutrition knowledge of the caregivers. Studies have shown that with appropriate training there has been improvement in nutritional standards.

**Aim**: The aim of this study was to analyse the nutritional adequacy of menus offered; and to determine the nutritional status of children aged two to five years old in registered child care facilities in the Inanda area.

**Methodology:** CCFs (n=10) in the Inanda area were randomly selected from multiple options to participate in the study. This study was conducted on children (boys (n= 91) and girls (n=109)) of ages two to five years old. Trained fieldworkers and teachers assisted in interviewing parents to complete the socio-demographic questionnaire. The researcher gathered menus and recipes for analysis, using Foodfinder Version 3 Software. The researcher also conducted plate-waste studies to determine consumption patterns during CCF meal times. Anthropometric measurements for weight and height were collected. In order to establish BMI-for-age and height-for-age, the WHO Anthro Software and WHO AnthroPlus Software were used. Ten food handlers (FHs) were interviewed by the researcher on food preparation and serving.

**Results:** Most children (79.40%) originate from extended families that are female-headed. The highest form of education attained by most caregivers in the sample is standard 10 (47.74%) and 45.73% are unemployed. Of the 54.27% employed, 64.71% are informally employed. Most respondents (72.87%) are living on a total household income of less than R2500. The anthropometric results of the children show very low prevalence of severe stunting (1.74%) and stunting (5.42%). Less than halve (34.48%) of the children were at a possible risk of being overweight, 13.79% were overweight and 2.46% obese. The top 20 foods served in CCFs in Inanda were cereal-based staples of rice and maize meal more frequently than meat, dairy products and fruit and vegetables – all served far less frequently. All the CCFs did not meet the 60% of daily requirements for energy, fibre, calcium and

vitamin C in foods served. The CCFs have well-equipped, designated kitchens for food storage, preparation, serving and good hygiene practices.

**Conclusion:** Meals served to two to five year olds in registered CCFs in the Inanda area are nutritionally inadequate as most facilities do not contain 60% of the daily nutrient requirements from both daily meals served.

**Recommendations:** CCF owners and Food handlers should receive proper training and retraining on food safety and hygiene and menu planning. The government should increase the subsidy to CCFs in order to meet the nutritional needs of children in order to aid in the alleviation of under-nutrition.

## ACRONYMS

| | | |
|---|---|---|
| ADA | - | American Dietetic Association |
| AI | - | Adequate intake |
| AIDS | - | Acquired Immune Deficiency Syndrome |
| AGHE | - | Australian Guide to Healthy Eating |
| BMI | - | Body Mass Index |
| CBNP | - | Community Based Nutrition Programme |
| CCFs | - | Child care facilities |
| CCF | - | Child care facility |
| CoDC | - | Centers for Disease Control |
| cm | - | centimetre |
| CRC | - | United Nations Convention on the Rights of the Child |
| CSG | - | Child Support Grant |
| DoE | - | Department of Education |
| DGLV | - | Dark Green Leafy Vegetable |
| DoH | - | Department of Health |
| DRC | - | Democratic Republic of Congo |
| DRIs | - | Dietary Reference Intakes |
| DSD | - | Department of Social Development |
| EAR | - | Estimated Average Requirement |
| EC | - | Eastern Cape |
| ECD | - | Early Childhood Development |
| ECOWAS | - | Economic Community of West African States |
| ECSA | - | East Central and Southern Africa |
| EERs | - | Estimated Energy Requirements |
| EFA | - | Education for All |

| | | |
|---|---|---|
| EFR | - | Estimated Food Records |
| FAO | - | Food and Agriculture Organisation of the United Nations |
| FBDGs | - | Food-Based Dietary Guidelines |
| FCTs | - | Food composition tables |
| FET | - | Further Education and Training |
| FF3 | - | Food Finder 3 |
| FFQ | - | Food Frequency Questionnaire |
| FH | - | Food Handler |
| FHs | - | Food Handlers |
| FHQ | - | Food Handler's Questionnaire |
| g | - | grams |
| GDP | - | Gross Domestic Product |
| GECDS | - | Guidelines for Early Childhood Development Services |
| GHS | - | General Household Survey |
| HC | - | Head Circumference |
| HCW | - | Health Care Worker |
| HDL | - | High Density Lipoprotein |
| HIV | - | Human Immunodeficiency Virus |
| ICDS | - | Integrated Child Development Services |
| INK | - | Inanda, Ntuzuma and Kwamashu |
| INP | - | Integrated Nutrition Programme |
| IOM | - | Institute of Medicine |
| ISRDP | - | Integrated Sustainable Rural Development Programme |
| IU | - | International Units |
| JS | - | Joe Slovo |
| JBM | - | JB Mafora |
| Kcal | - | Kilocalorie |

| | | |
|---|---|---|
| Kg | - | Kilogram |
| kJ | - | Kilojoule |
| KZN | - | KwaZulu-Natal |
| LDL | - | Low Density Lipoprotein |
| MUAC | - | Mid-Upper Arm Circumference |
| MDG | - | Millennium Development Goals |
| MDM | - | Mid-Day Meal Scheme |
| MEC | - | Member of Executive Council |
| mcg | - | microgram |
| MRC | - | Medical Research Council |
| n | - | number |
| NCD | - | Non-Communicable diseases |
| NDP | - | National Development Plan |
| NFCS | - | National Food Consumption Survey |
| NGOs | - | Non-Government Organisations |
| PEM | - | Protein-energy malnutrition |
| PFBDGs | - | Paediatric Food-Based Dietary Guidelines |
| PHC | - | Primary Health Care |
| PMTCT | - | Prevention of mother-to-child transmission |
| QFFQ | - | Quantitative Food Frequency Questionnaire |
| RDA | - | Recommended Daily Allowance |
| RDI | - | Recommended Dietary Intake |
| RDP | - | Reconstruction and Development Programme |
| RE | - | Retinol Equivalent |
| SA | - | South Africa |
| SADC | - | South African Development Community |
| SAIMDC | - | South African Index of Multiple Deprivation for Children |

| | | |
|---|---|---|
| SANHANES | - | South African National Health and Nutrition Examination Survey |
| SAPFBDGs | - | South African Paediatric Food-Based Dietary Guidelines |
| SASSA | - | South Africa Social Security Agency |
| SAVACG | - | South African Vitamin A Consultative Group Survey |
| SD | - | Standard Deviation |
| SES | - | Socioeconomic Status |
| SPSS | - | Statistic Package for Social Sciences |
| SQFFQ | - | Semi-quantitative food frequency questionnaire |
| StatsSA | - | Statistics South Africa |
| SUN | - | Scaling Up Nutrition |
| TB | - | Tuberculosis |
| TS | - | Triceps Skinfold |
| UAFA | - | Upper Arm Fat Area |
| UAMA | - | Upper Arm Muscle Area |
| UEMOA | - | West Africa Economic Monetary Union |
| UK | - | United Kingdom |
| UL | - | Tolerable Upper Intake Level |
| UN | - | United Nations |
| UNICEF | - | United Nations Children's Fund |
| URP | - | Urban Renewal Programme |
| USA | - | United States of America |
| WFP | - | World Food Program |
| WFR | - | Weighed Food Records |
| WHO | - | World Health Organisation |
| WTHR | - | Waist-to-Height Ratio |

## TABLE OF CONTENT

CHAPTER TWO: LITERATURE SYNTHESIS

**LIST OF TABLE** **PAGE**

**LIST OF FIGURES** **PAGE**

**LIST OF ANNEXURES**

# CHAPTER ONE: BACKGROUND AND MOTIVATION FOR THE STUDY

## 1.1 INTRODUCTION

In this chapter the background to the study illustrates the impact of malnutrition and poverty on young children's nutritional health and well-being globally, in Africa and in South Africa (SA) nationally and locally in KwaZulu-Natal (KZN) where Inanda is situated. The chapter also illustrates trends in child care feeding and the importance of correct child care feeding globally and locally. The motivation to the study shows that as Inanda is regarded as a poverty stricken informal settlement, how proper feeding at childcare facilities plays a role in alleviating malnutrition in children if nutritional needs of children are met adequately. Malnutrition and poverty are reported to be major contributors to health problems in SA, especially in low income households in informal settlements; and where there is poverty, there is malnutrition.

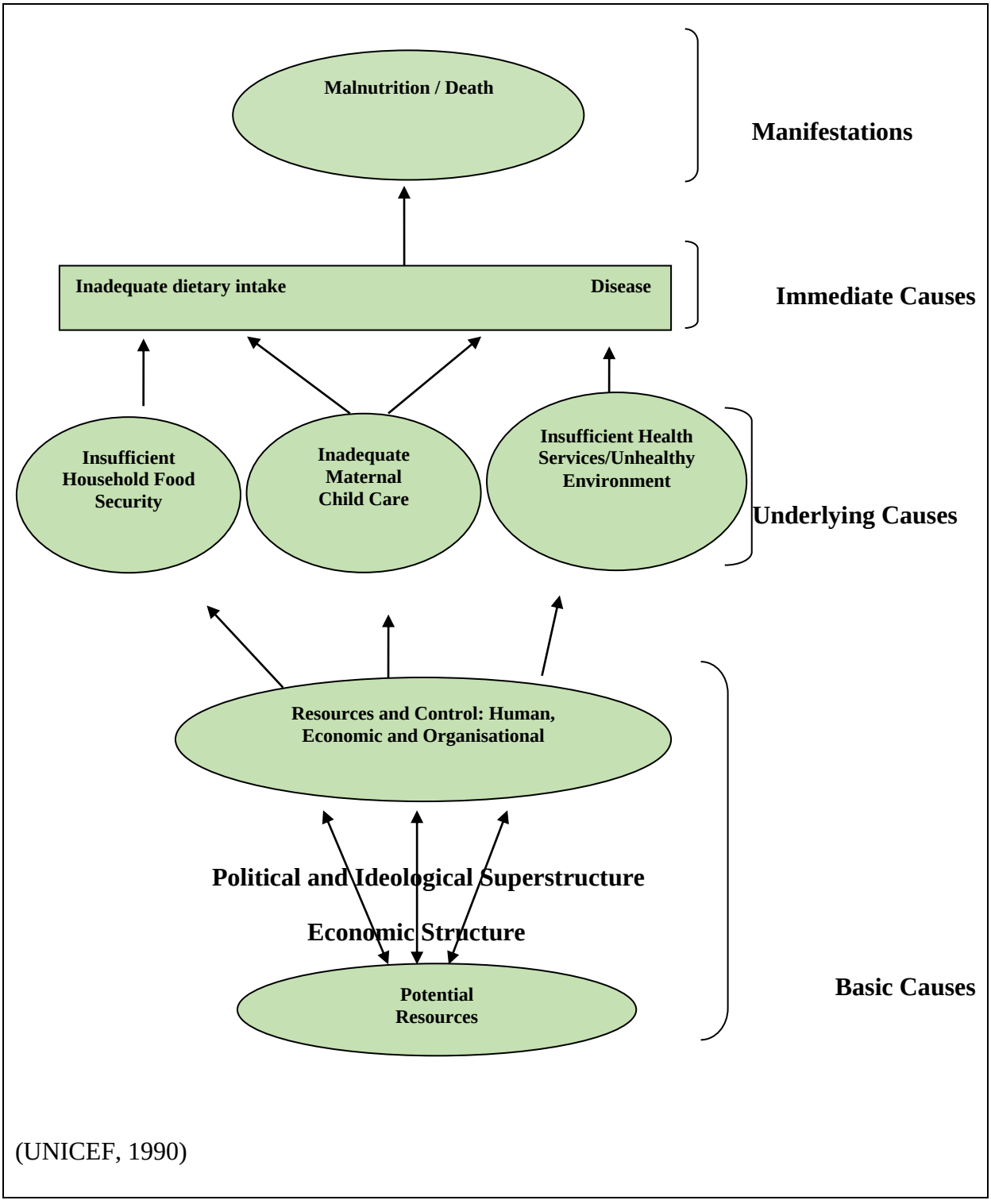
## 1.2 BACKGROUND TO THE STUDY

### 1.2.1. Childhood Malnutrition

Malnutrition is a pathological condition characterised by frequent infections and diseases not only from insufficient intake of macronutrients and/or micronutrients, but also from excessive intake of macro - and micro - nutrients characterised by obesity (Khongsdier, 2006). There is a developing problem where SA, together with a number of other developing countries, have to deal with both under-nutrition and the increase of obesity and non-communicable diseases (NCD) because of excesses and deficiencies in nutrient intake (Schonfeldt and Gibson, 2009). Malnutrition in childhood is linked to the high possibility of suffering from nutritional deficiency diseases in adulthood. Malnutrition in children affects the learning process and growth of the body resulting in an adult with low productivity and economic development (Iversen, du Plessis, Marais, Morseth, Hoisæther and Herselman, 2011).

The United Nations Children's Fund (UNICEF) developed a Conceptual Framework (figure 1.1) highlighting some of the causes of malnutrition and hunger in children as a foundation for analysing, assessing and acting on nutrition problems in communities in all the countries of the world. The causes of malnutrition vary according to location (basic causes), household

(underlying causes) and individuals (immediate causes) and each category influences the other (Smuts, Faber, Schoeman, Laubscher, Oelofse, Benadé and Dhansay, 2009, Steyn and Temple, 2008, UNICEF, 1990).




(UNICEF, 1990)

**Figure 1.1: UNICEFs Conceptual Framework of the Causes of Malnutrition**

Reduced food intake and illnesses can cause malnutrition in a child exposed to underlying causes of malnutrition like household poverty, lack of education of parents, resulting in the lack of skilled labour - hence the low socio-economic status, household food insecurity and lack of maternal and health care. The immediate causes stem from basic causes which include global and local structures including political factors, environmental factors like drought, floods and infertile soil, as well as economic factors which have a direct effect on the homes that the children come from, and are therefore causes of malnutrition in children (Saunders, Smith and Stroud, 2011).

The post-Apartheid SA government accepted malnutrition as one of the top public health priorities in SA (Labadarious, Steyn, Mgijimi and Dladla, 2005a, Statistics South Africa (StatsSA), 2008) and out of 10 leading natural death causes malnutrition was number five nationally, and ranked sixth in KwaZulu-Natal. A number of SA studies amongst children younger than five years old show that deficiencies of micronutrients and under-nutrition results in wasting (a low weight-for-height) and stunting (a low height-for-age) especially in rural communities (Lesiapeto, Smuts, Hanekom, du Plessis and Faber 2011, Dannhauser, Bester, Joubert, Badenhorst, Slabber, Badenhorst, du Toit, Barnard, Botha and Nogabe, 2000, Smuts *et al.*, 2009).

Globally, malnutrition contributes largely to child mortality, with under-nutrition an underlying factor in the deaths of over 50% of children younger than five years old. The death of about 3.5 million children is related to under-nutrition and 35% of diseases suffered by children younger than five years of age is a result of under-nutrition (Black, Allen, Bhutta, Caulfield, de Onis, Ezzati, Mathers and Rivera, 2008). In 2008, 93% of the 8.8 million deaths of children younger than five years old, that occurred globally, was recorded in developing countries within Africa and Asia, with Sub-Saharan Africa recording the deaths of one out of seven children before reaching the age of five years old (Walton and Allen, 2011). Continuous under-nutrition of children causes a delay and slows down the required growth spurt into adolescence, causing the child's biological age to lag behind the chronological age (Steyn and Temple, 2008). The mortality rate of children younger than five years old in SA was 61 per 1000 and 45.2 deaths for every 1000 live births and low birth weight was 8.3% in 1998 (Department of Health, 2002). In 2010 according to the Child Gauge statistics there was a decrease to 34 deaths for every 1000 live births for infants, and 50 deaths for every 1000 children under five years old (Hall and Lake, 2011).

In 2005, the frequency of stunting in one to nine year olds in SA was 18.0%, nationally, and 15.1% for KwaZulu-Natal (KZN). In 2010 the prevalence for severe stunting was 3.0% in KZN and 5.1% nationally (Kibel, 2010). Stunted children may become obese adults. As stunting is a widespread anthropometric nutrition disorder that affects children in SA, it has been observed that stunting in infancy does not improve with energy intake; as the child grows, weight gain occurs instead of an increase in height when the child consumes more energy food (Motswagole, Kruger, Faber and Monyeki, 2012).

Worldwide, 22 million children that are five years old and younger are overweight (Deckelbaum and Williams, 2012). Statistics for the World Health Organisation (WHO) European region show that despite interventions to decrease overweight and obesity in children, overweight and obesity statistics in 2010 were on the rise as one in three children were either overweight or obese, compared to one in four in 2008 (Humphreys and Fiankan-Bokonga, 2013). In the United States of America (USA) 20% of pre-schoolers aged two to five years old are overweight or obese (Larson, Ward, Neelon and Story, 2011). In 2008, Canada had the highest rate of obesity in children as young as two year old (Lynch and Batal, 2011). The Millennium Development Goals (MDGs) report of 2013 reported that 7% of children under five years old are overweight and one-quarter of that number lives in sub-Saharan Africa (Hongbo, 2013).

According to Faber (2010), childhood malnutrition is common in developing countries and SA carries the double burden of under-nutrition and high overweight and obesity statistics. The National Food Consumption Survey (NFCS) of SA's on one to nine year old children shows that 21.6% of the children were stunted, underweight was 10.3%, wasting was 3.7% and 17% was a combined figure for children that were overweight and obese (Labadarios, Steyn, Maunder, MacIntryre, Gericke, Swart, Huskisson, Dannhauser, Vorster, Nesmvuni and Nel, 2005b). The results of the first South African National Health and Nutrition Examination Survey (SANHANES-1) (2012) when compared to the NFCS-2005, indicated that in children younger than five years old stunting has increased to 21.5%, while wasting and underweight have decreased to 2.6% and 5.2% respectively. There is an increase in overweight of children aged two to five years old, as the SANHANES-1 presented an increase of 18.2% from 10.6%. Obesity remained constant at 4.5% from 4.7% when compared to the NFCS-2005 (Shisana, Labadarios, Rehle, Simbayi, Zuma and Dhansay, 2013).

## 1.2.2 Child Care Feeding

In SA the Child Care Act of 1983, regulation 38, provides the conditions for Early Childhood Development (ECD) facilities for children's meals but the payment of grants to ECD facilities is managed by the Department of Social Development (DSD) (Skweyiya, 2008). The regulation states that the place of care shall operate for a minimum of eight hours, and meals and refreshments shall be served to the child who is present at meal times or tea times (Skweyiya, 2008). The Children's Act of 2005 and its regulations also enable and regulate the provision of ECD services to young children, furthermore, the DSD also created the Guidelines for Early Childhood Development Services (GECDS) to provide direction on how to support the nutritional needs of young children in ECD programmes (Skweyiya, 2008). The Director-General or an authorised person evaluates the facility, the registers and official documents, the learning programmes and the progress in terms of nutrition and general well-being of the children in the child care facilities (CCFs) (Skweyiya, 2008).

The South African Department of Social Development developed a range of guidelines for early childhood development centres. The following section is an extract from these guidelines that applies to Child Care facilities with regards to food preparation and meals served:

**Guidelines for Early Childhood Development Service** (Sweyiya, 2008).

### Section 6.1 Premises and Equipment

Minimum Standards:

The buildings must be clean and safe for young children. Children must be protected from physical, social and emotional harm or threat of harm from themselves or others. All reasonable precautions should be taken to protect children and practitioners from the risk of fire, accidents and or other hazards.

If the same room space is used as a play room, office and kitchen, each area must be clearly marked. The separate areas will consist of an area for play activities, an area for taking care of sick children, and an area for food preparation. Fresh drinking water must be available for the children.

Where food is prepared on the premises, there must be an area for preparation, cooking and washing up. When the kitchen is in the same area as the playroom, it must be cornered off and safety requirements must be complied with. Children must be protected from the dangers of hot liquids and food and from fire and other cooking fuels such as paraffin.

The kitchen area or separate kitchen must also:

• Be safe and clean;

• Have adequate washing up facilities and clean, drinkable water;

• Have hand washing facilities for staff;

• Have adequate storage space;

• Have adequate lighting and ventilation;

• Have cooling facilities for the storage of perishable food;

• Have an adequate number of waste bins with tightly fitting lids;

• Have an adequate supply of water and cleaning agents for the cleaning of equipment and eating utensils. Cleaning agents must be kept in their original containers and out of the reach of children.

## Section 6.2 Health, Safety and Nutrition

Minimum Standards:

Children must be provided with at least one meal a day by either parents or the centre.

Children must be cared for in a responsible way when ill.

The parent or responsible family member of a child with a disability must receive information on the services and treatment the child can access locally.

The child spends a large part of the day away from home in the centre, for this reason the health, safety and nutritional guidelines are important responsibilities.

6.2.10

There should be a healthy environment for the children and staff.

The centre should be cleaned at least once a day; and toilets and potties must be cleaned after use and disinfected at least once a day.

There should be towels and enough soap available for children and staff.

Staff should wash their hands with soap and water after changing nappies, helping children in the toilet or dealing with any accidents.

Staff should wash their hands with soap and water before preparing or serving food.

Staff should be encouraged to take care of their own health and undergo regular health tests, particularly for tuberculosis.

Regular training should be given to staff on childhood illnesses, other infections such as HIV and AIDS, Hepatitis B and notifiable diseases such as Meningitis.

Staff and families should learn how illnesses can be spread and how to prevent this in the centre.

6.2.12

All meals and snacks should meet the nutritional requirements of the children.

The amount of food and drink provided for children must be adequate for their age. The dieticians of the Department of Health or medical institutions can be consulted for guidance in this respect.

Food served each day depends on the hours the centre is open:

If the centre is open for less than five hours, a snack must be provided.

If a centre is open for five hours or more but less than eight hours, two snacks and lunch must be provided.

If the centre is open for eight hours or longer each day, two snacks and two meals (breakfast and lunch) must be provided.

Meals can be provided by the centre or be provided by the parents.

6.2.13

Planning of a menu, whether for babies, toddlers or older children, must be done in consultation with an expert (e.g. clinic sister, dietician), because children of different ages have different nutritional needs. Menus for all meals at ECD Centres should be available for inspection, as well as for the information of the parents, at all times.

6.2.14

Children younger than one year old should be fed when they are hungry i.e. on demand.

Babies who are bottle-fed should be held by an adult while feeding. Milk formula must be made according to the manufacturer's instructions.

6.2.15

Children must be supervised by an adult when they are eating. Staff should make sure meal times are relaxed. Staff should be role models for healthy eating habits.
Children should be encouraged to try all the food available but they should never be forced to eat anything they do not want to eat. Children on special diets for health or disability reasons should be accommodated.

6.2.16
Safe, clean drinking water must always be available. If water is not from a piped source, it can be made safe by adding one teaspoon of bleach to 25 litres of water and left to stand overnight.
All water containers must be kept covered.

**APPENDIX H: GENERAL GUIDELINES FOR NUTRITION**

1. Plan menus according to the following basic meal patterns:

**Breakfast**

Porridge with milk and sugar

**Mid-morning snack**

Brown bread with margarine

Milk

**Midday meal**

Protein-rich food or dish, e.g. dry beans, meat, fish, chicken, eggs, cheese

Starchy food e.g. porridge, samp, maize rice, potato.

Vegetables, preferably dark green or deep yellow in colour, e.g. spinach, green beans, cabbage, carrots, pumpkin. The nutritional value of these vegetables is higher than that of other vegetables. Fruit, if possible, twice a week.

**Afternoon snack**

Brown bread with margarine

Peanut butter or other spread

Milk to drink

2. Do not discard meat bones or the outer leaves of vegetables but use these in soups or stews.

3. Do not scrape, peel or cut vegetables and potatoes the previous evening and leave them in water. These should all be prepared shortly before they are to be used, as the longer a

vegetable (either raw or cooked) is left standing, the more food value is lost. Do not soak vegetables once cut.

4. Always put vegetables to be cooked in a small amount of boiling water; more can be added later, if necessary. Cook until soft, and no longer, as over cooking diminishes the food value. Any leftover water should be used in soup or gravy.

5. A protein-rich food or body-building food such as dry beans, meat, fish, eggs or cheese, or a combination of these, forms part of the main meal every day, as it is essential for good nutrition. A small amount of fish, meat, chicken, egg or cheese, combined with dry beans or other dry legumes, makes a nutritionally adequate dish. Soya beans have a higher nutritional value than any other dry legume. Serve these products at least once or twice a week.

6. Peanut butter on brown bread is a good body-building food. It is preferable if milk is served with the same meal.

7. A meal consisting of vegetable soup with bread or porridge is not adequate unless a body-building food is served at the same time

8. Sufficient protective foods, such as vegetables and fruit, have to be included every day in order to protect children against disease. If fruit is not available, use fresh, raw vegetables, e.g. tomatoes, cabbage, carrots.

9. Skim-milk powder is the cheapest form of milk. If funds permit, full-cream, or low-fat (2%) milk should be used. Milk blends, although much cheaper, are not recommended, as these do not have the same nutritional value as milk products. Always look for the "Real Dairy" mark before you buy dairy products.

10. Use measuring spoons and cups and/or a scale to measure and weigh ingredients for recipes.

Pietersen, Charlton, du Toit and Sibeko (2007) found the quality of meals served to children at state-funded child care facilities (CCFs) in Cape Town inadequate in energy and micronutrient density, contrary to the principle of the Community Based Nutrition Programme (CBNP) which stipulates that one meal provided at a CCF should offer 66.6% of a child's Recommended Daily Allowance (RDA) (Pietersen *et al.*, 2007).

According to Neelon and Briley (2011) CCFs that operate for four to seven hours should offer 33.3% of the everyday nutritional needs of pre-school children. Furthermore, a CCF that operates for eight or more hours should provide at least 50% to 66.6% of a child's daily nutritional requirements. Food should also be served in the correct quantities to balance

energy and nutrient needs of children of different ages, while also catering to the children's appetites (Neelon and Briley, 2011). A study in Texas menus in several CCFs were found to be lacking in energy, iron and zinc (Padget and Briley, 2005).

In a study conducted in four low income CCFs in Guatemala, where children spend five to eight and a half hours a day, meals served ranged from one meal a day (lunch) to three meals a day (breakfast, lunch and a snack). The results varied in the four CCFs according to the nutrient contribution of the top 10 food items in the meals provided; but micronutrients zinc, iron and vitamin A were above 100% of Dietary Reference Intakes (DRIs) (Vossenaar, Panday, Hamelinck, Soto-Méndez, Doak and Solomons, 2011).

In Australia the number of children that attend CCFs has increased since 1996 (Soanes, Miller and Begley, 2001). Australian children that attend long-day care centres - eight or more hours – are served a nutrient-rich breakfast or lunch meal and two snacks that should supply 50% of the Recommended Dietary Intake (RDI) (Soanes *et al.*, 2001).

The South African Paediatric Food-Based Dietary Guidelines (SAPFBDG) state the necessity to provide sufficient nutrients in meals to support optimal growth and development (Bowley, Pentz-Kluyts, Bourne and Marino, 2007). Bowley *et al.* (2007) further states that childhood is an intermediary nutritional passage from dependence on a caregiver regarding food choices, to children making individual food choices and establishing eating habits and individual feeding behaviour that will eventually have an impact on society (Bowley *et al.*, 2007).

According to Briley and Roberts-Gray (1999) offering children a variety of foods at each meal provides proper nutrient intake and encourages the establishment of eating habits and personal preferences, as well as continued contribution to growth and development. The age of the children and the stage of mental development should be considered when planning meals. For children, the basis for receiving nutrients to meet nutritional requirements, nutritional adequacy and promoting of growth comes from the way children are accustomed to eating (Briley and Roberts-Gray, 1999). CCFs have a way of bringing about improvements or becoming hazardous to a child's nutritional status as a stay in a CCF determines the child's daily routine and daily consumption of meals (Vossenaar *et al.*, 2011). Table 1.1 Illustrates and summarises the main findings of studies conducted in SA's CCFs.

**Table 1.1: Child Care Facility Studies Conducted in South Africa 2000-2012.**

| Author& Reference | Study Population | Measuring Instruments | Summarised Results |
|---|---|---|---|
| **1. Dannhauser, Bester, Joubert, Badenhorst, Slabber, Badenhorst, Du Toit, Barnard, Botha, and Nogabe, 2000.**<br><br>Nutritional status of preschool children in informal settlement areas near Bloemfontein, South Africa. | Preschool children younger than 72 months from Joe Slovo (JS) and JB Mafora (JBM) informal settlements in Mangaung, near Bloemfontein in South Africa (n=348). | • Standardized questionnaires to obtain household resources.<br>• A 24-hour recall.<br>• Anthropometric measurements:<br>o Z-scores.<br>o Mid Upper Arm Circumference (MUAC).<br>o Triceps Skinfold (TS).<br>o Upper Arm Muscle Area (UAMA).<br>o Upper Arm Fat Area (UAFA).<br>o Head Circumference (HC).<br>• Blood samples.<br>• Stool samples. | For children of two to six years:<br>• Total protein higher than the RDA.<br>• Micronutrients including energy, iron, vitamin C, zinc, niacin, riboflavin, thiamine, vitamins A, $B_6$ and D were lower than RDAs.<br>• Omega-3 fatty acid consumption was also low.<br>• Z-scores indicated acute malnutrition:<br>o Underweight was 19.8% in JS; JBM = 18.6%.<br>o Stunting was 29% in JS; JBM = 21.5%.<br>o Wasting was 6.5% in JBM than 3.7% in JS.<br>o Low MUAC (JS = 14.6%; JBM = 12.3%).<br>o Low TS (JBM = 9.0%; JS = 6.3%).<br>o Low UAMA (JS = 8.1%; JBM = 6.6%).<br>o Low UAFA (JS = 12.6%; JBM = 11.6%).<br>o Low HC (JBM = 36.6%; than in JS = 24.4%).<br>• Plasma vitamin A was adequate<br>• Plasma albumin, ferritin, haemoglobin, MCV and haematocrit |

| | | | |
|---|---|---|---|
| | | | were normal<br>• Low retinol values.<br>• Iron stores depletion (JS = 19.3%; JBM = 17.3%)<br>• Most prominent parasite in stools were cysts of Giardia lamblia (JS = 24.5%; JBM = 24.7%) |
| **2. Pietersen, Charlton, du Toit and Sibeko, 2002.**<br><br>An assessment of the nutrient content of meals provided and facilities present at state-funded crèches In Cape Town. | 22 CCFs in Cape Town, sample of 1974 children older than three years and over a third older than five years. | • Questionnaires.<br>• Nine item multiple choice test.<br>• Krupp's electronic food scale.<br>• Food Finder Nutrient Assessment package.<br>• Anthropometric measurements of 275 children using a calibrated bathroom scale and Statistica version 5.1 Software package. | • Protein met the 33% of RDA<br>• Energy, calcium and iron were below the 33% of RDA<br>• Low content of thiamine, riboflavin, folate, Vitamin D, zinc, and vitamin E.<br>• Some meals did not provide vitamin D, vitamin A, vitamin B12 and vitamin C |
| **3. Faber, van Jaarsveld, and Laubscher, 2009.**<br><br>The contribution of dark leafy vegetables to total micro-nutrient intake of two to five year old children in a rural setting. | Children of two to five years of age. | • Five repeated 24-hour recalls by interviewing caregivers. | • Imifino was consumed in 1st and 4th quarter of the year, spinach was consumed in the 3rd quarter and the consumption of both imifino and spinach was low in the 2nd quarter.<br>• For all children consumption of DGLV contributed considerably to the total intake of the following micronutrients:<br><br>Calcium increased from 21 to 39 %, iron from 19 to 39%, vitamin A from 42 to 68%, and riboflavin from 9 to 22%. |

| | | | |
|---|---|---|---|
| **4. Schoeman, Smuts, Van Stuijvenberg, Oelofse, Laubscher, Benade, and Dhansay, 2010b.**<br><br>Primary health care facility infrastructure and services and the nutritional status of children 0 to 71 months old, and their caregivers attending these facilities in four rural districts in the Eastern Cape and KwaZulu-Natal provinces in South Africa. | PHC facilities, health care nurses and children of 0 to 71-months and their caregivers | • Questionnaires<br>• Anthropometric survey | • Low birth weight was 5% in EC and 8% in KZN.<br>• Underweight was 11% in the two provinces on 6 to 59 month-olds.<br>• In EC and KZN stunting was 22% and 24% respectively.<br>• Wasting was 5% in EC and 4% in KZN.<br>• In KZN 31% of children of 60 to 71-months were stunted. |
| **5. Kwinda, Van der Spuy, and Viljoen, 2011.**<br><br>Application of a food-based dietary guideline as a nutrition strategy in crèches to enhance vitamin A consumption. | 20 crèches in Thulamela municipality in Limpopo and 100 caregivers consisting of managers, owners, teachers and food handlers. | • Questionnaires,<br>• Observation and<br>• A game. | • After the training of caregivers there was an increase in the serving of Vitamin A-rich fruit and vegetables.<br>• Nutritional knowledge of caregivers improved with training.<br>• Crèches had gardens to grow vitamin A-rich vegetables.<br>• Menus included more fruit and vegetable sources of Vitamin A. |
| **6. Rudolph, Kroll, Beery, Douglas, Orr, and Sobiecki, 2011.**<br><br>An Assessment of a nutritional intervention in two populations in Alexandra, Johannesburg, South Africa. | 68 children aged three to six years from crèches in the Alexandra area of Johannesburg. | • Nutritional indicator survey tool.<br>• Anthropometric measurements.<br><br>• Clinical indicators of micro-nutrient deficiency. | • A pronounced weight gain in female children than male children during intervention period.<br><br>• Hand-grip strength improved, reflecting increase in muscle mass. |

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|---|---|---|---|
| | | • Hand-grip strength.<br>• Skin elasticity.<br>• Bio-Electrical Impedance Analysis.<br>• Household Food Insecurity Access Scale Questionnaire.<br>• Key Blood Indices.<br>• Household Dietary Diversity Score. | • Improved illness markers.<br>• Dietary diversity scores stayed low.<br>• Still at risk of micro-nutrient malnutrition. |

## 1.3 MOTIVATION FOR THE STUDY

The United Nations Convention on the Rights of the Child (CRC) described a child as an individual younger than 18 years, except in cases where the law of the country allows for a certain age younger than 18 years (Steyn, Labadarios and Nel, 2011). In 2009 children constituted 39% of the total population in SA, 22% of which lived in KZN (Meintjes and Hall, 2010). Sixty-one percent of children in SA lived on less than the per capita income of R552 per month that was used to determine the poverty line, and 36% originated from households with unemployed adults. In 2009, statistics in KZN estimated that roughly 68% of children lived in households below the poverty line and 35% of children resided in households with unemployed adults (Kibel, 2010).

This study was conducted on Inanda CCFs that have been registered with the DSD in Durban, KZN. Inanda was a residential area for Africans and Indians in the 1800s until 1936 when it was designated exclusively for Africans. Together with Kwamashu and Ntuzuma, Inanda became satellites of Durban during the apartheid era to house black Africans who were removed by force from their homes in areas around Durban's Central Business District (CBD). Inanda, Ntuzuma and Kwamashu (INK) are settlements under the Urban Renewal Programme (URP) of the eThekwini Municipality (Everatt, 2007).

The DSD conducted studies of socio-economic and demographic baseline in the 22 nodes that are part of the Integrated Sustainable Rural Development Programme (ISRDP) and URP

because of the profound poverty that people in the nodes live in. The programmes aimed to improve the nodes into economically thriving and socially cohesive areas. In the 2008 Inanda measurement survey a sample of 249 members of the adult population in the node was interviewed for the URP of the eThekwini Municipality. The poverty index in Inanda for the study was gauged using a 10-part matrix recommended by StatsSA. Table 1.2 shows the findings of the survey for all the URP nodes nationally. Inanda was one of the poorest URP nodes. Although Inanda improved compared to the 2006 survey, some significant challenges remained in the node (Everratt and Smith, 2008). Findings indicated that Inanda fared worst on every indicator compared to other URP nodes, provincially as well as nationally. Overall the poverty index of Inanda showed a negative increase from 24.7 in 2006 to 26.9 in 2008. The municipality has provided the area with services like Primary Health Care facilities (PHCF) and Mobile Clinics, DSD and Home Affairs offices, but the community is not utilising the services optimally in order to improve conditions (Everatt and Smith, 2008).

**Table 1.2: Poverty Scores comparing 2006 and 2008 Results (+positive gain = unchanged, - negative increase in poverty) (Everatt and Smith, 2008)**

| URP nodes | Female headed | Illiteracy Rate | Unemployment Rate | Lack of regular income | Over-crowding | Informal dwelling type | Absence of refuse collection | Sanitation below RDP | Water below RDP | Lighting below RDP | Poverty index '08 | Poverty index '06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mdansane | 65.2 | 15.2 | 71.6 | 5.5 | 0.0 | 0.4 | 12.0 | 2.8 | 2.4 | 1.6 | 17.6 (-) | 16.5 |
| Motherwell | 54.4 | 22.4 | 68.9 | 3.2 | 4.8 | 2.4 | 5.6 | 0.8 | 0.0 | 0.8 | 16.3 (+) | 16.7 |
| Alexandra | 50.4 | 13.6 | 58.5 | 1.6 | 21.2 | 14.8 | 7.6 | 3.6 | 9.2 | 1.2 | 18.2 (-) | 17.0 |
| **Inanda** | **54.4** | **20.0** | **77.7** | **1.2** | **9.2** | **23.2** | **5.2** | **45.2** | **24.8** | **8.4** | **26.9 (-)** | **24.7** |
| Kwa-Mashu | 52.8 | 15.2 | 77.6 | 2.8 | 6.0 | 6.8 | 4.0 | 9.6 | 8.0 | 4.4 | 18.7 (-) | 14.1 |
| Khayelitsha | 48.4 | 13.2 | 64.6 | 0.0 | 1.2 | 50.0 | 2.8 | 15.6 | 18.4 | 8.4 | 22.3 (+) | 27.1 |
| Mitchell's Plain | 31.2 | 8.0 | 32.0 | 0.4 | 0.4 | 7.6 | 1.6 | 1.6 | 3.6 | 0.0 | 8.6 (+) | 10.6 |
| Galeshewe | 60.8 | 21.2 | 63.5 | 8.4 | 2.0 | 8.4 | 19.6 | 4.0 | 4.0 | 7.6 | 20.0 (-) | 18.5 |
| Total | 52.2 | 16.1 | 64.6 | 2.9 | 5.7 | 14.2 | 7.3 | 10.5 | 8.9 | 4.1 | 18.7 (-) | 18.2 |

According to Khongsdier (2006), malnutrition is considered a major risk factor in the mortality rate of five year olds and under in developing countries, with the underlying cause as poverty compounded by poor access to material assets and health amenities.

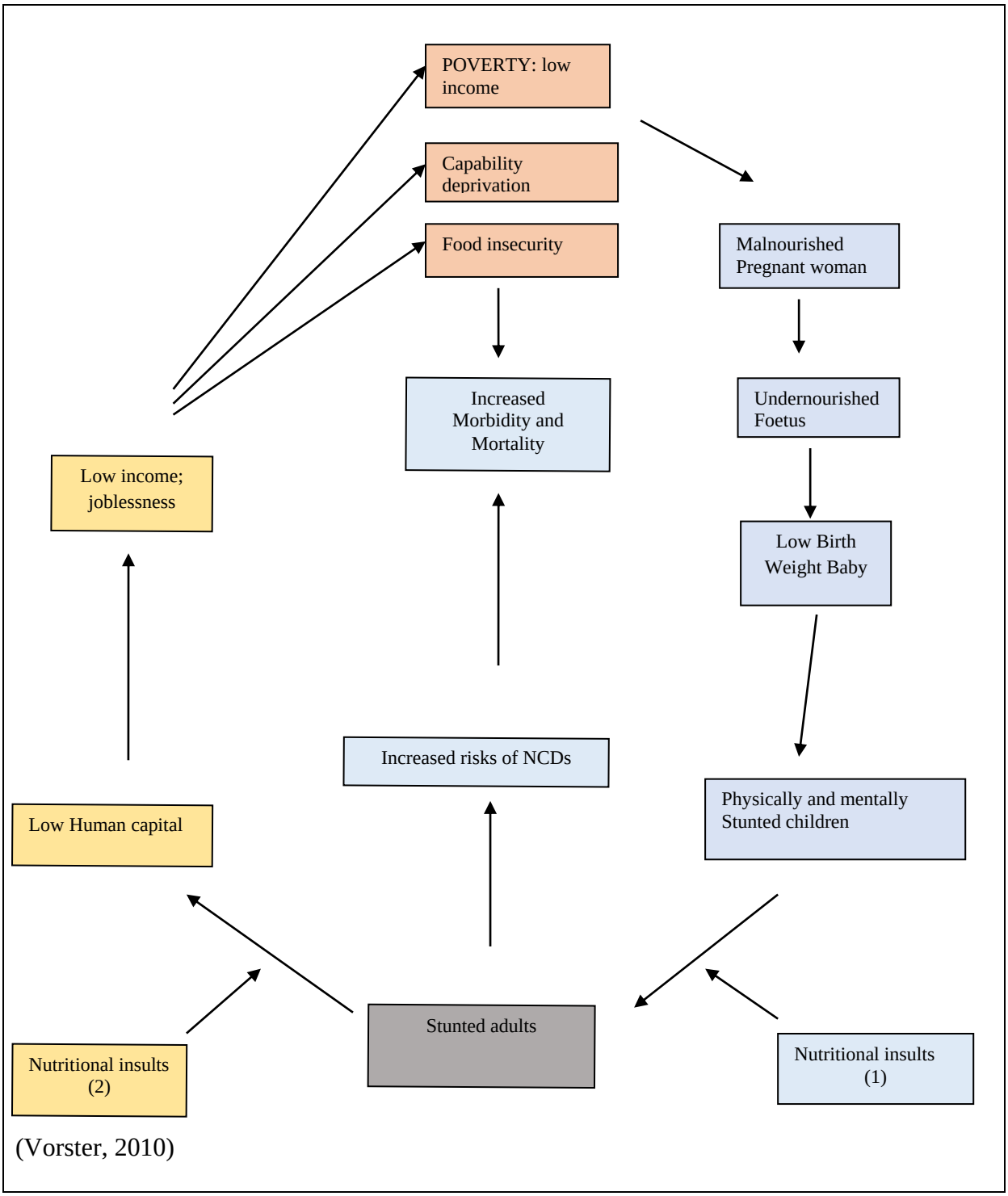



**Figure 1.2 The vicious cycle of poverty**

Figure 1.2 illustrates the vicious cycle of poverty. Vorster (2010) broadened the definition of poverty to include a lack of economical, educational and political opportunity, deprivation of capabilities and governing of the country.

The General Household Survey (GHS) found that in 2011 in SA, 45.5% (23.0 million) of the population was poor and 20.2% (10.2 million) of the population was living in extreme poverty. The GHS further found that self-reported hunger has dropped from 30% to 13% between 2002 and 2011, and this decline is due to, among other factors, expansion of credit which is a further problem when households are not able to repay loans (Lehohla, 2014). Research in SA shows that there is an association between income poverty and social segregation - that is poor children are not welcomed among non-poor peers. Income poverty increases the chances of mothers giving birth to low birth weight children that grow underweight, compromising their physical and mental development, remaining outside the education system since school fees are not affordable (Barnes and Wright, 2010).

The impact of poverty in childhood can last a lifetime and can be passed on from generation to generation, that is, children growing up in poverty have a high likelihood of becoming poor adults and, in turn, raising poor children (Barnes and Wright, 2010). Lack of educational attainment in childhood produces low human capital for the labour market, resulting in these children becoming adults with a low income or becoming unemployed thus food insecure, with poor access to services (Petrou and Kupek, 2010, Jamieson, Bray, Vivier, Lake, Pendlebury and Smith, 2011).

In SA child poverty is measured in relation to monetary resources, individual indicators of poor living standards, and eight dimensions of deprivations:

- Material deprivation
- Human capital deprivation
- Social capital deprivation
- Living environment deprivation
- Health deprivation
- Physical safety deprivation
- Adequate care deprivation
- Abuse (Barnes and Wright, 2010).

In his opening speech the Minister of Social Development (2010) stated that ECD programmes are mainly a plan for alleviating poverty. The programmes should be planned to deal with the total well-being of children by making certain that children grow up, among other things, healthy and well nourished (Department of Social Development - SA, 2010).

This study was conducted on 10 of the 45 Inanda CCFs registered with the DSD. The DSD annual report stated that in SA the ECD sites as well as children's enrolment in those ECD sites, had increased and the government's subsidy for ECD ranged from R9 to R12 per child and that subsidisation of Grade R was targeting poverty eradication. The subsidy should be used to provide day care, nutrition and payment of site employees and overheads (DSD, 2009, Biersteker and Dawes 2008). Beirsteker and Dawes (2008) concurred that high quality ECD service provision for poor children was a justified cost as it not only improves the child's well-being, but also prevents problems in later stages of the life cycle.

## 1.4 AIM OF STUDY AND ITS OBJECTIVES

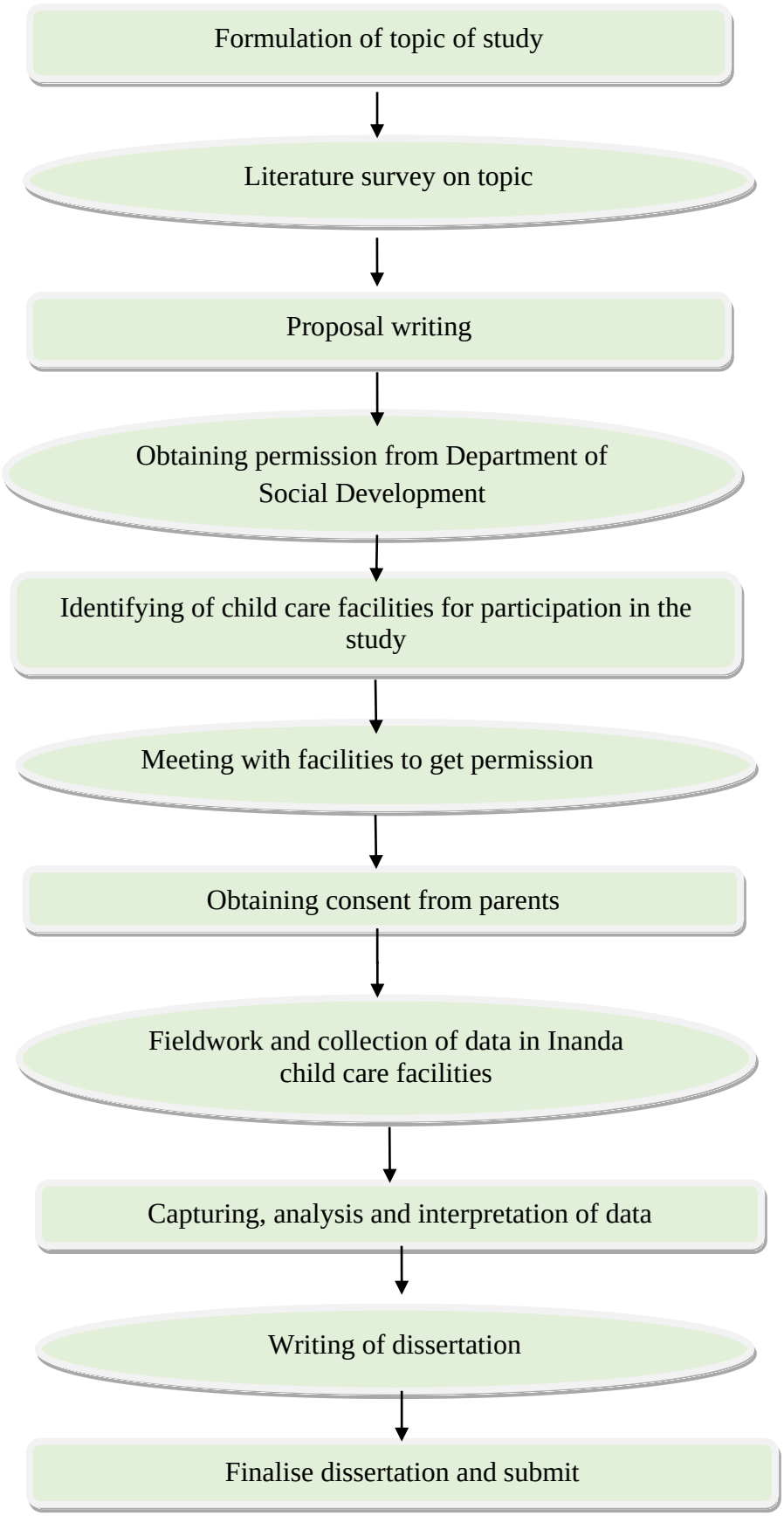
### 1.4.1 Study Aim

The main aim of the study was to determine the socio-demographic profile and nutritional status of the children, nutritional adequacy of menus and food safety practises when preparing food for two to five year old children at registered child care facilities in Inanda.

### 1.4.2 Specific Objectives

- To analyse the child care facilities' menus for nutritional adequacy by calculating the contribution of the meals to the total dietary requirements in relation to the RDAs and DRIs of the children.
- To determine the food handling and preparation practices in child care facilities in Inanda.
- To determine the nutritional status of the children in the sample using anthropometric measurements.
- To outline the socio-demographic profile of the households who have children at child care facilities in Inanda.

## 1.5 FLOW OF THE STUDY



## 1.6 STRUCTURE OF THE DISSERTATION

**Chapter One**: Background and Motivation of the Study

An overview of malnutrition, child care feeding and poverty in South Africa, and worldwide, is given.

**Chapter Two:** Literature Review

Review of studies on malnutrition causes and strategies to address it are explored.

**Chapter Three:** Methodology

Methods used during the study to collect and analyse data are explained

**Chapter Four:** Results and Discussion

Interpretation and discussion of the results of the study.

**Chapter Five:** Conclusions and Recommendations

The chapter draws conclusions on findings of the study and makes recommendations for future research.

## 1.7 Conclusion

Crucial and minor nutritional interventions to address malnutrition in SA are necessary but the existence of the issues related to food insecurity also present multi-faceted challenges (Bourne, Hendricks, Marais and Eley, 2007). Iversen *et al.* (2011) wrote that the co-existence of under and over nutrition affects the black population and poor urban areas of SA because of the change from eating food that is low in fat and high in carbohydrates to a diet that is low in nutrient density and energy dense because of a high calorie and fat intake (Faber, 2010, Iversen *et al.*, 2011). Chapter two will discuss literature review of malnutrition and CCF feeding recorded globally, throughout Africa and South Africa.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 INTRODUCTION

In this chapter the literature of malnutrition in children aged two to five years old will be reviewed, particularly factors that cause malnutrition in this age group, consequences of childhood malnutrition, the strategies to address childhood malnutrition, the impact of childhood malnutrition on the country's economy and the impact of recession on childhood malnutrition. The chapter will also review the nutritional needs, dietary intake and factors affecting the intake of food and the nutritional status of children aged two to five years old. Malnutrition in children is a worldwide problem, and every country is working to decrease the prevalence of poverty and malnutrition whether it is under-nutrition or over-nutrition.

## 2.2 DEFINITION OF MALNUTRITION IN CHILDREN AGED TWO TO FIVE YEARS OLD

Malnutrition occurs when there is an imbalance in the body's acquiring of necessary nutrients and the body can be either under-nourished or over-nourished (Petrou and Kupek, 2010). Childhood malnutrition may present itself as under-nutrition caused by the inadequate consumption of energy and other macro and micronutrients especially vitamins and minerals; or as over-nutrition caused by high consumption of nutrients especially energy (Petrou and Kupek, 2010). Petrou and Kupek (2010) further state that other than incorrect feeding practices, incorrect eating habits, and inadequate micronutrient intake that can cause under-nutrition, there are other contributing factors in developing countries - many of which are rooted in poverty, which include mothers that have a low level of schooling, living in rural areas, family financial crisis, living with a single parent, mothers that do not attend antenatal clinics, low birth weight and poor access to services (Petrou and Kupek, 2010).

Protein-energy malnutrition which causes diseases such as kwashiorkor and marasmus is the most prevalent type of malnutrition in children. In addition, the malnutrition of micronutrients including iron, vitamin C, vitamin A and iodine causes diseases such as scurvy, goitre and anaemia (Meier and Stratton, 2008, Shetty, 2006).

In 2011, global estimates - with a greater proportion in sub-Saharan Africa and South Asia - suggested that about 10% of children under five years old showed visible symptoms of wasting, which indicated malnutrition of high public health significant levels. Thirty percent were severely under-nourished which manifested in stunting-for-age, and in the South African Development Community (SADC) areas the fraction of children that were underweight was greater in rural areas when compared to urban areas. Underweight in children was positively correlated with low household income (Crush, Frayne and McLachlan, 2011). In developing countries poor nutrition among children contributed to 53% of deaths caused by infectious diseases as a result of under-nutrition (Crush *et al*., 2011).

Parents and caregivers are children's role models when it comes to developing eating habits. Mothers that are either overweight or obese are likely to raise overweight and obese children rather than underweight and stunted children. There is a probability that underweight and stunted mothers will raise stunted and underweight children. Contrary to SA where obesity and under-nutrition do co-exist within the same household in black population, as one in eight households have a well-nourished adult and an underfed child (Crush *et al*., 2011).

According to Kandala, Mandungu, Emina, Nzita and Cappucio (2011) in the Democratic Republic of Congo (DRC) 48% of children suffer from chronic malnutrition - both in war-torn provinces and peaceful areas. In 2007 about 46% of the children were recorded as stunted, and 19% of mothers had a low Body Mass Index (BMI) (Kandala, *et al.,* 2011). During the internal conflicts in the DRC, 75% of people were recorded as being malnourished. With a severe lack of national food production, the looting of crops by armed groups and increased food prices, the DRC was 100% reliant on food aid (Kandala *et al*., 2011).

Geographic location of a child's household is considered as one of the causes of under-nutrition. The distance of the home to local amenities affects the accessibility of food to the family. Roads, a poor public transport system and lack of ownership of vehicles affects the purchasing of food in urban, informal areas as well as rural areas (Kruger, Hendricks and Puoane, 2008).

Many countries, although showing a decrease in the poverty rate as well as the mortality rate of children under five years old, still have disparities that surface when countries are

evaluated individually because of the unequal distribution of services and access to services according to location, that is, rural or urban, ethnicity and income brackets of its population. Inequalities are seen as one of the causes of the slow decline in the fight against poverty (Monterrosa, 2013:8).

### 2.2.1 Over-Nutrition

#### 2.2.1.1 Overweight and Obesity in Children

Obesity is the accumulation of fats causing unfavourable gain in weight (Rossouw, Grant and Viljoen, 2012). Obesity is caused by a consumption of food that has high amounts of refined carbohydrates, fats and oils, combined with a decline in physical activity (Rossouw *et al.*, 2012). The meals served at a child care facility are a major contributor to a child's overall diet quality and health, especially in the prevention of childhood obesity (Kelly, Hardy, Howlett, King, Farrell and Hattersley, 2010).

Other than an unhealthy diet, "extra foods" are also considered another contributor to weight gain in children. The Australian Guide to Healthy Eating (AGHE) describes "extra foods" as food that does not provide necessary nutrients, and usually contains plenty of added fat, salt and sugars. The AGHE recommends that one to two portions, or up to 14% of daily total energy intake for children, may be sourced from extra foods (Kelly *et al*., 2010).

In the USA, food consumption data suggests that children have access to "kid food" that is inclined to be high in fat and sugar – including excessive amounts of fruit juice, juice-based sweetened cool drinks, fried chips and nutrient-poor snacks leading to the over-consumption of energy and fats, resulting in overweightness and obesity at a very young age (Labadarios, Dhansay and Hendriks, 2008).

Another cause of over-eating in children stems from parents that feed children specific food portions rather than allowing the child to self-regulate food intake (Labadarios *et al.*, 2008). There is a prevalence of obesity despite the prevalence of food insecurity because poverty in developing countries has given rise to diets with a high consumption of low-cost foods that are rich in carbohydrates and fats, and a low consumption of more expensive, nutrient-rich foods such as meat products, milk products, fruits and vegetables (Misra, Singhal and Khurana, 2010).

In a study conducted in Chile between 1987 and 1995 on children of five years old and younger, increased fat consumption was found to cause a rise in obesity (Misra *et al.*, 2010). In SA the NFCS of 1999 indicated that overweight and obese children were significantly predominant in urban areas when compared to rural areas (Labadarios *et al.*, 2005b).

Rossouw *et al*. (2012) state that for children the physical impact of being overweight or obese may result in:

- High possibility of developing type 2 diabetes mellitus, asthma or escalate the severity of existing asthma.
- Cardiovascular abnormalities in childhood.
- Low density lipoprotein cholesterol will be elevated.
- Higher triglyceride levels
- High density lipoprotein cholesterol levels will be decreased.
- The vascular endothelial will function irregularly.
- The left ventricular will function poorly and have an unusual mass.
- Atherosclerotic lesions.
- Awkward sleep apnoea.
- Low level of systemic inflammation.
- Puberty may start early.
- May develop foot and other deformities of the skeleton, and
- Suffer from liver sicknesses because of fat in the liver.

When the child grows to an adolescent, obesity may have a negative impact on psychological and psychosocial well-being of the child, which is likely to result in a withdrawal from physical activities, aggravating the weight problem that may then extend to adulthood. The negative impact may manifest in low self-esteem, absence of self-confidence, adverse self-perception, melancholy, stereotyping, discrimination and social rejection. Obesity in childhood leads to health problems in adulthood, it contributes to an adult developing hypertension, coronary heart conditions, type 2 diabetes mellitus, stroke, diseases of the liver, increased risks of any type of cancer, skeletal complications, various ovary sicknesses, and inflammatory illnesses resulting in premature death on some occasions (Meier and Stratton, 2008, Rossouw *et al.*, 2012).

### 2.2.1.2 Type 2 Diabetes Mellitus

The escalation in the intake of total fat in the diet results in a person gaining weight and depleting the body's resistance to insulin, resulting in the development of type 2 diabetes mellitus. Several developing countries have reported growing incidences of type 2 diabetes in children. People have changed from eating a healthy, traditional diet that contains high fibre, low fat and calories, to calorie-dense foods that contain fats, carbohydrates, red meat and are low in fibre (Misra *et al.*, 2010). This diet together with physical inactivity results in overweight and obesity. Type 2 diabetes mellitus comes about when insulin released is insufficient to satisfy the high needs caused by insulin resistance (Rosenbloom, Silverstein, Amemiya, Zeitler and Klingensmith, 2009, Louw, Bekker and Wentzel-Viljoen, 2001).

In children, type 2 diabetes mellitus presents symptoms such as frequent urinating (polyuria), increased thirst and fluid intake (polydipsia), blurred vision and loss of weight in association with an excretion of glucose in the urine, despite normal or low blood sugar levels. To treat type 2 diabetes there should be a lifestyle modification, that is, eating correctly and being physically active, as well as glucose level monitoring and prescribed medication. Severe type 2 diabetes cases may result in coma and death (Rosenbloom *et al.*, 2009). In North America and Europe type 2 diabetes was found in children from a lower socio-economic status, where there is a low income and less educated parents (Rosenbloom *et al.*, 2009).

## 2.2.2 Under-Nutrition

Shetty (2006) states that the terms malnutrition and under-nutrition are used interchangeably and further mentions that any nutrient may be a limiting factor in poor nutritional status, but the insufficient consumption of dietary energy and poor intake of macronutrients such as protein and fats and micronutrients such as iron, iodine, and vitamins A and C causes under-nutrition (Shetty, 2006).

### 2.2.2.1 Protein Energy Malnutrition

Protein-energy malnutrition (PEM) is the inadequate intake of protein, together with energy in some cases, over a long period of time which may cause the child to be stunted, wasted and/or underweight. Wasting is used to monitor nutritional status changes and can also be used as a predictor of the threat of death in children. Being underweight is an indicator of enduring and existing under-nutrition (Nordin, Boyle and Kemmer, 2013). Stunting is the indication of

chronic under-nutrition and thinness is the indication of immediate energy deficiency (Motswagole *et al.*, 2012). Kwashiorkor and marasmus are typical conditions of childhood PEM (Shetty, 2006).

## A. Kwashiorkor

Kwashiorkor is a form of protein-energy malnutrition where the intake of dietary protein, micronutrients and carbohydrates are not in proper proportion (Knoop, Stack, Storrow and Thurman, 2010, Scrimshaw and Viteri, 2010). Decreased synthesis of protein results in low levels of albumin in the blood serum known as Hypoalbuminemia. Albumin is a protein in the human body that forms a large part of the plasma mass. A characteristic symptom of kwashiorkor is the presence of oedema. Hypoalbuminemia decreases oncotic pressure resulting in the retention of fluid and sodium causing oedema. The child is underweight with wasted muscles but the face is round due to generalised oedema (WHO, 2008). The presence of oedema may present difficulties in diagnosing kwashiorkor because the child displays high z-scores for weight (Walton and Allen, 2011, WHO, 2008). Other symptoms include:

- Apathy - the child is withdrawn and irritable
- Loss of appetite – typically during illness the child will not eat
- Dermatitis, skin peeling and scaling with flaky paint appearance, the skin becomes dry, thin, shiny and wrinkled
- Hair becomes thin, sparse and does not have a pigment because of zinc deficiency
- Anaemia mainly caused by an iron deficiency
- Anorexia because of wasting muscles.

The severely malnourished child will also have infections and diarrhoea from malnutrition of nutrients (Walton and Allen, 2011, WHO, 2008).

## B. Marasmus

Marasmus is protein-energy malnutrition caused by a balanced inadequacy of protein and energy. The characteristic symptoms of marasmus include severe degeneration of muscles and minimal adipose tissue with an appearance described as “skin and bones” (Shetty, 2006, Walton and Allen, 2011, WHO, 2008). The body releases amino acids from the muscles to

produce albumin, resulting in severe muscle wasting, but with normal plasma albumin levels there is no oedema present. Other symptoms include:

- Loss of subcutaneous fat on the face
- Irritability
- Dull, inactive eyes
- Ribs structure seen through skin
- Hanging skin around the buttocks and thighs (WHO, 2008).

### C. Marasmic Kwashiorkor

This condition results when the presence of infections from a severely malnourished child presents the symptoms of both marasmus and kwashiorkor, that is, the child has severely degenerated muscles on the upper part of the body but the knees and ankles are swollen with oedema (WHO, 2008, Shetty, 2006)**.**

## 2.2.3 Nutritional Needs of Children Aged Two to Five Years Old

When people have plenty of food available and have money to purchase food at all times the right to adequate food access for every human being is met. But with a rise in food prices, this could lead to a reduction in access to quantity and quality of foods for low income households, presenting a likelihood of direct consequences for a woman and child's nutritional status (Brinkman, de Pee, Sanogo, Subran and Bloem, 2010).

According to Rah, Akhter, Semba, de Pee, Bloem, Campbell, Moench-Pfanner, Sun, Badham and Kraemer (2010) in developing countries, a diverse diet from basic food groups in the diet of children is linked to improved nutritional status, since higher dietary diversity scores are definitely linked with good dietary quality, increased household food security and sufficient micronutrient intake (Rah *et al.*, 2010). SA still needs to do away with stunting and rising overweight and obesity in children (Vorster, Badham and Venter, 2013).

The nutritional status of children in developed countries has improved because children live in clean conditions, eat uncontaminated food, are exposed to fewer pathogens, during illness receive prompt medical care and during convalescence nutritious food is consumed. In developing countries 27% of children younger than five years old are stunted and children with acute illnesses and persistent infections are at risk of inhibited growth. A lack of

nutritious food during convalescence causes a greater need for nutrients for both catch-up growth and resuming of natural growth trajectories (Thurnham, 2013: 34).

### 2.2.3.1 Dietary Reference Intakes

Dietary Reference Intakes (DRIs) are the current dietary recommendations formed by the Food and Nutrition Board of the Institute of Medicine (IoM) (Tulchinsky, 2010). The DRIs provide guidelines for the minimal, ongoing consumption level of a nutrient to avoid deficiencies and maximise the well-being for an individual or a group. The DRIs are also used to measure if the diet provides adequate nutrients to meet the individual's needs. DRIs are also used to keep the individual healthy and decrease the risk of prolonged diseases that may be caused by deficiencies (Butte, Fox, Briefel, Siega-Riz, Dwyer, Deming and Reidy, 2010). The DRIs are intended for use with healthy individuals, guidance is provided for vegetarian diets for some nutrients, and are also applied to the usual intake of nutrients from drinks, food, and dietary supplements (Murphy and Barr, 2011).

The term DRIs refers to the four nutrient-based reference values. The DRIs state the average daily intake of nutrients, and also accommodate deviations from the average values over a number of days. DRIs are nutritionally important reference values for the average mean intake over time (IoM, 2003). They are as follows:

- **Recommended Dietary Allowance**

Recommended Dietary Allowance (RDA) is consumption that satisfies the nutrient necessities of approximately all persons in that specified gender at the given stage of the life cycle (Murphy and Barr, 2011).

- **Estimated Average Requirement**

Estimated Average Requirement (EAR) is used for research in groups of people to measure the mean intake of nutrients of the group studied (Gibson, 2005). EAR is met when the dietary consumption value of a nutrient satisfies 50% of the well-nourished individuals in an identified gender group at a particular stage of the life cycle (IoM, 2003). EAR should not be used to measure the intake of an individual (Gibson, 2005).

- **Estimated Energy Requirement**

Estimated Energy Requirement (EER) is a term used to describe the typical consumption of diet related energy that is expected to sustain energy needs in a fit adult in order to maintain current body weight and activity level. In children, expectant women and lactating mothers the EER also takes into account the necessities for building up of tissues or milk production at a rate that is consistent with good health (IoM, 2003, Gibson, 2005).

- **Tolerable Upper Intake Level**

Tolerable Upper Intake Level (UL) is the uppermost consumption of nutrients that will not be harmful to the health of nearly all persons in an identified group (Del Valle, Yaktine, Taylor and Ross, 2011). The UL is set with an aim to protect the utmost sensitive people out of the general healthy public, and relates to long-lasting regular intake of the specified nutrient from food, fortified food, nutrient supplements, water and other non-food sources of the nutrient (IOM, 2003).

- **Adequate Intake**

Adequate Intake (AI) is used in the absence of scientific evidence to set EAR (Del Valle *et al.*, 2011). The value of the AI is established based on the levels of consumption derived from approximations of the observed mean intakes of a specified nutrient, by a sample of healthy individuals presenting normal presence of a particular nutrient in the blood, accurate growth or other functional health indicators (IoM, 2003).

### 2.2.4 Macronutrient Deficiencies

Macronutrients are carbohydrates, fats, energy, protein, dietary fibre and water and are found in food a person eats because the body cannot produce these nutrients. In children, macronutrient deficiencies result in stunting, wasting and underweight children. Stunted children have stunted growth which slows down brain development, resulting in a child more likely to learn poorly. Globally, 30% of children below the age of five years old are stunted, and 18% are underweight (Nordin *et al.*, 2013). According to the Department of Economics and Social Affairs of the United Nations (UN) Secretariat (2013) internationally, one in six children under five years old is underweight and one in four is stunted (Hongbo, 2013).

Four nutrient-based reference values are used as guidelines to meet the daily nutrient requirements of the body (IoM, 2003). The reference values differentiate for different age groups of children. The age groups of children below 18 years are separated as follows:

- 2 to 6 months
- 7 to 11 months
- 1 to 3 years
- 4 to 8 years
- 9 to 13 years
- 14 to 18 years

The needs of boys and girls may be different in other nutrients (IoM, 2003). This study focuses on children of two to five years old, therefore reference values of nutritional needs for age groups of one to three years old and four to eight years old will be explored.

## A. Protein

Protein is the most important nutrient for growth in infants and young children. A lack of any of the nine essential amino acids that build up and maintain body tissues to promote growth may result in stunted growth (Swart and Dhansay, 2008). The RDA is a reference value used for daily requirements of protein. Boys and girls of the age group one to three years old require 13g/day of protein, while girls and boys of the age group four to eight years old require 19g/day (IoM, 2003). Proteins obtained from animal sources that are commonly eaten by children include milk, chicken, beef, and eggs. Plant protein sources include cereals such as legumes, maize meal, bread and peanut butter (Swart and Dhansay, 2008).

## B. Carbohydrates

The body and the brain obtain energy from carbohydrates (Swart and Dhansay, 2008). Uses of energy in the body are mentioned in sub-section D. The EAR is a reference value utilised to provide a guide for carbohydrate daily requirements. Boys and girls from one to eight years old require 100g/day of carbohydrates in the diet (IoM, 2003). Carbohydrate sources that are often consumed by children in SA are: maize meal food items such as porridge, pap and crumbly ‘phuthu’; bread, rice, sugar; grains like oats and fruit and vegetables including sweet corn (Swart and Dhansay, 2008).

## C. Dietary fibre

Dietary fibre together with adequate hydration in the large bowel contributes to the reduction of constipation in most normal people because inadequate faecal bulk happens when there is a lack of fibre in the diet (IoM, 2003). Meeting the set recommended intake of fibre prevents coronary heart disease and people with irritable bowel syndrome and flatulence may suffer from gastrointestinal distress from a high intake of dietary fibre. On the other hand, regular high dietary fibre intake is less likely to result in significant damaging effects in healthy individuals (IoM, 2003). The AI is a reference value used for dietary fibre daily requirements. Children aged one to three years old require 19g/day and children of four to eight years old require 25g/day of dietary fibre (IoM, 2003). Dietary fibre is obtained by consuming a variety of whole grain cereals like: popcorn, oats and wheat bran and also pulses, potatoes, fruit and vegetables (Swart and Dhansay, 2008).

## D. Energy

In childhood, energy is needed for increased activity, to form growing tissues and also to synthesize the energy deposited in the tissues (FAO, 2001:21, IoM, 2003). In developing countries factors such as the burden of infectious diseases like diarrhoea and parasitic infections, micronutrient deficiencies and catch-up growth increases the need for energy intake in children (Swart and Dhansay, 2008). Table 2.1 indicates the Estimated Energy Requirements (EERs) for children with active physical activity levels (IoM, 2003):

**Table 2.1: EERs for Children with Active Physical Activity Levels (IoM, 2003)**

| Gender | Age group | Kcal | kJ |
|---|---|---|---|
| Males | 1 - 2 years | 1 046 | 4 393 |
| | 3 - 8 years | 1 742 | 7 316 |
| Females | 1 – 2 years | 992 | 4 199 |
| | 3 – 8 years | 1 642 | 6 896 |

The FAO, WHO and UN Expert Consultation report (2001) states that energy for metabolic and physiological functions of humans is obtained in the chemical energy bound in food sources of carbohydrates, fats and proteins which act as fuel. Carbohydrates and fats are main sources of energy and protein may also provide energy if other energy intake sources are low (FAO, 2001: 6). The NFCS of 1999 found that 26% of children aged one to three years old

consumed 50 to 66.6% of the daily energy needs (Labadarios *et al.*, 2005b). The main findings of the SANHANES-1 indicate that children from the youngest age groups score highest on perceived ability to change dietary behaviour from consuming foods that are high in fat and sugar, to increasing fibre, fruit and vegetable consumption (Shisana *et al.*, 2013). Studies in SA's CCFs indicate that energy intake is lower than that of the RDA (Dannhauser *et al.*, 2000, Pietersen *et al.*, 2002 and Steyn, 2000). Energy density can be achieved in dietary intake by adding one teaspoon of oil, margarine, avocado or peanut butter to 100g of porridge, as well as increasing the consumption of vegetables or fruit (Swart and Dhansay, 2008). Also, energy is provided by animal protein sources such as meat or chicken. Mixing foods with varying energy density, for example: cooked rice, mashed potatoes and butternut will contribute to energy intake from that particular meal (Swart and Dhansay, 2008).

### 2.2.5 Micronutrient Deficiencies

Micronutrients are vitamin and mineral substances found in a food item, provided in small amounts. Micronutrient deficiencies of vitamins and minerals are recorded worldwide, affecting all people of all ages and genders - especially vulnerable groups in the population such as children, women and the aged (Tulchinsky, 2010). Micronutrient malnutrition is one of the largest problems globally, a child's nutrient needs are high because children are still growing and are most likely to suffer from childhood diseases such as diarrhoea, vomiting and others that can inhibit absorption of necessary micronutrients (Steyn, Nel, Nantel, Kennedy and Labadarios, 2006).

Micronutrient deficiencies cause specific diseases and increase the severity of infectious diseases and chronic illnesses, which ultimately has an influence on the child's well-being and risk of mortality (Tulchinsky, 2010).

Vulnerable communities consume plant-based staple foods and have low consumption of animal sources of food, predisposing the people in the community to deficiencies in micronutrients vitamin A, calcium, iron, riboflavin, zinc and vitamin $B_{12}$ (Faber, 2010). A national survey in 2005 showed that 63.6% of SA children younger than nine years old were vitamin A deficient, 28% were anaemic, 45% had a low zinc status and children with a poor iron status were recorded at 13% (Labadarios *et al.*, 2005b). One in three people in sub-Saharan Africa have micronutrient malnutrition of which women and children have a deficiency in iron, iodine and vitamin A (Crush *et al.*, 2011).

## A. Calcium

Calcium is needed to facilitate the clotting of blood and for healing of wounds, muscle contraction, nerve transmission and formation of bones and teeth. Calcium also has a structural function as it is stored in bones (Stein, 2010). Boys and girls of the ages one to three years old require 500 mg/day AI of calcium and boys and girls of the ages four to eight years old require 800mg/day AI per day (IoM, 2003). Calcium-rich foods consumed by children include tinned pilchards and dairy products such as: milk, yoghurt, 'maas', cheese wedges or cheese sliced or grated on pizza and in sandwiches, milkshakes, flavoured milk, drinking yoghurt and ice-cream (Swart and Dhansay, 2008).

## B. Vitamin A

Vitamin A is known to be a critical factor in child health and survival as it is vital for growth and maintenance of the immune system (Faber, Venter and Benadé, 2002). A national survey of 2005 found that 63.6% of children of the ages one to nine years old were vitamin A deficient (Labadarios *et al.,* 2005b). In SA for every three children, two are deficient in vitamin A (Development Bank of South Africa (DBSA), 2008). The results of the recent SANHANES-1 reported a decrease in vitamin A deficiency by 20% to 43.6% in 2012 (Shisana *et al.,* 2013). Faber *et al*. (2002) further states that vitamin A is needed for eye health - for the eye to produce tears and to enhance vision, especially in the dark, which can be compromised by a deficiency. Vitamin A helps to prevent infections by keeping all the cells in the eyes, the inside of the mouth and cells that line the gut and the respiratory tract healthy (Browne, 2010).

Boys and girls of one to two years old require 210µg/day EAR while boys and girls of three to eight years old require 275µg/day EAR of vitamin A in their diet, on daily basis (IoM, 2003). Vitamin A is found naturally in vitamin A and pro-vitamin A rich foods. Retinol is another type of vitamin A obtained from egg-yolks, organ meats and dairy products which are best in improving vitamin A status – but often expensive to purchase. Pro-vitamin A carotenoids is one other form of vitamin A found in cabbage, spinach, lettuce and other green-leafed vegetables, as well as in orange and yellow fruits and vegetables. Pro-vitamin A carotenoids can be converted in the body into another form of vitamin A, known as Retinol. Vitamin A can also be found in fortified foods and supplements (Faber *et al.,* 2002). Children are also given a vitamin A dose and boosters with immunisation.

## C. Iron

The main function of iron is to produce haemoglobin, which is the red blood cell that transports oxygen to body tissues from the lungs, and also for basic cellular function of the brain and muscles (Swart and Dhansay, 2008). In SA, one in every seven children have a low iron status, with 27.90% of the children recorded as anaemic from low haemoglobin concentration (DBSA, 2008). The results of the SANHANES-1 show that 10.7% children younger than five years old are anaemic, compared to 28.9% in the NFCS 2005 study (Shisana *et al.*, 2013). For growth during infancy and childhood increased amounts of iron are required for an increase in the amount of blood in tissues, and also to be stored for use when needed (Swart and Dhansay, 2008). Iron is also an integral part of enzyme reaction in various tissues, and the deficiency of iron may interfere with vital functions of the body, which may lead to morbidity and death (IOM, 2003). Children are more susceptible to childhood diseases like worm infestation that causes loss of blood, thus requiring more nutrients than adults (Nolijana, Norman, Dhansay, Labadarios, van Stuijvenberg, Bradshaw and South African Comparitive Risk Assessment (SACRA), 2007).

Boys and girls aged one to two years old require 3.0 mg/day EAR from all forms of iron in food, supplements, fortified foods and water, while boys and girls in the age group three to eight years old require 4.1mg/day EAR of iron daily in the diet (IOM, 2003). Food sources of iron include: red meat such as beef, lamb, pork and liver, offal, fish, egg yolks and poultry. Vegetarian sources of iron include cereals, pulses and green leafy vegetables such as spinach (Swart and Dhansay, 2008) (Nojilana *et al.*, 2007). Poor dietary iron bioavailability results from eating less meat and fish products and more cereals which causes an iron deficiency in the body. Vitamin C is also required for iron absorption (Ogboko, Fisher and Swart, 2011, Nojilana *et al.*, 2007).

## D. Zinc

Zinc is an essential part of various enzymes that optimises digestion in order for the body to work at optimum levels (Samuel, Egal, Oldewage-Theron, Napier and Venter, 2010). Samuel *et al.* (2010) further states that zinc is an antioxidant, anti-inflammatory, regulates immune processes within cells, and in children zinc is needed for optimum physical and brain growth as well as neurobehavioral development (Samuel *et al.*, 2010).

Boys and girls of the age group one to two years old require 2.2mg/day EAR while boys and girls aged three to eight years old require 4.0mg/day EAR of zinc in their diet (IoM, 2003). In SA about 45.3% of the children have a poor zinc status (Labadarios *et al.*, 2005b). Zinc rich foods include: meat, fish and poultry, but these are expensive food items for resource poor communities. Plant sources that are poor in zinc include cereals and legumes but have high phytate levels which may hinder bioavailability of zinc (Samuel *et al.*, 2010). Table 2.2 shows the functions of other minerals and vitamin with food sources:

**Table 2.2: Other Micronutrients (IoM, 2003, Department of Health (DoH), 2004), Govender, 2011:65-68)**

| Nutrient | DRIs / day for one to three year olds | DRIs / day for four to eight year olds | Food Sources | Functions |
|---|---|---|---|---|
| **Phosphorus** | 380mg EAR | 405mg EAR | Red meat, poultry, fish, milk, cheese, yoghurt, maas and cereal grains. | Is needed for breaking down energy in carbohydrates, fats and protein. |
| **Iodine** | 65mcg EAR | 73mcg EAR | Iodised salt and seafood | Needed to construct thyroid hormones. |
| **Thiamine (Vitamin $B_1$)** | 0.4mg EAR | 0.7mg EAR | Bread, cereals, pork, tuna, asparagus, spinach, lettuce, tomatoes, mushrooms, sunflower seeds, green peas, brussel sprouts, eggplant and fortified foods | For healthy blood and to assist the body in converting carbohydrates into glucose.<br>Help the body digest fats and protein.<br>Helps with the proper working of the nervous system.<br>Needed for healthy liver, hair, skin and eyes.<br>Required for optimum brain function. |
| **Riboflavin (Vitamin $B_2$)** | 0.4mg EAR | 0.8mg EAR | Dairy products, fish meat, calf liver, eggs, beans, lentils, nuts, whole grains, green leafy vegetables | Sustain the mucous membranes all through the digestive tract.<br>Required for development of |

| | | | | |
|---|---|---|---|---|
| | | | spinach, lettuce, asparagus, chard, mustard greens, broccoli, turnip, mushrooms and fortified foods | red blood cells for healthy blood.<br><br>Assists the body in building up antibodies to fight illnesses.<br><br>Needed for skin, hair, finger and toe nails and the connective tissues. |
| **Niacin (Vitamin $B_3$)** | 5mg EAR | 9mg EAR | Meats, poultry, fish, peanuts, brewer's yeast wholegrain, enriched cereal grains and fortified foods | Essential for the absorption of carbohydrates, fatty acids and amino acids.<br><br>Needed for cell respiration, circulation and healthy skin.<br><br>Necessary to keep the nervous system working properly.<br><br>Regulate secretion of bile and stomach fluids. |
| **Folate** | 120mcg EAR | 250mcg EAR | Dark green leafy vegetables, beets, oranges, orange juice, kidney, liver, legumes, whole grain cereals, nuts, beans, and fortified foods | Necessary for the development of DNA and RNA.<br><br>Essential in the formation and development of the blood's white and red cell count. |
| **Vitamin $B_6$** | 0.4mg EAR | 0.8mg EAR | Fortified cereal, nuts, peanut butter, dried beans, potatoes, lean meats, milk, liver, fortified foods and bananas | Needed for healthy blood.<br><br>Aids the body to utilise proteins to sustain a healthy nervous system. |
| **Vitamin $B_{12}$** | 0.7mg EAR | 1.5mg EAR | Lean meats, low fat milk and eggs | Used in cell division and growth.<br><br>Needed in the formation of red blood cells.<br><br>Aids in nerve function. |

| | | | | |
|---|---|---|---|---|
| | | | | Assists in the prevention of heart disease |
| **Vitamin C** | 13mg EAR | 39mg EAR | Red peppers, oranges and orange juice, sweet potatoes, broccoli, tomatoes and tomato sauce. | Needed for immune function.<br>Facilitates healing of wounds.<br>Is an antioxidant. |
| **Vitamin D** | 5mcg AI | 5mcg AI | Milk and other dairy products fortified with vitamin D, milk, cod liver oil, eggs, salmon, tuna, mackerel, and fortified breakfast cereals | Needed by the body for the absorption and use of calcium.<br>Controls how the body uses phosphorous.<br>Facilitates the absorption of calcium from the small intestine.<br>Aids in the formation and maintenance of bone strength. |
| **Vitamin E** | 5mg EAR | 9mg EAR | Fruits and vegetables, margarines, vegetable oils, nuts, grains, seeds and fortified cereals. | Assist in keeping the skin, nerves and reproductive system healthy. |
| **Vitamin K** | 30mcg AI | 60mcg AI | Spinach, cabbage, turnip greens, broccoli, cauliflower, canola oil, soybean oil and olive oil. | Essential for blood clotting.<br>For construction of bone and kidney tissues.<br>Needed for healthy bones. |

## 2.3 CONSEQUENCES OF DEFICIENCIES IN CHILDREN

According to Nordin *et al.* (2013) micronutrient insufficiencies result in lethargy, fatigue, reduced learning ability, reduced immunity, brain damage, blindness, a possibility of death from diarrhoea, goitre, malaria, pneumonia and measles. In childhood the deficiency of vitamins such as iodine, zinc, vitamin A and iron is devastating when it comes to compromised development and child mortality (Buhl, 2010).

Iron deficiency impedes cognitive development (Buhl, 2010). Iron deficiency can lead to decreased oxygen transporting capacity which will have a negative impact on the body's ability to resist illnesses and also on the child's growth (Black, 2003). Iron deficiency affects women and children worldwide; according to the WHO (2011) more than 30% of the world's population and an estimated 40% of preschool children are anaemic due to iron deficiency. In developing countries, mainly in poorly resourced areas, iron deficiency anaemia increases the risk of morbidity in children and is aggravated by diseases such as HIV and AIDS, malaria, worm infections, hookworm infestations and tuberculosis (WHO, 2011).

Anaemia can also be caused by deficiencies of vitamin A, folate and vitamin $B_{12}$ and also by HIV, malaria, sickle cell disease, other infections or inherited anaemia. Childhood anaemia affects the child's academic performance negatively even when the anaemia has been treated (Black, 2003).

Deficiency of vitamin A causes night blindness and also weakens the immune system and escalates the possibilities of death from malaria, diarrhoea and measles (Buhl, 2010). In 2010 approximately 250 million preschool children were recorded as deficient in vitamin A, worldwide, becoming blind within a year, with half of that number dying within a year of losing eyesight (Haour-Knipe, 2009). Another consequence of vitamin A deficiency is that the child may lose a natural resistance to new infections or be unable to stop the expansion of existing infections - resulting in an increase in the chance of suffering from illnesses caused by infections and an increased chance of mortality caused by infections (Shisana *et al.*, 2013).

Vitamin $B_{12}$ is obtained from animal sources like milk and meat and children that consume these foods inadequately may have a vitamin $B_{12}$ deficiency. The result of a Guatemalan study

in school children found that the children were slow to react during neuropsychological assessments of recollection, rationalising and perception, furthermore the children had a poor academic performance, attention difficulties and were delinquents (Black, 2003). Table 2.3 illustrates other major micronutrient deficiency disorders affecting children globally.

**Table 2.3 Other Major Micronutrient Deficiency Disorders Affecting Children (Tulchinsky, 2010)**

| Micronutrient | Major Deficiency Disorders |
|---|---|
| **Folate** | Megaloblastic anaemia, depression, impaired mental use |
| **Thiamine** | Beriberi |
| **Riboflavin** | Fatigue, dermatitis, eye changes, reduced iron absorption, brain malfunction |
| **Niacin** | Pellagra, diarrhoea |
| **Vitamin $B_6$** | Dermatitis, anaemia, neurological disorders, fits, high plasma homocysteine |
| **Vitamin C** | Scurvy (haemorrhages, exhaustion, decreased resistance to infection, anaemia) |
| **Vitamin D** | Rickets, osteomalacia, colorectal cancer, osteoporosis |
| **Calcium** | Rickets, diminished bone mineralization, osteoporosis |
| **Fluoride** | Causes dental decay, has an adverse impact on the health of the bone |

Zinc deficiency in childhood has an influence on the child's failure to grow well, contributes to a child's stunted growth, also causing a decline in immunity as well as death from pneumonia, diarrhoea and malaria in smaller children. It may also weaken the child's mental growth through fluctuating levels of being active, attention span and other functions of the nervous system (Jacobs, 2009, Buhl, 2010).

Iodine deficiency is associated with low cognitive abilities and also mental deficiencies because of a delay in the development of the brain. Prolonged and severe deficiencies may result in death of the child (Buhl, 2010).

## 2.4 CAUSES OF MALNUTRITION AND FACTORS AFFECTING FOOD INTAKE IN CHILDREN AGED TWO TO FIVE YEARS OLD

The UNICEF Conceptual Framework for the causes of Malnutrition, as described in chapter one, illustrates the causes of malnutrition and will be discussed further in this section.

### 2.4.1 Inadequate Dietary Intake

A diet is adequate when food consumed provides a nutrient intake that meets the needs of a healthy individual, when compared to the standards of the DRI (Joubert and Ehrlich, 2007). Presently 165 million children younger than five years old, worldwide, are chronically malnourished and 38% of children from under-developed countries are stunted (Food for Thought, 2013).

Sufficient dietary intake is vital for good nutrition. Parents are advised to give children a variety of foods that are rich in nutrients so that one's dietary intake has a variety, in order to prevent deficiencies of nutrients (Oldewage-Theron and Kruger, 2011). In vulnerable communities children generally eat staples such as maize meal porridge, 'phuthu pap' and bread, and not nearly enough fruit, vegetables, meat and milk products - resulting in micronutrient deficiencies particularly in vitamins C, calcium, vitamin D, iron, iodine, vitamin E, zinc and potassium as well as fibre and energy (Butte *et al.*, 2010, Zuercher, Grace and Kranz, 2011). Meat and dairy products are key sources of a typical daily diet in Inanda, as sheep, goats and cattle are not only kept as family assets but also as a food source (Everatt and Smith, 2008).

According to Kruger *et al.* (2008) a diet that is high in cereal staples is associated with unsatisfactory growth of children due to low bioavailability of minerals because of high fibre and phytate content. The results of the NFCS of 1999 showed that in SA every one of two children between the ages of one and nine years old consumed approximately below half of the recommended intake for micronutrients zinc, calcium, folate, iron, riboflavin, vitamin A, niacin, vitamins $B_6$, and vitamin C (Labadarios *et al.*, 2008). The 2005 national study by Labadarios *et al.* (2005b) showed that the dietary intake of children between one and nine years old was below 67% of RDA for micronutrients calcium, vitamin A, iron and zinc (Faber, 2010, Tulchinsky, 2010). The results of the SANHANES show a decrease in the

prevalence of micronutrient deficiencies because the DoH took to introduce mandatory fortification programmes of staple food and vitamin A supplementation programmes as suggested interventions after the 2005 study (Shisana *et al.*, 2013).

In a study conducted in the United Kingdom, the diet of children under five years old was found to be too low in iron, zinc and vitamins A, in addition, very low in vitamin D for some groups of children. Overall, the children consumed too little fruit and vegetables and too much salt and sugar, contributing to tooth decay (Crawley, 2006).

### 2.4.2 Illness

Malnutrition is challenging among children because the consequences of malnutrition and the deficiencies of micronutrients comprise of being underweight, stunting, physical inactivity and a decline in the body's ability to fight diseases (Rudolph, Kroll, Beery, Marinda, Douglas, Orr and Sobiecki, 2011). The presence of infections in a child with malnutrition is another prominent cause of ill health, as well as the root of the demise of children in low income communities all over the world. Depending on the severity and the nature of an infection, there is often reduced food intake, resulting in diseases such as anorexia (Neumann, Marquardt and Bwibo, 2012).

**(a) Diarrhoea**

Diarrhoea is an illness whereby there is an increased incidence of passing of stool or the stool emitted has a consistency that is more watery than normal. The frequency and consistency of the stool may vary with age and diet. Diarrhoea can be severe or prolonged, and at times, the child may vomit and sometimes the stool may contain blood or mucus (McGee, 2007). Diarrhoea is caused by viruses, bacteria, parasites, antibiotics and diet (McGee, 2007). Diarrhoea is also one of the illnesses that contributes to the death of under five year old children (Schoeman, Faber, Adams, Smuts, Ford-Ngomane, Laubscher and Dhansay, 2010a). In rural communities, where the manifestation of diarrhoeal incidents is high, the cultural practise of using enemas to manage diarrhoea is a threat to a child's survival (Schoeman, Smuts, Faber, Van Stuijvenberg, Oelofse, Laubscher, Benadé and Dhansay, 2010b). During periods of diarrhoea the child loses nutrients. If there is nausea and vomiting, food may be avoided leading to deficiencies. Diarrhoea is managed by supplying fluids and electrolytes for rehydration, after which a regular diet may be resumed by eating small, light meals (McGee, 2007).

**(b) Food Allergies**

Food allergies refer to the hostile reaction of the immune system to specific foods (Gupta, Kim, Barnathan, Amsden, Tummala and Holl, 2008). According to Sampson (1999) wheat, some fruit, seeds and protein foods like milk, eggs, fish, soy, peanuts and other nuts cause 90% of food allergies in children (Sampson, 1999). Eczema is related to food allergies; triggers may be legumes, milk and eggs (Groenewald, 2003). Diarrhoea may also be caused by soy protein and wheat. Wheat may cause urticaria, eczema and 'baker's asthma'. Other conditions caused by food allergies in children include rhinitis, asthma, oral allergy, laryngeal oedema and anaphylaxis. Different reactions may be caused by different food allergens in different individuals (Louw *et al.*, 2001, Groenewald, 2003). Food allergies can be life threatening and the symptoms are managed by strict avoidance of the offending food allergens (Gupta *et al.*, 2008). Avoidance of certain foods may lead to deficiencies. Children may outgrow food allergies at the end of the first decade of life, but management of food allergies is important (Gupta *et al.*, 2008).

**(c) HIV and AIDS**

HIV and AIDS infections increase susceptibility to malnutrition because there are nutritional deficiencies in infected children; malnutrition makes the immune system weak and the body cannot resist the transmission of HIV. Malnourishment increases the advancement of the disease, and as a result, the two become tangled in a vicious cycle (McGee, 2007). In a study by Magadi (2011) HIV and AIDS prevalence in sub-Saharan Africa is alleged to have slowed down the attainment of MDG 5, which is - reducing the under five year old mortality rate – by encroaching on the well-being and nourishment of children through illness of the child or any other family member. The study further states that HIV and AIDS can affect children directly or indirectly, that is, the services provided to the community become overloaded by the magnitude of HIV and AIDS cases, therefore the child's life after the illness and / or death of the parent, combined with poverty as well as reduced agricultural and economic output causing a shortage of food, ultimately leads to malnutrition due to deficient social and biological susceptibilities of children (Magadi, 2011).

## 2.4.3 Insufficient Household Food Security

Food security refers to when a person has enough of the right food quality to eat and thus live well (Jacobs, 2009). In a study by Crush *et al*. (2011) children from households in low income brackets were found to be underweight because poor households employ coping strategies

such as decreasing the number of meals and amount of food a person eats in a day, which may have detrimental consequences for children (Duggan, 2010, Crush *et al.*, 2011). A rise in exchange rates and increase in exports push the local food prices making food unaffordable to low income earners. The 2007/8 global commodity price shock also had an impact on local supply and availability of food (Pereira and Ruysenaar, 2012). The non-existence of money to purchase food and poverty are key causes of lack of food security (Iversen *et al.*, 2011).

Food security also includes access to land to plant fresh produce, therefore children living in informal urban settlements because of the lack of land may be more under-nourished and food-insecure than the rural counterparts (Barnes and Wright, 2010). SA has a problem of poor soil quality that leached of most minerals and the rainfall is erratic consequently rural subsistence farmers yield low crops. Massive droughts and floods also contribute to the low yields of fresh produce. Low yields lead to lack of surplus food to sell to the people as a result food prices rise because of low supply (Laing, 2011).

According to Crush *et al.* (2011) many people in the urban parts of SADC are severely food insecure and although in urban areas food is available, children suffer from under-nutrition because of the shortage of health services, good sanitation and parental care. The inaccessibility of food, because of the lack of resources to purchase preferred foods, affects the quality of household diets as diets lacking in diversity become adopted (Crush *et al.*, 2011).

The results of the NFCS of 1999 illustrated that all variables showed an association between poor diet, poor anthropometric status and poor household food security in children aged one to nine years old (Labadarios *et al.*, 2008). The SANHANES found that 26% of the SA population is food insecure, compared to 52.3% and 52.00% of the NFCS of 1999 and NFCS of 2005 respectively, as financial access to food is determined by household income (Shisana *et al.*, 2013).

### 2.4.4 Unhealthy Environments

According to Iversen *et al.* (2011) more than 2.3 million children younger than five years old in SA reside in shacks, making the children highly susceptible to burns and paraffin poisoning. Iversen *et al.* (2011) further stated that 30% of children reside in over-crowded homes which intensifies the probabilities of the child being abused sexually and contracting

airborne illness such as Tuberculosis (TB) (Iversen *et al.*, 2011). Other overcrowding implications for children include: pressure on household amenities and services, lack of space to play or do homework and a lack of privacy (Hall and Wright, 2010).
Children are immediately affected by a shortage of food, infections from inadequate sanitation and support services during periods of famine, civil conflicts or war (Gbakima, Konteh, Kramer, Sahr, George and Luckay, 2013).

Household size, family structure, parental ignorance in recognising a child is undernourished, a parent's inability to distinguish sickness and have the child taken to see a doctor, inadequate maternal care, unhygienic surroundings, inappropriate clothing, unsuitable shelter, exposure to disease that is contagious as well as cross-infection of diseases are all issues exacerbated by overcrowded households and communities; are family factors that have an adverse impact on a child's wellbeing and survival (Heaton, Forste, Hoffman and Flake, 2005).

According to Kandala *et al.* (2011) the DRC experienced political instability, and as a result there was high rates of childhood diseases reported, such as: malnutrition, malaria, acute respiratory infections, TB and diarrhoea. Furthermore, the declining state of health caused the reappearance of epidemics such as typhoid fever and measles resulting in high child mortality rates due to malnutrition (Kandala *et al.*, 2011).

The Department of Economic and Social Affairs of the UN Secretariat in a 2013 report mentions that more than two billion people accessed improved drinking water sources in SA and over 2.5 billion people are still without developed sanitation amenities, which presents a major health and environmental hazard (Hongbo, 2013).

In a study among rural and urban families in Indonesia, the lack of improved latrines was associated with a child history of diarrhoea and also an increase in mortality risk of children under five years of age. Diarrhoea has been reported to contribute to childhood stunting as investigations conducted in many countries show that the effects of diarrhoea on stunting were attributed to more than five episodes of diarrhoea in 25% of children below the age of 24 months (Kraemer, 2013:12). In most populations, diarrhoeal infection is the most common of infections responsible for the death of children below the age of five years old. (Nordin *et al.*, 2013). Nordin *et al.* (2013) further states that diarrhoea-related deaths in children could be

reduced by having safe water to drink and improved sanitation and hygiene practices, which also speeds up the country's economic and social development.

### 2.4.5 Insufficient Health Services

Lack of good health services and unhygienic environments are among the basic causes of childhood malnutrition (Schoeman *et al.*, 2010b). Infections, including HIV and AIDS, pneumonia and sepsis, diarrhoea and malnutrition are prominent causes of death in children younger than five years old in SA (Chopra, Daviaud, Pattinson, Fonn and Lawn, 2009). Twenty-two percent of all preventable deaths of children below five years old were a result of the absence of senior doctors, nurses and inadequate paediatric beds. Fifty-three percent of child mortality rates were related to health care workers (HCW) not using Integrated Management of Childhood Illnesses in clinics, incorrect evaluation of the hospitals and lack of proper management of hospitals. Twenty-five percent of child deaths were related to either the parent or carer not recognising the severity of an illness (Chopra *et al.*, 2009). Chopra *et al.* (2009) further states that the SA government has tried to improve access to basic health care, but there are other problems that are partly responsible for the difficulty in reducing child mortality rates, which include: intensified poverty, less conducive environmental conditions for good food production in rural areas and expansive peri-urban townships.

The results of a study conducted in the EC and KZN showed that primary health care (PHC) facilities had inadequate resources and that certain communities still follow 'risky' cultural practices, that is, people consulting traditional healers after PHC visits. The same study also found that some HCW were unaware which Integrated Nutrition Programme (INP) guidelines were being utilised at the PHC facility, and in KZN none of the HCW in the sample had been trained in PEM management. Seventy-five percent had been trained in Integrated Management of Childhood Illnesses, HIV prevention of mother-to-child transmission and the Expanded Programme on Immunisation. The study further found that malnutrition and TB registers were either not kept or not up-to-date. The prominent cause of child mortality for children under five years old in the two provinces was diarrhoea (Schoeman *et al.*, 2010b).

### 2.4.6 Education and Ignorance of Parents

Maternal and paternal education is important for child health and survival because educated parents are better placed to afford food, health care, clothes and hygienic living conditions for

children (Heaton *et al.*, 2005). Educated fathers are involved in child rearing and understand child development, while educated mothers have greater health knowledge and are more likely to recognise a child's illnesses and seek medical assistance immediately in a clinic or appropriate health institution. Educated parents are also more likely to have longer intervals between child births, reducing low-birth weight in children (Heaton *et al.*, 2005).

Low maternal education, (five years or less) has been linked to a low chance of children becoming overweight, and a higher chance of children becoming underweight (Lesiapeto *et al.*, 2011). The same study found that mothers with seven years or more of schooling were linked to a lesser risk of raising stunted children and a greater risk of raising obese children (Lesiapeto *et al.*, 2011). Children of single mothers, less educated parents and children with parents engaged in informal sector business were found to be malnourished (Crush *et al.*, 2011). Children from female-headed households were also found to be at a significant disadvantage on crucial socio-economic indicators, which in turn has severe consequences for the health status of all family members, including: household income and expenditure, educational attainment, employment opportunities and access of government grants (Goebel, Dodson and Hill, 2010).

### 2.4.7 Education of Care Givers at Child Care Facilities

A large number of mothers are multi-tasking, raising children while being employed on a full-time basis. The number of children that spend a good part of the day at a child care facility has risen worldwide (Neelon and Briley, 2011). It then becomes the responsibility of the care giver in the CCF to feed the children correctly (Bourne *et al.*, 2007). Bourne *et al.* (2007) further states that care givers in CCFs should be trained to make knowledgeable choices to meet children's nutritional needs when planning meals (Bourne *et al.*, 2007). Studies that analyse CCF menus have found that the menus do not satisfy the daily requirements of energy and micronutrients for children (Erinosho, Dixon, Young, Brotman and Hayman, 2011).

Care givers in some CCFs did not have adequate nutrition knowledge, and as a result were not able to serve a variety of food that could contribute to nutritional adequacy of meals (Kwinda, Van der Spuy and Viljoen, 2011). The result of the study indicated that with training the care giver's nutrition knowledge improved and meals served at CCFs also improved nutritionally in variety and diversity, while gardens were also utilised to grow vegetables to be included in meals (Kwinda *et al.*, 2011).

A study in Cape Town conducted by Pietersen *et al.* (2007) showed that 72% of care givers rated nutritional benefits of CCF meals as important. The results of this study showed that care givers needed training in nutrition principles; menu planning and budgeting for food purchases and that there should be a strategy for regular monitoring (Pietersen *et al.*, 2007).

In another study in Pretoria conducted by Molotja (2008), it was found that care givers, both at home as parents and in CCFs, had basic nutrition knowledge, which is, most knew four out of five food groups and which foods are non-nutritious. The care givers could also recognise food that is good for the child to eat and thus grow well - but the researcher concluded that there was a need for proper nutrition education (Molotja, 2008).

Studies in the USA, Canada and Australia showed that there was a lack of proper training or limited training and guidance in creating environments that support healthy eating of children by care givers in CCFs. But with guidelines and training there were improvements in the nutrition knowledge and practises of care givers – though there were still inadequacies in child care feeding (Lynch and Batal, 2011, Freedman and Alvarez, 2010).

### 2.4.8 Cultural Beliefs and Traditions

Dietary habits are established over a long period through various factors such as levels of education, family members, culture, socio-economic levels and religious beliefs (Choi, Shin, Jung, Park, Lee and Song, 2008). Social or cultural influences, customs, food beliefs and taboos, ethnic origin and geographic location often determine the acceptance of food combination, eating patterns and eating behaviour (Mbhenyane, Makuse, Ntuli, Mbhatsani and Sayed, 2008). Cultural and social customs have influences on a family's decisions and may encourage healthier diets and improved eating habits (Just, Heiman and Zilberman, 2007).

In SA's multicultural society, communities farmed traditional staple fresh produce, rich in micronutrients which include: roots, tubers, cereal grains and indigenous fruit and vegetables (Mbhenyane *et al.*, 2008). A traditional African diet was based mainly on harvested indigenous agricultural products, wild edible vegetation and hunted animals - all of which are rich in fibre, high in carbohydrates, low in salt and fat and contain moderate amounts of protein. Whereas, the modern urban African diet has more variety and is entirely based on commercial availability of foods that have an increased content of carbohydrates and salt, are

low in fibre, contain moderate protein quantities and moderate fat quantities (Mbhenyane *et al.,* 2008).

Traditional Indian food consumption is dictated mainly by religion, therefore the Indian culture's diet is varied, but some religions follow vegetarian diets. The Indian diet is typically high in fat and distinctive due to a wide variety of whole and crushed spices used. Carbohydrate sources are rice, roti, white bread, potatoes and sugar (Mbhenyane *et al.*, 2008). Use of convenience food and fast foods is also growing among the Indian population. White, Coloured and some Indian South Africans that follow a Western diet consume a diet that is high in fat, high in protein, moderate in carbohydrates and low in fibre (Mbhenyane *et al.*, 2008).

In Kenya, it was found that there is no statistically significant decrease in food intake in children who have a mild illness than those who were not ill, but avoided specific foods because of enforced dietary restrictions and iatrogenic practices were found to be other causes of malnutrition in children (Neumann *et al.*, 2012)

### 2.4.9 Religion

Dietary practices have been incorporated into religious practices all around the world. Religious beliefs and practices range from relaxed to highly restrictive. Food intake by children is affected by the religion the family follows, as religion may prescribe the diet of its followers in a number of ways, such as:

- Certain foods and drinks may be forbidden all together from the diet - vegetarian diets and the belief in no killing of animals etc.
- Restricting food during certain periods - fasting and holy days.
- Associating food preparation with rituals of faith - Halal and Kosher food preparation methods (Mbhenyane *et al.,* 2008).

The nutrient intake of vegan children in recent years is sufficient because a greater variety of food that is abundant in nutrients as well as fortified vegan foods are accessible and available (Messina and Mangels, 2001). Deficiencies can also be avoided if parents commit to right food choices, follow correct meal planning guidelines and make time to plan vegan diets in order to support normal growth in children (Messina and Mangels, 2001). The ADA recommends that vegetarian diets should be appropriately planned to achieve nutritionally

adequate diets with health benefits, so as to prevent and treat certain diseases. The planned diets should also be appropriate for people's ages and amount of physical activity of an individual (Craig and Mangels, 2009). Young children are among the people that are exempt from fasting during Ramadan in the Muslim religion (Mbhenyane *et al.*, 2008).

According to Just *et al.* (2007) in the USA compliance with certain religious laws and ceremonies often govern the social and cultural customs that a family follows, and thus influences food choices. The results of the study found that children from orthodox families model the father's food preferences if he does the shopping, and children from secular families follow the mother's food preferences if she does the food shopping (Just *et al.*, 2007).

### 2.4.10 Poverty

Barnes and Wright (2010) found that very low living standards where children do not have access to sufficient resources define child poverty in SA. Children who live with unemployed adults have a high probability of going hungry for days, compared with children with at least one employed adult in the family (Barnes and Wright, 2010). Barnes and Wright (2010) further state that poverty is often closely related to hunger, but hunger can be alleviated by cultivating the land to grow basic foods for nourishment, becoming more food-secure, especially in rural areas.

In SA, children are more affected by poverty than adults on social factors like household type, geographic distribution, co-residence with parents, orphaning, child care, housing conditions, access to services like water, sanitation and electricity, household income distribution, unemployment of household members and access to social grants (Hall and Wright, 2010). The SA government introduced social grants as a strategy to alleviate poverty, Child Support Grant (CSG) is mainly aimed at reducing poverty in children (Barnes and Wright, 2010). Despite eight million children in SA between 0 to 13 years old qualifying to receive CSGs in 2008, no impact was recorded in the alleviation of poverty in SA because the CSG was paid in a low value of R220 per month (Pendlebury, Lake, Smith and University of Cape Town Children's Institute, 2009).

The type of household orientation is a contributing factor in the nutritional status of a child. Children that are raised by one parent, those that are from large families but with limited income and children from extended families have a high probability of stunting

(Tanumihardjo, Anderson, Kaufer-Horwitz, Bode, Emenaker, Haqq, Satia, Silver and Stadler, 2007). Mothers suffering from under nutrition, obesity and diabetes whether before or after childbirth are able to leave imprints in the developing foetus passing these conditions to the following generations, therefore, strategies to alleviate poverty among women of child-bearing years are necessary to prevent the progression to forthcoming generations (Tanumihardjo *et al*., 2007).

Children who are stunted and living in poverty in childhood develop reduced intellectual growth causing the child not to achieve well at school and poverty is associated with disease, reduced cognitive development and death in children (Hendricks, Goeiman and Hawkridge, 2013). According to a report by the Department of Economics and Social Affairs of the UN Secretariat poverty continues to predominate sub-Saharan Africa and Southern Asia countries. The report further states that globally poverty is not addressed in regions where there is a lack of education because people cannot find productive employment, in areas where there are under-resourced health services and facilities, in areas where environmental resources have been exhausted and where there is bad governance, corruption in government and wasting of public resources (Hongbo, 2013).

### 2.4.11 Urbanisation

In Southern Africa the rate of urbanisation is greater than 4% since there are more rural spaces than urban spaces. A positive result of urbanisation includes accessing electricity to make use of television and radios to find out about available food products on the market. Other positive attributes include urban areas offering improved roads, distribution networks, better infrastructure that attracts retailers to build shops, thereby improving access to a variety of local and international food products (Kearney, 2010). Kearney (2010) further states that urbanisation has both a positive and negative impact on food consumption patterns, causing changes in eating habits and behaviour. A newly diverse diet will include changes to food that is consumed which includes high energy, sugar, saturated fat and salt levels and low fibre and micronutrient levels. Activity levels may also shift to low-energy expenditure jobs (Kearney, 2010). In the SADC region there is increasing urban poverty in low income and slum areas associated with urbanisation (Crush *et al.*, 2011).

The assumption reported by StatsSA (2010) in the mid-year report is that in 2010 only Gauteng and the Western Cape received a high number of migrants, and an estimated 1 800

people migrated to KZN. Limpopo and the EC recorded the largest number of people migrating out of the two provinces (StatsSA, 2010). Circular migration is high in SA as people migrate from rural to urban areas to improve the household's socio-economic status (SES) (Todes, Kok, Wentzel, Van Zyl and Cross, 2010). International migrants and migrants from within Africa that face difficulties such as food insecurity, unemployment, poverty, unreliable access to social services, AIDS pandemic, political tensions and civil war migrate to SA for improved SES as the country has a prominent economic position within Africa (Todes *et al.*, 2010).

### 2.4.12 Displacement

Madhavan, Schatz, Clark and Collinson (2012) found that children with mothers who are temporary migrants or mothers that are deceased have a higher likelihood to move, when compared with children that live with mothers at home. As a result, the migration and consequent displacement of a child is likely to affect crucial areas of a child's wellbeing, such as nutritional status, educational accomplishment and access to health care (Madhavan *et al.*, 2012).

SA has become refuge to refugees from African countries such as the DRC, Zimbabwe, Burundi, Rwanda, Somalia and Ethiopia. In 2012 there were 65 300 recognised refugees residing in SA and an estimated 230 500 applications received from asylum seekers (United Nations Refugee Agency, 2012:2). The refugees reside mainly in urban areas, but spread across SA and have access to social grants. Refugee children can enrol at local schools for education from basic to tertiary and receive free, basic primary health care (Nyenti, du Plessis and Apon, 2007). Asylum seekers cannot access social grants until a refugee status has been granted (Nyenti *et al.*, 2007).

Globally, women and children are predominant victims of displacement and are the most vulnerable in such situations. For instance, children in refugee camps are prone to malnutrition and the spread of infectious and diarrhoeal diseases (Gbakima *et al.*, 2013). There is frequent migration of children in refugee camps in search of safety in other camps, and while the7 children are on the move there is resultant insufficient intake of essential foods to sustain growth, resulting in children becoming stunted and suffering from acute malnutrition as a result of displacement (Gbakima *et al.*, 2013).

In Kakuma refugee camp in Kenya, refugees suffer from both blatant and hidden hunger because the camp is poorly situated for agricultural, economic opportunity and infrastructural needs. There are limited resources within the camp and refugees depend on international aid and the provision of nutritional supplements to meet their needs (Perry, 2013:66).

### 2.4.13 Food Eaten Away From Home

Children in CCFs eat half of the daily meals away from home in the facility attended. Studies have shown that CCF meals are lacking in energy and other micronutrients (Pietersen *et al.*, 2002, Dannhauser *et al.*, 2000). The SA government subsidises the CCFs in order to provide nutritious foods for children below five years old that spend time in the facilities when parents are away at work. The CCFs need to develop recipes for affordable and nutritious meals to serve to children, as currently meals served in CCFs are nutritionally inadequate and staff require training on meal planning, food hygiene, purchasing, preparation and responsive feeding (Berry and Proudlock, 2014).

Street food sold by a street vendor in a stall - such as tuck shops in townships or a stand in town, as well as fast food sold in formal outlets in malls or business districts are examples of foods consumed 'away from home' (Steyn, Labadarios and Nel, 2011). Both these types of outlets sell food and beverages with high amounts of sugar, energy, sodium, saturated fats and a low content of fibre and micronutrients (Van Zyl, Steyn and Marais, 2010). Dietary diversity of fast foods was significantly greater than that of street food, which was significantly lower in dietary diversity. Street food and soft drink intake is known to contribute to obesity in children that consumed such foods more than once a week while at school (Van Zyl *et al.*, 2010).

In SA, a greater number of people from low and medium socio-economic groups purchase cooked food from tuck-shops, work canteens and roadside stands at bus and taxi ranks. Fast foods are mainly purchased by people in medium and high socio-economic classes (Steyn *et al.*, 2011).

Food service establishments are essential for the success of actions that aim to provide an appropriate supply of nutrients. Therefore, menus with innovative and healthy options that encourage the consumption of fruits and non-starchy vegetables must reflect the reality of

these places and, in addition, include all nutritional, sensorial, cultural, and economical aspects. A dietician must continuously assess whether proposals of food service establishments are being met (Waxman, 2004).

## 2.5 METHODS TO DETERMINE DIETARY INTAKE, MENU ANALYSIS AND NUTRITIONAL STATUS IN CHILDREN

This section will describe the various methods that can be used to assess children's nutritional status and dietary intake.

### 2.5.1 Dietary Intake

According to Livingstone, Robson and Wallace (2004) the correct way of assessing nutritional intake in children and teenagers is an essential requirement for monitoring the nutritional status. Dietary reporting of food intake in childhood is often presented by the parent, but what the child consumes outside the home may not be known to the parent (Livingstone, Robson and Wallace, 2004). Livingstone *et al.* (2004) further state that day care givers should be included when assessing dietary intake on behalf of children.

Children younger than 12 years old require reporting assistance from parents because the children have limited recall skills, limited ability to estimate portion sizes and have limited knowledge of food. Furthermore, the use of visual tools of assessment such as household measures, food models and food photographs may not produce accurate reporting as children have not cognitively mastered estimating the amounts of food eaten. Children are also prone to considerable errors such as under-reporting - where the child may miss foods, or over-reporting where the child may report on phantom foods (Livingstone *et al.*, 2004). Dietary assessment methods in the evaluation of nutritional status include, among others, food frequency questionnaire, 24 hour recall and food records.

### A. Food Frequency Questionnaire

Food frequency questionnaire (FFQ) is a list of foods that provide nutrients to assess usual food intake and tendencies in eating patterns (Joubert and Ehrlich, 2007). The questionnaire can be completed by the participator, or the interviewer may interview the participator. The

questions relate to food eaten, and the participator replies by recording how many times a food item was eaten in a day, per week or on a particular month or throughout the year (Rankin, Hanekom, Wright and MacIntyre, 2010). The limitations of FFQs are that there could be reduced accuracy in estimating quantities as it is reliant on the memory of the participant (Rankin *et al.*, 2010).

## B. Quantitative Food Frequency Questionnaire

Quantitative Food Frequency Questionnaire (QFFQ) is a structured list of food and drinks, including portion amounts using grams and millilitres. QFFQs are the best indicators of portion sizes of FFQs, as QFFQs are overseen by a trained interviewer using photography, books or models for approximation of portion sizes (Rankin *et al.*, 2010). QFFQs are also used to gauge the intake of a group in epidemiology studies to determine the associations between diet and disease (Joubert and Ehrlich, 2007).

QFFQs should be sensitive to different cultures to avoid under-reporting, because if foods are left off of the list total consumption may become difficult to obtain (Rankin *et al.*, 2010). Self-administered questionnaires may also have limitations: if the respondent requires literacy skills to describe his or her diet or has difficulty in determining portion sizes accurately (Joubert and Ehrlich, 2007). Another disadvantage is that analysis may be difficult without the use of a computer and other special programmes (Joubert and Ehrlich, 2007).

The two other types of QFFQs are:

1. **Semi-Quantitative Food Frequency Questionnaire (SQFFQ)** which includes foods and drinks that are normally eaten. Portion sizes are approximated using small, medium or large rates of measure. SQFFQs are easier to control and are not time consuming like FFQs (Rankin *et al*., 2010).
2. **Non-Quantitative Food Frequency Questionnaire (Non-QFFQ)** does not mention portion sizes only the recording of the frequency of food intake and the disadvantage is that there is no indication of food portions sizes (Rankin *et al*., 2010).

## C. 24-Hour Recall

A trained fieldworker oversees the completing of the 24-hour recall questionnaire to estimate amounts with the aid of a combination of food models, photographs from books and

household measuring implements such as a tea cup, saucer and ladles. The participant reports, in detail, all the food and liquids consumed in a period of 24-hours (Rankin *et al.*, 2010). The interviewer can obtain the 24-hour recall in single or multiple occasions (Joubert and Ehrlich, 2007). 24-hour recall is a quick process to measure usual food consumption because all seven days of the week can be assessed to establish day-to-day variability. It is suitable for use in a large area the researcher may be studying, and suitable for people that may be illiterate because the questionnaire is easy to complete, has a good response rate and costs less to administrate. The disadvantage may be that the researcher relies on the memory and the capability of the respondent to remember portion sizes, which may lead to a biased recollection, which consequently misrepresents the participant's habitual dietary consumption (Rankin *et al.*, 2010).

## D. Food Records

Food records are utilised for research in small groups to determine tendencies in eating patterns or habitual intake. The participant writes down all the drinks and the food prepared and eaten over specified days. Every other day or successive days may be used to arrive at a useful estimate of usual intake (Joubert and Ehrlich, 2007). According to Rankin *et al.* (2010) this method minimises mistakes in reporting because food consumed is documented before and after consumption, therefore there is no need for the participant to recall food eaten and accuracy of portion sizes. There are two methods used to collect food records and both methods rely on the commitment of the respondent (Rankin *et al.*, 2010).

### (i) Weighed Food Records (WFR)

Food and drinks consumed are recorded in precise quantities in grams. The participant weighs up and records liquids and foods before consumption, as well as food that is left over after the meal, using a food scale. The advantage of weighed food records is that the participant is trained to weigh and measure food correctly, especially food with a variety of ingredients. As a result, exact amounts of food and drinks consumed are recorded. The limitation is that the participant may adjustment the usual amount of food eaten in order to make the weighing of food or drinks simpler (Rankin *et al.*, 2010).

### (ii) Estimated Food Records (EFR)

Household food measuring implements, models of food and photographs of food portion sizes are used to guess the quantities of drinks and foods the participant has consumed. Estimates

are converted to grams for recording, which sometimes may be inaccurate if the conversion is incorrect. The participant guesses the weight of liquids to be consumed and food to be eaten - therefore EFR is easier to complete than WFR (Rankin *et al.*, 2010).

### 2.5.2 Menu Analysis

According to Ginani, Zandonadi, Araujo and Botelho (2012) menu analysis instruments are based on nutritional composition tables because the method is the most practical way to obtain data for assessing the nutritional quality of a menu. The purpose of menu planning is done so that meals meet pre-requisites such as food habits and nutritional, sensorial, and sanitary qualities. Therefore it is essential to assess the meals to determine whether the objectives are met, moreover, menu analysis allows identification of possible planning mistakes, as well as potential interventions for required corrective actions (Ginani *et al.*, 2012).

#### 2.5.2.1 The Food Finder Computer Programme for Analysis of Menus

The SA, Food Finder 3 (FF3) is a software programme for analysing food eaten by an individual, different cultures or inhabitants of an area of study. The FF3 is based on the American Food Composition Tables with SA food types added in. FF3 also uses the most recent version of the South African Food Composition Database with updated fruit and vegetables, beef, milk and eggs, containing nutrient information from SA origin, international databases and scientific publications. The FF3 programme is used by nutritional researchers and dieticians for food-related treatments, the food industry for product development and by training institutions for training purposes (Medical Research Council (MRC), 2010).

#### 2.5.2.2 Food Composition Tables

Food composition tables (FCTs) provide the researcher with comprehensive information on the nutrients found in foods. The nutrient information in the tables was collected from various sources - for example: chemically examined food, food composition databases from other countries such as the American Food Composition Tables, published scientific studies and recipe calculations (MRC, 2010). The FCTs are used to analyse the amount of nutrients consumed by an individual or group and also used in the formulation of nutrition strategies (Schonfeldt and Gibson, 2009). The FF3 is based on the FCT.

### 2.5.2.3 Plate Waste Studies / Weighed Food Records

Plate waste refers to the amount of edible servings of food given that was not eaten. Plate waste studies are conducted to measure the nutrients received by the person who is consuming the food served. When large amounts of food are left uneaten, nutritional requirements cannot be met when one fails to consume the nutritious meals served. Plate waste studies can also be used to measure whether the menu item is accepted or not by the occupants in an institution. Plate waste studies can be conducted daily to measure waste in order to change the amount of food being prepared in order to combat wastage of food by preventing excess. Plate waste studies are done by recording the weight of wasted food or by observation as to whether there is wastage or not (Buzby and Guthrie, 2002).

## 2.5.3 Nutritional Status

Growth assessments are recorded on growth charts mainly to evaluate and monitor the nutritional status of a child with height-for-age, weight-for-age, waist circumference, mid-upper arm circumference and head circumference as pointers of growth and for all children. Table 2.4 shows the WHO cut-off points used as reference standards for growth assessment in children.

**Table 2.4: WHO Anthropometric Cut-Off Points Used for Growth Assessment in Children (WHO, 2008).**

| Z-score | **Classification** | **Classification** | **Classification** |
|---|---|---|---|
| | **Height-for-Age** | **Weight-for-Age** | **BMI-for-Age** |
| < - 3SD | Severely Stunted | | Severely wasted |
| < - 2SD | Stunted | Underweight | Wasted |
| > - 1SD to < + 1SD | Normal | Normal | Normal |
| > + 1SD | | Possible risk of overweight | Possible risk of overweight |
| > + 2SD | | Overweight | Overweight |
| > + 3SD | | Obese | Obese |

Overweight and obesity are measured by using BMI-for-age, as BMI of children differs at different ages. Clinical assessment, weight-for-age and skinfold thickness are other methods of measuring obesity (Rossouw *et al.*, 2012).

### 2.5.3.1 Anthropometric Indicators for Children Aged Two to Five Years

### A. Height-for-Age (stunting/short for age)

Height-for-age compares the measured child's height to the average of peers (Joubert and Ehrlich, 2007). According to WHO (1995) height refers to both length and stature, so height-for-age reveals attained linear growth and the presence of a shortfall indicates long-standing inadequacies of health or nutrition. Length is measured in a horizontal position and stature is a measurement of standing height (WHO, 1995). A cut-off point of -2 Standard Deviation (SD) indicates stunting (table 2.4). Stunted children that are continually exposed to persistent infections and insufficient food intake are likely to be at greater risk for morbidity or mortality (WHO 1995).

The fieldworker needs to explain the reason for taking the child's height measurement to the child, explaining the procedure in a sensitive, unintimidating way (WHO, 2008). Before the child is measured, socks and shoes, hats and hair ornaments should be removed. The height of a child of aged two to five years old is measured in the following manner:

- The height board should be placed on level ground.
- The child is measured standing.
- Kneel in order to be at the same height level of the child.
- The child should step onto the horizontal base panel of the instrument.
- The child should stand with feet somewhat separate.
- The child's back and buttocks should touch the upright board.
- The mother may assist by holding the child's knees to ensure the child is touching the upright board.
- The child's head should be positioned so that the chin is parallel to the horizontal base panel.
- To secure the child's position, place a hand under the child's chin.
- Use the other hand to lower the head board and place it on top of the head of the child, compressing the hair.
- Take the reading and record the height measurements in centimetres (cm) to the nearest 0.1cm (World Health Organization, 2008).

## B. Weight-for-Age (wasting/ thinness)

Weight-for-age compares the measured weight of the child to the average weight of peers (Joubert and Ehrlich, 2007). This is the most commonly used anthropometric indicator because weight-for-age alters very quickly as a result of changing availability of food and health conditions (WHO, 1995). Underweight is indicated by below -2 SD which is a standard median on WHO child growth charts. According to the WHO, progressive underweight in children increases the risk of child mortality (WHO, 1995).

The WHO (2008) recommends that before weighing the researcher or health worker needs to explain the child's need to remove shoes, hair ornaments and the outer clothing to minimal clothing in order to attain an accurate weight. Children of two to five years old are weighed in the following manner:

- The child is weighed alone.
- The scale is placed on a level floor.
- Turn on the scale and re-zero the scale.
- Ask the child to step on the scale and stand in the centre of the scale, with feet slightly separated and arms resting at the sides.
- Ask the child to stand still while the weight reading appears.
- The weight of the child is recorded to the nearest 0.1kg (WHO, 2008).

## C. Weight-for-Height

Weight-for-height indicates the body weight of the child in relation to the child's height. This indicator compares the weight of the child to the average weight of peers with the same height (Joubert and Ehrlich, 2007). Low weight-for-height indicates thinness as a result of a chronic dietary deficit or disease. Thinness may be described as wasting, resulting from prolonged starvation or continuing disease. A greater lean body mass is also recorded as a high weight-for-height, but the child maybe overweight and not obese. In a case where the majority of the people record a high weight-for-age it is then taken as an indicator for obesity in that population (WHO, 1995). Weight-for-height is not used in routine child growth monitoring, but where a birth date is not available then weight-for-height is an important measure in nutritional epidemiology (Joubert and Ehrlich, 2007).

According to the WHO and UNICEF (2009) severe acute malnutrition which increases the risk of death is indicated by a SD of less than – 3SD and below - 2SD indicates wasting which can still be corrected with good nutrition and health care. There is a lower mortality rate for children with weight-for-height below + 1SD and above – 1SD, and there is even lower risk of death for children with a weight-for-height more than + 2SD (WHO and UNICEF, 2009). Although there is no risk of death for children within > - 1SD and > + 2SD cut off points, there are increased chances of suffering from non-communicable disease resulting from obesity (WHO and UNICEF, 2009).

## D. BMI-for-Age (Underweight/ Overweight)

A child's BMI is indicated in percentile ranking among the average of children of the same sex and age (Joubert and Ehrlich, 2007). BMI-for-age is the measure that can be used continuously from two to 19 years of age to screen obese, overweight or underweight among children and adolescents (CoDC, 2011). BMI-for-Age is calculated similar to the adult BMI, that is, weight is divided by height squared ($cm/m^2$) (WHO, 2008). BMI is a preferred indicator for thinness and overweight using weight and not fat accumulation (Duggan, 2010).

## E. Waist-to-Height Ratio in Children

Waist-to-height (WHTR) ratio is considered a way of assessing obesity in children correctly because WHTR calculates the amount of fat in the body and its accumulation around the abdomen, which increase the chances of suffering from hypertension, diabetes, and cardiovascular disease in children (Yan, Bingxian, Hau, Jianghong, Jun, Dongliang, Yujian, Ling, Yanying and Kaiti 2007). WHTR is influenced by age and gender, and as a result WHTR cut-off points in boys and girls are different (McCarthy and Ashwell, 2006). A study in China found that WHTR cut-off points may also differ by ethnicity since diet in different countries is not similar (Yan *et al.*, 2007). McCarthy and Ashwell (2006) found that waist circumference indicates upper body fat accumulation, while stature influences the magnitude of waist circumference, so when the two measurements are used together a good indication of obesity in children is achieved.

To measure WHTR in children:

- The height is measured as per the procedure described above in Weight-for-age measurement.

- The waist circumference is measured with the child standing, and after gently exhaling, the measurement is taken below the rib cage to the nearest centimetre.
- The ratio is established by dividing the waist circumference by the child's height (Maffeis, Banzato and Talaminl, 2008).

## F. Mid-upper Arm Circumference

Mid-upper arm circumference (MUAC) is used for screening in both emergency and non-emergency situations. The use of MUAC identifies better when the child is at risk of death than using anthropometric measurements of weight and height. MUAC is used as an indicator of chronic protein under-nutrition in children during famine or in refugee camps. The cut-off points used for children under five years of age are 12.5cm or 13.0cm (WHO, 1995). According to WHO standards a population is considered to be well-nourished if there are very few children aged six – 60 months with a MUAC-for-Age of less than 11.5 cm. The MUAC indicates the following:

- More than 14cm shows that the child is normal
- 12.5 - 14cm indicates mild or moderate under-nutrition
- Less than 12.5cm points to severe under-nutrition.
- Less than 11.5 cm indicates a higher risk of child mortality (WHO and UNICEF, 2009).

To measure the MUAC and skinfold thickness in children the mid-upper arm point is found and marked as following:

- The researcher or fieldworker palpitate the shoulder of the child to find the acromion process and mark it.
- The arm is then bent to $90^0$ with the hand facing up so that the bony structure at the elbow stands out.
- Working behind the child, the fieldworker places one end of the measuring tape on the mark indicated on the acromion process and runs the tape down along the upper arm to the bony structure of the elbow.
- The assisting fieldworker makes an indication midway along the arm (de Onis, Onyango, Van den Broeck, Chumlea and Martorell, 2004).

To measure:

- The arm of the child hangs comfortably without tightening the muscles.

- Wrap the tape lying flat without gaps around the marked midpoint of the arm and do not compress the skin.
- The circumference measure is taken where the tape meets and recorded to the last completed 1mm (de Onis *et al.*, 2004).

## G. Skinfold Thickness

Skinfold thickness measurements assess the thickness of subcutaneous tissue and is commonly used for measuring obesity among adults - but only highly skilled individuals can take measurements in children. The skinfold measurements have a restricted value for measuring the degree of wasting because changes in the individual's muscle mass cannot be taken into account (WHO, 1995). According to Joubert and Ehrlich (2007) skinfold thickness is used to measure body composition using a skinfold calliper. The skinfold calliper measures the millimetres of fat compressed under the thickness of a double-fold of skin. Commonly used skinfold sites are triceps, biceps, sub scapula, supra-iliac, thigh and medial-calf. The accuracy of the results may decrease with an increase in body fat, therefore different skinfold sites on the individual may be measured. Different skinfold sites may be measured for body composition of different individuals in the same study. A number of formulae are available for interpretation of fat percentages from skinfold thickness (Joubert and Ehrlich, 2007). Skinfold thickness is measured with the child standing or sitting and the skinfold is grasped gently to avoid discomfort, compressing the fat and recorded to the last completed 0.2mm (de Onis *et al.*, 2004).

## 2.5.3.2. Surveys

Surveys are used to gather information about the population using self-administered questionnaires or interviews. In a survey the respondents are randomly selected from the general population in a geographically defined area using a multi-stage, stratified, random sampling design to avoid bias (Joubert and Ehrlich, 2007). The respondents are interviewed at home, with randomly selected local schools or clinics referred to as visiting points. The surveys are cross-sectional studies but may also form part of other study designs. Fieldwork teams may preferably be recruited from within the community, interviewed and trained to ensure accuracy of the data collected and correct implementation of the data collection procedure. Quality control procedures should be in place to verify that:

1. The correct sampling procedure has been followed.

2. Every interview has taken place.
3. The information collected during the interview has been correctly recorded.

The final step of the survey is the fieldwork report detailing the procedures used and difficulties experienced during the data collection. The fieldwork report is an important supplement to the report on the findings of the study (Joubert and Ehrlich, 2007). The following types of surveys are some that may be carried out to determine the nutritional assessment of the population.

## A. Socio-Demographics Surveys

Demography is the scientific description of the characteristics of the population – such as the size and changes in size of the population, composition and distribution of the population, which can be measured numerically. The primary source of demographic data is the national census and routine surveys such as annual household surveys (Joubert and Ehrlich, 2007). Demographic surveys are conducted to collect information on a range of aspects that affect the nutritional status of a person or the population – such as: household composition, education, ethnicity, religion, income, employment, assets, amenities, sanitation, access to health services, infrastructure and access to transportation (Gibson, 2005).

## B. Health Surveys

Health surveys or community surveys are studies that are conducted to estimate the health-related events in a population. The surveys may be conducted to measure the prevalence of health states and also to assess the impact of an intervention (Joubert and Ehrlich, 2007). The health surveys are also conducted in order to design programmes and strategies that will change the health status of the group in a positive way (Puoane, Steyn, Bradshaw, Laubscher, Fourie, Lambert and Mbananga, 2012).

## C. Nutrition Knowledge Surveys

Nutrition knowledge surveys are conducted to assess the areas of weakness in people's understanding of healthy eating and to evaluate the success of the nutrition education campaign. The questionnaire utilised should assess overall nutrition areas such as nutrition terms, diet-disease relationship, food sources and nutrient content of food, current dietary

recommendations and nutrition. Questionnaires for nutrition knowledge include some demographic questions and accommodate cultural variations in a diet (Parmenter and Wardle, 1999). Parents' education and nutrition knowledge are assumed to have an impact on the child's nutritional status (Parmenter and Wardle, 1999).

### D. Food and Safety Practise Surveys

Food handling practices are evaluated in the interest of food safety as food borne diseases are attributed to incorrect food preparation and handling (Redmond and Griffith, 2003). The food handling survey identifies risky practices when handling and consuming food and the result of the survey determines training needed regarding food safety (Altekruse, Yang, Timbo and Angulo, 1999). A study in the USA found that risky food handling increased with the increase in SES, as people in high SES were not accustomed to food preparation as often as people in lower SES who were more aware of correct food preparation practices (Altekruse *et al.*, 1999). Proper training of the food handler is one of the strategies to increase food safety (Altekruse *et al.*, (1999).

## 2.6 STRATEGIES TO ADDRESS MALNUTRITION

Various strategies can be used to alleviate malnutrition, this section includes the most common strategies used in various contexts.

### 2.6.1 Fortification of Food

Food fortification is used to add-on adequate amounts of nutrients in food during processing in order to improve dietary intake and good nutrition (Tulchinsky, 2010)**.** Sufficient amounts of micronutrients are added to staple foodstuff that is commonly eaten by a large number of people in order to reduce micronutrient deficiencies without the need to change food consumption behaviours (Buhl, 2010, Sablah, Grant and Fiedler, 2013:18). The SA government has a regulation for compulsory fortification, adding the most commonly deficient micronutrients, which include: zinc, iron, folic acid, vitamins A, riboflavin, niacin, thiamine and vitamin $B_6$ to products like maize meal and wheat flour (Buhl, 2010).

In 2001 the SA government also nationalised the iodisation of salt (Buhl, 2010). Universal salt iodization programmes began in Africa in the early 1990s and have helped reduce iodine deficiencies (Sablah *et al.*, 2013:18). The review conducted in 2013 on African countries found that there is a steady improvement in the iodine status in Africa because of successful national iodisation programmes. Of the 54 African countries:

- Thirty countries have reported adequate iodine status in their population
- Eleven countries are still iodine deficient, of which six are moderately iodine deficient and five mildly iodine deficient.
- Three countries have excessive intake of iodine, with Somalia receiving excess from drinking water. Uganda does not have the up-to-date figures, therefore the country is still considered as having excessive iodine intake.
- Ten countries have no data on iodine status (Jooste, Andersson and Assey, 2013:53 – 55).

The UNICEF report stated the aim of reducing iodine deficiency by year 2005 was achieved in 30 developing countries through the universal iodisation of salt. The report further states that iodised salt is consumed by more than half the population in the USA (69%), Latin America (86%), East Asia (85%) and 47% of the population in central regions of both Europe and Asia (Engle, Black, Behrman, de Mello, Gertler, Kapiriri, Mortorell and Young, 2007).

In 2002 SA and the Economic Community of West African States (ECOWAS) coincidently launched fortification for wheat and maize. Currently, two regional organisations are moving the fortification agenda forward in Africa: the West Africa Economic Monetary Union (UEMOA) as well as the East, Central and Southern Africa (ECSA). UEMOA wheat flour and cooking oil fortification standards exist in eight UEMOA countries and correspond with 15 ECOWAS countries to expand access to and the marketing of fortified staples. ECSA countries are also scaling up fortification, and as a result, 70% of the population in African countries with mandatory fortification legislation are estimated to be regularly consuming at least one fortified food staple daily (Sablah *et al.*, 2013: 21).

The World Food Program (WFP) reported targeting food intervention to ensure that populations acquire the right food timeously by:

- Providing good quality, fortified blended food products.
- Creating micronutrient packets to be used to fortify food at home.
- Finding more ways to fortify basic foodstuffs for people.

- Trying out prepared foods to alleviate moderate acute malnutrition.
- Investigating the use of complementary food supplements.

(WFP and Nutrition, 2011).

Globally, food fortification is vital to ensure essential nutrients are available in processed foods to improve human nutrition. A study in Alexandra (SA) where the population's diet normally consisted of maize meal 'phuthu' and bread, fortified with the recommended amounts of vitamin A, folate, iron, zinc and other vitamins, revealed micronutrients inadequacy in the sample, signifying that fortification of the commonly consumed staples was not successful (Rudolph *et al.*, 2011).

### 2.6.2 Food Supplementation

Supplementation can be used as a temporary solution in cases of critical vitamin and mineral deficiency through the use of nutrient supplement powders (Buhl, 2010). The results of a study in Mpumalanga province showed that supplementation from the weaning stage up to three years of age increased intellect during school years and on intelligence tests until the children were adults (Schatz, Madhavan and Williams, 2011).

According to Haour-Knipe (2009) the on-going vitamin A supplementation provided to preschool children has improved and maintained health of children, and has shown a decrease in the causes of death in children (Haour-Knipe, 2009).

In a study in China, multiple micronutrient supplementations including eight micronutrients: iron, calcium, zinc, folate, niacin, thiamine, riboflavin and vitamin A were incorporated into the food of two to six year old preschoolers daily, for six months. The results showed an improvement in the digestion of iron, reducing the predominance of anemia and diarrhoea, respiratory infectious diseases and the deficiency of vitamin A was improved (Chen, Zhang, Li, Chen, Wei, Qu and Liu, 2011).

### 2.6.3 Food Diversification

Food diversification is an intervention strategy that aims to ensure that a variety of food items like meat and meat products, dairy products, cereals, legumes, lipids, oil, fresh fruit and fresh and correctly cooked vegetables are eaten to provide plenty of essential micronutrients,

necessary for a healthy human body (Mbhenyane *et al.,* 2008, FAO, 2013). Dietary diversification is a cheaper intervention strategy that requires little or no money, but encourages consumption of micronutrients that are potentially sustainable (Mbhenyane *et al.*, 2008).

SA has a low dietary diversity in informal urban areas and even lower in rural areas of Limpopo and the EC as the majority of people live in poverty and can only generally afford staple foods such as maize meal and rice. Lack of dietary diversity causes nutrient deficiencies because of the consumption of a very limited diet, which does not include: meat products, dairy products, fruit and vegetables. A baseline survey in Southern African city households showed that many people do not eat a diverse diet (Oldewage-Theron and Kruger, 2011, Crush *et al.,* 2011). The unaffordable diverse diet can be achieved by making use of indigenous staples that are home-grown or wild plants and hunted animals that are excellent sources of protein, vitamins and minerals (Mbhenyane *et al.,* 2008).

A Food System consists of institutions that produce agricultural products in addition to processing these products in controlled environments to ensure that diverse, nutritious food is available and accessible to consumers. According to the FAO (2013) viable food systems yield nutritious foods in the present day while ensuring the capacity of future generations is well nourished too. Viable food systems utilise resources well at every step from the farm to the dinner table to ensure that consumers get the maximum food yield from water, land, fertilizer and available labour - while saving resources for the future to ensure quality and quantity of food is available for humans. In return, consumers should consume balanced diets and minimise food wastage. In Vietnam the use of food systems through crop farming, aquaculture and animal husbandry produced improvements through alleviating malnutrition in children because of the increased intake of animal sources of food and fruits and vegetables. Therefore through good nutrition there was a significant improvement in the well-being and the income of the rural Vietnamese population (FAO, 2013).

### 2.6.4 Nutrition Education

Nutrition Education is an intervention whereby participants keenly take part in the learning process. The aim is to change detrimental nutrition-related habits that contribute to poor health in order to achieve modified, nutrition-related behaviour for the promotion of good

health so that the nutritional status of people is improved (Mbhenyane et al., 2008, Behr and Ntsie, 2008).

Extreme inequalities of wealth and poverty in SA have resulted in nutrition interventions such as feeding schemes at CCFs, schools, soup kitchens and clinics having not been successful as the interventions only serve as a temporary solution, while deeper social and economic causes of under-nutrition are not being resolved (Witten, Jooste, Sanders and Chopra, 2004).

Studies show that nutrition education programmes are effective when linked with other interventions like promotions, food supplementation, food fortification and other awareness programmes (Behr and Ntsie, 2008). Behr and Ntsie (2008) further state that nutrition education programmes should include the community during designing, implementation and evaluation, taking in consideration the consumer's socio-economic status, lifestyle, cultural eating habits, comprehension and ability to apply the information and the nutrition-related public health concerns. Monitoring and evaluation is important in nutrition education in order to measure the outcome of the programme or make improvements to programmes if the programme is not resulting in a change in behaviour (Behr and Ntsie, 2008).

The WHO landscape analysis of SA - which shows the countries readiness to improve nutrition - shows that SA is capable and has enough resources to enhance nutritional interventions to decrease under-nutrition in children and mothers (Iversen, Marais, du Plessis and Herselman, 2012). SA has developed many good policies to alleviate malnutrition, but problems such as HCWs with insufficient training, healthcare staff shortages, lack of implementation of some policies, lack of monitoring of interventions and lack of evaluation of the programmes has resulted in the persisting existence of the under-nutrition and over-nutrition in SA (Iversen *et al.*, 2012).

The interventions proposed for CCFs include growth and monitoring, treatment of severe acute malnutrition, vitamin A supplementation, de-worming of children, teaching hand washing and hygiene to children and caregivers, nutrition counseling to CCF caregivers using FBDG, training on menu planning, preparing nutritious meals and cultivating food gardens, and providing nutrition education to children on eating healthy food to avoid ill-health (Hendricks *et al.*, 2013). A study by Faber and Wenhold (2007) found that nutrition education for care givers resulted in improved knowledge, resulting in nutritious meals being served to

children. The establishment of gardens at CCFs improved the availability of indigenous fruit and vegetables for consumption at CCFs.

### 2.6.5 South African Government Initiatives

The SA government implemented various strategies to address malnutrition in SA.

#### 2.6.5.1 Integrated Nutrition Programme (INP)

The national INP is a nutrition strategy that centres on people affected by malnutrition, for example, children below six years of age, pregnant women, breastfeeding mothers, people suffering various chronic diseases including diseases of lifestyle, the elderly and disabled people (DBSA, 2008, DoH, 2008). The goal of the INP is to promote and use nutrition education to treat and prevent malnutrition in SA and to curb the future consequences of non-communicable diseases that may come with continued ignorance in regards to nutrition issues (Labadarios *et al.*, 2008, DoH, 2008).

The key performance areas the INP focuses on include infant and young child feeding, maternal nutrition, adolescent nutrition, disease specific nutrition support, treatment and counselling, micronutrient malnutrition control, community based nutrition interventions, food service management and nutrition education, promotion and advocacy (Iversen *et al.*, 2012). Labadarios *et al.* (2008) highlighted the successes of the INP nutrition policy, which includes:

Developing guidelines for vulnerable groups to enhance nutritional status; educating the public in order to alleviate common nutritional disorders in SA; creating structures for monitoring and evaluation of expected progress of interventions to alleviate PEM; elimination of iodine deficiency disorders by the salt iodation programme; establishing a decrease in folate deficiency; fortifying staple foods with various micronutrients to enhance the consumption of micronutrients; establishing a decrease in the prevalence of stunting in SA because existing programmes are constantly monitored and assessed (Labadarios *et al.*, 2008).

### 2.6.5.2 National Development Plan

According to Hendricks *et al.* (2013) in SA the National Development Plan (NDP) places important emphasis on nutrition for pregnant mothers and early childhood. The DoH has created many policies and programmes to address malnutrition.

The policies and programmes related to nutrition include:

• A dedicated Nutrition Directorate and an INP;

• A Roadmap for Nutrition in South Africa 2013 – 2017;

• The Tshwane Declaration of Support for Breastfeeding in SA (promoting exclusive breastfeeding regardless of the mother's HIV status);

• The Strategic Plan for Health and Nutrition of All Children and Women in SA 2012 – 2016;

• The launch of the global Campaign for Accelerate Reduction of Maternal and Child Mortality in Africa;

• The revision of the guidelines on the prevention of mother-to-child treatment to allow all HIV-positive women to continue breastfeeding their infants up to 12 months of age (Hendricks *et al.*, 2013).

### 2.6.5.3 South African Food-Based Dietary Guidelines

Each country writes Food-Based Dietary Guidelines (FBDG) to help the country's population understand nutrient intake goals through food eaten in order to prevent nutrition-related diseases (Schönfeldt, Hall and Bester, 2013). The FAO's Nutrition Education and Consumer Awareness Group assist all governments to develop the national FBDG. According to the FAO the country's FBDG should reflect the country's nutritional situation and act as recommendations, in an ordinary language, that the people will understand (FAO, 2012). The FBDGs should be based on scientific principles and offer useful advice that is suitable to the local dietary patterns, customs, economic conditions and lifestyle of the people (FAO, 2012).The South African Food Based Dietary Guidelines (SAFBDG) were created to educate SA people in understanding healthy diets in terms of food and not nutrients, to address nutrition challenges like over-nutrition, under-nutrition and micronutrient deficiencies (FAO, 2012).

In 2003 SAFBDG had two sets - a set for adults and children above seven years old and another set for infants from birth up to seven years old. The main health issues stated in the

SAPFBDG included, among others: stunting, deficiencies of Vitamins A and $B_{12}$, iron, calcium, iodine, zinc and folate, irregular feeding, adverse outcomes of HIV and AIDS, TB and other infections, poor coverage of immunisation programmes, food allergies in children, dental issues, unhygienic practices resulting in cholera and insufficient parental and health care (Swart and Dhansay, 2008).

In 2013 the SAFBDG were revised. The new SAFBDG are based on 18 risk factors, nine that contribute to deaths and disability-adjusted life years in SA, six that relate to over-nutrition and non-communicable diseases and three relating to under-nutrition and a lack of diversity in the diet of South Africans. The revised FBDG are recommendations supported by evidence and will assist the SA public to choose a healthy diet, consequently eradicating nutrition-related health problems in SA (Vorster *et al.*, 2013).

The revised FBDGs are general messages directed at children from five years and older and up to adults:

- Enjoy a variety of foods
- Be active
- Make starchy foods the basis of most meals
- Eat dry beans, split peas, lentils and soya
- Eat plenty of vegetables and fruits everyday
- Have milk, ‘maas’ or yoghurt every day
- Fish, chicken, lean meat or eggs can be eaten daily
- Drink lots of clean, safe water
- Use fats sparingly. Choose vegetable oils rather than hard fat
- Use salt sparingly
- Use sugar and foods and drinks high in sugar sparingly (Vorster et al., 2013)

The SAPFBDGs have four age categories, which are 0-6 months, 6-12 months, 12-36 months and 3-5 years. They are:

**0-6 Months**

• Give only breast milk, and no other foods or liquids to your baby for the first six months of life.

**Six - 12 Months**

• At six months, start giving your baby small amounts of complementary foods, while continuing to breastfeed to two years old and beyond

• Gradually increase the amount of food, number of feeds and variety as your baby gets older

• Feed slowly and patiently and encourage your baby to eat, but do not force your child

• From six months of age, give your baby meat, chicken, fish or egg every day, or as often as possible

• Give your baby dark-green leafy vegetables and orange-coloured vegetables and fruit every day

• Start spoon feeding your baby with thick foods, and gradually increase to the consistency of family food

• Hands should be washed with soap and clean water before preparing or eating food

• Avoid giving tea, coffee and sugary drinks and high-sugar, high-fat salty snacks to your baby.

**12-36 Months**

• Continue to breastfeed to two years and beyond.

• Gradually increase the amount of food, number of feedings and variety as your child gets older.

• Give your child meat, chicken, fish or egg every day, or as often as possible.

• Give your child dark-green leafy vegetables and orange-coloured vegetables and fruit every day.

• Avoid giving tea, coffee and sugary drinks and high-sugar, high-fat salty snacks to your child.

• Hands should be washed with soap and clean water before preparing or eating food.

• Encourage your child to be active.

• Feed your child five small meals throughout the day

• Make starchy foods part of most meals

• Give your child milk, ‘maas’ or yoghurt every day

**Three - Five years**

• Enjoy a variety of foods

• Make starchy foods part of most meals

• Lean chicken or lean meat or fish or eggs can be eaten every day

• Eat plenty of vegetables and fruit every day
• Eat dry beans, split peas, lentils and soya regularly
• Consume milk, maas or yoghurt every day
• Feed your child regular, small meals and healthy snacks
• Use salt and foods high in salt sparingly
• Use fats sparingly. Choose vegetable oils, rather than hard fats
• Use sugar and food and drinks high in sugar sparingly
• Drink lots of clean, safe water and make it your beverage of choice
• Be active!
• Hands should be washed with soap and clean water before preparing or eating food.
(Vorster *et al.*, 2013).

### 2.6.5.4 Food Parcels

The DSD had a temporary National Food Emergency Scheme programme which intended to distribute food parcels to poor households that spend less than R300 on food per month. Children from homes headed by siblings, orphans, disabled people, children from homes headed by mothers or grandmothers and households with people affected by HIV and AIDS were beneficiaries of the scheme. Beneficiaries of food parcels were required to complete an application form in the presence of the welfare officer at the local DSD office. Each recipient's household received a food parcel worth R300 (Moeng and de Hoop, 2008).

The South African Social Security Agency (SASSA) offers a food security grant that gives out food parcels to a small percentage of vulnerable children, since a large number of vulnerable children benefit from social grants and a child can only benefit from one grant at a time (Koch, 2011). The government, through the DSD, offers a Social Relief of Distress grant that provides, among other basic necessities, food parcels or food vouchers to buy food for families in distress after a disaster has struck or while the family awaits registration for a social grant (SA Government Information, 2014). In the 2013/2014 budget speech on the DSD, Mr Botes, Member of the Executive Council, mentioned that the government will spend R19 million from the DSD and SASSA on food parcels for Social Relief of Distress grants (SA Government Information, 2014).

### 2.6.5.5. Grants

The SASSA manages the social grant system. A Child Support Grant provides small, but much needed allowances for children in underprivileged households (Taylor, Kidman and Thurman, 2011). In 2010 about 14 million beneficiaries were receiving grant payments of R250 monthly, and evidence shows that school enrolments have increased, as well as increased food consumption and improved nutritional status of grant beneficiaries (Taylor *et al.*, 2011, Jamieson *et al.*, 2011).

Other governmental programmes in the social grants system that are non-contributory means-tested, that is, not contributed for by an individual, but much needed for a better life, are pension grants to all adults over the age of 60 to the amount of R1010, and other grants such as the foster child grant (R710) and disability grants (R1080) that require additional documentation such as birth certificates, death certificates and identity books. As a result, the grants are less accessible to some of the population since many children and adults are not in possession of the above documents because of the absence of Home Affairs services in rural areas. The presence of other grants such as a pension and disability grant in households with children increases the overall income of the household. If there were no social grants provided, child poverty would rise noticeably in SA (Hall and Wright, 2010, Jamieson *et al.*,, 2011).

### 2.6.5.6 Vitamin A Supplementation

Intervention like Vitamin A Supplementation has proven to reduce all causes of mortality resulting from deficiencies in children younger than five years old. Worldwide, there is the recommendation for children less than five years old to receive Vitamin A doses every six months (Horton and Center, 2008). According to the WHO guidelines, children of six to 11 months old should receive a dose of 100 000 IU and children of 12 to 59 months should receive a dose of 200 000 IU (DoH, 2008).

According to Nordin *et al.* (2013) eating a variety of foods rich in Vitamin A is a basic preventative measure for Vitamin A deficiency. In SA's KZN crop-based intervention which focused on cultivating orange-fleshed sweet potatoes, butternut, spinach, carrots and dark green leafy vegetables, together with receiving and monitoring of nutrition education, an effective increase in Vitamin A intake and other nutrients was been observed as well as

reduced ill health in children aged five years old and younger (Laurie and Faber, 2008, Faber, Van Jaarsveld and Laubscher, 2009, Faber *et al*., 2002).

Although there is a slight decrease in childhood vitamin A deficiency, black children are more vitamin A deficient than coloured children in SA. The WHO classifies SA as having a major public health problem since vitamin A deficiency prevalence is recorded at 43.6%. More interventions are required to increase the status of vitamin A in SA children (Shisana *et al.*, 2013).

### 2.6.5.7 Millennium Development Goals

MDGs refer to developmental objectives that were approved in the UN Millennium summit to be achieved by 2015 for international development. The National Coordinating Committee for the MDGs 2013 report states that for SA the MDGs are in line with the country's challenges that the present government is working to overcome. The report further states that the government has provided a 'social wage' packages which include: social grants, no-fee schools, free health care and basic services in the form of the Reconstruction and Development Programme (RDP), housing, reticulated water, electricity, sanitation, sewerage and removal of solid waste in informal settlements to improve the lives of the deprived (Lehohla, 2013).

In her opening speech, minister of DSD, Miss Bathabile Dlamini highlighted that improvements in the ECD programmes will contribute to the achievement of MDGs, as about five of the eight MDGs relate to child survival and wellbeing (DSD, 2010). Table 2.5 shows SA's progress in achieving MDGs up-to-date. SA is seen to have made noticeable achievement in changing the lives of the people in the country and achieving some of the MDGs. For example: halving extreme hunger and enrolling children in school, but because of unemployment and inequalities in wealth distribution, there are still many challenges to face in order to improve the lives of many people in SA. The National Coordinating Committee for the MDGs (2013) report states that the distance between the implementers and the source of the policy is the problem and the greater the distance, the lower the impact of the policy. SA also has a problem of poor local governing of people and misuse of government funds. Other than improving the nutritional status of children, food-based interventions also help to achieve

the country's target of reducing child mortality and increasing school enrolments by 2015 (Lehohla, 2013).

**Table 2.5: South Africa's Progress in Achieving Millennium Development Goals (Lehohla, 2013)**

| MDG | MDG Target by 2015 | Status in SA | Achievability |
|---|---|---|---|
| **1 – Eradicate extreme poverty and hunger** | 4.7% | 8.3% of children under five years were underweight in 2008 | Likely to achieve |
| **2 – Achieve universal primary education** | 100% | 93.4% of boys and 96.1% of girls were starting grade one in 2012 | Likely to achieve |
| **3 – Promote gender equality and empower women** | 1:1 | 0.96 : 1 was the ratio of girls to boys that registered in primary school in 2011 | Likely to achieve |
| | 1:1 | 1.0 : 1 was the ratio of literate women to men of the ages of 15 to 24 years in 2011 | Achieved |
| | 50% | 45% was the female share of non-agricultural wage employment | Unlikely to achieve |
| **4 – Reduce child mortality** | 20 deaths per 1000 live births | The death rate for children younger five years was 53 deaths for every 1000 live births in 2010 | Likely to achieve |
| | 100% | 99.1% of children were immunised in health facilities in 2011 | Likely to achieve |
| **5 – Improve maternal health** | 38 maternal deaths per 100 000 live births | 269 maternal deaths per 100 000 live births in 2011 | Unlikely to achieve |
| | 100% | 100.6% antenatal care coverage in 2011 | Achieved |
| | 100% | 94.3% of births attended by a skilled health care worker in 2009 | Likely to achieve |
| **6 – Combat HIV and AIDS, malaria and** | 4.2% | HIV prevalence among 15 to 24 year olds was 7.3% in 2011 | Likely to achieve |
| | 80% | 75.2% of HIV infected people that received Antiretroviral drugs in 2011 | Likely to achieve |
| | 95% | 15 to 24 year olds well-informed in HIV and AIDS in 2012 was 48.5% | Unlikely to achieve |
| | 100% | 59.9% people reported to have used a condom when they last had sex in 2012 | Unlikely to achieve |

| | | | |
|---|---|---|---|
| **other diseases** | 32311 per 100 000 | 6846 incidents of malaria per 100 000 in 2012 | Unlikely to achieve |
| | 229 per 100 000 | 72 malaria deaths per 100 000 in 2012 | Achieved |
| | 100% | 73.8% were TB cases discovered and treated using Directly Observed Treatment Short Course (DOTS) in 2011 | Likely to achieve |
| | 147 per 100 000 | 49 TB deaths per 100 000 in 2011 | Achieved |
| **7 – Ensure environmental sustainability** | 88.3% | Better drinking water sources available to 90.8% of the SA people in 2011 | Achieved |
| | 74.65% | 66.5% of the population was using improved sanitation facilities in 2011 | Likely to achieve |
| | Below 34% of carbon dioxide emissions on 'business as usual' by 2020 | 7.49% of carbon dioxide emissions per capita in 2009 | Likely to achieve |
| **8 – Develop a global partnerships for development** | SA's target of 3 to 6% | The inflation rate by headline consumer price index was 5.0% | Achieved nationally |

## 2.6.6 Other World Government's Initiatives

Malnutrition is a global problem because of the emergence of a double burden of under-nutrition and over-nutrition. As a result, 10 million children are estimated to die from causes of malnutrition that can be prevented through simple and affordable interventions (Crush *et al.*, 2011). Governments all over the world have devised strategies to assist the population to combat hunger and poverty.

### 2.6.6.1 The First 1000 Days of Life

Worldwide, there is awareness that correct nutrition in the first 1000 days of a child's life can prevent the lasting consequences of malnutrition. Physical and mental developmental damages caused at this stage are irreversible and other than saving a child's life, good nutrition at this stage can also save the country's future expenses in addressing malnutrition.

During the first 1000 days the focus is on:

- Pregnancy and pre-pregnancy to ensure the world's mothers and future mothers are well nourished;
- To ensure greater numbers of babies are breastfed from birth to six months old;
- Children receive the right foods at the right time, together with continued breastfeeding to prevent and treat malnutrition from six months old up to two years old (Badham, 2013).

### 2.6.6.2 The Cash Transfer Programme

The cash transfer programme is a welfare programme formulated to alleviate poverty whereby the government transfers money to people that meets a prescribed criterion as well as certain conditions set by the government in order to keep receiving the money. The conditions include: children enrolling and attending school, receiving immunisation and going for regular check- ups at the doctor. According to UNICEF, the conditional cash transfer programme has shown improvements in food intake and reduction of stunting and in Mexico. Evidence shows that conditional cash transfers, nutrition education to care givers and direct nutritional supplementation for young children improves growth and motor development (Schatz *et al.*, 2011). Latin America and the Caribbean currently have 15 intervention programmes underway, 10 of which have specific nutrition co-responsibilities for children from birth to 14 years old. The programmes showcase success in reducing stunting and mortality rates, but there are still challenges faced such as: regional disparities, the double burden of malnutrition and health inequalities that affects indigenous communities, families in rural areas, people with poor education and people with poor access to basic services (Monterrosa, 2013:7).

### 2.6.6.3 Scaling Up Nutrition

Scaling Up Nutrition (SUN) is a drive that ensures that leaders of countries worldwide prioritise nutrition in the countries' development plans, with governments prioritising efforts to address malnutrition. Forty-three countries in 2013 were members of the SUN movement. The movement assists countries in:

- Setting clear nutritional targets
- Scaling up intervention programmes

- Putting in place necessary resources (Zotor and Ackatia-Armah, 2013:68, SUN Movement Secretariat, 2012).

### 2.6.6.4 The World Food Programme (WFP)

In 2011 the WFP supplied breakfast, lunch or both meals to 25.9 million school children in 60 countries worldwide. The WFP programme supplied either complete meals or high energy biscuits or snacks. Other programmes in other countries distributed take-home ratios where families obtained food on condition that the children attended school regularly. School meals offered essential nutritional benefits, especially when combined with de-worming and micronutrient fortification. The initiative also inspired poor households to send children to school (WFP, 2012).

### 2.6.6.5 Millennium Development Goals

Nine Millennium villages were created in sub-Saharan African countries, with acute focus given to extreme poverty and under-nutrition in a bid to achieve MDGs. The interventions included agricultural interventions, nutritional interventions and nutrition-related efforts. After three years of interventions there were reports of reduction in under five year old mortality rates, poverty, food insecurity, stunting prevalence and malaria parasitemia in village sites. The village sites showed that MDGs could be achieved in sub-Saharan Africa through agriculture, nutrition, environment and basic infrastructure (Pronyk, Muniz, Nemser, Somers, McClellan, Palm, Huynh, Amor, Begashaw and McArthur, 2012). Micronutrient deficiencies and stunting are nutritional issues that may prevent the accomplishment of MDGs, especially in South Asia and sub-Saharan African countries (Crush *et al*., 2011).

Fulfilment of MDGs may also be hindered by the inequalities in the distribution of wealth in countries, resulting in people with a low household income not able to escape poverty. Lack of resources such as finances, poor governance, management problems, incorrect approaches and economic or humanitarian crises are among the factors that limit progress in achieving MDGs (Nordtveit, 2008).

According to Nordtveit (2008) there is Education for All (EFA) and MDGs. EFA is education-specific, with main goals for different areas of poverty alleviation integrated into MDGs. Educational programmes should not only address EFA policy targets for primary

school enrolments, but should also address the intergeneration of poverty contexts. Nutritional deficiencies may hinder learning, therefore improving the quality of education is needed as low-quality education will not alleviate poverty and only produce illiterate children (Nordtveit, 2008).

MDG seven is about ensuring environmental sustainability. Achieving this MDG will contribute to the reduction of malnutrition because according to FAO (2013), agriculture depends heavily on natural resources and is also a dominant force behind many environmental threats. 70% of fresh water resources are used by crops and the livestock sector, 60% of land is used by forestry industries, 80% of global crop and pastures areas are used by livestock alone and globally, 60% of ecosystems are ruined and not sustainable as aquaculture has increased land and water usage. As a result, food security and nutrition are under severe threat (FAO, 2013).

## 2.7 IMPACT OF MALNUTRITION IN CHILDREN ON THE COUNTRY'S RESOURCES

Malnutrition can impact on a country's resources, health systems, public assistance programmes and the economy.

### 2.7.1 Impact of Malnutrition on a Country's Health System

Inequalities in malnutrition are calculated using the illness concentration index which plots the socio-economic status of a group of children against the magnitude of morbidity from malnutrition, to estimate the scope of inequalities in malnutrition illnesses (Zere and McIntyre, 2003). Zere and McIntyre (2003) found that socio-economic inequalities in health concentrate on the lower socio-economic status households, and that health inequalities during early years of life should be addressed as there is likelihood for the inequalities to extend to adulthood. Furthermore, malnutrition has a negative impact on child survival and may possibly adversely affect well-being and productivity in adulthood (Zere and McIntyre, 2003).

The new government of SA prioritized, among other things, maternal and child health care by building primary care clinics and also made health care services free of charge for mothers

and children at primary health care clinics and government hospitals. In 2009, SA still had a high child mortality rate caused by diseases that are avoidable and curable, among which 52 of 600 children were younger than five years old (Chopra *et al.*, 2009).

Other health problems include a lack of human resources, that is, shortage of nurses and doctors at PHC facilities, especially in rural areas. Also included in this is poor infrastructure as people in rural areas have a problem of accessing the nearest PHC facility because of the unavailability of transport fees (Schoeman *et al.*, 2010a).

In children, micronutrient deficiencies have unfavourable costs to the child's health such as: diminishing of development, an immune system that is malfunctioning and neurobehavioral dysfunction which contributes to the increase in the spread and advancement of infectious diseases, as well as a decrease in intellectual potential and an increase in childhood illnesses and deaths (Chen *et al.*, 2011).

### 2.7.2 Impact of Malnutrition on a Country's Economy

Maternal nutrition and health should be made a priority as mothers are the primary caregivers of children. There should be an elimination of poverty among women because women are seen as being responsible for health care when a child is ill. Women should also provide for the education of children. Women also contribute politically and economically to the progress and well-being of communities (Tanumihardjo *et al.*, 2007). By the age of 5 years malnourished children are already falling behind in cognitive development to their well-nourished peers, if this condition persist these malnourished children will underachieve at school and as adults will accumulate less human capital and enjoy less earning that their counterparts and their children will in turn repeat this cycle (Aguero, Carter and Woolard, 2006).

In sub-Saharan Africa malnutrition causes more than 50% of the deaths of infants and young children, with childhood malnutrition also linked to reduced educational achievement during school years and earning capacity in adulthood (Petrou and Kupek, 2010). Under-nutrition may be one of the underlying contributors to poor physical and intellectual development during childhood, poor educational achievements as the child grows, reduced health status in

all the stages of a life cycle and unproductive adults for the labour market (Petrou and Kupek, 2010).

The National Coordinating Committee for the MDGs 2013 report states that in 2011 approximately 15 million, people compared to 3.9 million in 2001, were receiving social grants. This means there was an increase in government expenditure in this regard in a bid to alleviate poverty in poor households. The report further states that the Gini-Coefficient of SA continues to indicate inequalities in SA as children and women are a major challenge because of higher levels of poverty in these vulnerable groups, and that the inequalities are caused by high rates of unemployment in SA (Lehohla, 2013).

The SUN Movement Report of 2011-2012 states that the World Bank estimates that countries affected by stunting and other forms of under-nutrition lose at least 2 - 3% of the Gross Domestic Product (GDP), as well as billions of dollars in salaried employment and available health care spending (SUN Movement Secretariat,2012). According to FAO (2013) malnutrition costs up to 5% of global income per year that is lost through inefficient productivity and direct health care costs (FAO, 2013).

According to Stein (2010) the World Bank report suggests that vitamin and mineral deficiencies may cause approximately 5% loss of the GDP, but addressing the deficiencies comprehensively may cost less than 0.3% of the GDP. Therefore it is seen that malnutrition has a negative impact on economic growth, globally (Stein, 2010).

### 2.7.3 The Role of Recession on Malnutrition

The global financial crisis resulted in SA not growing economically, a sharp decrease in exports and overseas investments, less foreign aid, poor payments of accounts, failure to repay and settle loans, less tourism income, a decline of foreign exchange rates, job losses and governments lowering expenditure. As a result malnutrition gained momentum and government lowered subsidies on health, water and sanitation sectors, but taxes on food and fuel were high (Brinkman *et al*., 2010). According to Brinkman *et al.* (2010) income and food prices make food accessible, while financial crisis upsets income factors through job losses and reduced remuneration. Raised foods prices also lessen access to food for low income earners. Poverty is present in areas where people are unemployed and have a low household income, moreover, food prices play an influential role in low income earners who face a

choice whether to purchase healthy food items which are generally more expensive, but have a higher micronutrient composition. The poorer communities then resort to purchasing energy-dense food items that cost less but are nutritionally inferior and are major contributors to obesity (Temple, Steyn, Fourie and de Villiers, 2011).

The National Coordinating Committee for the MDGs (2013) report illustrates that in SA the disturbance in the decline in prevalence of poverty and malnutrition took place between 2006 and 2009 owing to the global economic crisis in 2005 to 2009 (Lehohla, 2013).

In 2008, during the peak of the global financial crisis, the WFP conducted a number of food security evaluations to measure how much inflation in food prices affected households. The results indicated that:

- People ate food that was low in quality.
- A decrease in the frequency of meals as well as reduced food quality. Macronutrient and energy deficiencies were noted, leading to underweight and elevated danger of severe malnutrition in children.
- A greater number of children dropped out of school.
- Families sold assets of monetary value.
- People reduced visits to clinics and hospitals (Brinkman *et al.*, 2010).

The WFP also carried out Food Consumption Score surveys to assess the variety and regularity of food eaten within a seven day period. The results indicated that when food prices are high and income is low, families reduced both energy consumption and food diversification because of a decrease in the purchase of nutrient-dense food. Households also decrease the purchase of sugar, oil, salt and even staples. Food consumption changes cause decreased micronutrient and overall health status, elevating vulnerability to infections like diarrhoea, sluggish mental development and growth, which contributes to sub-standard school performance and decreased output at work (Brinkman *et al.*, 2010).

There is evidence that in some instances an improvement in household income does not always mean a diversified, healthy food intake - as households may spend the money on nutrient deficient foods or purchase other things (Stein, 2010).

## 2.8 Conclusion

Poverty, childhood malnutrition, unemployment, illiterate caregivers and income inequalities are problems that persist in SA, in spite of the government working hard to come up with interventions to improve the lives of the poorest people in SA. Globally, governments are working to improve the living conditions of communities, but inequalities in income and access to services hinders the eradication of some health problems for the well-being of populations.

# CHAPTER THREE: METHODOLOGY

## 3.1 INTRODUCTION

This chapter explains how data was collected in order to determine the socio-demographic profile of the Inanda households where the children that attend the CCFs reside, nutritional status of the children, the food handler's (FHs) profiles, food hygiene, storage and preparation practises at the CCFs, menus, recipes and plate wastage. Research methods were appropriately selected to meet all the research objectives.

## 3.2 PERMISSION AND CONSENT

The study was approved by the Faculty Research Committee at the Durban University of Technology and adhered to the Medical Research Council's research ethics guidelines.

A letter requesting permission was delivered to the office of the Director of Department of Social Development in Durban to request permission to conduct the study in registered CCFs in Inanda. The request to conduct the study was acknowledged in writing by the Regional Director of Department of Social Development to conduct the study in the registered CCFs in Inanda (Annexure A). A list of CCFs registered with the DSD was forwarded so that permission could be obtained from the selected facilities to be involved in the study (Annexure B).

The first visit to the randomly selected facilities was made by the researcher in person in order to locate the facility and also for the researcher and the owner or supervisor of the facility to be introduced and the requirements of the study to be explained and permission requested. An information letter (Annexure C) was presented to the owner or supervisor and a consent form (Annexure D) was completed if permission was granted.

On obtaining permission from the facilities, the CCFs were requested to provide a list of children aged two to five years old. Each child in the required age groups was given an information letter (Annexure E) and a consent form (Annexure F) in an envelope to take home to parents. Two weeks was given until the following visit to collect returned forms from parents. In that time, some parents contacted the researcher for clarity or any other concerns. After responses from parents were received, the consent forms were checked. From the

consent forms, a list for each facility was drawn which was used to identify children that were able to take part in the research. The children who were to participate in the study were then selected from the compiled lists by picking every fourth child on the list, the children then had to assent to participate. Some parents did not complete all sections of the consent form and therefore the fully completed forms were given first preference. Incomplete forms which contained a parent's signature were noted and then considered as giving consent. In a case where the five children were to be picked from only six or seven children, drawing names out of a hat was used to draw out those to be excluded from the study. Children that did not return consent forms were excluded from participating in the study. The researcher informed the participants that:

- Participation in the study was voluntary.
- The participants could withdraw from the study at any time.
- The information collected would be kept confidential.
- Participant numbers would be allocated to the children and code names to CCFs to ensure confidentiality and anonymity.
- The children would not be expected to remove clothing when being weighed and measured except for shoes, heavy jackets and hats.
- The children were weighed in private with the weight only visible to the researcher.
- The information will be stored at the University for five years, after which, it will be shredded and disposed of.
- No one will have access to the data except the supervisor and the researcher.

## 3.3 STUDY TYPE AND SETTING

The study is a descriptive, cross-sectional, observational study. A survey is a descriptive study often used to identify health problems in a population (Joubert and Ehrlich, 2007). The survey included questionnaires, interviews, observations, anthropometric measurements, weighing of food portions and plate waste.

This study was conducted in CCFs in Inanda that are registered with the DSD. Inanda is situated 20km away from the boundary of Durban's CBD. It consists of fifteen wards. The area is demarcated according to urban, peri- urban and rural parts of Inanda. Almost half a million people live in Inanda as a result Inanda is amongst the largest conglomeration of informal settlements in SA (Everatt and Smith, 2008). The area has a large number of urban

migrants from rural EC. The Department of Provincial and Local Government (DPLG), 2004, described Inanda as a low-income, residential area with a large number of informal settlements, populated by a large number of poorly educated, unemployed young people resulting in an area with dense levels of poverty (Everatt and Smith, 2008).

## 3.4 SAMPLING STRATERGY

Twelve CCFs agreed to be involved in the study. Ten CCFs were randomly selected by drawing names out of a hat in each demarcation of Inanda, that is, rural, peri-urban and urban. In each CCF a sample of more or less 20 children was identified to participate in the study as per DRI age group categories, that is, 10 children were two and three years old and age groups four to five years old consisted of ten children.

A total sample of two hundred and three (n= 203) children, with boys (n=92) and girls (n= 111) was identified for the study. Participant numbers were then given to the selected children who had consent to participate in the study. Figure 3.1 shows the CCFs and the number of children in each CCF that participated in the study.

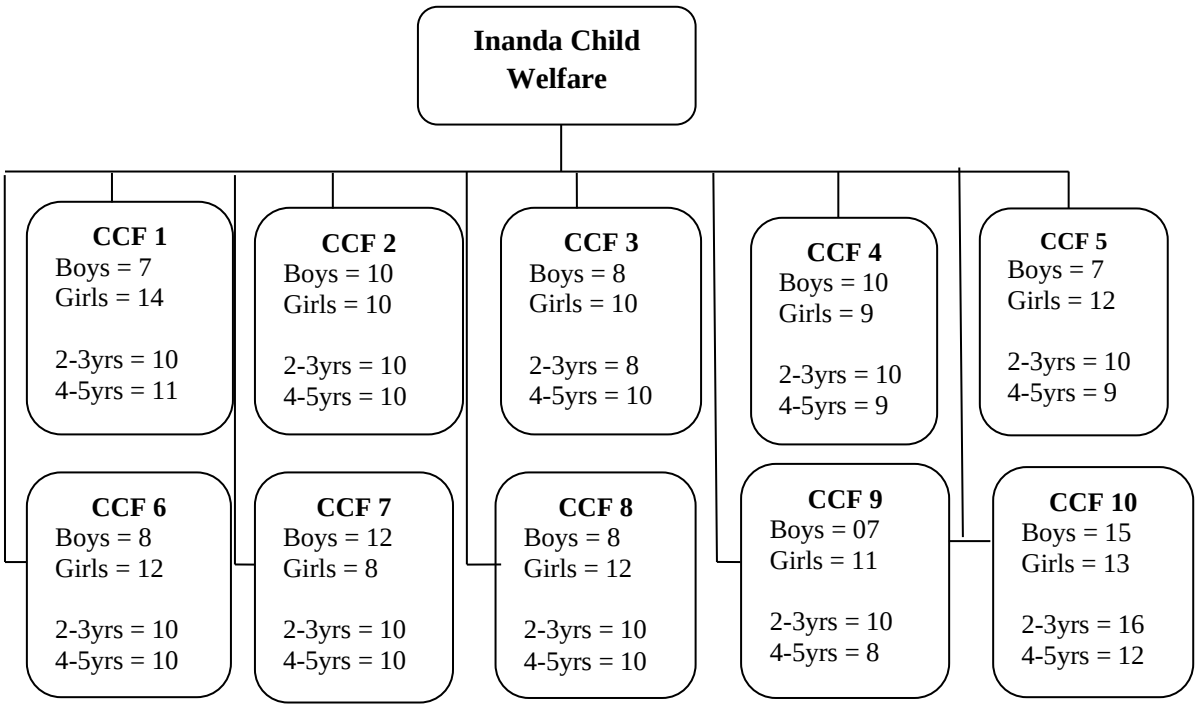



**Figure 3.1: CCFs participating in the study**

### 3.4.1 Inclusion and Exclusion Criteria

The following were included in the study:

- Children in the age group two to five years old and ten months old.
- Boys and girls.
- Children attending Inanda CCFs.

The following were excluded from the study:

- Children under two years old.
- Children older than six years old.
- Children visiting the area.

## 3.5. FIELDWORKERS TRAINING AND SUPERVISION

Fourteen trained fieldworkers assisted on different occasions to carry out the fieldwork. Four third-year students from Durban University of Technology's Department of Food and Nutrition and two trained community members and eight teachers assisted as fieldworkers. The fieldworkers were trained on how to conduct interviews with parents i.e. manner of approach, tone during questioning and confidentiality of answers (Annexure G). Completing the questionnaires was practiced during role play.

Fieldwork was carried out at each facility. The researcher spent five days of the week in each facility to collect the facility's menu plans, recipes, conduct plate-waste studies for the two meals the facilities offered and complete food handler's questionnaires. Anthropometric measurements and socio-demographic questionnaires were completed with the help of fieldworkers in the presence of the researcher.

## 3.6. ADMINISTRATION OF QUESTIONNAIRES

### 3.6.1 Socio-Demographic Questionnaires

The socio demographic questionnaires were completed to determine the profile of the households of children that attended the CCFs in Inanda. A valid socio-demographic questionnaire (Annexure H) developed by Oldewage-Theron, Salami, Zotor and Venter (2008) was used in this study. The questionnaire was explained to the respondents as looking at ways of acquiring and utilising food available to the family, factors like family size,

location and state of the home, food outlets available, insect problems when storing food, availability of fuel for cooking food and available assets or appliances to store, cook, serve and feed family members. The socio-demographic data was collected from parents over the weekends by the researcher and trained fieldworkers at the CCFs. Eleven parents completed the questionnaire on their own during the meeting. Thirteen parents requested that the questionnaire be sent to them with the child and these were sent with a self-sealing envelope for confidentiality, with the researcher collecting the envelopes from teachers. In eight CCFs a teacher was trained to assist the parents in completing the questionnaire in the morning when bringing children to the facility, or in the afternoon when collecting the children. It took parents about fifteen minutes to complete this questionnaire.

### 3.6.2 Anthropometric Measurements

The nutritional status of the children was established by measuring weight and height. Before taking the measurement, the researcher explained to each child why measurements were taken. The researcher also demonstrated to each child how each measuring equipment worked to alleviate any fears of the child. An anthropometric data record sheet (Annexure J) was used to record height and weight.

#### 3.6.2.1 Height

- A Scales 2000 portable stadiometer with a sliding height rod was used to measure the children standing.
- The stadiometer was place on the hard floor.
- The children removed shoes, hoods and hats.
- The children stood on the baseboard with feet a little distance apart.
- The back of the head, buttocks and legs all touched the upright rod.
- The child's head looked straight forward so that the chin was parallel to the baseboard.
- To keep the child in this position a hand was placed under the chin.
- The other hand was used to lower the height rod to be placed on top of the head of the child, compressing the hair.
- Measurements were read out and recorded in centimetres (cm) to the nearest 0.1cm after being taken twice. Where both times yielded same results the measurement was recorded as is, and where the two measurements were different, an average was used. (WHO, 2008).

### 3.6.2.2 Weight

To record weight as accurate as possible:

- The child stood alone on the calibrated electronic physician scale (PPS Scales 2000) placed on a hard floor.
- The child wore minimal clothing i.e. uniform dress for girls and pants and a top for boys, since measurements were taken in full view of the other children as there was no room for privacy. But second tops, jackets, jerseys, socks and shoes were removed. For two year olds wearing nappies, measurements were taken during nappy changing times when nappies were removed.
- The scale was re-zeroed before the child stepped on and stood in the centre section of the scale, with feet a little distance apart.
- The child stood still, but relaxed.
- The weight was taken and recorded on an anthropometric data sheet to the nearest 0.1kg. Measurements were recorded after being taken twice. Where both times yielded the same result, the measurement was recorded as is and where the two measurements were different, an average of the two was used (WHO, 2008).

### 3.6.3 Menus

To analyse the CCF's menus for nutritional adequacy, the menu plans for each of the 10 CCFs were written daily, for a week, while the food handler (FH) was preparing meals using a menu sheet (Annexure K). The CCFs assured the researcher that the menus for the week were recorded as per a normal week, with no additional or less food items served. Menu items were listed according to the order in which the food was served.

### 3.6.4 Recipes

To calculate the contribution of the CCF's meals to the total dietary requirements of the sample population in relation to the Daily Recommended Intakes (DRIs), each ingredient that was to be cooked was weighed on a Digi DS-708 electronic kitchen scale. Ingredients were weighed uncooked and peeled. The mass and volume of ingredients was recorded on a list of ingredients and the method was written from observation and questioning of the FH. Recipes were recorded on a recipe sheet (Annexure L). The recipes were transferred to FF3 software in order to attain an accurate nutrient breakdown of the menu items served to the children.

### 3.6.5 Plate Waste/Weighed Food Records

For accurate measurements of nutrient intake and portion sizes served to the children in various CCFs, a weighed method was the appropriate method to use for plate waste studies (Carr, Levins and Lindeman, 2000). Twenty meals to be consumed by the children in the sample were weighed in each CCF. The plate waste after the children had eaten the meals was recorded, everything that came back to the kitchen was documented (Annexure M). Plate waste measurements were conducted for breakfast and lunch meals. A weighing station was set up in each kitchen. The researcher observed and weighed the food portions. Plate waste was deducted from portion sizes served and actual intake recorded. The mean intake per age group was then calculated. Plate waste was measured in the following manner (Annexure M).

**Figure 3.2: Plate waste method**

- A Digi DS-708 electronic kitchen scale was used to weigh an empty bowl to get the plate weight (image 1 in figure 3.2). The empty bowl's weight was recorded and the scale zeroed.
- Then the first food item (cereal) was weighed and recorded and the scale zeroed again (image 2 in figure 3.2).
- The next item (protein) was added to the first item in the bowl and was weighed and recorded (image 3 in figure 3.2).
- In cases where a vegetable portion was offered, the scale was re-zeroed and the item was added, the bowl was weighed and weight recorded
- Column G was the total weight of the meal served.

- Column F or H was used to record waste once the bowl was returned to the kitchen after the child had eaten. It was weighed with the left-over food and the weight was recorded.

To ensure compliance, the researcher remained in the CCFs for the duration of the service and eating period, and supervised that no food was thrown away or shared with others to record waste. An average portion size consumed by the group was calculated, recorded on the menu as the portion served, and used for nutrient analysis.

### 3.6.6 Food Handler's Questionnaire (FHQ)

The study also aimed to determine the food handling and preparation practices and safety and food hygiene standards in the CCFs. The food Handler questionnaire (FHQ) (Annexure I) used was developed by Meaker (2008). The FHQ is available in both English and isiZulu. The FHQ was completed in an interview by the researcher, while the FH carried on with daily duties. Some parts of the questionnaire were completed by observation by the researcher.

## 3.7 DATA ANALYSIS

The variables aimed to assess each of the objectives set for the study are seen in table 3.1, which indicates each of the objectives with variables assessed and statistical method applied to each**.**

### 3.7.1 Socio-Demographic Questionnaire

The data was captured using Excel 2007. It was analysed using the IBM SPSS version 2.0 Software for descriptive statistics and presented in percentages and frequencies by the researcher. Tables and figures were created by the researcher using Excel and Word 2007.

### 3.7.2 Anthropometric Measurements

The anthropometric measurements for children between the ages of two to five years old were analysed using the WHO Anthro v.3.2.2 software, which measures the growth and development of the children up to 60 months old. The WHO AnthroPlus v.1.0.4 software was used to analyse data for children older than 60 months but up to 71 months old to measure growth and development of children and adolescents (WHO, 2007). The data was presented using the WHO growth indicators of height-for-age (stunting), and BMI-for-age (wasting, overweight and obesity) at cut-off points indicated in table 2.4.

**Table 3.1: The Objectives of the Study with Variables and Statistical Methods Applied**

| OBJECTIVE | VARIABLES | STATISTICAL ANALYSIS |
|---|---|---|
| 1. To determine the socio-demographic profile of households who have children at CCFs in Inanda. | Caregiver's profile, family composition, accommodation, income, work status, language, caregiver's education and family assets. | Descriptive statistics, SPSS version 20.0 |
| 2. To determine the nutritional status of the children using anthropometric measurements. | Height and weight. | WHO Anthro version 3.2.2 (WHO, 2007)<br>WHO AnthroPlus version 1.0.4 (WHO, 2007) |
| 3. To analyse the CCF's menus for nutritional adequacy and the menu's contribution to total daily dietary requirements of children in relation to DRIs and RDAs. | Menu items, recipes, plate waste. | Food Finder software version 3 for mean, minimum, maximum and standard deviation compared to DRIs and RDA. |
| 4. To determine the food handling and preparation practices of FHs in CCFs. | FH's experience and training, availability of menus and recipes, food preparation area and equipment for cooking, serving and eating, food allocation, kitchen hygiene and FH's personal hygiene practices. | Descriptive statistics, SPSS version 20.0 |

### 3.7.3 Recipes and Weighing of Food for Nutrient Adequacy of Menus

All breakfast and lunch menus and averages of portion sizes from plate waste were captured using Excel 2007 by the researcher. The data was analysed by a trained postgraduate nutrition student using Food Finder version 3 Software (Langenhoven, Kruger, Gouws and Faber, 1991) to determine nutrients intake from the meals provided at the CCFs for nutritional adequacy. The nutrient contribution of the CCF meals was compared to the daily needs of the children of one to three years old and four to eight years of age using the DRIs from the IoM (2003).

### 3.7.4 Food Handler's Questionnaire

The data was captured using Excel 2007 and analysed on IBM SPSS 2.0 software for descriptive statistics and presented in percentages and frequencies by the researcher. Tables and figures were created using Excel and Word 2007.

## 3.8 CORRELATIONS

Correlations were drawn using ANOVA to determine significant differences between the 10 CCFs on the mean intakes of macronutrients energy, protein, fat and carbohydrates. A $p-<$ 0.05 were considered to indicate statistical significance and $p-<0.001$ as strongly significant.

## 3.9 CONCLUSION

In this chapter all the methods and instruments utilised to collect data and measure the nutritional adequacy of meals, children's nutritional status, practises of FH on safety and hygiene during food preparation, availability of resources at CCFs and socio-demographics of households where children live were discussed. The results of the data collected in this chapter will be interpreted and discussed in Chapter four.

# CHAPTER FOUR: RESULTS AND DISCUSSION

## 4.1 INTRODUCTION

The main aim of the study was to determine the nutritional adequacy of menus and safety practises of food preparation for two to five year old children at registered CCFs in Inanda. The nutritional status of children and the socio-demographic profile of the households who have children at CCFs in Inanda were also determined. This chapter will present the results in tables and graphs and a discussion thereof.

## 4.2 RESULTS

### 4.2.1 Socio-Demographic Questionnaires

The socio-demographic questionnaires were administered to 199 parents because four pairs of children in the sample were siblings. The results of the socio demographic questionnaire present the profile of 199 households of the children that attended Inanda CCFs. The results reflect the household profile, living conditions, amenities, house and insect problems, employment, household income, buying of food, education of parents or guardians, home language and assets.

#### 4.2.1.1 Household Profile and Living Conditions

The results in Table 4.1 indicate that a large number of respondents that completed the questionnaire were mothers of the children (71.36%) aged between 18 and 35 years old (66.85%). The table also shows that in the absence of mothers, aunts and siblings (14.07%) and grandmothers (5.53%) were immediate caregivers of children at home. A large number of households (40.20%) are headed by mothers and, more households were female-headed if the numbers of mothers, aunts, sister siblings and grandmothers are added together. Large numbers live in urban and peri-urban parts of Inanda such as townships (40.07%) and squatter camps (11.06%). Households that were in rural villages were 41.21%. A large number of households (46.23%) had five to seven family members and 79.40% lived with extended family members.

**Table 4.1: Family Composition and Location of Households**

| Role of Caregiver in the Family | Number (n = 199) | Percentage (%) |
|---|---|---|
| Mother | 142 | 71.36 |
| Grandmother | 11 | 5.53 |
| Father | 18 | 9.05 |
| Other, Aunty, Sibling | 28 | 14.07 |
| Total | 199 | 100.00 |
| **Age of the Caregivers** | | |
| 18 - 35 | 133 | 66.85 |
| 36 - 59 | 56 | 28.14 |
| 60+ | 7 | 3.52 |
| Not indicated | 3 | 1.51 |
| Total | 199 | 100.00 |
| **Family Head** | | |
| Father | 73 | 36.68 |
| Mother | 80 | 40.20 |
| Sibling | 3 | 1.51 |
| Grandma | 26 | 13.07 |
| Grandpa | 9 | 4.52 |
| Aunt | 3 | 1.51 |
| Uncle | 2 | 1.01 |
| Other, did not specify | 3 | 1.51 |
| Total | 199 | 100.00 |
| **Type of Living Area** | | |
| Town /City | 5 | 2.51 |
| Farm | 5 | 2.51 |
| Squatter camp | 22 | 11.06 |
| Rural village | 82 | 41.21 |
| Hostel | 1 | 0.50 |
| Township | 81 | 40.70 |
| Other, RDP house | 3 | 1.51 |
| Total | 199 | 100.00 |
| **Number of People Living in the House** | | |
| 2 – 4 members | 53 | 26.63 |
| 5 – 7 members | 92 | 46.23 |
| 8 – 10 members | 44 | 22.11 |
| 11+ members | 10 | 5.03 |
| Total | 199 | 100.00 |
| **Extended Family Members in the Household** | | |
| Yes | 158 | 79.40 |

Table 4.2 indicates that in 42.71% of households all children had birth certificates, 26.13% had completed immunisation and 96.98% had children still attending school and preschool. In 139 households children walked to school and to CCFs. In some households it was found that children in one household went to school in different modes of transport, that is, one child will take a bus to school and another will walk to school, depending on the distance to school.

**Table 4.2: Child Information in Households**

| No. of Children with Birth Certificates in the Household | Number (n = 199) | Percentage (%) |
|---|---|---|
| None | 2 | 1.01 |
| Some | 112 | 56.28 |
| All | 85 | 42.71 |
| Total | 199 | 100.00 |
| **No. of Children that Completed Immunisation** | | |
| None | 41 | 20.60 |
| Some | 106 | 53.27 |
| All | 52 | 26.13 |
| Total | 199 | 100.00 |
| **No. of School and CCF Going Children** | | |
| CCF only | 6 | 3.02 |
| School and CCF | 193 | 96.98 |
| Total | 199 | 100.00 |
| **Transport to School** | | |
| Walk | 139 | |
| Bus | 14 | |
| Taxi | 41 | |
| Lift | 24 | |
| Other, own car, school bus | 13 | |
| Total | 231 | |

According to Table 4.3 about 66.33% of respondents had lived more than five years in their homes. The majority of the households had one main house (n=106) in the yard with no outside buildings. The houses had more than four rooms (43.22%) and were made from bricks (71.36%). One-hundred and thirty-one (65.83%) of the homes were owned by the occupants.

**Table 4.3: Living Conditions**

| Duration of Stay in The House | Number (n =199) | Percentage (%) |
|---|---|---|
| Less than 1 year | 9 | 4.52 |
| 1 - 5 years | 58 | 29.15 |
| More than 5 years | 132 | 66.33 |
| Total | 199 | 100.00 |
| **Type of House** | | |
| Brick | 142 | 71.36 |
| Clay | 30 | 15.08 |
| Grass | 1 | 0.5 |
| Wood | 8 | 4.02 |
| Zinc/shack | 18 | 9.05 |
| Total | 199 | 100.00 |
| **Number of Rooms** | | |
| Less than two rooms | 55 | 27.64 |
| 3 - 4 rooms | 58 | 29.15 |
| More than 4 rooms | 86 | 43.22 |
| Total | 199 | 100.00 |
| **Outside Building(s)** | | |
| Yes | 93 | 46.73 |
| **State of Current Living** | | |
| Homeless | 2 | 1.01 |
| Living with relatives | 36 | 18.09 |
| Living with friends | 1 | 0.50 |
| Hostel accommodation | 1 | 0.50 |
| Squatter home | 8 | 4.02 |
| Rented house /flat | 18 | 9.05 |
| Own house/flat | 131 | 65.83 |
| Employees properties | 2 | 1.01 |
| Total | 199 | 100.00 |

Table 4.4 indicates that most households had a tap in the yard (51.26%) and (26.13%) had taps inside the house. Households that had taps both inside and outside the house were 7.04%. Most households used pit latrine toilets (54.27%). There was removal of waste services available to 68.84% of the households. The roads were mostly gravel (63.32%) in front of the houses.

**Table 4.4: Amenities**

| Water | Number (n=199) | Percentage (%) |
|---|---|---|
| Tap in the house | 52 | 26.13 |
| Tap outside the house (in yard) | 102 | 51.26 |
| Borehole | 1 | 0.50 |
| Spring/ river/dam water | 2 | 1.01 |
| Fetch water elsewhere | 28 | 14.07 |
| Inside and outside the house | 14 | 7.04 |
| Total | 199 | 100.00 |
| **Toilet Facilities** | | |
| None | 11 | 5.53 |
| Pit latrine | 109 | 54.27 |
| Flush/ sewage | 73 | 36.68 |
| Bucket system | 4 | 2.01 |
| Pit and flush | 3 | 1.51 |
| Total | 199 | 100.00 |
| **Waste Removal** | | |
| Yes | 137 | 68.84 |
| **Gravel Road** | | |
| Yes | 126 | 63.32 |

Although most respondents in table 4.5 (38.69%) indicated that there were no housing problems, another large number (34.67%) subsequently indicated that the house was too small for all family members, and looking at the numbers in table 4.3, 53.27% had no outside buildings in the yard and 56.79% had houses with four or less number of rooms. Other house problems included need for repairs, problem of cracking, incomplete structure and environmental issues like dampness and extremely cold temperatures.

**Table 4.5: Housing Problems**

| Types of Structural Problems | Number (n=199) | Percentage (%) |
|---|---|---|
| Too small | 69 | 34.67 |
| Needs repairs, cracking | 35 | 17.59 |
| Dampness | 11 | 5.53 |
| Extremely cold | 1 | 0.50 |
| Incomplete | 4 | 2.01 |
| Made with unsafe materials | 1 | 0.50 |
| Plumbing and water sanitation | 1 | 0.50 |
| None | 77 | 38.69 |
| Total | 199 | 100.00 |

In figure 4.1 other household problems experienced were insect infestations, such as mosquitoes (n=136), ants (n=88), mice (n=79) and cockroaches (n=75). Other insects problems experienced by the community included flies (n=31), geckos (n=33), frogs (n=35), snakes (n=33) and a very small number (n=13) had a bed bugs problem.

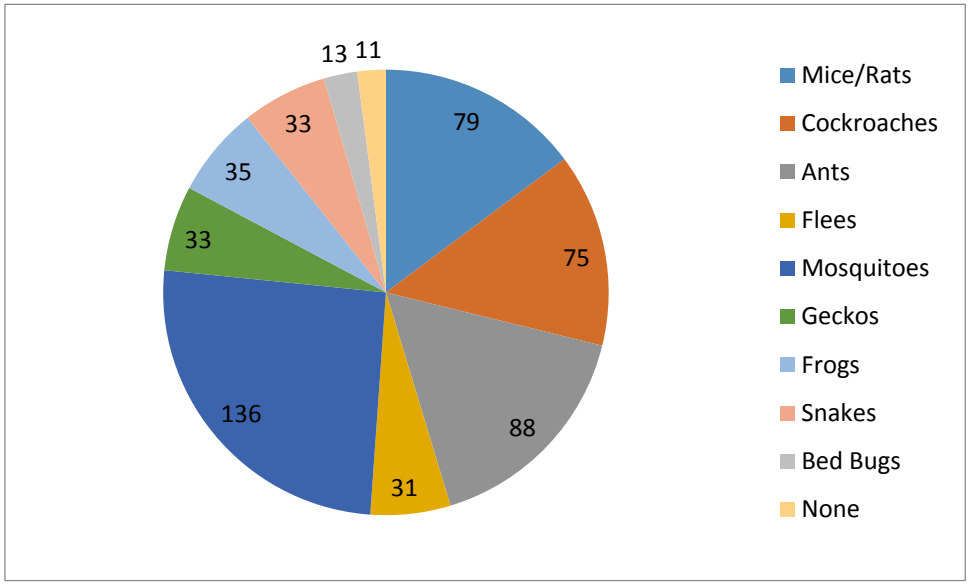



**Figure 4.1: Number of Households Affected by Insect Infestation in Households (n=199).**

### 4.2.1.2 Employment, Household Income and Expenditure

Table 4.6 demonstrates that 45.73% (n=91) of the respondents were unemployed. Of the 91 respondents that were unemployed, 65.93% (n= 60) were not working and the remaining 34.07% (n=40) were students, retired, housewives or working on-call as jobs were available. Forty-six (50.55%) respondents had been unemployed for more than three years, 71.43% (n=65) of the unemployed were actively looking for jobs.

**Table 4.6: Employment Status**

| Employment Status | Number (n = 199) | Percentage (%) |
|---|---|---|
| Employed | 108 | 54.27 |
| Unemployed | 91 | 45.73 |
| Total | 199 | 100.00 |
| **Reasons for Unemployment Status** | **Number (n = 91)** | **Percentage (%)** |
| Unemployed | 60 | 65.93 |
| Retired | 4 | 4.40 |
| Housewife | 11 | 12.09 |
| Student | 14 | 15.38 |
| Other, on-call if work available | 2 | 2.20 |
| Total | 91 | 100.00 |
| **Duration of Unemployment** | **Number (n = 91)** | **Percentage (%)** |
| Less than 6 months | 5 | 5.49 |
| 6 - 12 months | 9 | 9.89 |
| 1 - 3 years | 14 | 15.38 |
| More than 3 years | 46 | 50.55 |
| 0ther, student, retired | 17 | 18.68 |
| Total | 91 | 100.00 |
| **Actively Looking for Employment** | | |
| Yes | 65 | 71.43 |

Table 4.7 indicates results which pertain to employment and household income. Only 48.15% of respondents were permanently employed. The respondents that were government employees (19.33%) included nurses, teachers, court clerks and hospital workers and police personnel. About 15.97% of the respondents were employed as receptionists, secretaries, brokers, consultants and sales persons in private companies and banks. A large number of respondents (64.71%) were employed informally or on contract as domestic workers, cleaners, general assistants and waitresses and self-employed respondents included car mechanics and seamstresses. Of the 77, 11 were the unemployed respondents that indicated to be on-call as domestic workers and cleaners. The household income of a small percentage of respondents (26.63%) was more than R2500 per month, followed closely by 24.12% of households that survived on an income between R1001 to R1500 per month.

**Table 4.7: Employment and Household Income**

| Employment status | Number (n=108) | Percentage (%) |
|---|---|---|
| Permanent | 52 | 48.15 |
| Temporary | 37 | 34.26 |
| Fixed term | 16 | 14.81 |
| Other, labour broker, on call | 3 | 2.78 |
| Total | 108 | 100.00 |
| **Work Sector** | **Number (n=119)** | **Percentage (%)** |
| Government employees | 23 | 19.33 |
| Private company employees | 19 | 15.97 |
| Informal workers and self employed | 77 | 64.71 |
| Total | 119 | 100.00 |
| **Total Household Income Per Month** | **Number (n=199)** | **Percentage (%)** |
| Less than R500 | 16 | 8.04 |
| R501 - R1000 | 33 | 16.58 |
| R1001- R1500 | 48 | 24.12 |
| R1501 - R2000 | 18 | 9.05 |
| R2001 - R2500 | 30 | 15.08 |
| More than R2500 | 53 | 26.63 |
| Not indicated | 1 | 0.50 |
| Total | 199 | 100.00 |

In 95.98% of the households, contributors of household income came from between one and up to five people as indicated in table 4.8. Income contributions also included pensions from grandparents and disabled family members and social grants received by children. About 49.75% of the respondents reported that sometimes there was a lack of money to purchase food. A large percentage of households (72.87%) lived on total household income of less than R2500 per month (table 4.7).

**Table 4.8: Buying of Food**

| Number of Income Contributors | Number (n=199) | Percentage (%) |
|---|---|---|
| 1 - 5 people | 191 | 95.98 |
| 6 - 10 people | 8 | 4.02 |
| Total | 199 | 100.00 |
| **Number That Lack Money to Purchase Food** | | |
| Always | 16 | 8.04 |
| Often | 15 | 7.54 |
| Sometimes | 99 | 49.75 |
| Seldom | 25 | 12.56 |
| Never | 44 | 22.11 |
| Total | 199 | 100 |
| **Food Buying Intervals** | | |
| Everyday | 8 | 4.02 |
| Once a week | 28 | 14.07 |
| Once a month | 159 | 79.90 |
| Other, twice a month | 4 | 2.01 |
| Total | 199 | 100.00 |
| **Money Spent on Food Per Month** | | |
| R0 – R150 | 5 | 2.51 |
| R151 - R300 | 19 | 9.55 |
| More than R500 | 123 | 61.81 |
| I do not know | 52 | 26.13 |
| Total | 199 | 100.00 |

The majority (79.90%) of households, as seen in table 4.8, purchased food once a month, spending more than R500 on food in supermarkets (n=178) as seen in figure 4.2. Twenty-eight households (14.07%) bought food once a week. Wholesalers (22.10%) were other types of food buying outlets that were available in the area that the community utilised.

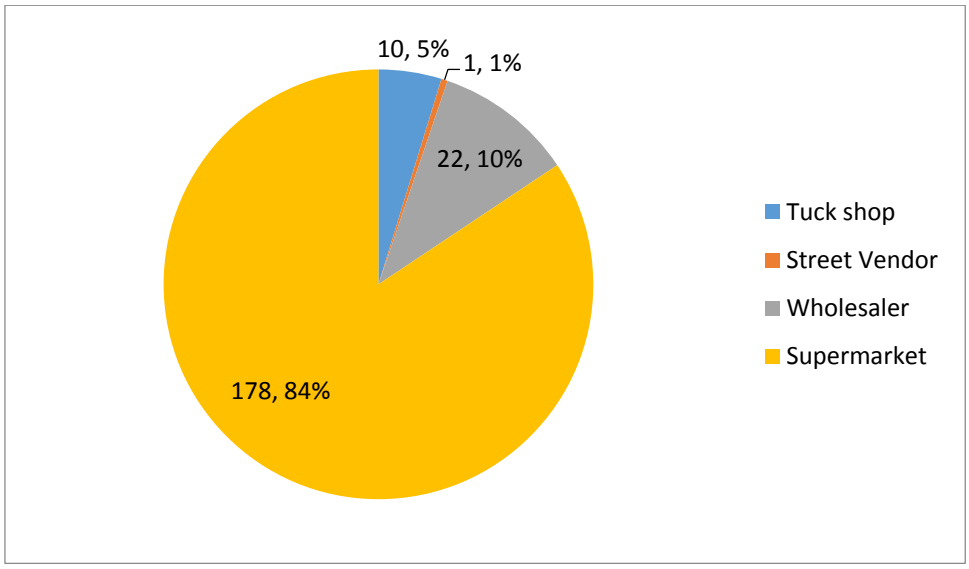



**Figure 4.2: Food buying Outlets Used (n=199)**

### 4.2.1.3 Education, Language and Household Responsibilities

In table 4.9 only 47.74% (n=95) of the respondents had obtained up to Standard 10 of schooling. Another large number of respondents (23.12%, n=46) had up to standard 8 of schooling. Colleges and other post-school institutions were attended by 17.09% (n=34) and 6.53% (n=13) respectively. The majority of households were Zulu speaking (94.47%, n=188).

**Table 4.9: Education and Language**

| Highest Level of Education of Caregivers | Number (n = 199) | Percentage (%) |
|---|---|---|
| None | 1 | 0.50 |
| Primary school | 10 | 5.03 |
| Standard 8 | 46 | 23.12 |
| Standard 10 | 95 | 47.74 |
| College/FET | 34 | 17.09 |
| Other post school, University | 13 | 6.53 |
| Total | 199 | 100.00 |
| **Home Language** | | |
| Zulu | 188 | 94.47 |
| Xhosa | 9 | 4.52 |
| Other, Zulu & Xhosa, Zulu & English | 2 | 1.01 |
| Total | 199 | 100.00 |

Most of the household duties were carried out by mothers, that is, cooking of food (67.34%, n=134), serving and feeding of children (73.87%, n=147), allocating money to spend on food (59.30%, n=118) and the buying of food (68.84%, n=137). In 11.56% of the households

buying of food was either done by the mother or the father. In 9.55% of the households the father and mother decided on the amount of money to spend on food (refer to table 4.10).

**Table 4.10: Household Duties**

| Food Preparation Responsibility | Number (n=199) | Percentage (%) |
|---|---|---|
| **Father** | **4** | **2.01** |
| **Mother** | **134** | **67.34** |
| **Sibling** | **14** | **7.04** |
| **Grandma** | **12** | **6.03** |
| **Aunt** | **4** | **2.01** |
| **Other, mother, sibling, aunt, grandmother or helper** | **31** | **15.58** |
| **Total** | **199** | **100.00** |
| **Child Feeding Responsibility** | | |
| **Father** | **4** | **2.01** |
| **Mother** | **147** | **73.87** |
| **Sibling** | **9** | **4.52** |
| **Grandma** | **11** | **5.53** |
| **Aunt** | **4** | **2.01** |
| **Other, mother, sibling, father or helper** | **24** | **12.06** |
| **Total** | **199** | **100.00** |
| **Food Buying Responsibility** | | |
| **Father** | **10** | **5.03** |
| **Mother** | **137** | **68.84** |
| **Sibling** | **8** | **4.02** |
| **Grandma** | **19** | **9.55** |
| **Aunt** | **1** | **0.50** |
| **Uncle** | **1** | **0.50** |
| **Other, mother and father share duties** | **23** | **11.56** |
| **Total** | **199** | **100.00** |
| **Money Allocated to Food Decision Maker** | | |
| **Father** | **27** | **13.57** |
| **Mother** | **118** | **59.30** |
| **Sibling** | **11** | **5.53** |
| **Grandma** | **23** | **11.56** |
| **Grandpa** | **1** | **0.50** |
| **Other, mother and father share duties** | **19** | **9.55** |
| **Total** | **199** | **100.00** |

## 4.2.1.4 Household Meals and Assets

Table 4.11 explains that 61.31% of respondents reported eating three meals a day. A large number (77.39%) of respondents ate most meals at home and 67.34% of the children ate most meals at home. Some caregivers reported that children ate before going to the CCF and also

ate when returning home and at supper time - as a result more meals were consumed at home than at the CCF. Small percentages of caregivers (2.51%) and the children (7.04%) consumed equal numbers of meals at home and work and home and school.

**Table 4.11: Consumption of Meals**

| No. of Meals Per Day Eaten By The Care givers | Number (n=199) | Percentage (%) |
|---|---|---|
| One | 6 | 3.02 |
| Two | 44 | 22.11 |
| Three | 122 | 61.31 |
| More than 3 | 27 | 13.57 |
| Total | 199 | 100.00 |
| **Where Care givers Eat Most Meals** | | |
| Home | 154 | 77.39 |
| Friends | 2 | 1.01 |
| Work | 33 | 16.58 |
| School | 5 | 2.51 |
| Other, Home and work | 5 | 2.51 |
| Total | 199 | 100.00 |
| **Where Children Eat Most Meals** | | |
| Home | 134 | 67.34 |
| School | 51 | 25.63 |
| Other, home & school | 14 | 7.04 |
| Total | 199 | 100.00 |

Figure 4.3 illustrates that more than half of the respondents owned the following equipment for food storing and preparation: refrigerator (n=171), freezer (n=78), electric stove (n=156), electric kettle (n=181) and microwaves (n=118). Other types of stoves owned include hot plate, gas stoves and paraffin stoves. Ninety-eight households own lounge suites. Most households have more than one radio (n=200), television (n=207) and other essential assets like a bed with a mattress (n=506), electric iron (n=196) and dining room suite (n=78).

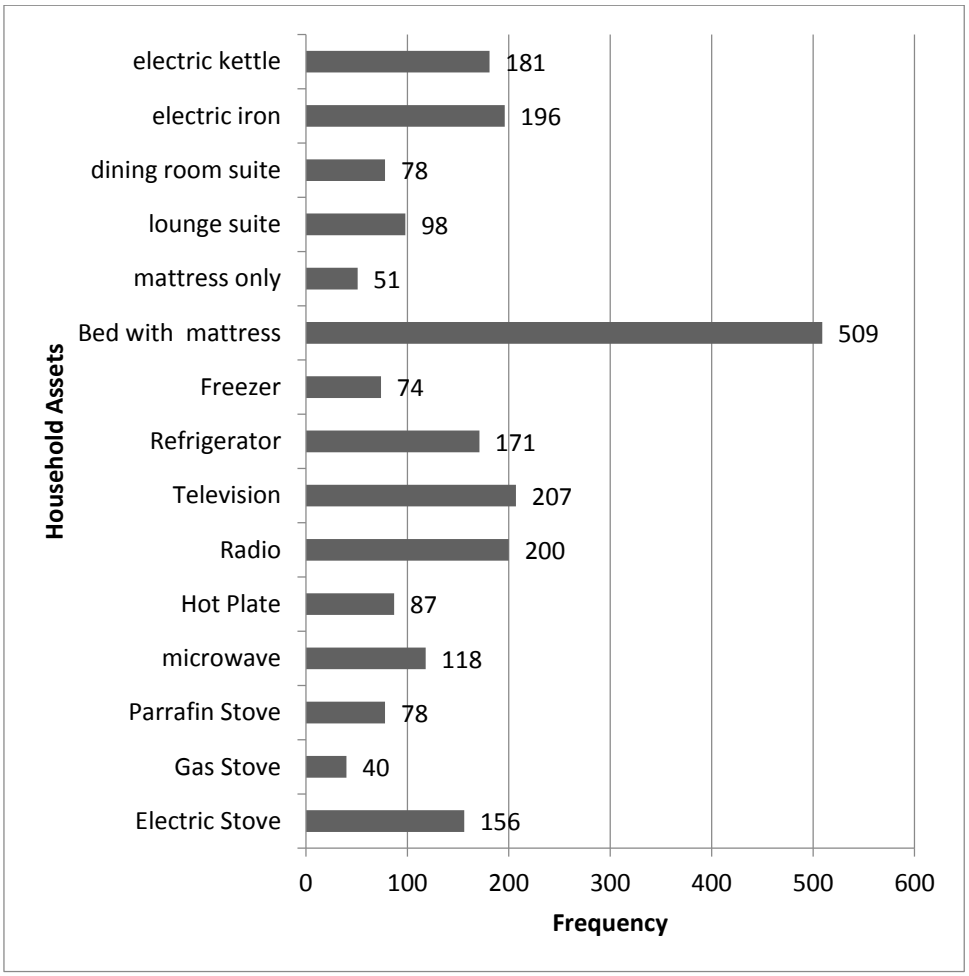



**Figure 4.3: Number of Household Assets (n = 199)**

Figure 4.4 reflects that the most widely used mode of transport in households (n=168) was taxis. Only 23 households owned vehicles. Buses were also widely used in the area especially where there were no tarred roads.

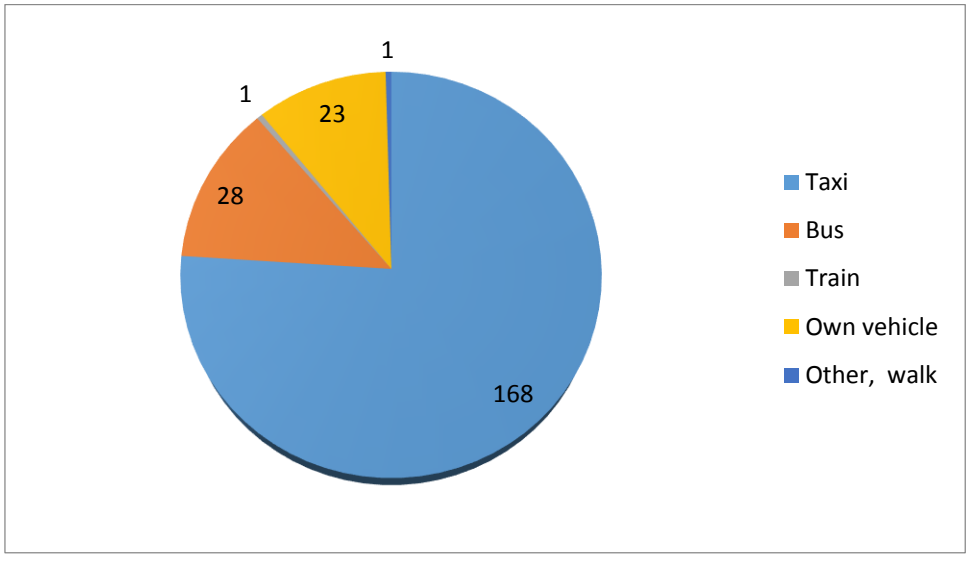



**Figure 4.4: Mode of Transport Indicated in Numbers.**

Figure 4.5 illustrates that 170 households used electricity, many in the form of prepaid electricity to cook food. Forty households owned paraffin stoves to use as an alternative for cooking when prepaid electricity ran out.

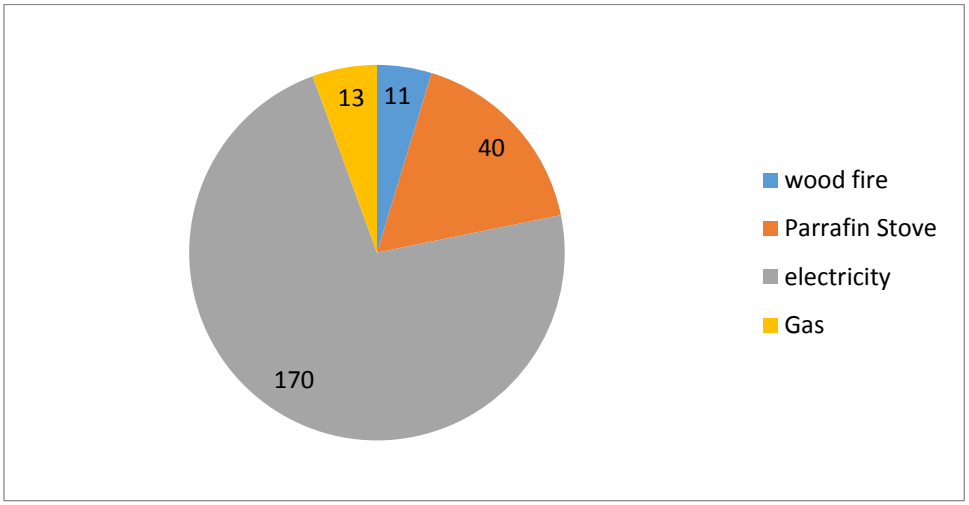



**Figure 4.5: Fuel Used for Cooking (n=199).**

One hundred and fifty-two households used stainless steel pots to cook food daily as indicated in figure 4.6. Aluminium pots were used by only 40 households.

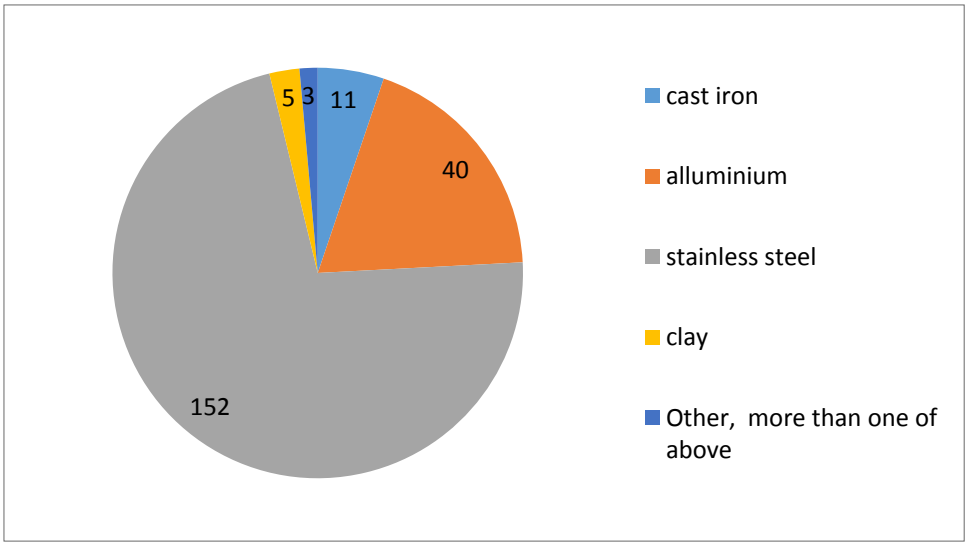



**Figure 4.6: Material Pots Used for Cooking are Made from Indicated Numbers**

## 4.2.2 Anthropometric Measurements of Children

### 4.2.2.1 Height-for-Age (Stunting)

High percentages of the children in all CCFs were within the normal z-score ranges of height-for-age as seen in table 4.12. In the age group of between two to three year olds 6.50% (n=3) of the boys and none of the girls were severely stunted, and 10.90% (n=5) of the boys and 6.80% (n=4) of the girls were stunted. In the age group of between four to five years old and ten months old 1.96% (n=1) of the girls and none of the boys were severely stunted, while 2.13% (n=1) of the boys were stunted compared to 1.96% (n=1) of the girls.

**Table 4.12: Anthropometric Data of Children: Height-for-Age (Stunting) (n=203)**

| Z-score | Classification | Boys 2-3yrs (n= 46) | Girls 2-3yrs (n= 59) | Boys 4-5yrs (n= 47) | Girls 4-5yrs (n= 51) |
|---|---|---|---|---|---|
| < - 3SD | Severely stunted | 6.50% (n=3) | 0% | 0% | 1.96% (n=1) |
| < - 2SD | Stunted | 10.90% (n=5) | 6.80% (n=4) | 2.13% (n=1) | 1.96% (n=1) |
| > - 1SD to + 3SD | Normal | 82.60% (n=38) | 93.20% (n=53) | 97.87% (n=46) | 96.08% (n=49) |

### 4.2.2.2. BMI-for-Age (Wasting)

Table 4.13 below illustrates that none of the children in all the age groups in all CCFs were severely wasted nor wasted. In all CCFs children in the age group of two to three years old, 39.10% (n=18) of the boys and 42.10% (n=25) of the girls were within the normal BMI-for-Age range, while 32.60% (n=15) of the boys and 42.30% (n=25) of the girls were at a possible risk of being overweight.

**Table 4.13: Anthropometric Data of Children: BMI-for-Age (Wasting) (n=203)**

| Z-score | Classification | Boys 2-3yrs (n= 46) | Girls 2-3yrs (n= 59) | Boys 4-5yrs (n= 47) | Girls 4-5yrs (n= 51) |
|---|---|---|---|---|---|
| < - 3SD | Severely wasted | 0% | 0% | 0% | 0% |
| < - 2SD | Wasted | 0% | 0% | 0% | 0% |
| > - 1SD to < +1SD | Normal BMI-for-age | 39.10% (n=18) | 42.40% (n=25) | 57.45% (n=27) | 58.82% (n=30) |
| > +1SD | Possible risk of overweight | 32.60% (n=15) | 42.30% (n=25) | 31.91% (n=15) | 29.41% (n=15) |
| > + 2SD | Overweight | 24.00% (n=11) | 10.20% (n=6) | 10.64% (n=5) | 11.77% (n=6) |
| > + 3SD | Obese | 4.30% (n=2) | 5.10% (n=3) | 0% | 0% |

In the same age group 24.00% (n=11) of the boys and 10.20% (n=6) of the girls were overweight, while 4.30% (n=2) of the boys and 5.10% (n=3) of the girls were recorded as obese. In the age group four to five years old, 57.45% (n=27) of boys and 58.82% (n=30) of girls were within the normal BMI-for-Age ranges while 31.91% (n=15) of the boys were at a possible risk of overweight compared to 29.41% (n=15) of the girls. More girls (11.77%, n=6) than boys (10.64%, n=5) were overweight. None of the boys or girls in this age group was obese.

### 4.2.3. Menus

The Inanda CCFs in the study all opened at 7am and closed at 3pm or opened at 7am and closed at 4pm. Five day menu plans were collected on-site as the FHs were preparing meals for the children. CCF10 did not provide meals for two year olds. Table 4.14 shows the menus for both meals served at Inanda CCFs, and Annexure N shows the CCF's menus together with the averages of weighed portion sizes for each age group in the sample.

Maize meal and rice are offered almost daily in both meals served at the CCFs. Maize meal was offered in the form of porridge, crumbly 'phuthu' and stiff pap. CCF one and five served maize meal porridge with milk and sugar every morning while CCF seven served porridge with milk on three days of the week and peanut butter was added to the porridge on one day of the week. CCF eight added milk on one day of the week and margarine and sugar on two days of the week, CCF nine added milk to porridge once a week and peanut butter once a week. Other CCFs only added sugar to the maize meal porridge. CCF two always served maize meal porridge mixed with Morvite and CCFs four, seven and ten served Morvite on Fridays. Maltabella was served by CCFs eight and ten once a week and CCF one twice a week. Two CCFs served cornflakes on one morning throughout the week.

## Table 4.14: Menus for Meals Served at Inanda CCFs

| CCF ONE BREAKFAST | |
|---|---|
| **Monday to Friday** | Maize meal porridge |
| **Monday and Friday** | Maltabella porridge |
| **Friday** | Boiled egg |
| **LUNCH** | |
| **Monday** | Vegetable Soup<br>Rice |
| | Samp and Beans |
| **Tuesday and Thursday** | Dhall Soup<br>Rice |
| | Vegetable Soup<br>Rice |
| **Wednesday and Friday** | Potato Vegetable Soup<br>Rice |
| | Beans<br>Rice |

| CCF THREE BREAKFAST | |
|---|---|
| **Monday to Friday** | Maize meal porridge |
| **LUNCH** | |
| **Monday** | Cabbage Soup<br>Phuthu |
| **Tuesday** | Fish Soup<br>Rice |
| **Wednesday** | Samp and Beans |
| **Thursday** | Dhall Soup<br>Phuthu |
| **Friday** | Vegetable Soup<br>Rice |
| | |

| CCF FIVE BREAKFAST | |
|---|---|
| **Monday to Friday** | Maize meal porridge |
| **LUNCH** | |
| **Monday and Thursday** | Chicken vegetable soup<br>Rice |
| **Tuesday** | Dhall and fish Soup<br>Rice |
| **Wednesday** | Mince and vegetable soup<br>Rice |
| **Friday** | Dhall and fish curry<br>Rice |
| | Samp and beans with Fish |

| CCF TWO BREAKFAST | |
|---|---|
| **Monday to Friday** | Maize meal porridge<br>with Morvite |
| **TEA TIME** | |
| **Monday and Thursday** | Apple |
| **Tuesday and Friday** | Orange |
| **Wednesday** | Marie biscuits |
| **LUNCH** | |
| **Monday and Thursday** | Egg Soup<br>Rice |
| **Tuesday and Friday** | Fish Soup<br>Rice |
| **Wednesday** | Minced meat Soup<br>Rice |

| CCF FOUR BREAKFAST | |
|---|---|
| **Monday to Thursday** | Maize meal porridge |
| **Friday** | Morvite |
| **LUNCH** | |
| **Monday** | Chicken Curry<br>Rice |
| **Tuesday** | Fish Curry<br>Rice |
| **Wednesday** | Beans<br>Rice |
| **Thursday** | Beef Sausage Curry<br>Rice |
| **Friday** | Brown bread Polony Sandwich |
| | Diluted Juice |

| CCF SIX BREAKFAST | |
|---|---|
| Monday to Friday | Maize meal porridge |
| **TEA (5YRS ONLY)** | |
| **Monday to Friday** | Rooibos tea<br>White or brown bread<br>margarine |
| **LUNCH** | |
| **Monday** | Chicken Curry<br>Rice |
| **Tuesday** | Beans and Vegetable Curry<br>Rice |
| **Wednesday** | Fish Curry<br>Rice |
| **Thursday** | Samp and Beans |
| **Friday** | Maas and Phuthu |

| CCF SEVEN BREAKFAST | |
|---|---|
| **Monday, Tuesday and Thursday** | Corn meal porridge |
| **Wednesday** | Cornflakes<br>Milk |
| **Friday** | Banana Morvite |
| **LUNCH** | |
| **Monday** | Fish Curry<br>Rice |
| **Tuesday** | Chicken Curry<br>Rice |
| **Wednesday** | Beef sausage Curry<br>Rice |
| **Thursday** | Mincemeat and Cabbage<br>Rice |
| **Friday** | Maas and Phuthu |

| CCF EIGHT BREAKFAST | |
|---|---|
| **Monday, Wednesday and Thursday** | Maize meal porridge |
| **Tuesday** | Maltabella porridge |
| **Friday** | Cornflakes<br>Milk |
| **LUNCH** | |
| **Monday** | Beef Curry<br>Butternut<br>Rice |
| **Tuesday** | Maas and Phuthu |
| **Wednesday** | Fish Curry<br>Rice |
| **Thursday** | Soup<br>Brown or whole wheat Bread |
| **Friday** | Samp and Beans |

| CCF NINE BREAKFAST | |
|---|---|
| **Monday to Friday** | Maize meal porridge |
| **LUNCH** | |
| **Monday** | Fish Soup<br>Rice |
| **Tuesday** | Beans<br>Phuthu |
| **Wednesday** | Vegetable Curry<br>Rice |
| **Thursday** | Samp and Beans with Fish |
| **Friday** | Chicken Curry<br>Butternut<br>Rice |

| CCF TEN BREAKFAST | |
|---|---|
| **Monday, Wednesday and Thursday** | Maize meal porridge |
| **Tuesday** | Maltabella porridge |
| **Friday** | Morvite |
| **LUNCH** | |
| **Monday** | Mixed Vegetable Soup<br>Rice |
| **Tuesday** | Chicken Curry<br>Rice |
| **Wednesday** | Fish Soup<br>Rice |
| **Thursday** | Samp and beans |
| **Friday** | Fish Curry<br>Crumbly Phuthu |

Almost all meals for the two year olds, as seen on table 4.14 were served with rice at lunch time as rice is soft and more palatable especially for younger children. Rice was also served mostly as starch for lunch meals for the older age group of children. Soup powders were used to thicken soups and curries in all CCFs. CCF four served Morvite and polony sandwiches made from brown bread with diluted, sweetened juice on a Friday because there was no electricity to cook meals. CCF eight served brown or whole-wheat bread with soup that was brought as a donation to the CCF every Thursday for lunch. CCF six served a slice of brown or white bread with tea to five year olds only at tea time.

CCF one served children of three to five years old a boiled egg once a week and CCF two served egg soup on two days of the week. Beef was served once a week at CCFs two, four, five and eight and twice a week at CCF seven. Chicken was served once a week at CCFs four, five, six, seven, nine and ten. Canned fish was served at nine of the CCFs and CCF five, nine and ten served fish twice a week. In most CCFs the bones and the insides of canned fish were removed. CCF one served vegetables and legumes only to the children. Seven CCFs served samp and beans to children and CCFs five and nine added canned fish to the samp and beans. CCFs four and five served dhall soup to children. CCFs one, six and nine served beans once a week.

Milk was offered in the form of milk in the porridge for breakfast in some CCFs. In one CCF, 375g Nespray powdered milk was added to the pot of porridge. Milk was also served with cornflakes for breakfast at two CCFs. Milk quantities were stretched by adding 500ml of water to 1litre of milk. CCFs six, seven and eight served maas and ‘phuthu’ once a week.

The researcher observed that in all curries and soups served, the first step during cooking was sautéing onions in 100ml to 125ml of sunflower cooking oil. Only one CCF spread the bread with margarine for tea. Only CCF two served half of an apple or half of an orange to children during tea time, with Marie biscuits given on one day of the week. Vegetables mostly used in curries and soups were onions, potatoes, green beans, green peppers, tomatoes, spinach and carrots, as well as frozen vegetables including carrot, green beans and sweetcorn. Two CCFs served cabbage soup.

#### 4.2.3.1 Top 20 Food Intakes

Table 4.15 illustrates the top 20 foods that were served at the CCFs collectively for the five days of the week, ranked by total intake of all CCFs. The top 20 list is presented separating age groups two to three years old from four to five years old because the two age groups have different nutritional needs and the ranking is different for the two groups but same menus are served.

**Table 4.15: Top 20 Foods Consumed by the Children in all the CCFs as Measured by Menu Plans for Five Days (n=10) Ranked by Total Intake.**

| 2 to 3 years old | | | | | | 4 to 5 years old | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | **Food Items** | **Total Intake** | **Mean Intake** | **±Std Deviation** | **Frequency consumed** | **No.** | **Food Items** | **Total Intake** | **Mean Intake** | **±Std Deviation** | **Frequency consumed** |
| 1 | **Maize meal** | **6911g** | **150g** | **±35.16** | **46** | **1** | **Maize meal** | **5627g** | **120g** | **±49.27** | **47** |
| 2 | **Rice, cooked** | **3414g** | **100g** | **±23.05** | **34** | **2** | **Rice, cooked** | **2857g** | **82g** | **±33.94** | **35** |
| 3 | **Fish soup** | **792g** | **72g** | **±28.02** | **11** | **3** | **Fish soup** | **665g** | **60g** | **±12.42** | **11** |
| 4 | **Cold drink, squash diluted** | **500ml** | **125ml** | **±0** | **4** | **4** | **Samp and beans** | **653g** | **109g** | **±74.47** | **6** |
| 5 | **Samp & beans w/ fish soup** | **466g** | **155g** | **±23.86** | **3** | **5** | **Mabella, sorgum, cooked** | **646g** | **162g** | **±76.18** | **4** |
| 6 | **Phuthu and Maas** | **437g** | **146g** | **±66.61** | **3** | **6** | **Baked beans Soup** | **370g** | **74g** | **±37.87** | **5** |
| 7 | **Vegetable soup** | **416g** | **104g** | **±27.78** | **4** | **7** | **Morvite** | **354g** | **118g** | **±57.65** | **3** |
| 8 | **Morvite** | **386g** | **129g** | **±66.25** | **3** | **8** | **Vegetable soup** | **337g** | **84g** | **±35.54** | **4** |
| 9 | **Tea, Rooibos, Brewed** | **375ml** | **125ml** | **±0** | **3** | **9** | **Chicken curry** | **280g** | **70g** | **±25.94** | **4** |
| 10 | **Dhall soup** | **374g** | **126g** | **±61.2** | **3** | **10** | **Mince soup** | **233g** | **78g** | **±24.68** | **3** |
| 11 | **Mince soup** | **259g** | **86g** | **±9.71** | **3** | **11** | **Dhall and fish soup** | **226g** | **113g** | **±8.49** | **2** |
| 12 | **Chicken curry** | **246g** | **82g** | **±2.65** | **3** | **12** | **Phuthu and maas** | **210g** | **210g** | **±0** | **1** |
| 13 | **Dhall and Fish soup** | **224g** | **112g** | **±29.7** | **2** | **13** | **Tea, Rooibos, brewed** | **200ml** | **100ml** | **±0** | **2** |
| 14 | **Mabella, sorghum, cooked** | **202g** | **101g** | **±26.87** | **2** | **14** | **Sugar, white, granulated** | **185g** | **6g** | **±2.06** | **33** |
| 15 | **Samp and beans** | **193g** | **96.50g** | **±12.02** | **2** | **15** | **Egg soup** | **162g** | **81g** | **±0** | **2** |
| 16 | **Bread, brown** | **185g** | **46g** | **±16.01** | **4** | **16** | **Bread, brown** | **135g** | **34g** | **±4.79** | **4** |
| 17 | **Egg soup** | **182g** | **91g** | **±0** | **2** | **17** | **Cold drink, squash diluted** | **125ml** | **125ml** | **±0** | **1** |
| 18 | **Baked beans soup** | **150g** | **50g** | **±8.66** | **3** | **18** | **Chicken and Dhall soup** | **104g** | **104g** | **±0** | **1** |
| 19 | **Milk, whole fresh** | **141ml** | **70.50ml** | **±77.07** | **2** | **19** | **Chicken and vegetable soup** | **104g** | **104g** | **±0** | **1** |
| 20 | **Sugar, white, granulated** | **139g** | **5.35** | **±1.57** | **26** | **20** | **Orange, raw peeled** | **90g** | **45g** | **±0** | **2** |

For age group two to three years old, as seen in table 4.15, maize meal porridge (150g ±35.16, n=46) ranked number one and rice (100g ±23.05, n=34) ranked number two as the most frequently consumed. Other alternatives to maize meal porridge were Morvite (129g ±66.25, n=3) at number eight and Maltabella porridge (101g ±26.87, n=2) at number 14. One CCF served sliced brown bread (46g ±16.01, n=4), ranking in at number 16 with tea (125ml ±0, n=3) at number nine during tea time. Other sources of carbohydrates included dhall soup (126g ±61.2, n=3) ranking at number 10 and baked bean soup (50g ±8.66, n=3) at number 18, served with rice. Samp and beans with fish soup (155g ±23.86, n=3) ranked at number five and samp and beans (96.50g ±12.02, n=2) appears again at number 15.

For the age group four to five years old, as seen in table 4.15, maize meal porridge (120g ±49.27, n=47) ranked at number one and rice (82g ±33.94, n=35) at number two as the most frequently consumed in the CCFs. Other alternatives to maize meal porridge were Morvite (118g ±57.65, n=3) at number seven and Maltabella porridge (162g ±76.18, n=4) at number five. One CCF served sliced brown bread (34g ±4.79) with tea (100ml ±0, n=2) ranking at number 13 during tea time only. Samp and beans (109g ±74.47, n=6) ranked at number four, baked bean soup (74g ±37.87, n=5) at number six and dhall and fish soup (113g ±8.49, n=2) at number 11 - served with rice to the older children as other sources of carbohydrates.

Canned fish was widely offered (n=11) as fish soup ranked number three on the top 20 list for both age groups. For the age group two to three years old, as illustrated in table 4.15, canned fish soup (72g ±28.02, n=11) was served with rice in the CCFs. Canned fish was also cooked with dhall (112g ±29.7, n=2) ranking at number 13 and served with rice. Canned fish soup with samp and beans (155g ±23.86, n=3) ranked at number five and was served in two CCFs. Other sources of protein included minced meat soup (86g ±9.71, n=3) at number 11, chicken curry (82g ±2.65, n=3) at number 12 and egg soup (91g ±0, n=2) at number 17, all served with rice.

In the age group four to five years old, as shown in table 4.15, fish soup (60g ±12.42, n=11) was served with rice. Chicken curry (70g ±25.94, n=4) at number nine was the second most served protein source after fish, followed by minced meat soup (78g ±24.68, n=3) at number 10, and egg soup (81g ±0, n=2) at number 15. Chicken and dhall soup (104g ±0) at number 18 and another served chicken and vegetable soup (104g ±0) ranking at number 19, all served with rice or ‘phuthu pap’.

Milk (70.5ml ±77.07, n=2) ranked at number 19 and was served with cornflakes. ‘phuthu’ and ‘maas’ was served to both the younger children (146g ±66.61), ranking at number six and the older children (210g ±0, n=1) at number 12, once a week.

**Table 4.16: Mean Fruit and Vegetable Intake per Child for all CCFs for the Five Day Menu.**

| | Mean intake (g) ±SD |
|---|---|
| **CCF 1** | 33.30g ±50.90 |
| **CCF 2** | 110.70g ±164.70 |
| **CCF 3** | 13.20g ±22.80 |
| **CCF 4** | 7.70g ±13.30 |
| **CCF 5** | 13.50g ±23.40 |
| **CCF 6** | 9.20g ±16.00 |
| **CCF 7** | 4.10g ±7.10 |
| **CCF 8** | 10.20g ±17.70 |
| **CCF 9** | 8.30g ±14.40 |
| **CCF 10** | 9.50g ±16.50 |

Table 4.16 illustrates the mean intake of fruit and vegetables offered in CCF meals for each of the 10 CCFs. Fresh and frozen vegetables were included in soups that appear at numbers seven, 10 and 13 for two to three year olds and numbers eight, 11 and 18 for the older group. Protein dishes rank in numbers 11 and 12 for two to three year olds and numbers nine, 10 and 19 were extended using vegetables. Only CCF two gave children half an apple alternating with half an orange (45g ±0), ranking at number 20, four days a week to all children during tea time.

### 4.2.3.2 Nutrient Analysis

The nutrient analysis of the menus was compared to the DRIs compiled by the IoM in 2003. Tables 4.17A and 4.17B show the contribution of daily nutrient intake of children aged two to

three years old at Inanda CCFs. According to the GECDS, CCFs that open for eight or more hours should provide two meals and a snack. The ADA states that meals should meet at least 50% to 66% of daily nutrient requirements of the children and the rest should be consumed at home (Benjamin Neelon and Briley, 2011, SKWEYIYA, 2008). Therefore the nutrient adequacy of the meals served at the CCFs was compared to 60% of the requirements of the children.

Tables 4.17A and 4.17B illustrate the nutrient adequacy of menus for the age group two to three years old at CCFs one to 10.

CCF one served some meals that were far below the recommended 60% DRIs on a number of nutrients. Meals at CCF one did not provide vitamins $B_{12}$ and D at all. The energy provided was 1504.47kJ (±844.947), dietary fibre 3.26g (±1.329), calcium 94.32mg (±74.202), phosphorus 173.09mg (±94.505), iodine 5.03mcg (±6.274), vitamin A 95.66mcg (±99.66), riboflavin 0.20mg (±0.178), niacin 2.36mg (±1.733) and folate 52.03mcg (±39.850) were all below 60% of DRIs from both meals, altogether. Thiamine (0.53mg ±0.447) was above 100% of the DRI of 0.40 mg and vitamin K exceeded the DRI of 30mcg at 34.60mcg ±43.901 which was 115.33% the recommended amount per day.

Meals served at CCF two provided an exceedingly high intake of several nutrients. The nutrients were protein 14.11g (±0.751), carbohydrates 116.48g (±8.405), iron 3.80mg (±0.120), zinc 2.46mg (±0.172), riboflavin 0.40mg (±0.070), thiamine 0.41mg (±0.045) and vitamin $B_{12}$ 1.03mg (±0.4421) which were above 100% of DRI recommendations. Vitamin C 33.57mg (±12.28) was 258.23% of DRI (13mg). Nutrients that were below 60% of DRIs for the two meals per day were dietary fibre 4.86g (±0.495), calcium 181.22mg (±33.925), phosphorus 174.48mg (±18.612), iodine 23.63mcg (±12.350), folate 19.61mcg (±3.136), vitamin $B_6$ 0.16mg (±0.037), vitamin D 2.98mcg (±1.431), vitamin E 1.96mg (±0.709) and vitamin K 3.93mcg (±1.336).

At CCF three most nutrients were below 60% of the DRIs from the two meals served each day. These were: energy 1249.07kJ (±125.760), protein 4.99g (±0.928), carbohydrates 52.68g (±6.528), dietary fibre 3.54g (±0.647), calcium 36.51mg (±15.662), phosphorus 169.53mg (±22.415), zinc 1.24mg (±0.128), iodine 0.61mcg (±0.565), vitamin A 52.69mcg (±7.791), riboflavin 0.18mg (±0.015), niacin 1.68mg (±0.531), vitamin $B_6$ 0.20mg (±0.047), folate

35.74mcg (±12.969), vitamin $B_{12}$ 0.36mg (±0.474), vitamin D 0.62mcg (±0.318), vitamin E 1.27mcg (±0.646) and vitamin K 11.96mcg (±16.694).

In meals served at CCF four, only vitamin C 12.50mg (±17.216) was above 60% of DRIs (13mg). All other nutrients were below 60% of DRIs from both meals as shown in table 4.17A.

## Table 4.17A: Nutrient Adequacy of Menus for Children of Two to Three years Old (CCFs One to Five)

| Nutrient /day | DRIs age group 1 to 3 years | CCF 1 menu mean intake ± SD | % contribution of CCF1 menu to daily needs of the children (DRIs) | CCF 2 menu mean intake ± SD | % contribution of CCF 2 menu to daily needs of the children (DRIs) | CCF 3 menu mean intake ± SD | % contribution of CCF 3 menu to daily needs of the children (DRIs) | CCF 4 menu mean intake ± SD | % contribution of CCF 4 menu to daily needs of the children (DRIs) | CCF 5 menu mean intake ± SD | % contribution of CCF 5 menu to daily needs of the children (DRIs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy (kJ) (EER) | 4 393 Boys | 1504.47 ±844.947 | 34.25% | 2603.87 ±225.432 | 59.27% | 1249.07 ±125.760 | 28.43% | 987.38 ±829.608 | 22.48% | 1734.04 ±235.18 | 39.47% |
| | 4 166 Girl | 1504.47 ±844.947 | 36.11% | 2603.87 ±225.432 | 62.50% | 1249.07 ±125.760 | 29.98% | 987.38 ±829.608 | 23.70% | 1734.04 ±235.18 | 41.62% |
| Total protein (g) (RDA) | 13 | 9.40 ±4.464 | 72.31% | 14.11 ±0.751 | 108.54 % | 4.99 ±0.928 | 38.38% | 5.40 ±4.125 | 41.54% | 13.31 ±4.699 | 102.38 % |
| Carbohydrates avail. (g) | 100 | 61.32 ±27.32 | 61.32% | 116.48 ±8.405 | 116.48 % | 52.68 ±6.528 | 52.68% | 42.80 ±37.494 | 42.80% | 71.04 ±1.601 | 71.04% |
| Total dietary fibre (g) (AI) | 19 | 3.26 ±1.329 | 17.16% | 4.86 ±0.495 | 25.58% | 3.54 ±0.647 | 18.63% | 2.46 ±2.552 | 12.95% | 4.05 ±1.297 | 21.32% |
| Calcium (mg) (AI) | 500 | 94.32 ±74.202 | 18.86% | 181.22 ±33.925 | 36.24% | 36.51 ±15.662 | 7.30% | 46.78 ±61.454 | 9.36% | 39.26 ±11.948 | 7.85% |
| Iron (mg) (EAR) | 3.0 | 2.00 ±1.459 | 66.67% | 3.80 ±0.120 | 126.67 % | 2.46 ±0.168 | 82.00% | 1.10 ±1.059 | 36.67% | 1.82 ±0.428 | 60.67% |
| Phosphorus (mg) (EAR) | 380 | 173.09 ±94.505 | 45.55% | 174.48 ±18.612 | 45.92% | 169.53 ±22.415 | 44.61% | 61.32 ±15.898 | 16.14% | 214.56 ±41.545 | 56.46% |
| Zinc (mg) (EAR) | 2.2 | 1.34 ±0.625 | 60.91% | 2.46 ±0.172 | 111.82 % | 1.24 ±0.128 | 56.36% | 1.05 ±1.107 | 47.73% | 1.63 ±0.439 | 74.09% |
| Iodine (mcg) (EAR) | 65 | 5.03 ±6.274 | 7.74% | 23.63 ±12.350 | 36.35% | 0.60 ±0.565 | 0.94% | 29.18 ±21.194 | 44.89% | 2.68 ±2.004 | 4.12% |
| Vitamin A (RE) (mcg) (EAR) | 210 | 95.66 ±99.66 | 45.55% | 188.49 ±26.594 | 89.76% | 52.69 ±7.791 | 25.09% | 54.74 ±100.522 | 26.07% | 56.86 ±27.197 | 27.08% |
| Thiamine (mg) (EAR) | 0.4 | 0.53 ±0.447 | 132.50% | 0.41 ±0.045 | 102.50 % | 0.25 ±0.055 | 62.50% | 0.16 ±0.174 | 40.00% | 0.31 ±0.054 | 77.50% |
| Riboflavin (mg) (EAR) | 0.4 | 0.20 ±0.178 | 50.00% | 0.40 ±0.070 | 100.00 % | 0.18 ±0.015 | 45.00% | 0.11 ±0.194 | 27.50% | 0.14 ±0.036 | 35.00% |
| Niacin (mg) (EAR) | 5.0 | 2.36 ±1.733 | 47.20% | 4.44 ±0.980 | 88.80% | 1.68 ±0.531 | 33.60% | 1.82 ±2.128 | 36.40% | 3.28 ±2.522 | 65.60% |
| Vitamin$B_6$ (mg) (EAR) | 0.4 | 0.34 ±0.231 | 85.00% | 0.16 ±0.037 | 40.00% | 0.20 ±0.047 | 50.00% | 0.12 ±0.056 | 30.00% | 0.26 ±1.111 | 65.00% |
| Folate (mcg) (EAR) | 120 | 52.03 ±39.850 | 43.36% | 19.61 ±3.136 | 16.34% | 35.74 ±12.969 | 29.08% | 20.72 ±23.331 | 17.27% | 31.14 ±14.009 | 25.95% |
| Vitamin$B_{12}$ (mg) (EAR) | 0.7 | 0.00 ±0.000 | 0.00% | 1.03 ±0.442 | 147.14 % | 0.36 ±0.474 | 51.43% | 0.09 ±0.175 | 12.86% | 0.42 ±0.213 | 60.00% |
| Vitamin C (mg) (EAR) | 13 | 10.45 ±8.273 | 80.38% | 33.57 ±12.281 | 258.23 % | 9.88 ±5.461 | 76.00% | 12.50 ±17.216 | 96.15% | 4.96 ±3.335 | 38.15% |
| Vitamin D (mcg) (AI) | 5.0 | 0.00 ±0.000 | 0.00% | 2.98 ±1.431 | 59.60% | 0.62 ±0.318 | 12.40% | 0.20 ±0.426 | 4.00% | 0.37 ±0.114 | 7.40% |
| Vitamin E (mg) (EAR) | 5.0 | 0.74 ±0.882 | 14.80% | 1.96 ±0.709 | 39.20% | 1.27 ±0.646 | 25.40% | 1.11 ±1.110 | 22.20% | 1.19 ±0.675 | 23.80% |
| Vitamin K (mcg) (AI) | 30 | 34.60 ±43.901 | 115.33% | 3.93 ±1.336 | 13.10% | 11.96 ±16.694 | 39.87% | 1.04 ±1.107 | 3.47% | 2.45 ±0.944 | 8.17% |

EAR: Estimated Average Requirement
EER: Estimated Energy Requirement
SD: Standard Deviation
AI: Adequate Intake
RE: Retinol equivalent
RDA: Recommended Daily Allowance
kJ: Kilojoules
g: grams

| | | | | | |
|---|---|---|---|---|---|
| | Less than 60% of DRIs | | Above 60% of DRIs | | Exceeding 100% of DRIs |

In CCF five energy 1734.04kJ (±235.188), dietary fibre 4.05g (±1.297), calcium 39.26mg (±11.948), phosphorus 214.56mg (±41.545), iodine 2.68mcg (±2.004), vitamin A 56.86mcg (±27.197), riboflavin 0.14mg (±0.036), folate 31.14mcg (±14.009), vitamin C 4.96mg (±3.335), vitamin D 0.37mcg (±0.114), vitamin E 1.19mg (±0.675) and vitamin K 2.45mcg (±0.944) were below 60% of DRIs. Only protein 13.13g (±4.70) was above the DRI (13g) at 102%.

Meals served at CCFs six and nine provided insufficient nutrients, as illustrated in table 4.17B, in that all nutrients were below 60% of DRIs from both meals served, except for carbohydrates at 94.60g (±68.11) which above 60% of DRI (100g) at CCF nine. In CCF seven, meals offered a number of nutrients that were 100% and above of the DRIs from both meals. These nutrients were protein 13.91g (±4.186), zinc 2.20mg (±1.640), vitamin A 229.40mcg (±148.952), vitamin $B_{12}$ 0.72mg (±0.589), and vitamin C 20.38mg (±28.603). Nutrients that were below 60% of DRIs were energy 2253.97kJ (±849.644), dietary fibre 4.45g (±3.276), calcium 124.15mg (±171.349), phosphorus 185.67mg (±35.213), iodine 10.41mcg (±17.374), folate 25.45mcg (±18.902), vitamin D 0.66mcg (±0.563) and vitamin K 7.54mcg (±5.181).

The two meals at CCF eight offered less than 60% of DRIs with regards to the following nutrients: energy 1113.63kJ (±416.018), protein 6.95g (±2.709), carbohydrates 41.75g (±13.612), dietary fibre 1.86g (±1.188), calcium 62.73mg (±57.853), phosphorus 121.34mg (±46.201), zinc 0.97mg (±0.405), vitamin A 23.51mcg (±35.415), riboflavin 0.21mg (±0.305), niacin 2.64mg (±2.375), vitamin $B_6$ 0.23mg (±0.285), folate 35.50mcg (±52.665), vitamin C 5.03mg (±3.995), vitamin D 0.74mcg (±0.600), vitamin E 2.73mg (±2.695) and vitamin K 1.57mcg (±1.020). Vitamin $B_{12}$ 1.02mg (±0.872) was exceedingly high at 145.71% above the recommended DRI of 0.7mg for this nutrient in this age group.

## Table 4.17B: Nutrient Adequacy of Menus for Children of Two to Three Years Old (CCFs six – 10)

| Nutrient /day | DRIs age group 1 to 3 years | CCF 6 menu mean intake ± SD | % contribution of CCF 6 menu to daily needs of the children (DRIs) | CCF 7 menu mean intake ± SD | % contribution of CCF 7 menu to daily needs of the children (DRIs) | CCF 8 menu mean intake ± SD | % contribution of CCF 8 menu to daily needs of the children (DRIs) | CCF 9 menu mean intake ± SD | % contribution of CCF 9 menu to daily needs of the children (DRIs) | CCF 10 menu mean intake ± SD | % contribution of CCF 10 menu to daily needs of the children (DRIs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy (kJ) (EER) | 4 393 Boys | 964.89 ±581.50 | 21.96% | 2253.97 ±849.64 | 51.31% | 1113.63 ±416.01 | 25.35% | 1884.93 ±1085.5 | 42.91% | 1478.22 ±379.96 | 33.65% |
| | 4 166 Girls | 964.89 ±581.50 | 23.16% | 2253.97 ±849.64 | 54.10% | 1113.63 ±416.01 | 26.73% | 1884.93 ±1085.5 | 45.25% | 1478.22 ± 79.966 | 35.48% |
| Total protein (g) (RDA) | 13 | 5.38 ±3.646 | 41.38% | 13.91 ±4.186 | 107.00 % | 6.95 ±2.709 | 53.46% | 6.66 ±2.290 | 51.23% | 10.28 ±4.963 | 79.08% |
| Carbohydrates avail. (g) | 100 | 43.90 ±23.116 | 43.90% | 91.30 ±47.480 | 91.30% | 41.75 ±13.612 | 41.75% | 94.60 ±68.106 | 94.60% | 63.15 ±16.474 | 63.15% |
| Total dietary fibre (g) (AI) | 19 | 2.27 ±1.223 | 11.95% | 4.45 ±3.276 | 23.42% | 1.86 ±1.188 | 9.79% | 2.93 ±0.480 | 15.42% | 3.30 ±1.282 | 17.37% |
| Calcium (mg) (AI) | 500 | 29.12 ±33.460 | 5.82% | 124.15 ±171.34 | 24.83% | 62.73 ±57.853 | 12.55% | 13.20 ±4.618 | 2.64% | 59. 47 ±53.862 | 11.89% |
| Iron (mg) (EAR) | 3.0 | 0.74 ±0.592 | 24.67% | 2.48 ±1.325 | 82.67% | 1.84 ±1.833 | 61.33% | 1.17 ±0.157 | 39.00% | 1.62 ±0.803 | 54.00% |
| Phosphorus (mg) (EAR) | 380 | 99.50 ±58.374 | 26.18% | 185.67 ±35.213 | 48.86% | 121.34 ±46.201 | 31.93% | 140.89 ±44.905 | 37.08% | 156.02 ±51.242 | 41.06% |
| Zinc (mg) (EAR) | 2.2 | 0.67 ±0.440 | 30.45% | 2.20 ±1.640 | 100.00 % | 0.97 ±0.405 | 44.09% | 0.89 ±0.207 | 40.45% | 1.40 ±0.714 | 63.64% |
| Iodine (mcg) (EAR) | 65 | 4.02 ±6.520 | 6.18% | 10.41 ±17.374 | 16.02% | 53.21 ±115.67 | 81.86% | 9.55 ±7.992 | 14.69% | 29.44 ±20.609 | 45.29% |
| Vitamin A(RE) (mcg) (EAR) | 210 | 50.46 ±54.886 | 24.03% | 229.40 ±148.95 | 109.24 % | 23.51 ±35.415 | 11.20% | 23.30 ±16.726 | 11.10% | 110.44 ±88.203 | 52.59% |
| Thiamine (mg) (EAR) | 0.4 | 0.19 ±0.131 | 47.50% | 0.39 ±0.234 | 97.50% | 0.25 ±0.195 | 62.50% | 0.19 ±0.076 | 47.50% | 0.24 ±0.110 | 60.00% |
| Riboflavin (mg) (EAR) | 0.4 | 0.06 ±0.044 | 15.00% | 0.34 ±0.364 | 85.00% | 0.21 ±0.305 | 52.50% | 0.10 ±0.025 | 25.00% | 0.14 ±0.124 | 35.00% |
| Niacin (mg) (EAR) | 5.0 | 1.01 ±1.084 | 20.20% | 4.76 ±2.680 | 95.20% | 2.64 ±2.375 | 52.80% | 1.21 ±0.873 | 24.20% | 3.34 ±3.018 | 66.80% |
| Vitamin$B_6$ (mg) (EAR) | 0.4 | 0.10 ±0.076 | 25.00% | 0.26 ±0.173 | 65.00% | 0.23 ±0.285 | 57.50% | 0.11 ±0.044 | 27.50% | 0.15 ±0.099 | 37.50% |
| Folate (mcg) (EAR) | 120 | 18.17 ±20.015 | 15.14% | 25.45 ±18.902 | 21.21% | 35.50 ±52.665 | 29.58% | 27.49 ±15.077 | 22.91% | 15.36 ±14.806 | 12.80% |
| Vitamin$B_{12}$ (mg) (EAR) | 0.7 | 0.07 ±0.135 | 10.00% | 0.72 ±0.589 | 102.86 % | 1.02 ±0.872 | 145.71 % | 0.15 ±0.218 | 21.43% | 1.04 ±1.325 | 148.57 % |
| Vitamin C (mg) (EAR) | 13 | 2.08 ±1.928 | 16.00% | 20.38 ±28.603 | 156.77 % | 5.03 ±3.995 | 38.69% | 3.26 ±2.168 | 25.08% | 9.17 ±12.387 | 70.54% |
| Vitamin D (mcg) (AI) | 5.0 | 0.11 ±0.157 | 2.20% | 0.66 ±0.563 | 13.20% | 0.74 ±0.600 | 14.80% | 0.23 ±0.205 | 4.60% | 0.79 ±0.988 | 15.80% |
| Vitamin E (mg) (EAR) | 5.0 | 0.34 ±0.156 | 6.80% | 2.68 ±1.041 | 53.60% | 2.73 ±2.695 | 54.60% | 0.67 ±0.323 | 13.40% | 1.47 ±0.636 | 29.40% |
| Vitamin K (mcg) (AI) | 30 | 2.37 ±2.868 | 7.90% | 7.54 ±5.181 | 25.13% | 1.57 ±1.020 | 5.23% | 1.24 ±0.585 | 4.13% | 5.14 ±9.918 | 17.13% |

EAR: Estimated Average Requirement
SD: Standard Deviation
RE: Retinol equivalent
kJ: Kilojoules
EER: Estimated Energy Requirement
AI: Adequate Intake
RDA: Recommended Daily Allowance
g: grams

| | | | | | |
|---|---|---|---|---|---|
| | Less than 60% of DRIs | | Above 60% of DRIs | | Exceeding 100% of DRIs |

Meals at CCF ten were exceedingly high in vitamin $B_{12}$ as children were served 1.04mg (±1.325) which is 148% above the DRI recommended amount of (0.7mg). Nutrients such as energy 1478.22kJ (±379.966), dietary fibre 3.30g (±1.282), calcium 59.47mg (±53.862), iron 1.62mg (±0.803), phosphorus 156.02mg (±51.242), iodine 29.44mcg (±20.609), vitamin A 110.44mcg (±88.203), riboflavin 0.14mg (±0.124), vitamin $B_6$ 0.15mg (±0.099), folate 15.36mcg (±14.806), vitamin D 0.79mcg (±0.988), vitamin E 1.47mg (±0.636) and vitamin K 5.14mcg (±9.918) were below 60% of DRIs from both meals served.

Tables 4.18A and 4.18B illustrate the nutrient adequacy of menus for age group four to five years at CCFs one to 10. Meals offered at CCF one had carbohydrates 108.69g (±14.399), iron 4.28mg (±1.490) and thiamine 0.53mg (±0.108) that exceeded 100% of the DRIs (100g, 4.1mg and 0.5mg respectively). Energy 2439kJ (±412.784), dietary fibre 7.49g (±2.930), calcium 111.86mg (±49.676), iodine 6.70mcg (±11.707), riboflavin 0.25mg (±0.103), niacin 2.81mg (±1.172), vitamin $B_{12}$ 0.18mg (±0.350), vitamin C 9.70mg (±5.633), vitamin D 0.80mcg (±1.774) and vitamin E 1.41mg (±0.828) were below 60% of DRIs from both meals.

Meals served at CCF two were above 100% of DRIs on the following nutrients: protein 19.08g (±1.745), carbohydrates 161.21g (±7.509), iron 5.33mg (±0.308), thiamine 0.56mg (±0.033) riboflavin 0.57mg (±0.071), niacin 6.46mg (±1.843), vitamin $B_{12}$ 2.84mg (±2.792) and vitamin C 44.52mg (±12.670). Nutrients that were below 60% of DRIs included energy 3564.17kJ (±168.982), dietary fibre 4.86g (±0.495), calcium 259.00mg (±71.724), phosphorus 231.53mg (±53.663), iodine 31.19mcg (±13.790), vitamin $B_6$ 0.20mg (±0.036), folate 22.53mcg (±3.486), vitamin E 2.59mg (±0.721) and vitamin K 5.26mcg (±2.063).

As illustrated in table 4.18B at CCFs three, four and five the meals served were below 60% of DRIs in all nutrients, except for: carbohydrates 67.21g (±5.983), iron 3.20mg (±0.184) and thiamine 0.34mg (±0.058) at CCF 3, vitamin C 13.92mg (±19.590) at CCF four and protein 12.21g (±6.258) together with carbohydrate 74.49g (±19.107) at CCF five were above 60% of DRIs (100g, 4.1mg and 19g respectively).

**Table 4.18A: Nutrient Adequacy of Menus for Children of Four - Five Years Old (CCFs one to five)**

| Nutrient /day | DRIs age group 4 to 8 years | CCF 1 menu mean intake ± SD | % contribution of CCF 1 menu to daily needs of the children (DRIs) | CCF 2 menu mean intake ± SD | % contribution of CCF 2 menu to daily needs of the children (DRIs) | CCF 3 menu mean intake ± SD | % contribution of CCF 3 menu to daily needs of the children (DRIs) | CCF 4 menu mean intake ± SD | % contribution of CCF 4 menu to daily needs of the children (DRIs) | CCF 5 menu mean intake ± SD | % contribution of CCF 5 menu to daily needs of the children (DRIs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy (kJ) (EER) | 7 316 Boys | 2439.86 ±412.784 | 33.35% | 3564.17 ±168.982 | 48.72% | 1605.56 ±104.845 | 21.95% | 1122.3 ±1017.523 | 15.34% | 1735.41 ±537.717 | 23.72% |
| | 6 896 Girls | 2439.86 ±412.784 | 35.38% | 3564.17 ±168.982 | 51.68% | 1605.56 ±104.845 | 23.28% | 1122.3 ±1017.523 | 16.27% | 1735.41 ±537.717 | 25.17% |
| Total protein (g) (RDA) | 19 | 16.18 ±4.805 | 85.16% | 19.08 ±1.745 | 100.42 % | 6.36 ±0.817 | 33.47% | 6.09 ±5.248 | 32.05% | 12.21 ±6.258 | 64.26% |
| Carbohydrates avail.(g) (EAR) | 100 | 108.69 ±14.399 | 108.69 % | 161.21 ±7.509 | 161.21 % | 67.21 ±5.983 | 67.21% | 49.19 ±45.244 | 49.19% | 74.49 ±19.107 | 74.49% |
| Total dietary fibre (g) (AI) | 25 | 7.49 ±2.930 | 29.96% | 4.86 ±0.495 | 25.58% | 4.59 ±1.139 | 18.36% | 2.59 ±3.066 | 10.36% | 3.18 ±1.230 | 12.72% |
| Calcium (mg) (AI) | 800 | 111.86 ±49.676 | 13.98% | 259.00 ±71.724 | 32.38% | 47.45 ±16.555 | 5.93% | 52.91 ±73.692 | 6.61% | 31.30 ±19.981 | 3.91% |
| Iron (mg) (EAR) | 4.1 | 4.28 ±1.490 | 104.39 % | 5.33 ±0.308 | 130 % | 3.20 ±0.184 | 78.05% | 1.17 ±1.282 | 28.54% | 1.56 ±0.676 | 38.05% |
| Phosphorus (mg) (EAR) | 405 | 305.24 ±80.944 | 75.37% | 231.53 ±53.663 | 57.17% | 217.30 ±17.847 | 53.65% | 67.68 ±12.387 | 16.71% | 202.53 ±72.904 | 50.01% |
| Zinc (mg) (EAR) | 4 | 2.56 ±1.017 | 64.00% | 3.39 ±0.215 | 84.75% | 1.58 ±0.120 | 39.50% | 1.17 ±1.324 | 29.25% | 1.57 ±0.708 | 39.25% |
| Iodine (mcg) (EAR) | 65 | 6.70 ±11.707 | 10.31% | 31.19 ±13.790 | 47.98% | 0.71 ±0.566 | 1.09% | 30.16 ±25.612 | 46.40% | 2.22 ±2.031 | 3.42% |
| Vitamin A (RE) (mcg) (EAR) | 275 | 261.95 ±244.685 | 95.25% | 266.70 ±34.470 | 96.98% | 71.11 ±19.336 | 25.86% | 62.85 ±116.558 | 22.85% | 49.41 ±29.592 | 17.97% |
| Thiamine (mg) (EAR) | 0.5 | 0.53 ±0.108 | 106 % | 0.56 ±0.033 | 112.00 % | 0.34 ±0.058 | 68.00% | 0.18 ±0.205 | 36.00% | 0.27 ±0.092 | 54.00% |
| Riboflavin (mg) (EAR) | 0.5 | 0.25 ±0.103 | 50.00% | 0.57 ±0.071 | 114 % | 0.23 ±0.015 | 46.00% | 0.13 ±0.225 | 26.00% | 0.13 ±0.048 | 26.00% |
| Niacin (mg) (EAR) | 6 | 2.81 ±1.172 | 46.83% | 6.46 ±1.843 | 107.67 % | 2.11 ±0.529 | 35.17% | 2.04 ±2.498 | 34.00% | 2.95 ±2.522 | 49.17% |
| Vitamin $B_6$(mg) (EAR) | 0.5 | 0.35 ±0.106 | 70.00% | 0.20 ±0.036 | 40.00% | 0.25 ±0.047 | 50.00% | 0.13 ±0.056 | 26.00% | 0.26 ±0.150 | 52.00% |
| Folate (mcg) (EAR) | 160 | 116.32 ±22.762 | 72.70% | 22.53 ±3.486 | 14.08% | 47.44 ±23.034 | 29.65% | 21.45 ±24.897 | 13.41% | 23.75 ±10.801 | 14.84% |
| Vitamin $B_{12}$ (mg) (EAR) | 1 | 0.18 ±0.350 | 18.00% | 2.84 ±2.792 | 284 % | 0.43 ±0.505 | 43.00% | 0.10 ±0.192 | 10.00% | 0.28 ±0.205 | 28.00% |
| VitaminC (mg) (EAR) | 22 | 9.70 ±5.633 | 44.09% | 44.52 ±12.670 | 202.36 % | 10.48 ±4.371 | 47.64% | 13.92 ±19.590 | 63.27% | 4.57 ±3.192 | 20.77% |
| Vitamin D (mcg) (AI) | 5 | 0.80 ±1.774 | 16.00% | 4.03 ±1.776 | 80.60% | 0.77 ±0.334 | 15.40% | 0.23 ±0.507 | 4.60% | 0.29 ±0.112 | 5.80% |
| Vitamin E (mg) (EAR) | 6 | 1.41 ± 0.828 | 23.50% | 2.59 ±0.721 | 43.17% | 1.74 ± 0.986 | 29.00% | 1.18 ±1.299 | 19.67% | 0.99 ±0.696 | 16.50% |
| Vitamin K (mcg) (AI) | 55 | 54.72 ±53.801 | 99.49% | 5.26 ±2.063 | 9.56% | 6.14 ±3.045 | 11.16% | 1.33 ±1.598 | 2.42% | 2.25 ±1.120 | 4.09% |

EAR: Estimated Average Requirement
SD: Standard Deviation
RE: Retinol equivalent
kJ: Kilojoules
EER: Estimated Energy Requirement
AI: Adequate Intake
RDA: Recommended Daily Allowance
g: grams

| | Less than 60% of DRIs | | Above 60% of DRIs | | Exceeding 100% of DRIs |
|---|---|---|---|---|---|

In meals served at CCFs six and nine (table 4.18B) the nutrients were below 60% of DRIs in all nutrients except for carbohydrates, which were 84.84g (±22.842) in CCF six and 68.32g ±8.524 in CCF nine. Thiamine was 0.33mg (±0.168) at CCF six which was above 60% of DRIs.

At CCF seven meals were below 60% of DRIs both meal served in the following nutrients: energy 2397.00kJ (±949.549), dietary fibre 4.72g (±3.656), calcium 135.13mg (±184.491), phosphorus 193.36mg (±31.286), zinc 2.39mg (±1.797), iodine 11.30mcg (±19.181), vitamin $B_6$ 0.28mg (±0.189), folate 26.10mcg (±19.387), vitamin D 0.69mcg (±0.607), vitamin E 2.92mg (±1.648) and vitamin K 10.06mcg (±20.909). Vitamin C 22.23mg (±31.617) was above 100% of DRIs (22mg) in both meals.

All nutrients were below 60% of DRIs in both meals at CCFs eight, nine and ten - with an exception of four nutrients, which were: iodine at CCF eight, which was offered above 100% of DRI (65mcg) at 73.54mcg (±159.090), vitamin $B_{12}$ at CCFs eight and ten, served at 1.32mg (±1.087) and 1.04mg (±1.325) respectively. Thiamine 0.30mg (±0.184) at CCF eight and carbohydrates at CCFs nine and ten (68.32g ±8.524 and 63.15g ±16.474) were served at amounts that met 60% of DRIs from both meals at these CCFs.

**Table 4.18B: Nutrient Adequacy of Menus for Children of Four to Five Years Old (CCFs six to 10)**

| Nutrient /day | DRIs age group 4 to 8 years | CCF 6 menu mean intake ± SD | % contribution of CCF 6 menu to daily needs of the children (DRIs) | CCF 7 menu mean intake ± SD | % contribution of CCF 7 menu to daily needs of the children (DRIs) | CCF 8 menu mean intake ± SD | % contribution of CCF 8 menu to daily needs of the children (DRIs) | CCF 9 menu mean intake ± SD | % contribution of CCF 9 menu to daily needs of the children (DRIs) | CCF 10 menu mean intake ± SD | % contribution of CCF 10 menu to daily needs of the children (DRIs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Energy (kJ) (EER)** | **7 316 Boys** | 1858.67 ±572.804 | 25.41% | 2397.00 ±949.549 | 32.76% | 1573.95 ±537.602 | 21.51% | 1521.11 ±192.637 | 20.79% | 1478.22 ±379.966 | 20.21% |
| | **6 896 Girls** | 1858.67 ±572.804 | 26.95% | 2397.00 ±949.549 | 34.76% | 1573.95 ±537.602 | 22.82% | 1521.11 ±192.637 | 22.06% | 1478.22 ±379.966 | 21.44% |
| **Total protein (g) (RDA)** | **19** | 10.75 ±3.979 | 56.58% | 14.59 ±4.785 | 76.79% | 10.66 ±4.149 | 56.11% | 8.38 ±2.656 | 44.11% | 10.28 ±4.963 | 54.11% |
| **Carbohydrates avail. (g) (EAR)** | **100** | 84.84 ±22.842 | 84.84% | 98.80 ±51.139 | 98.80% | 57.55 ±15.590 | 57.55% | 68.32 ±8.524 | 68.32% | 63.15 ±16.474 | 63.15% |
| **Total dietary fibre (g) (AI)** | **25** | 2.27 ±1.223 | 9.08% | 4.72 ±3.656 | 18.88% | 2.61 ±1.511 | 10.44% | 3.33 ±0.681 | 13.32% | 3.03 ±1.282 | 12.12% |
| **Calcium (mg) (AI)** | **800** | 72.12 ±60.635 | 9.02% | 135.13 ±184.491 | 16.89% | 128.60 ±123.462 | 16.08% | 22.51 ±8.712 | 2.81% | 59.47 ±53.862 | 7.43% |
| **Iron (mg) (EAR)** | **4.1** | 1.24 ±0.682 | 30.24% | 2.66 ±1.432 | 64.88% | 2.08 ±1.660 | 50.73% | 1.56 ±0.277 | 38.05% | 1.62 ±0.803 | 39.51% |
| **Phosphorus (mg) (EAR)** | **405** | 205.63 ±60.221 | 50.77% | 193.36 ±31.286 | 47.74% | 197.16 ±77.369 | 48.68% | 176.80 ±27.509 | 43.65% | 156.02 ±51.242 | 38.52% |
| **Zinc (mg) (EAR)** | **4.0** | 1.37 ±0.435 | 34.25% | 2.39 ±1.797 | 59.75% | 1.53 ±0.687 | 38.25% | 1.12 ±0.190 | 28.00% | 1.40 ±0.714 | 35.00% |
| **Iodine (mcg) (EAR)** | **65** | 11.30 ±22.366 | 17.38% | 11.30 ±19.181 | 17.38% | 73.54 ±159.090 | 113.14 % | 12.95 ±10.670 | 19.92% | 29.44 ±20.609 | 45.29% |
| **Vitamin A (RE) (mcg) (EAR)** | **275** | 87.20 ±85.458 | 31.71% | 247.41 ±167.461 | 89.97% | 46.39 ±69.843 | 16.87% | 30.92 ±28.086 | 11.24% | 110.44 ±88.203 | 40.16% |
| **Thiamine (mg) (EAR)** | **0.5** | 0.33 ±0.168 | 66.00% | 0.40 ±0.265 | 80.00% | 0.30 ±0.184 | 60.00% | 0.24 ±0.036 | 48.00% | 0.24 ±0.110 | 48.00% |
| **Riboflavin (mg) (EAR)** | **0.5** | 0.12 ±0.065 | 24.00% | 0.36 ±0.401 | 72.00% | 0.28 ±0.360 | 56.00% | 0.12 ±0.024 | 24.00% | 0.14 ±0.124 | 28.00% |
| **Niacin (mg) (EAR)** | **6.0** | 1.68 ± 1.422 | 28.00% | 4.86 ±2.995 | 81.00% | 2.91 ±2.073 | 48.50% | 1.73 ±1.350 | 28.83% | 3.34 ±3.018 | 55.67% |
| **Vitamin $B_6$(mg) (EAR)** | **0.5** | 0.18 ±0.112 | 36.00% | 0.28 ±0.189 | 56.00% | 0.27 ±0.268 | 54.00% | 0.15 ±0.074 | 30.00% | 0.15 ±0.099 | 30.00% |
| **Folate (mcg) (EAR)** | **160** | 31.17 ±21.984 | 19.48% | 26.10 ±19.387 | 16.31% | 45.63 ±55.585 | 28.52% | 25.78 ±8.022 | 16.11% | 15.36 ±14.806 | 9.60% |
| **Vitamin $B_{12}$ (mg) (EAR)** | **1.0** | 0.14 ±0.175 | 14.00% | 0.75 ±0.585 | 75.00% | 1.32 ±1.087 | 132.00 % | 0.24 ±0.286 | 24.00% | 1.04 ±1.325 | 104.00 % |
| **Vitamin C (mg) (EAR)** | **22** | 3.12 ± 2.665 | 14.18% | 22.23 ±31.617 | 101.05% | 6.62 ±5.032 | 30.09% | 4.77 ±3.041 | 21.68% | 9.17 ±12.387 | 41.68% |
| **Vitamin D (mcg) (AI)** | **5.0** | 0.11 ±0.156 | 2.20% | 0.69 ±0.607 | 13.80% | 0.84 ±0.767 | 16.80% | 0.32 ±0.235 | 6.40% | 0.79 ±0.988 | 15.80% |
| **Vitamin E (mg) (EAR)** | **6.0** | 0.74 ±0.447 | 12.33% | 2.92 ±1.648 | 32.44% | 3.42 ±3.530 | 57.00% | 0.95 ±0.218 | 15.83% | 1.47 ±0.636 | 24.50% |
| **Vitamin K (mcg) (AI)** | **55** | 2.44 ±2.477 | 4.44% | 10.06 ±20.909 | 16.77% | 2.16 ±1.719 | 3.93% | 1.61 ±0.769 | 2.93% | 5.14 ±9.918 | 9.35% |

EAR: Estimated Average Requirement
SD: Standard Deviation
RE: Retinol equivalent
kJ: Kilojoules
EER: Estimated Energy Requirement
AI: Adequate Intake
RDA: Recommended Daily Allowance
g: grams

| | | | | |
|---|---|---|---|---|
| | Less than 60% of DRIs | | Above 60% of DRIs | Exceeding 100% of DRIs |

### 4.2.3.3 Energy Distribution for all CCFs

Table 4.19 presents the results of the energy distribution of the macronutrients according to the WHO population dietary intake goals (WHO, 2003) at all CCFs for all age groups, altogether. The total energy contribution of protein for the two meals served was below the WHO goals at CCFs two, three, four, six and nine. Only CCFs seven (17.46%) and eight (22.92%) were within the WHO goals in the contribution of total fat to energy intake. All other CCFs were below the minimum of 10% of the recommended WHO population intakes. All CCFs reached the WHO population dietary goals for carbohydrates except for CCF two (76.54%), CCF six (77.51%) and CCF nine (81.32%), which were above 55% - 75% of the WHO range. Dietary Fibre food sources consumed contributed below 20% of the WHO's recommendation of >25g/day or 60% (15g) for children from both meals at all CCFs. Fruit and vegetables were far below 60% (240g) of ≥400g of the recommended WHO goal (WHO, 2003).

**Table 4.19: Energy Distribution**

| Nutrient | WHO Goal | CCF 1 | CCF 2 | CCF 3 | CCF 4 | CCF 5 | CCF 6 | CCF 7 | CCF 8 | CCF 9 | CCF 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Protein (g) | 10 - 15% | 10.93% | 9.15% | 6.77% | 9.23% | 12.50% | 9.71% | 10.42% | 11.04% | 7.51% | 11.82% |
| Total Fat (g) | 15 - 30% | 8.96% | 12.17% | 7.39% | 13.56% | 10.81% | 8.99% | 17.46% | 22.92% | 5.57% | 12.45% |
| Carbohydrates Avail. (g) | 55 - 75% | 72.67% | 76.54% | 71.40% | 74.13% | 71.31% | 77.51% | 69.48% | 63.18% | 81.32% | 72.63% |
| Total Dietary Fibre (g) | >25g/day 60%=15g | 5.02g | 4.86g | 4.08g | 2.53g | 3.61g | 2.27g | 4.59g | 2.23g | 2.93g | 3.03g |
| Fruit and Vegetables (g) | >400g/day 60% = 240g | 33.30g | 110.70g | 13.20g | 7.70g | 13.50g | 9.20g | 4.10g | 10.20g | 8.30g | 9.50g |

## 4.2.4 Weighed Food Records

No waste was recorded because the children ate all the food that was served. In a few cases where children were absent the portion was recorded as waste for the study.

## 4.2.5 Food Handler's Questionnaire

The questions answered in this questionnaire offer results concerning the profile of the FHs in Inanda CCFs, recipes, food storage and food safety, food preparation, food holding, serving of meals and hygiene of the kitchen.

In the 10 CCFs that participated in the study, eight CCFs had one food handler, while two CCFs had two food handlers. In one CCF one FH cooked for the age groups three to six years old, and the other FH for age groups six months up to two years old. Table 4.20 indicates that

41.67% of FHs had less than a year's experience in food preparation working in the present CCF. Most of the FHs (83.33%) had no previous experience in food service. Most of the FHs, with less than a year of working as FHs, had received training once from owners of the CCFs at the commencement of the job (25.00%) or from previous FHs (25.00%). FHs with many years of experience in food handling (25.00%) only received training years ago with the DoH. In two CCFs community volunteers were used to prepare meals if the regular FHs were not at work.

**Table 4.20: Profile of Food Handlers (n =12)**

| Experience of Food Handlers in the Present CCF | Number (n = 12) | Percentage (%) |
|---|---|---|
| less than a year | 5 | 41.67 |
| One to three years | 3 | 25.00 |
| More than 3 years | 4 | 33.33 |
| Total | 12 | 100.00 |
| **Previous Food Service Experience** | | |
| No | 10 | 83.33 |
| Yes | 2 | 16.67 |
| Total | 12 | 100.00 |
| **Training Received From** | | |
| Department of Health | 3 | 25.00 |
| Principal | 3 | 25.00 |
| Another cook/food handler | 3 | 25.00 |
| Previous employer | 2 | 16.67 |
| Other, secretary did the cooking and used her own knowledge | 1 | 8.33 |
| Total | 12 | 100.00 |
| **Frequency of Re-Training of FHs** | | |
| Once a year | 3 | 25.00 |
| Never | 9 | 75.00 |
| Total | 12 | 100.00 |

Figure 4.7 below shows results on 11 areas of training received by FHs. Twenty-five percent of FHs were trained on how to prevent food contamination, cross-contamination of food and handling injuries in the workplace. Only one FH (8.33%) had received training on menu planning, first aid and table setting and manners. Four FHs had received training on hand washing, personal hygiene and illness in the work place. Of the twelve FHs, only 2 had received training on safety and hygiene. Five FHs had received training on preparation of food. Re-training was never offered as indicated by most FHs (75.00%).

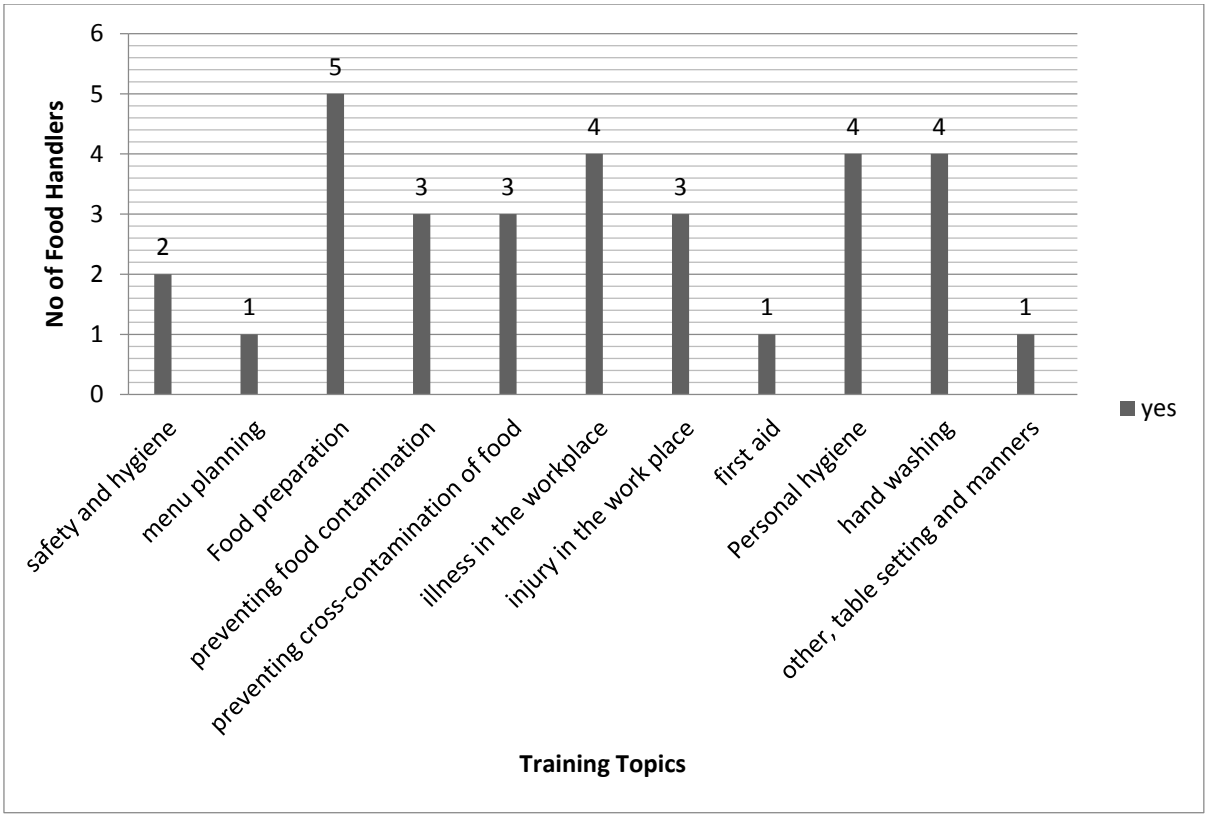



**Figure 4.7: Areas of Training for Food Handlers in Numbers**

Table 4.21 presents observations of the researcher about the availability of menus and recipes at the CCFs. Menus were available and displayed on all the CCFs' kitchen walls as per the GECDS for parents and officials to see. In most cases, what was on the wall was slightly different from what was being prepared because of factors such as electricity outages due to load shedding or no prepaid electricity. In other cases closer to the end of the month some of the stock had run out so improvisation or affordable food items were bought or whatever was in the storeroom was used, resulting in menu items being repeated in the week at times. In most of CCFs (90.00%) the stock in the store room was within expiry dates. Only one CCF (10.00%) had an 80kg bag of expired maize meal that had to be used to make porridge and 'phuthu' for the children, or nothing else was available.

The researcher was never shown any recipes at any of the CCFs but on interviewing the FH in one CCF, the FH that cooked for children of two months to two years old stated that the CCF had recipes from the Department of Health and the recipes were used. Nine CCFs (90.00%) did not have recipes. Upon interviewing the FHs, 90% explained that either the former cook handed over the recipe by word of mouth (50.00%) or the FH (40.00%) was told the name of the menu item to prepare from their own knowledge.

**Table 4.21: Menus and Recipes**

| Availability of a Menu | Number (n = 10) | Percentage (%) |
|---|---|---|
| **Yes** | **10** | **100.00** |
| **Are expiry dates on food checked?** | | |
| **Yes** | **9** | **90.00** |
| **Are recipes available?** | | |
| **No** | **9** | **90.00** |
| **Use of recipes?** | | |
| **No** | **9** | **90.00** |
| **Where are recipes obtained from?** | | |
| **Department of Health** | **1** | **10.00** |
| **Cook/ food handler** | **5** | **50.00** |
| **Other, own** | **4** | **40.00** |
| **Total** | **10** | **100.00** |

Table 4.22 shows how food preparation was carried out in the CCFs. All the CCFs had a designated kitchen with adequate preparation and cooking space. The CCFs also had food preparation utensils such as stoves, pots, jugs, knives, spoons, chopping boards and running cold water in the kitchen as well as in the yard, for cooking and washing utensils after cooking and eating. None of the CCFs had measuring equipment and mixing tools.

**Table 4.22: Preparation of food**

| Where is food prepared? | Number (n = 10 ) | Percentage (%) |
|---|---|---|
| **Designated kitchen?** | | |
| **Yes** | **10** | **100.00** |
| **Adequacy of food preparation/cooking space?** | | |
| **Yes** | **10** | **100.00** |
| **Availability of cooking water?** | | |
| **Yes** | **10** | **100.00** |
| **Availability of preparation utensils?** | | |
| **Knives** | | |
| **Yes** | **10** | **100.00** |
| **Boards** | | |
| **Yes** | **9** | **90.00** |
| **Measuring equipment** | | |
| **No** | **10** | **100.00** |
| **Spoons** | | |
| **Yes** | **10** | **100.00** |
| **Mixing tools** | | |
| **No** | **10** | **100.00** |

Breakfast was served from 8am until 9am depending on the time of arrival of the children at the CCFs. As soon as washing up of breakfast dishes was completed, the FHs started preparing lunch - as a result Table 4.23 shows that in 70.00% of CCFs, food was held for more than 45 minutes before serving of lunch. In all the CCFs, the food was held by keeping the pot on the stove top after switching the stove off on completion of cooking. The serving of lunch was from 11.30am to 1pm depending on the programme of the CCF. In 90.00% of the CCFs the FH dished up the food and the teachers served the food to the children. In one CCF (10.00%) the FH dished up and served food to the children. Where community volunteers (30.00%) were present, they dished up the food and the teachers served the food to the children.

**Table 4.23: Food Holding and Serving through Observation**

| Duration of Food Holding Before Serving | Frequency (n=10) | Percentage (%) |
|---|---|---|
| **Less than 15 minutes** | **1** | **10.00** |
| **15 – 30 minutes** | **1** | **10.00** |
| **30 – 45 minutes** | **1** | **10.00** |
| **More than 45 minutes** | **7** | **70.00** |
| **Total** | **10** | **100.00** |
| **How food is kept warm?** | | |
| **Kept on stove top switched off** | **10** | **100.00** |
| **Adequacy of serving space?** | | |
| **Yes** | **10** | **100.00** |
| **Who serves food?** | | |
| **Cook / food handler** | | |
| **Yes** | **9** | **90.00** |
| **Teachers** | | |
| **Yes** | **10** | **100.00** |
| **Community volunteer** | | |
| **No** | **7** | **70.00** |
| **How long does the service take?** | | |
| **Less than 15 minutes** | **2** | **20** |
| **15 – 30 minutes** | **5** | **50** |
| **More than 30 minutes** | **3** | **30** |
| **Total** | **10** | **100.00** |

In 30% (n=3) of the CCFs serving took more than 30 minutes because classes had to share the use of plates or bowls and spoons. Food was served using ladles (100.00%), serving spoons (30.00%) and cups (10.00%) as indicated in figure 4.8

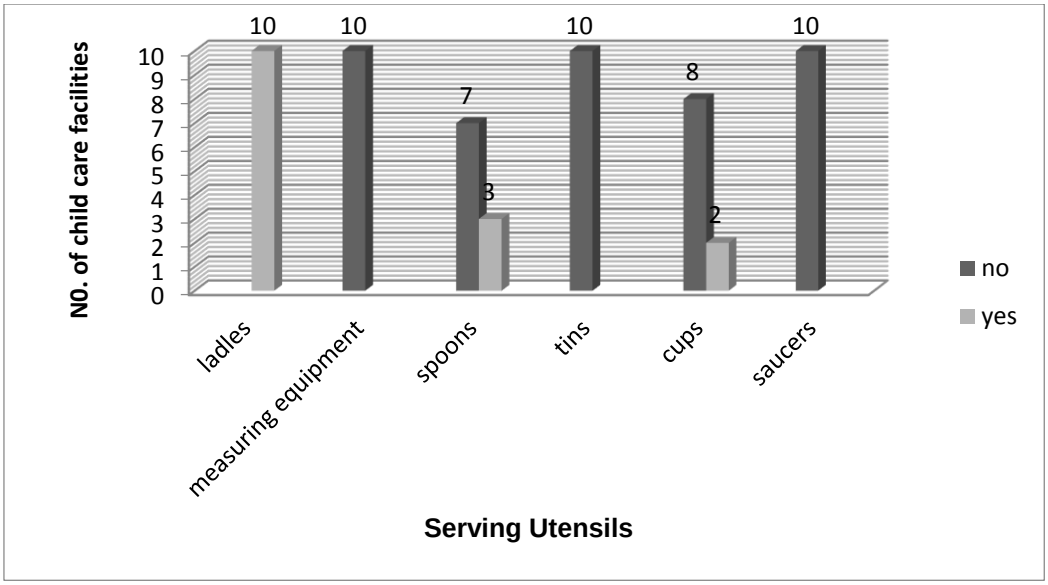



**Figure 4.8: Adequacy of Food Serving Utensils**

As seen in table 4.24, in 90% of the CCFs children used bowls for eating food. In one CCF (10.00%) bowls and spoons were not adequate and some children brought eating utensils from home. As mentioned before, some shared the utensils by washing them when the first age group had completed eating in time for the last age group to use the same bowls.

**Table 4.24: Adequacy of Eating Utensils through Observation**

| Eating Utensils | Frequency (n = 10) | Percentage (%) |
|---|---|---|
| **Bowls** | | |
| **Yes** | **9** | **90.00** |
| **Spoons** | | |
| **Yes** | **9** | **90.00** |

In all the CCFs (100.00 %,) food was allocated by individual portioning as shown in table 4.25 below. Different portion sizes were given to each age group although it was measured by 'eye'. As seen in Tables 4.17 A and B and 4.18 A and B the mean intake for ages two to three years old yielded bigger portions than four to five years old because, near the end of serving when the older children were served, some portions got smaller in order to cater for all children (see Annexure N). The researcher observed that in most CCFs (90.00%) children were not happy with the portion size of food and second portions were rarely given.

**Table 4.25: Allocation of food (observed)**

| Variables | Frequency (n = 10 ) | Percentage (%) |
|---|---|---|
| **How is food allocated?** | | |
| **Individual portioning** | **10** | **100.00** |
| **Is food served per age group?** | | |
| **Yes** | **10** | **100.00** |
| **Is it a standardised portion size?** | | |
| **No** | **10** | **100.00** |
| **Are learners happy with the portion size?** | | |
| **No** | **9** | **90.00** |

Table 4.26 presents the state of kitchen and personal hygiene of the FHs. FHs wore clean aprons and hair was always covered with headgear of some kind as presented in figure 4.9.


**Figure 4.9: FH Preparing to Serve Food.**

There was no hand-washing soap and chemicals for sanitizing in 80% of CCFs. All CCFs used cold running water and green bar sunlight soap for hand-washing and washing of dishcloths. Sunlight liquid was used for washing cooking and eating utensils. Other household detergents such as Domestos and Handy Andy were used for cleaning the work surfaces and floors. Mops, brooms and dustpans were available for cleaning in all CCFs. Floors were

swept after every meal or snack time because children sat on the carpet to eat meals as no table and chairs were available in all CCFs.

**Table 4.26: Kitchen and Personal Hygiene**

| Soap available for hand washing? | Frequency (n = 10 ) | Percentage (%) |
|---|---|---|
| No | 10 | 100.00 |
| **Running water for hand washing?** | | |
| Cold - yes | 10 | 100.00 |
| **Availability of cleaning chemicals?** | | |
| Yes | 6 | 60.00 |
| **Availability of cleaning tools?** | | |
| Yes | 10 | 100.00 |
| **Are work areas sanitised?** | | |
| No | 8 | 80.00 |
| **Frequency of sanitising** | | |
| Frequently | 1 | 10.00 |
| Weekly | 1 | 10.00 |
| Never | 8 | 80.00 |
| Total | 10 | 100.00 |

All the FHs wiped preparation areas and washed preparation utensils during and after preparation of food. Twenty percent of CCFs (n=2) sanitized work surfaces using Domestos once a week. Six CCFs used gas burners and the other four used electric stoves that were wiped during and after food preparation (refer to table 4.27).

**Table 4.27: Hygiene of Work Areas**

| Frequency of Washing Utensils | Frequencies (n=10) | Percentage (%) |
|---|---|---|
| **During preparation** | | |
| Yes | 8 | 80.00 |
| **After food is ready** | | |
| Yes | 10 | 100.00 |
| **After the work is finished** | | |
| Yes | 10 | 100.00 |
| **Frequency of cleaning stoves and preparation areas** | | |
| **During preparation** | | |
| Yes | 9 | 90.00 |
| **After food is ready** | | |
| Yes | 9 | 90.00 |
| **After the work is finished** | | |
| Yes | 5 | 50.00 |
| No | 5 | 50.00 |
| Total | 10 | 100.00 |

## 4.2.6 Correlations

### 4.2.6.1 Macronutrients

Table 4.28, presents the correlation between the mean intake of macronutrients such as energy, protein, fat and carbohydrates when comparing all CCFs that were statistically analysed using Anova two-tailed where $p<0.05$ level was regarded as statistically significant.

**Table 4.28: Significant Differences between the Mean Intakes of Macronutrients per CCF**

| | Mean ENERGY (kJ) | Mean PROTEIN (g) | Mean FAT (g) | Mean CARBOHYDRATES (Available) (g) |
|---|---|---|---|---|
| **CCF 1** | 1907.37 | 12.26 | 4.62 | 81.53 |
| **CCF 2** | 3084.02***** | 16.59***** | 10.15***** | 138.85***** |
| **CCF 3** | 1427.31 | 5.68 | 2.85 | 59.95 |
| **CCF 4** | 1089.52 | 5.92 | 3.99 | 47.51 |
| **CCF 5** | 1734.72 | 12.76 | 5.07 | 72.77 |
| **CCF 6** | 1411.78 | 8.07 | 3.43 | 64.37 |
| **CCF 7** | 2325.48 | 14.25***** | 10.97***** | 95.05 |
| **CCF 8** | 1324.29 | 8.60 | 8.20 | 49.21 |
| **CCF 9** | 1703.02 | 7.52 | 2.56 | 81.46 |
| **CCF 10** | 1478.22 | 10.28 | 4.97 | 63.15 |

***indicates statistical significance at <$p$=0.05**

In most of the macronutrients no statistical significance was observed between the CCFs except for the average intakes of energy in CCF two - which was statistically significantly higher than average energy intakes of CCF one ($p$=0.006), CCF three ($p$=0.000), CCF four ($p$=0.002), CCF five ($p$=0.000), CCF six ($p$=0.001), CCF eight ($p$=0.000), CCF nine ($p$=0.011) and CCF ten ($p$=0.000).

The average intake of total protein in CCF two was statistically significantly higher than the average total protein intakes of CCF three ($p$=0.000), CCF four ($p$=0.001), CCF six ($p$=0.007), CCF eight ($p$=0.005) and CCF nine ($p$=0.000). CCF seven also reflected a statistically significantly higher protein level than the average total protein intakes of CCF three ($p$=0.004), CCF four ($p$=0.033) and CCF nine ($p$=0.029).

The average intake of total fat in CCF two was statistically significantly higher when compared to the average total fat intake of CCF one ($p$=0.001), CCF three ($p$=0.000), CCF four ($p$=0.016), CCF six ($p$=0.002), CCF nine ($p$=0.000), and CCF 10 ($p$=0.011). The average intake of total fat in CCF seven was also statistically significantly higher when compared to the average total fat intake of CCF one ($p$=0.009), CCF three ($p$=0.002), CCF four ($p$=0.024), CCF six ($p$=0.007), CCF nine ($p$=0.002), and CCF ten ($p$=0.041).

The average intake of carbohydrates in CCF two was statistically significantly higher than the average intakes of CCF one ($p$=0.005), CCF three ($p$=0.000), CCF four ($p$=0.002), CCF five ($p$=0.000), CCF six ($p$=0.001), CCF eight ($p$=0.000) and CCF ten ($p$=0.000).

The nutrient breakdown of the menus offered by the CCF also reflected that CCF two and seven presented the children with >60% and in some cases >100% of DRIs for various nutrients.

## 4.3 DISCUSSION

### 4.3.1 Demographics Information

The results of the socio-demographic questionnaires indicated that most children (56.29%) came from households headed by mothers, grandmas, sister siblings and aunts, with members of up to 10 people including extended family members living in the home (table 4.1). In SA female-headed households are common because of the history of the country where men migrated to urban areas to work. Today the major cause of female headed households is non-marriage and increased deaths caused by HIV and AIDS which, in the latter, is the case in Inanda (Schatz *et al.*, 2011, Everatt and Smith, 2008). High unemployment in South Africa has resulted in unemployed youth and young adults postponing leaving home, or conversely, having to return home seeking support to from parents or relatives in order to live. This, in turn, has given rise to large family compositions, resulting the in depletion of resources at the family's disposal. Therefore many people are forced to share available resources and supporting unemployed family members drags many households into deep poverty (Klasen and Woolard, 2009).

A larger percentage (72.87%) of households lived on a total income of less than R2500 per month, which includes employed family members together with government grants to children, disabled and the old citizen grants (table 4.7). Although a large percentage of

families (79.90%) spent more than R500 on food a month, 49.75% reported that sometimes there was a lack of money to buy food. The results of the socio-demographics of Inanda are similar to results of studies in other low income informal urban and rural areas. A study in rural districts of KZN and the EC found that the children in the sample had the same characteristics as children in this study, that is, homes were female-headed and the mothers were young and single. The mothers also had a low education attainment, some were unemployed and from large families living off social grants. The study further found that the families had insufficient income and insufficient food consumption which ultimately affects the nutritional status of families, reflecting food insecurity (Schoeman *et al.*, 2010b).

Most of the parents (54.27%) of the children in the sample were employed. Of the employed, a large number of the respondents (64.71%) were informally employed as domestic workers, cleaners, general workers, waiters, etc. The highest level of education for the care giver was reported as standard ten (47.74%) with only 17.09% having attended colleges and FET colleges and 6.53% attending universities (table 4.9). Of the 45.73% unemployed, 50.55% had been unemployed for more than three years and were actively looking for employment (tables 4.6 and 4.7). In 2009 the unemployment rate in SA was 24%, 64% of children lived in households with at least one employed adult and 36% in homes with no employed adults. Women had a higher unemployment rate than men, resulting in children in female-headed households being more poor than children in other households (Jamieson *et al.*, 2011).

Most respondents (71.36%) owned brick houses with up to four or more rooms but 36.67% indicated that the house is too small for the family. The respondents (66.33%) have lived in the area for more than five years and have municipal services like prepaid electricity (n=170), water in the yard (51.26%), removal of solid waste (68.84%) and pit latrine toilets with ventilation (54.27%) that were built for the community (tables 4.3 - 4.4 and figure 4.5). The roads in front of houses are mostly gravel (63.32%) but the main roads are tarred, providing access to public transport such as taxis and buses that respondents largely depend. Children mostly walk to school. The results of this study are contrary to that of a study by Dannhauser *et al.* (2000) which shows that at CCFs in Mangaung, children came from homes made from corrugated iron and had mainly one room in JBM and one or two rooms in JS, with between three to 15 people living in each room. The same study also found that the areas had no electricity, primus stoves used and were fuelled by paraffin to cook food, but water was available in taps on premises in JS and from a tap in the neighbourhood in JBM. Taxis were

forms of transport used in the both areas. Although the GHS of 2011 illustrates that there were improvements in services like electricity installations, access to water, sanitation and solid waste removal in both rural and urban areas nationally, there are still more improvements to be made in the country and in this study community (GHS, 2011).

The care givers (77.39%) and the children (67.34%) ate most of their meals at home with mothers deciding on how much to spend on food, as well as cooking of meals, serving and feeding the children. Although a small number of children (25.63%) ate most of their daily meals at CCFs, the meals in CCFs need to be balanced to meet at least 60% of the children's daily requirements. CCF owners in this study made the same comment mentioned by the CCF managers in the study by Pietersen *et al.* (2007) that some children arrived at the CCF very hungry as a result of not having eaten the night before. The study further states that the DoH provides state-funding for CCFs as part of nutrition intervention in order to achieve nutrition adequacy for vulnerable children at CCFs. The DSD provides financial assistance to CCFs to serve nutritious meals and the CBNP stated that one meal offered at the CCF should provide 33.33% of the RDA of the children as a guideline for CCF managers (Pietersen *et al.*, 2007).

Inanda can be regarded as one of the most poverty stricken areas of SA because households are overcrowded, income is low and there are high unemployment rates. The result of the socio-demographic questionnaire of the Inanda households, presented by the South African Index of Multiple Deprivation for Children (SAIMDC), reflects the general poor living status in the Inanda community in which the children from this study live and also indicates that the children suffer from a number of deprivations. The children are income and employment deprived as 45.73% of the caregivers were unemployed and 72.87% of households lived on less than R2500 per month. Consequently, income deprivation children become material deprivation as 49.75% of the households lacked money at times to purchase food, forcing low income households to buy and eat energy-dense and nutrition inferior diets. Local food stores also lack healthy food variety leading to food insecurity (Barnes, Wright, Noble and Dawes, 2007). The owners of the CCFs commented that one of the major problems is poor or non-payment of monthly CCF fees. This sometimes resulted in a shortage of money to purchase food for CCF meals as the DSD was not funding CCFs with the current enrolment numbers, which were higher than allowed by the DSD. The children in CCFs are also living environmentally deprived as 9.05% live in shacks and 46.23% live in homes, with five to seven members under one roof. About 22.11% live in homes with eight to 10 members. This

overcrowding could contribute to the risk of the child being abused or mistreated. The children are also deprived of adequate care as 1.51% of children came from child-headed households. Some respondents (grandmothers and aunts) that were interviewed were guardians or care givers to children as mothers had either died or were working away from home (Barnes *et al.*, 2007, Temple and Steyn, 2009, Barnes and Wright, 2010).

### 4.3.2 Anthropometry

The anthropometric results show a low prevalence of severely stunted children among boys (6.50%) of the age group two to three years old, and girls (1.96%) of the four to five years age group. The results also illustrate a low prevalence of stunting in boys (10.90%) and girls (6.80%) of age group two to three years old and boys and girls of the age group four to five years old, recorded as 2.13% and 1.96% respectively. The outcome of the study by Pietersen *et al.* (2007) also found a low prevalence of severe stunting and stunting in the children at the CCFs in Cape Town while the South African Vitamin A Consultative Group (SAVACG) study found that 23% of SA children under six years old were stunted (Pietersen *et al.*, 2007). The results of this study are contrary to the study by Schoeman *et al.* (2010b) which found that in KZN, 31% of six to 71 month old children were stunted. Studies in SA and other Sub-Saharan African countries show that boys from households of poor socio-economic status are more likely to be stunted than girls of the same background (Wamani, Åstrøm, Peterson, Tumwine and Tylleskär, 2007, Lesiapeto *et al.,* 2011). Stunting is considered a reliable indicator of long-standing under-nutrition in childhood and it is considered to reveal the adverse effects of poverty on under-nutrition that may have accumulated during early years of childhood (Petrou and Kupek, 2010). According to Motswagole *et al.* (2012) stunting is a common nutritional disorder affecting SA children because linear growth is lost during infancy.

Stunting in childhood predicts poor cognitive performance resulting in lower educational achievement as child grows. Furthermore poor growth in early childhood lead to lean body mass and a short stature in adulthood resulting in decreased productivity when performing manual labour jobs (Victora, Adair, Fall, Hallal, Martorell, Richter and Sachdev, 2008). Black *et al.* (2008) found that deficiencies in zinc, calcium, vitamin D and iodine contribute to stunting in children if the child's diet does not provide the required nutrients and also if the mother was undernourished during pregnancy.

As a child's energy intake needs increase, so does weight gain, as opposed to length gain (Motswagole *et al.*, 2012). In 2008 SA children that were overweight and obese were 10% and 4%, respectively (DBSA, 2008). The results of this study show a high prevalence of children in the cut-off point of > + 1SD (possible risk of overweight) in both boys (32.26%) and girls (42.30%) in age group two to three years old and 31.91% in boys and 29.41% in girls of the age group four to five years old. There is moderate prevalence of overweight in boys (17.20%) and girls (10.91%) in all age groups altogether. This study further shows a low percentage of obesity in the sample, with boys (4.30%) and girls (5.10%) in the age group two to three years old as obese, while none of the boys and girls over the age of four years old were obese, indicating a shift from underweight children, as presented by the previous study, to more overweight children (table 4.13). overweight and obesity in childhood increase the risk of hypertension, type 2 diabetes and cardiovascular illnesses in adulthood (Rossouw *et al.*, 2012).

Exceeding the required amount of carbohydrate intake may contribute to weight gain. The large percentage of energy distribution in Inanda CCFs meals was from carbohydrates and small amounts from dietary fibre and fat. The results are the same as the findings of the study conducted in SA where girls were found to be more overweight and obese than boys (Rossouw *et al.*, 2012). The results of the present study are the same as the findings from the joint UNICEF, WHO and the World Bank findings - in most countries boys are more stunted than girls and that the overweight status in children is on the rise. The results of the BMI-for-Age are contrary to the study that show that children in this age group in rural areas of KZN and the EC are underweight (Lesiapeto *et al.*, 2011).

### 4.3.3 Menus and Nutrient Analysis

Menus served at Inanda CCFs did not have a wide variety of food items, the various CCFs served almost the same types of menus. The portion sizes for starch as seen on Annexure N are above the recommended 40g and 60g for children of one to three years old and four to six years old, respectively. The portion sizes for meat and vegetable dishes should at least be 70g to 80g for children of one to three years old as 40-50g is a recommended portion for protein, and 30g for a vegetable portion, excluding soup. Children of four to five years old should be served at least 110g of mixed meat and vegetable dishes, as 60g is recommended for protein and 50g is recommended for vegetables, excluding soup. Children should also be served

about 200ml of milk to meet daily requirements and the GECDS recommends that children should be given skimmed milk to drink (Gordon-Davis and Van Rensburg, 2004, Skweyiya, 2008).

Menus served in all Inanda CCFs did not provide >60% of the DRIs for nutrients energy, fibre, calcium and vitamin E. Various studies conclude that CCF meals usually do not meet requirements for energy (Pietersen *et al.*, 2007, Dannhauser *et al.*, 2000).

CCFs in Inanda do not serve calcium rich foods adequately, small amounts of milk (70.50ml ±77.07), which ranked at number 19 on the top 20 foods list (table 4.15), are added to the porridge and 'maas' at number six and 12, is served once a week in three CCFs. At this age calcium is needed to build strong bones and teeth and also to clot the blood and heal wounds (Stein, 2010). There was a lack of dietary fibre and vitamin E in meals at CCFs as a result of low consumption of fibre-rich carbohydrate foods like whole wheat cereals and grains, oats and fruit, (which only appear at number 20 in the top 20 foods list), and insufficient vegetables (which appear at number seven and eight in some curries and soups on the top 20 foods list.

- CCF one met 60% of DRIs for nutrients protein, carbohydrates, iron, zinc thiamine, vitamin $B_6$, vitamin C and vitamin K. Only meals for four to five year olds met the 60% requirement for phosphorus, zinc, vitamin A and folate.
- In CCF two protein, zinc, carbohydrates, iron, vitamin A, niacin, riboflavin, thiamine, vitamin $B_{12}$ and vitamin D (for four to five year olds) reached the recommended 60% contributed by CCF meals. Vitamin D in age group two to three years old was 59.60%. Only four to five year olds were served above 60% of DRIs for vitamin C.
- In CCFs three, four and nine meals were insufficient in all nutrients except for iron and thiamine in CCF three, vitamin C for older children in CCF four and carbohydrates in CCF nine.
- CCF five met the 60% of DRIs for protein and carbohydrates for all the children and iron, zinc, thiamine, niacin, vitamin $B_6$ and vitamin $B_{12}$ for the smaller children only.
- CCF six was below 60% of DRIs on all nutrients for the smaller children and only met 60% of DRIs for carbohydrates and thiamine for older children.

- CCF seven reached 60% on nutrients protein, carbohydrates, iron, vitamin A, thiamine, riboflavin, niacin, vitamin $B_{12}$, and vitamin C. Zinc was close at 59.75% and only age group two to three years old met 60% for vitamin $B_6$.
- CCF eight met 60% for iodine, thiamine and vitamin $B_{12}$ for all the children. For age group two to three years old iron levels reached 60% of DRIs.
- In CCF 10 meals for all the children met 60% for carbohydrates and vitamin $B_{12}$. Only meals for smaller children met 60% of DRIs for protein, zinc, thiamine, niacin and vitamin C.

In a study in Mangaung by Dannhauser *et al.* (2000) a cereal-based diet and low intake of fruit and vegetables resulted in low vitamin C and bioavailable iron. In a study in Thulamela municipality in Venda by Kwinda *et al.* (2011) the meals at the CCFs were cereal-based with maize meal porridge mostly consumed. A low intake of fruit and vegetables contributed to a low vitamin A intake. In this study menus consisted of mainly maize meal porridge and crumbly 'pap', rice, Morvite, Maltabella, samp and beans. As a result only four CCFs met 60% for vitamin C and four CCFs had meals with adequate iron for all children, two CCFs had adequate iron for age group two to three years old only. Only one CCF gave fruit as a snack and vegetables were used in small amounts in soups and curries.

Dannhauser *et al.* (2000) further found that protein was sufficient in meals but the meals were low in iron, zinc, niacin, riboflavin, calcium, vitamin A and vitamin $B_6$ which suggested that the protein sources were of low quality. In this study protein levels in CCFs three, four, six, eight, nine and 10 were inadequate owing mostly to canned fish (number 3, n=11) and chicken (numbers 9,12, 18 and19) being served once a week at three CCFs. Some CCFs served beans twice a week as bean soup; (number six and 18), samp and beans (numbers four and five), only one CCF serving boiled egg to older children and one CCF served egg soup (number15 and 17) twice a week. In meals served in CCFs in a study in Cape Town, where CCF meals should meet one third of RDA, protein exceeded recommended RDAs as CCFs were serving protein foods such as meat, eggs, fish, cheese, and chicken. But in the same study, meals were low in thiamine, riboflavin, zinc, vitamin D, folate and vitamin E and recommended RDAs for energy, calcium and iron were never met. Some meals also did not provide vitamin D, A, C and $B_{12}$ at all (Pietersen *et al.*, 2007). Another study shows that increasing the intake of dark green leafy vegetables, especially the indigenous types,

contributes considerably to the total intake of calcium, vitamin A and riboflavin (Faber *et al.*, 2009).

The results from this study are similar to the study in rural Bangladesh by Rah *et al.* (2010) stating that stunting is largely attributed to a chronic intake of a low-quality diet lacking in both macro and micronutrients as well as infections which are strongly associated with poverty (Rah *et al.*, 2010). Results of studies conducted in 40 New York based and 20 Texas based child care centres showed that meals were below the RDAs in micronutrients and energy (Padget and Briley, 2005). A study by Ball, Benjamin and Ward (2008) in 20 North Carolina CCFs showed that children were consuming insufficient whole grains, fruit and vegetables but were consuming excessive amounts of saturated fats in fried meat or high fat meat, whole milk and sugar in snacks (Ball *et al.*, 2008). A study in Chinese pre-schoolers in rural Heqing County illustrated that there was sub-optimal intake of zinc, vitamin A, iron and calcium but the children were stunted suggesting prolonged inadequate dietary intake (Willows, Barbarich, Wang, Olstad and Clandinin, 2011). In the WHO European region, national surveys of 53 countries showed there was increased prevalence of obesity because of a low consumption of fruit and vegetables and an overall high fat consumption (Humphreys and Fiankan-Bokonga, 2013). Worldwide there is a problem with CCF feeding which needs to be addressed and improved. The results show that the Inanda CCFs are not very different from the rest of the world when it comes to nutrient adequacy of food served to children.

The ADA has identified guidelines for child care nutrition for two to five year old children that attend child care programs, as these CCFs did not meet DRIs recommendations. In the USA it is recommended that CCFs should serve fresh, raw or frozen fruit and vegetables rich in Vitamin C every day in child care, Vitamin A-rich foods on three days of the week and whole wheat grain products like whole wheat bread and oats porridge are a good source of dietary fibre (Neelon and Briley, 2011). Few CCFs in the USA were following the recommendation for children to drink fat free milk for Vitamin D and Calcium needs (Neelon and Briley, 2011). In France, nurseries and primary schools have menus and food preparation methods ensuring that the food children eat is healthier, replacing soft drinks with water and distributing free fruit. By 2007, as a result, the obesity increase in children was recorded as slowing down (Humphreys and Fiankan-Bokonga, 2013).

### 4.3.4 Food Handlers and CCFs

The CCFs are following the GECDS as the results indicate that the Inanda CCFs were well equipped to prepare meals for the children. All CCFs provided two meals from designated kitchens with cooking and preparation equipment; running water for cooking, washing up and cleaning facilities and utensils for serving and eating. The researcher observed a high level of cleanliness in the CCF kitchens, but the CCFs need to improve on the hygiene of the kitchen when it comes to sanitising of work surfaces more frequently. The same results were established in a study by Pietersen *et al.* (2007) in Cape Town's state-funded CCFs.

The result of the study also revealed that 83.33% of the FHs in the Inanda CCFs did not have any previous experience in food preparation. Seventy-five percent of FH received initial training on food preparation from the DoH, owners of CCFs and previous FHs but never received refresher training (75.00%) on food handling, safety and hygiene and menu planning. Proper training on correct food preparation methods combats negative practices of soaking of food in water before cooking and cooking in too much water which results in the loss of nutrients in food (Hotz and Gibson, 2007). Aiello, Larson and Sedlak (2008) found that poor food storage, poor food preparation practices like undercooking food and cross-contamination, moist work surfaces that are not properly sanitised, contribute to Salmonellosis outbreaks in children younger than five years of age. Proper hand washing before food preparation and eating is important to reduce cross-contamination and foodborne illnesses, in children risk of diarrhoea are reduced by 42 to 48% when hands are washed with soap and water because pathogens on hands are reduced (Greene, Freeman, Akoko, Saboori, Moe and Rheingans, 2012). More than 70% of CCF held food for more than 45mins before serving and kept the food on the stove that has been switched off. CCFs need to keep the hot food hot and not hold the food for more than two hours before serving because bacteria that cause foodborne illnesses multiply rapidly at room temperature (Aiello *et al.,* 2008).

The results of the menu analysis in table 4.3.4 indicate that there are nutritional inadequacies in the meals in Inanda CCFs and improvements need to be made in this regard. Many studies in SA show that without formal training care givers in CCFs were aware of the importance of healthy eating for children. The care givers understood what healthy food is but also had some misconceptions about the role of some food items. The care givers had some nutrition knowledge but it was not correctly detailed. Some care givers knew three to four of the five

basic food groups, caregivers had positive and negative strategies to introduce new foods to children and to get children to eat healthy food - but it was also noted that with training the nutritional knowledge of caregivers improved drastically and care givers applied this knowledge and improved CCF meals (Pietersen *et al.*, 2007, Kwinda *et al.*, 2011) (Lynch and Batal, 2012).

The GECDS state that staff at CCFs should sit with the children and model healthy eating habits and make sure meal times are relaxed, while encouraging children to try all food that is available, but not force the children to eat anything they do not want to eat (Skweyiya, 2008). The research by the ADA in 2010 on care givers illustrated many positive attitudes and practices in CCFs to get children to eat meals, but with training there were improvements in the care givers' feeding knowledge and other aspects of meal times in their practices (Freedman and Alvarez, 2010).

## 4.4 CONCLUSION

Worldwide there is a problem of increasing childhood obesity due to the eating habits of children in CCFs. Additionally there is a problem of nutritional inadequacies of macronutrients and micronutrients in meals served at CCFs worldwide. There is also a need for training of caregivers and development of appropriate meals for CCF feeding in order to improve nutritional quality of meals.

# CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

## 5.1 INTRODUCTION

In chapter four the results of the study were presented and discussed, drawing relations to the studies conducted in child care facilities in South Africa since 2000 as presented in a table in chapter one. This chapter presents the aim of the study, the limitations, the main findings, the conclusions and recommendations based on the analysis of the data.

## 5.2 THE AIM OF THE STUDY

The aim of the study was to establish the nutritional adequacy of menus served to children at child care facilities in Inanda in relation to the contribution thereof to the nutritional status of the children. Menus as well as the food handlers' knowledge of food preparation and practises were considered as factors that contribute to the nutritional adequacy of the meals that are consumed by the children.

## 5.3 LIMITATIONS OF THE STUDY

- One learner died during the study and some changed schools so new learners and parents in respective CCFs were requested to give consent to complete the data collection process.
- There was a misinterpretation on the aim of the study from parents who saw the study as a vehicle to obtain social grants so there might have been under-reporting on the socio-demographic questionnaire.
- Only the CCF meals were analysed for adequacy and what the child consumed at home was not considered as part of this study, therefore the adequacy or inadequacy of CCF meals is not the only contributor to the children's anthropometric status.

## 5.4 MAIN FINDINGS

The literature reveals that childhood malnutrition is a global problem whether it is present in developed or developing countries. Malnutrition can be classified as under-nutrition, depicted by stunting, wasting, and being underweight. Over-nutrition is characterised by, overweight and obesity. According to the Joint UNICEF, WHO and the World Bank child malnutrition database, it is estimated that in 2012 the prevalence of stunting and wasting had declined in

children younger than five years old worldwide, but 36% of stunted children globally lived in Africa. Of the 99 million that were underweight, 29% were based in Africa and 28% of severely wasted and wasted children in Africa. The results of the first South African National Health and Nutrition Examination Survey of 2012 indicated that in children younger than five years old 21.5% were stunted, 2.6% were wasted and 5.2% were underweight. The recent trends show the rise of overweight and obesity in children causing a double burden to the existing under-nutrition issue, especially in sub-Saharan Africa and other developing countries. The reports show that overweight prevalence was on the rise from 32 million children in 2000 to an estimated 44 million children that were overweight in 2012 - stating that the prevalence has increased in Africa, with Southern Africa's prevalence being the highest at 18%. In SA, 18.2% of children less than five years old were recorded as overweight and 4.5% were obese. Protein-Energy Malnutrition and micronutrient deficiencies of iron, vitamin A, zinc and iodine are amongst the major causes of childhood malnutrition in the world.

Other factors like poverty and illnesses, especially diarrhoea in children, unemployment of parents, inequalities of wealth and access to services, that is, poor health services and unhygienic living conditions, informal housing, household overcrowding, lack of education of parents and caregivers, the global financial crisis and increased consumption of cereal-based staples, sugar and fats are other causes of childhood malnutrition that affects the nutritional status of children. Children rely entirely on parents for availability of all necessities of life and failure of parents or caregivers to meet children's needs has a bigger impact on the child's life than any other member of the household. Studies show that child poverty is higher in many developing countries but is extreme in sub-Saharan African countries. Child poverty leads to adult poverty and also impacts on future generations.

Child care facilities have a very important role in improving and maintaining the nutritional status of children because children in child care facilities eat half of daily meals at the facilities. The leading problem in child care feeding is seen as the lack of nutrition knowledge of care givers which has resulted in CCFs not providing balanced and adequately nutritious meals. Studies show that CCF meals do not adequately meet the requirements for energy and other macro and micronutrients like proteins, fibre, iron, zinc, calcium, and vitamins A, D, E and K resulting in deficiencies.

In South Africa the government started a strategy of subsidising registered non-government facilities as one of the strategies to address hunger and under-nutrition in children below the age of five years old that attend child care facilities. The child care facility subsidising has been deemed ineffective because the entire subsidy is not reserved solely for nutrition. The Department of Social Development did not give a clear directive for the allocation of subsidy and as a result provinces have allocated 50% to nutrition and the other 50% to staff salaries and other CCF needs. The 50% allocation does not seem sufficient for feeding children since the meals provided at CCFs are inadequate in nutrition. CCFs also complain of the late payment of the subsidy. Another problem in Inanda CCFs is the poor payment of school fees resulting in a shortage of money to purchase food.

Globally, governments are working hard to alleviate childhood malnutrition, child poverty, HIV and AIDS and unemployment to improve the lives of vulnerable groups. In SA, poor monitoring and lack of evaluation of government initiatives to alleviate poverty has resulted in a slow decline in child poverty and malnutrition. Moreover, rural areas face a lack of infrastructure, health and education facilities and other services as a result of the migration of people to urban areas, resulting in a growth of informal settlements that have high unemployment and poverty levels. A study found that Inanda's population is comprised largely of young people who are unemployed.

In order to furnish a profile of the type of households the children attending Inanda CCFs came from, the essential variables were identified as: household composition, employment of parents, education of parents, household income, and money spent on buying food as well as household assets. A large number of children come from female-headed households that are overcrowded as the household included extended family members and some respondents reported that the house was too small for the occupants. A large number of parents were employed, but of the employed a large number are informally employed. Most respondents (47.74%) had a qualification of up to standard ten. Only a small number of households lived on more than R2500 per month as household income and most households spent more than R500 on food per month. A large number of households live on less than R2500 per month as household income, which may mean not much of the income is spent on food. About 49.75% of the respondents reported a lack of money to buy food, sometimes reflecting food insecurity.

Most households reported having an electric stove, refrigerator, radio and televisions. The households purchased food once a month as there are storage facilities. Access to the latest specials on food and new product information is achieved from the ownership of radios and televisions. The literature states that high food costs and low income causes family members to eat nutritionally inferior diets because energy dense foods such as refined cereals and foods with added sugar are purchased, whereas nutrient rich foods such as dairy products, protein, vegetables and fruit are expensive and are therefore are not purchased on a limited budget. A diet of energy dense foods and lack of food diversity in childhood may result in weight gain as the child grows, while obesity is a possibility in adulthood.

The anthropometric results of the children in the present study indicated that in the age group two to three year old a few boys were severely stunted and more boys than girls were stunted. In the age group four to five years old girls were severely stunted but more boys were stunted than girls. Furthermore the BMI-for-Age indices for two to three year olds show that more girls were at possible risk of being overweight than boys, but more boys were overweight than girls and more girls were obese than boys. In the age group four to five years old a large number of children were at possible risk of being overweight, especially boys, but girls were recorded as being more overweight than boys.

The diet of the children in the Inanda child care facilities may be a contributing factor to the nutritional status of the children as the present study found that the top 20 food items on CCF menus were cereal based staples of rice and maize meal, eaten far more frequently than meat, dairy products, fruit and vegetables. The most commonly served protein source is canned fish. Other protein sources like beef, minced meat, chicken and sausages are prepared with vegetables in curries, soups or stews, each served at least once a week in some facilities. The child care facilities did not serve fruit to children except for one that served half of a fruit on four days of the week. Sugar beans, baked beans and dhall were other protein sources served at the child care facilities. Milk is served in very small quantities in porridge or sometimes milk is mixed with water and very small amounts are served with cornflakes. Many child care facilities did not meet the requirements for calcium, phosphorus and vitamin D, which may contribute to stunting in some children.

The ADA recommends that at least 50% to 60% of DRI be met by the child care facility meals depending on the number of meals the facility provides. The results of the dietary intake show that all the facilities did not meet the 60% requirements for energy except for CCF two in the two to three year old male category in the following nutrients: fibre, calcium and vitamin E.

The requirements for phosphorus, iodine, folate and vitamin D were met by one child care facility but not for all the children. Other child care facilities had varying adequacies and inadequacies for macro and micronutrients such as: protein, vitamin A, iron, niacin, riboflavin, thiamine, zinc, vitamin B6, vitamin B12 and vitamin C. All child care facilities met and some exceeded the daily requirements for carbohydrates for the two meals.

In 50% of child care facilities the energy distribution from protein was below the WHO goal of 10% minimum, 80% of child care facilities were below the WHO goal of 15% minimum for fat and all child care facilities met the WHO goals for carbohydrates. About 30% of the child care facilities exceeded the 75% maximum range of the WHO goal for carbohydrates consumed daily. None of the child care facilities met the WHO goals of at least 25g fibre per day and 400g of fruit and vegetables per day. The consequences of micronutrient deficiency in childhood have a lifelong impact on the physical and mental development in a human being. Deficiencies also contribute to child morbidity and mortality. The Guidelines for Early Childhood Development Services provide detailed guidelines for feeding at child care facilities, but the problem in Inanda's child care facilities is in providing correct portion sizes, as well as the frequency of serving nutrient rich foods to achieve adequate nutrient requirements for both meals.

The findings of the present study revealed that most of the FHs in Inanda child care facilities did not have previous experience in food service and were not receiving adequate training on meal planning, menu planning, food safety and hygiene, food preparation, preventing food contamination and cross contamination. The child care facilities had well- equipped designated kitchens for food preparation and serving and good hygiene practices were carried out daily during and after food preparation. The study found that children were served varying portions depending on the age groups.

## 5. 5 CONCLUSIONS

This study has found that meals served to two to five year olds in registered child care facilities in Inanda are nutritionally inadequate as most child care facilities did not meet the 60% daily requirements on a number of nutrients from both meals served in the child care facilities. The study further found that in the child care facilities the nutritional status of most children is normal, but there is a presence of a double burden of stunting and overweight for some child care facilities. The study confirms that low income communities consume more carbohydrates from refined cereals than fibre rich whole grain cereals and less meat, milk and milk products, fruit and vegetables, ultimately resulting in nutrient deficiencies.

## 5. 6 RECOMMENDATIONS

- **Government Departments**

1. The Guidelines for Early Childhood Development Services from the Department of Social Development should provide the Dietary Reference Intakes that the child care facility's meals should meet in order to prevent inadequacies.

2. The Guidelines for Early Childhood Development Services should recommend portions sizes for meals served at child care facilities in order to facilitate adequate consumption as portion sizes for different child care facilities varied throughout this study.

3. The Department of Social Development should increase the funding for meals at child care facilities. Enrolment numbers from child care facilities should be process as a matter of urgency in order to fund the facilities appropriately since child care facility owners reported poor payment of fees. Most children came from poor households and non-payment of fees impacted on the money allocated for purchasing food.

4. In collaboration with the Department of Education, the Department of Social Development should facilitate the annual training of child care facility owners and food handlers on nutrition knowledge, meal planning, correct usage of measuring equipment for food preparation and serving, as well as up and down scaling of recipes to accommodate for number of portions.

- **Non-Government Organisations**

Inanda child care facilities are mostly owned by women in the community that see the need for offering this service to parents in the community. The following are the recommendations for the child care facilities owners:

1. Use of cyclic menus will assist the child care facilities to include a wide variety of food items in the menu for nutritional adequacy and dietary diversity. The child care facilities should explore a two week cycle menu as two weeks will allow for better planning and procurement.

2. Vegetables from the gardens in the meals will increase nutrients. Almost all CCFs in the study had gardens and running water on the premises. A study in KZN's Ndunakazi found that home gardens for dark green leafy vegetables and yellow and orange fleshed vegetables improved the vitamin A status of children. Funds saved from not purchasing vegetables from gardens may be used to purchase other food items like animal foods to improve iron intake of the children.

3. Fruit trees should be planted so that children will be served fruit regularly, especially indigenous fruit trees such as: bananas trees, peach trees, mangoes tress and oranges trees. In a study conducted in KZN the intervention of using fresh produce from gardens improved nutrient intake of children because of availability and accessibility.

4. Some CCFs served maize meal porridge every morning for breakfast. For better variety maize meal porridge could be interchanged with oats porridge with skimmed milk powder, bread with peanut butter or boiled egg and grated cheese to prevent over-consumption of maize meal, which ultimately contributes to excessive carbohydrate intake. This variety would also increase fibre, calcium and protein intake.

- **Future research**

The results indicate that further research is needed as follows:

1. The Guidelines for Early Childhood Education Services do provide a menu plan and suggestions for health eating in CCFs. But the challenge still exists in the nutritional

inadequacy of CCF meals, establishing a level of nutrition knowledge of child care facility owners and food handlers in Inanda CCFs. Further research may assist in determining the extent of the need for training and retraining of owners and care givers.

2. Recent studies show that there is a decrease in physical activity, whereas food intake remains the same. For a healthy individual food intake should be balanced with energy output. Further research may be carried out to investigate the children's physical activity in relation to energy intake in meals consumed in Inanda child care facilities and the impact on the nutritional status of the children.

3. Some parents are not aware of the rise in the overweight status in children, hence some lunches packed from home are in high in energy and fat, contributing to overweight status. Child care facilities may assist in lowering the prevalence of obesity in preschool children. Further research is recommended in order to establish the contribution of home-packed snacks consumed by children during snack time, in relation to the contribution thereof to the overweight status of children in Inanda child care facilities.

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ANNEXURE A

# PROVINCE OF KWAZULU-NATAL

| UMNYANGO WEZENHLALAKAHLE NOKUTHUTHUKISWA KOMPHAKATHI | DEPARTMENT OF SOCIAL DEVELOPMENT | DEPARTMENT VAN WELSYN EN BEVOLKINGSONTWIKKELLING |
|---|---|---|


| | | |
|---|---|---|
| FAX | : 031 368 7752 | Durban Regional Office |
| Telephone/ Ucingo /Telfoon | : 031 33 68776 | PO Box 1503 |
| Enquiries / Imibuzo / Navrae | : Ms L.T. Mhlanga | DURBAN |
| Reference / Inkomba/ Navrae | : | 4000 |
| E-mail | : gumeden@dwbp.kzntl.gov.za | |


26 January 2009

54 Risegate Drive
Southgate
4068

Attention : Mrs Phindile Nzama

Your letter dated 16 January 2009 is hereby acknowledged.

Kindly forward your request directly to crèches at Inanda

Attached please find the list of crèches in Inanda, for ease reference.

Regards

[redacted]

GENERAL MANAGER: ETHEKWINI

## ANNEXURE B

| NO | NAME | | POSTAL ADDRESS | PHYSICAL ADD | AREA | WARD | DIST | D/REG | L | NPO-NO | AGE/NO | CONT.DET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **INANDA (45)**<br>**Co-Ordinator: ZANELE CELE** | | | | | | | | | | | |
| 543/9/DR | AMATIKWE PRE SCHOOL | URBAN | P.O.BOX 43246, INANDA,4310 | AMATIKWE | AMATIKWE | 53 | INANDA | 4/2/93 | 2 | 015-887 | 50 | MISS Y MDLETYE |
| 137/9 DR | BHEKA CRECHE | PERI URBAN | P.O.BOX 83507, INANDA, 4310 | AMAOTI | AMAOTI | 53 | INANDA | 18/1/96 | 2 | 016-054 | 40(2M-6YRS) | 5191069<br>073 1583190 |
| 417/9/DR | BHEKOKUHLE | URBAN | P.O.BOX 60052, PHOENIX,4068 | AREA 3, NHLU<br>NGWANE | NHLUNGWANE | 54 | INANDA | 1/3/95 | 2 | 016-054 | 35 (2-6YRS) | MIRRIAN SITHOLE<br>073 145 6917<br>082 4734978 |
| 546/9/DR | BRIGHT FUTURE | URBAN | P.O.BOX 43259, INANDA,4310 | NO.658 INANDA GLEBE | INANDA GLEBE | 44 | INANDA | 1/12/93 | 2 | 016-080 | 155 | C DLOMO<br>5102562 |
| 540/9/DR | BUNDLE OF JOY | URBAN | P.O.BOX 40914, REDHILL, 4071 | PIESANG RIVER | PIESANG RIVER | 55 | INANDA | 4/2/93 | 2 | 036 - 106 | 30 | B NKWANYANA<br>083 508 2221 |
| 898/9 DR | CATHULANI | URBAN | P.O.BOX 43168, INANDA , 4310 | UCC CHURCH | | 56 | INANDA | 26/11/98 | 2 | | 85 91-6 YRS) | THEMBANICELE<br>5102027 |
| 89/9 DR | EGUGULETHU | URBAN | P.O.BOX 43084, INANDA | 93 INANDA MAIN RD | STOP 8 INANDA | 56 | INANDA | 27/9/96 | 2 | 013-072 | 136(6M-6YRS) | MRS N.M DLADLA<br>5191716 |
| 535/9/DR | HAMBANATHI | URBAN | P.O.BOX 49026, QUALBERT,4078 | P.O.BOX 43186 INANDA MISSION | SKOKOKO | 56 | INANDA | 31/3/95 | 2 | 005-258 | 30 (1-6YRS) | HARRIET LANGA<br>5101027/<br>0732111257 |
| 506/9/DR | HLANGANANI CRECHE | URBAN | P.O.BOX 40368, REDHILL,4071 | A 2854, INANDA NEWTOWN | A SECTION | 55 | INANDA | 24/12/98 | 2 | 006-050 | 100 | BA CHONCO<br>5102128 |

| NO | NAME | | POSTAL ADDRESS | PHYSICAL ADD | AREA | WARD | DIST | D/REG | L | NPO-NO | AGE/NO | CONT.DET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 520/9/DR | KHANYISANI | URBAN | P.O.BOX 40452, REDHILL | INANDA AMAOTI | AMAOTI | 53 | INANDA | 11/3/95 | 2 | | 93 | M MHLUNGA |
| 534/9/DR | KHAYELIHLE | URBAN | P.O.BOX 43380, INANDA,4310 | 387 OHLANGE TOWNSHIP | OHLANGE | 57 | INANDA | 1/11/96 | 2 | 021-158 | 20 (2-6YRS) | NOMUSA SHEZI 5192882 |
| 10/9 DR | KHULAKAHLE | URBAN | P.O.BOX 43154, INANDA,4310 | STOP 8, INANDA | INANDA | 56 | INANDA | 11/4/96 | 2 | | 30 | T T GUMEDE 083 5374194 |
| 538/1/DR | ZIMELE | URBAN | PRIVATE BAG X 034 INANDA, 4340 | | AMATHIKWE | 53 | INANDA | | 2 | | 30 2-6YRS | MRS NDLELA 5101966 |
| 20/9/DR | MACHOBENI | PERI URBAN | P.O.BOX 84254, INANDA,4310 | 871 MACHOBENI LOCATION | MACHOBENI | 03 | INANDA | 11/04/96 | 2 | 034-268 | 47 (6M-6YRS) | MRS DUBU 082 3479262 |
| 893/9 DR | MASIBONISANE | URBAN | P.O.BOX 82785, INANDA NEWTOWN,4310 | B 279 INANDANDA NEWTON, INANDA | INANDA, NEWTOWN | 55 | INANDA | 22/11/96 | 2 | 007-966 | 100 | FREEDA 083 7344597 519 1378 |
| 523/9/DR | MBALENHLE | URBAN | P.O.BOX 40902, REDHILL, 4071 | G49 OHLANGE VILLIAGE | OHLANGE VILLIAGE | 57 | INANDA | 4/2/93 | 2 | | 50 (1-6YRS) | J. C MNGOMA 5195409 |
| 524/9 DR | MILK AFRICA | URBAN | P.O.BOX 97018, KWA ZIMELE, 4052 | A 1040, INANDA, NEWTOWN | NEWTOWN | 56 | INANDA | 15/4/93 | 2 | | 67(18M-6YRS) | J MAPHUMULO 5101510 |
| 525/9 DR | MINI DAY CARE | URBAN | P.O.BOX 43259, INANDA,4310 | NAMIBIA | INANDA | 56 | INANDA | 23/6/93 26/8/96 | 2 | 016-055 | 160 | C DLOMO 510 2562 |
| 526/9/DR | MZOKHANYAYO | URBAN | | MZOMUSHA KWA BESTER | KWA BESTER | 54 | INANDA | 4/2/93 | 2 | 008-928 | 110 (2-6YRS) | MRS KHESWA |
| 881/9 DR | OKUHLE | PERI URBAN | P.O.BOX 12947, KWA ZIMELE, INANDA | AMAOTI | AMAOTI | 53 | INANDA | 19/3/93 | 2 | | 75 | BEAUTY KNWELA 5101927 082 685 9233 |

| NO | NAME | | POSTAL ADDRESS | PHYSICAL ADD | AREA | WARD | DIST | D/REG | L | NPO-NO | AGE/NO | CONT.DET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 761/9DR | PHAKAMANI CRECHE | URBAN | P.O.BOX 43129, INANDA,310 | LOT. 1391 MAIN RD,4030 | OHLANGE TOWNSHIP | 56 | INANDA | 18/9/90 | 2 | 023-293 | 45 (0-7YRS) | A. ZINCU 5191887 |
| 155 /9 DR | PHAPHAMANI | URBAN | P.O.BOX 43063, INANDA,4310 | | INANDA | 56 | INANDA | 4/2/93 | 2 | | 60 (6MTS-6YRS) | MRS N GUBANE |
| 75/9/DR | REJOICE | URBAN | P.O.BOX 43084, INANDA,4310 | 93 INANDA MAIN ROAD | STOP 8, INANDA | 56 | INANDA | 7/12/93 | 2 | 004-620 | 40 (2-6YRS) | CELE 5076695 |
| 1192/1 DR | SANDILE CRECHE AND PRE SCHOOL | URBAN | INANDA 4310 | 846 OHLANGE INANDA | NEWTOWN WHITE CITY | 57 | INANDA | 06/01/04 | 1 | 008-777 | 60 | A SISHI 519 1062 |
| 555/1 DR | SAWELAMAKHOSAZANE | URBAN | P.O BOX 43492 INANDA 4310 | SECTION C 415, INANDA NEWTOWN | INANDA NEWTOWN | 54 | INANDA | 23/9/92 | 2 | | 65 | V.C GUMEDE 309 6969 |
| 756/9 DR | SINAMUVA CRECHE | URBAN | P.O.BOX 481724, QUALBERTH, 4028 | C 975 INANDA NEWTOWN | SECTION C | 54 | INANDA | 27/9/96 | 2 | | 80 (6MNT-6YRS) | SIBISI 5190451 |
| 250/1 DR | VELABAHLEKE | URBAN | P.O.BOX 3586, DURBAN | EZIMBUZINI GROUND | OHLANGE | 57 | INANDA | 21/6/83 | 2 | 030-662 | 40 12M – 6YRS | MBATHA 082 5035326/519755 3 |
| 1159/9 DR | VEZUKUKHANYA | RURAL | P.O.BOX 59162, INANDA, 4310 | ITHWELENYE OGODWENI | AMATIKWE | 19 | NDWEDWE | 8/1/03 | 2 | 009-184 | 60 (1-6YS) | BEATY NGCOBO 5180759 |
| 993/9 DR | SIPHOKUHLE | URBAN | P.O.BOX 90006, INANDA,4310 | NO.1254 LOT 44, BESTER AREA 1 | BESTER | 54 | INANDA | | | 028-998 | 60 (1-6YRS) | ZANELE S GUMEDE 5013032 |
| 886/9/DR | SIYABONGA | PERI URBAN | P.O.BOX 043, INANDA,4310 | GOQOKAZI AMATIKWE | AMATIKWE | 56 | INANDA | | 2 | | 10 (2-6YRS) | PASTOR S.A MASIKANE 03344 41128 |
| 21/9 DR | SIYAKHULA | URBAN | PO.BOX 41972, KWA ZIMELE,4032 | PIESANG RIVER | PIESANG RIVER | 44 | INANDA | 11/4/86 | 2 | | 37(2M-6YRS) | 072 1582021 N NKOSI |

| NO | NAME | | POSTAL ADDRESS | PHYSICAL ADD | AREA | WARD | DIST | D/REG | L | NPO-NO | AGE/NO | CONT.DET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 143 /9/ DR | SIYAVUKA CRECHE | URBAN | P.O.BOX 67143, INANDA,4310 | AMATIKWE | AMATIKWE | 56 | INANDA | 4/2/93 | 2 | 036-538 | 20 | NONHLANHLA 072 419 2289 518 0001 |
| 1208/1/D R | SIYATHUTHUKA | URBAN | P.O. BOX 68295 INANDA 4310 | GANDHI SETTLEMENT BHAMBAY! INANDA 4310 | INANDA | 57 | INANDA | 11/12/04 | 2 | 044-545 | 40 6MNTHS – 6 YRS | BUSISIWE MXINWA 519 5358 |
| 735/9 DR | SOBAHLE CRECHE | URBAN | P.O.BOX 43246, INANDA, 4310 | NGCONGANGCO NGA | INANDA MISSION | 03 | INANDA | 1/11/96 | 2 | | 30 (6M-6YRS) | MSOMI 5103604 |
| 511/9/ DR | THEMBALISHA | URBAN | P.O.BOX 43327,INANDA,4310 | C 147, INANDA NEWTOWN | SECTION C, NEWTOWN | 54 | INANDA | 19/3/93 | 2 | | 70 (6M-6YRS) | DLOMO 5102562 |
| 44/9/DR | THOLITHEMBA | PERI URBAN | C/O VALLEY CENTRE, ROOM 1001, 44 LORNE STREET, DBN | 409 EZIMANGWENI | EZIMANGWENI | 54 | INANDA | | 2 | 016 - 046 | 70 (8M-6YRS) | E.B MAKHANYA 082 3953958 |
| 528/9/DR | THUTHUKA | URBAN | P.O.BOX 83187, INANDA,4310 | F 43, DUBE VILLIAGE | OHLANGE | 57 | INANDA | 4/3/93 | 2 | | 50(3-6Yrs) | MRS L DUDE 519 1314 |
| 259/DR | INKANYISO CRECHE & PRE SCHOOL | RURAL | P.O.BOX 81095, INANDA, 4310 | A52 MZOMUSHA AREA, INANDA, 4310 | MZOMUSHA AREA | 54 | INANDA | 1/11/05 | 1 | 008-946 | 80 (6M-6YRS) | DORIS DLADLA 083 7396341 |
| 548 | KHULAKAHLE | RURAL | P. O. BOX 43026 INANDA 4310 | UMZINYATHI | QADI T/A | 3 | INANDA | 19/1/00 | 2 | 028-969 | 116 1-6YRS | MRS DORIS NGIDI 0732620017 |
| 207/9/DR | SBONOKUHLE | RURAL | P.O.BOX 59040, INANDA | AMATIKWE RESERVE | AMATIKWE | 3 | INANDA | 31/12/98 | 1 | 007-380 | 40 (1-6YRS) | JOYCE NTULI 5186184 |
| 931/9/DR | SIYAPHAMBILI | URBAN | P.O.BOX 43003 INANDA , 4310 | EBUHLENI ROAD AMATHABETHU | AMATHABETHU QADI T/A | 3 | INANDA | 19/1/00 | 2 | 008-077 | 75 0-6YRS | MRS SF GUMEDE 5103597 |

| NO | NAME | | POSTAL ADDRESS | PHYSICAL ADD | AREA | WARD | DIST | D/REG | L | NPO-NO | AGE/NO | CONT.DET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 193/8 DR | THOKOZANI | RURAL | P. O. BOX 43119 INANDA 4310 | AMATIKWE RESERVE | AMATIKWE | 3 | INANDA | 25/2/00 | 1 | | 50 1-6YRS | |
| 10/1/7/1/4 | SIBONKUKHANYA CRECHE & PRESCHOOL | RURAL | P.O.BOX 5151 DURBAN 4000 | UPPER UKUMANAZA, MZINYATHI | MZAINYATHI | 3 | INANDA | 1/12/05 | 2 | 041-265 | 40 (6M-6YRS) | ELISE MZANYATHI 073 239 1435 |
| 10/1/7/6 | S'KETHETOKHUL E CRECHE & PRE SCHOOL | RURAL | P.O.BOX 94080 INANDA, 4310 | NTABENDE AREA, MZINYATHI | MZINYATHI | 3 | INANDA | 28/11/05 | 2 | 041-742 | 40 (6M-6YRS) | MRS GRACE MSOMI 073 8632132 |
| 10/1/8/1/ 283 | CEBELIHLE CRECHE | URBAN | P.O.BOX 59024, INANDA,4310 | ITHWELENYE, AMATIKWE | AMATIKWE | 3 | INANDA | 29/11/05 | 1 | 039-419 | 43(6M – 6YRS) | PRISC BHENGU 072 5241525 |

**ANNEXURE C**

Department of Food and Nutrition,

Tel. (031) 373-2326, Fax (031) 373-2795,

P.O. Box 1334, Durban 4000

2 October 2009

Dear Madam

Ngiyabonga ukuba uthathe lelithuba ufunde lencwadi. Ngingu Mrs Phindile Nzama ngisebenza eMqhawe High School ngifundisa iConsumer Studies. Ngokuzimisela ukuthuthuka kulesisifundo ngibhalise izifundo zokuqhubeka kulomkhakha eDurban University of Technology ka Department of Applied Sciences: Consumer Sciences: Food and Nutrition, iMaster of Techology. Ngokwezifundo zami kumele ngenze ucwanigo kubantwana abaneminyaka kusukele ku 2 kuya ku 5 basezinkulisa zaseNanda ngokudla abakudla enkulisa nasemakhaya.

Ngibhala lencwadi ukucela imvume yakho ukuba ngisebenzisane nawe nenkulisa yakho ukwenza lolucwaningo. Ngizodinga ulwazi ngenkulisa kuzofanele abasizi basekhishini lenkulisa baphendule uhla lwemibuzo, ngicwaninge i menu yabantwana, ngikale ukudla umntwana akuphakeliwe besengikala ukudla okusale kumntwana uma engaqedanga lokhu akuphakeliwe. Imvume yakho izongigunyaza ukuthi inkulisa yakho izoba indawo ezosebenza ukuba ngihlangane kuyo nabantwana nabazali babo ngempelasonto ukuze ngingezukuphazamisa ukufunda kwabantwana. Kulomhlangano ngizokala isisindo nobude bomntwana, umzali aphendule imibuzo ngesimo sasekhaya lomntwana nokuthi udla kanjani nakangakanani umntwana ekhaya. Abantwana nabazali ngizobapha itiye umasihlangana nabo uma kuzothatha isikhathi eside besemhlanganweni nami. Ngizocela nokuthi inkulisa isebenze ukungidlulisela izincwadi zokuxhumana nabazali ngithole nezimpendulo ngani.

Ngethemba ukuthi imiphumela yocwaningo izonisiza nani ekuthuthukiseni indlela abantwana abadla ngayo ukuze bakhule bedla ngendlela enempilo ukugwema izifo ezinjengokukhuluphala, nesifo soshukela, nezinye ezibangwa indlela esidla ngayo.

Ngisazocela nemvume kubazali nababheki babantwana.

Ozithobayo

Mrs Phindile Nzama
Researcher

**ANNEXURE D**

Department of Food and Nutrition,

Tel. (031) 373-2326, Fax (031) 373-2795,

P.O. Box 1334, Durban 4000

**IMVUME YENKULISA : UKWANELA KOMSOCO EKUDLENI KWABANTWANA 2 KUYA KU 5 IMINYAKA EZINKULISA ZASENANDA**

Mina _____ (amagama ngokugcwele) ngifundile ngaqondisisa imininingwane ngocwaningo futhi ngichazeliwe ngaqondisisa ngokugcwele ngocwaningo neresearcher ngagculiseka. Ngiyavuma ukuthi i_____ Creche & Preschool izimbandakanye nocwaningo.

Osayinile _____
Supervisor

Isayinwe e_____(indawo)

Usuku_____

**Ofakazi**

Igama _____ Igama _____

Osayinile _____ Osayinile_____

Basayine e_____ (indawo) Usuku _____

I adresi yenkulisa _____ Official Stamp

_____

_____

Telephone/ Cell number _____

**ANNEXURE E**

Department of Food and Nutrition,

Tel. (031) 373-2326, Fax (031) 373-2795,

P.O. Box 1334, Durban 4000

Mzali

Ngiyabonga ukuba uthathe lelithuba ufunde lencwadi. Ngingu Mrs Phindile Nzama ngisebenza eMqhawe High School ngifundisa iConsumer Studies. Ngokuzimisela ukuthuthuka kulesisifundo ngibhalise izifundo zokuqhubeka kulomkhakha eDurban University of Technology ka Department of Applied Sciences: Consumer Sciences: Food and Nutrition, iMaster of Techology. Ngokwezifundo zami kumele ngenze ucwanigo kubantwana abaneminyaka kusukele ku 2 kuya ku 5 basezinkulisa zaseNanda ngokudla abakudla enkulisa nasemakhaya.

Ngibhala lencwadi ukucela imvume yakho ukuba wena nomntwana wakho nizimbandakanye nalolucwaningo. Kulolucwaningo ngizobuka indlela ukwanela ngayo umsoco ekudleni okudliwa abantwana ezinkulia ezibhalise kwi Department of Social Development. Lokhu ngikwenzela ukuze kuthuthuke ulwazi lwabazali nababheki babantwana ezinkulisa. Ngethemba ukuthi imiphumela yocwaningo izonisiza nani ekuthuthukiseni indlela abantwana abadla ngayo ukuze bakhule bedla ngendlela enempilo ukugwema izifo ezinjengokukhuluphala, nesifo soshukela, nezinye ezibangwa indlela esidla ngayo.

Ucwaningo luzothatha izinsuku ezine esithubeni sezinyanga uOkthoba kuyakuDisemba. Kuzoba izinsuku ezigqagqene evikini nangempelasonto ngokuphumelela kwenu nobabili nomntwana. Abantwana bazo kalwa isisindo nobude kuphela. Kukalwe nokudla abaphakelwa khona enkulisa sibheke ukuthi uyadla aqede na ukudla aphakelwe khona. Umzali uzophendula imibuzo ngesimo sasekhaya lomntwana, nangendlela umntwana adla ngayo ekhaya ezinsukwini ezimbili evikini nangempelasonto eyodwa nje. Sizosebenzisa amagceke enkulisa ama sihlangana.

Ngicela ugcwalise ifomu elihambisana nalencwadi ulibuyise nomntwana kusasa. Uma unemibuzo nansi imininingwane yami ngezansi.

Ozithobayo

Mrs Phindile Nzama
Researcher
Cell number : 082 485 8350
Telephone : 031- 539 6558 (ntambama)

**ANNEXURE F**

DURBAN UNIVERSITY of TECHNOLOGY

Department of Food and Nutrition,
Tel. (031) 373-2326, Fax (031) 373-2795,
P.O. Box 1334, Durban 4000

**IMVUME YOMZALI : UKWANELA KOMSOCO EKUDLENI KWABANTWANA 2 KUYA KU 5 IMINYAKA EZINKULISA ZASENANDA**

Mina _____ (amagama ngokugcwele) mzali ngifundile ngaqondisisa imininingwane ngocwaningo noma ngichazeliwe ngaqondisisa ngokugcwele ngocwaningo noma ngixoxile ngocwaningo neresearcher ngagculiseka. Ngiyavuma ukuzimbandakanya nocwaningo.

Mina mzali noma mbheki ka _____ (amagama ngokugcwele) umntwana oneminyaka engu _____ nginikeza imvume ukuba umntwana wami asebenzisane neresearcher kulolucwaningo.

Osayinile _____ Ubuhlobo _____

Isayinwe e_____ Usuku_____

Ofakazi

Igama _____ Igama _____

Osayinile _____ Osayinile_____

Basayine e_____ Usuku _____

I adresi yamzali _____

_____

_____

**ANNEXURE G**

**Food and Nutrition Consumer Sciences**

# FIELDWORKER TRAINING MANUAL

## 1. WHAT IS A FIELD WORKER?

The field worker is an extremely important person in this project. In fact, this research would not be possible without the field workers. The field workers are the individuals who must interview the subjects (the people chosen to take part in the research) and get correct and accurate information from them. The subjects must feel at ease with the field worker so that they will not feel threatened or intimidated and will willingly answer the questions to the best of his or her ability.

## 2. FIELDWORKER CODE OF CONDUCT

In order to be a successful interviewer, a field worker must have (or develop) the following characteristics:

1. **Friendliness**: the field worker must be able to make each subject feel relaxed and not threatened in any way. The subject must feel that the field worker sees him or her as a person, not just another number that must be dealt with.
2. **Respect**: the subject must be treated with respect at all times. For example, he must be greeted politely, thanked for his time and co-operation; he must not be forced to answer a question that he is not willing to answer. The field worker must never show if she disagrees with something the subject has said.
3. **Patience**: each subject has to be asked the same questions in the same way. This means that the field worker must ask the same questions over and over, which can be very tiring and irritating. However, the field worker may never show that she is impatient or irritated even when the subjects are slow to answer or when they do not understand the questions. She must be able to control her own feelings and hide them when necessary.
4. **Reliability**: the field worker must be reliable, she/he must pay attention to detail, record all answers accurately, not skip over questions or make up answers.

5. **Enthusiastic and Motivated**: the field worker must be enthusiastic about the research. She should be doing it because she really wants to and not just because it's just a job.
6. **Flexible**: a good field worker is able to adapt to circumstances. She is aware that things do not always work out as planned and sometimes she will have to work under difficult and uncomfortable conditions.
8. **Neat Appearance**: the field worker must always look neat and well groomed, but never overdressed. The following guidelines for dress should be followed:
- wear neat, simple and comfortable clothes
- do not wear badges or emblems of organisations, churches, etc. as these may influence the way subjects answer.
- dress so that the subject will concentrate on the interview and not on the way you are dressed.

## 3. HOW TO CONDUCT THE INTERVIEW

If the subjects in a project are children, the parents and/or caregivers will need to be involved in the interview process to verify information that is needed for the questionnaires. If the questions need to be translated the interviewers must be careful not to change the focus of the question.

### 1. How do I begin?

Greet the subject politely and introduce yourself.
Ask what language the subject would prefer to speak.
Explain what the interview is about. Let the subject ask questions about the research. Reassure the subject that the answers are confidential and that neither the subject nor his or her address will be identified.
Put the subject at ease. Be flexible and sensitive to the subject. Some subjects may be tense or apprehensive. In such cases, talking about something general, e.g. the weather may put the subject at ease.

### 2. How do I conduct the interview?

• During the interview direct the questions to the subject, but if it is a child and he or she cannot answer, ask the parent/caregiver for the information needed.
• Ask the questions exactly as they are written on the questionnaire. Try even to keep your tone of voice the same for each subject so as not to lead the subject or to give him an idea of how you want him to answer. You may have to explain a question or

use different wording if the subject cannot understand it.

• Ask the questions in the order that they appear on the questionnaire. If the subject refuses to answer the question, record the lack of response and go on to the next question.

• Follow the instructions on the questionnaire. Sometimes it may seem that a subject has already answered a question when he answered a previous one, but the interviewer must still answer the question. For example, the questions about Polony and atchaar. Start the question: "We have already mentioned this, but…".

• Do not lead the respondents. Do not try to influence the way the subject answers. Keep your facial expression friendly, but neutral. Never show surprise or shock or approval to the subject's answers. Try to avoid unconscious reactions such as nodding the head, frowning, raising the eyebrows. Never give your own opinions.

• Keep the tone of the interview conversational. Be friendly and courteous. Do not make the subject feel as if he or she is taking an examination or is on trial be familiar with the questionnaire so that you can ask questions conversationally rather than reading them stiffly. The questionnaire is designed to keep the amount of writing to a minimum. However, if a subject gives a long response to an 'other' question, say, 'excuse me while I write that down'. Don't make the subject feel as though you have forgotten he is there.

• Keep control of the interview. Do not let the subject go off into irrelevant conversation. If he or she does, bring him or her gently back to the interview.

• Allow the subject time to think; do not hurry him to answer. However, if he is silent for too long, repeat the question, or 'prompt' him. For example, say 'you have told me how you cook cabbage; now please tell me how you cook pumpkin.

• Follow the instructions on the questionnaire for recording the responses. Record all responses, including negative responses or refusals to answer.

• **Make sure that you have written in the subject's number.**

**3. How do I end the interview?**

o Tell the subject that you have finished the interview.

o Reassure him that everything he has told you is confidential.

o Thank him for his time and cooperation. Direct him to the next stage. Greet him.

**ANNEXURE H**

**Food and Nutrition Consumer Sciences**

# SOCIO-DEMOGRAPHIC QUESTIONNAIRE: AFRICAN COMMUNITY

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 from any reports or publications.

## 1. GENERAL INFORMATION

Subject number:……..…….

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 |

## 3. ACCOMMODATION AND FAMILY COMPOSITION

3.1 Do you live in?

| Town/City | Farm | Squatter camp | Rural village | Hostel | Township | Other, specify... |
|---|---|---|---|---|---|---|
| | | | | | | |

3.2 Do other people live in your house?

| |
|---|
| Yes |
| No |

3.3 How many people are living in your house?

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

3.4. Please **complete** the table below on all members of the household

| Name of household member | Age (yrs) | Gender M / F | Family relationship | Does this person eat and sleep in this house at least 4 days a week? |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

3.5 Are all members' permanent residents in this house?

| Yes | No |
|---|---|
| | |

3.6 If yes, how long have you been staying permanent in this house?

| < 1 year | 1-5 years | >5 years |
|---|---|---|
| | | |

3.7 In what type of house are you staying?

| Brick | Clay | Grass | Wood | Zinc/shack |
|---|---|---|---|---|

3.8 How many rooms does your house have?

| < 2 rooms | 3-4 rooms | > 4 rooms |
|---|---|---|

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

| Yes | No |
|---|---|

3.10 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……. | |

3.11 Do you have the following facilities at home?

3.11.1 Water

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

3.11.2 Toilet facilities

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

3.11.3

| Waste removal | Yes | No |
|---|---|---|

3.11.4

| Tarred road in front of house | Yes | No |
|---|---|---|

3.11.5

| | | |
|---|---|---|
| Gravel road in front of house | Yes | No |

3.12 To what extent do you have problems with the state of your house (e.g. too small, repairs,
dampness, etc.)?

……
……

3.13. Do you have problems with the following?

| | |
|---|---|
| Mice/ Rats | |
| Cockroaches | |
| Ants | |
| Flees | |
| Mosquitoes | |
| Geckos | |
| Frogs | |
| Snakes | |
| Bed Bugs | |

## 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 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?

| < R500 | R501 – R1000 | R1001 - R1500 | R1501 – R2000 | R2001 – R2500 | >R2501 |
|---|---|---|---|---|---|

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

4.10. 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 |
|---|---|---|---|---|

4.11. 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

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|

4.12. How often do you buy food?

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

4.13. Where do you buy food?

| Tuck shop | Street vendor | Wholesalers | Supermarket | Other, specify…… |
|---|---|---|---|---|

4.14.What type of transport do you use to get around?

| | |
|---|---|
| Taxi | |
| Bus | |
| Train | |
| Own vehicle | |
| Other Specify | |

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| R 0 – R 50 | R 51 – R 100 | R 101 – R 150 | R 151 – R 200 | R 201 – R 250 | R 251 – R 300 | > R 500 | I do not know |

## 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 attending school

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| None | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | All |

5.6 How do the children get to school?

| Walk | Bus | Taxi | Lift | Other, specify…… |
|---|---|---|---|---|
| | | | | |

## 6. ASSETS

| **Tick one block for every question:** | Self | Father | Mother | Sibling | Grandma | Grandpa | Aunt | Uncle | Cousin | Friend | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6.1 Who is mainly responsible for food preparation in the house? | | | | | | | | | | | |
| 6.2 Who decides on what type of food is bought for the household? | | | | | | | | | | | |
| 6.3 Who is mainly responsible for feeding/serving the child? | | | | | | | | | | | |
| 6.4 Who is the head of this household? | | | | | | | | | | | |
| 6.5 Who decides how much is spent on food? | | | | | | | | | | | |

6.6 How many meals do you eat per day?

| 0 | 1 | 2 | 3 | > 3 |
|---|---|---|---|---|

6.7 Where do you eat most of your meals?

| Home | Friends | Work | School | Other, specify……. |
|---|---|---|---|---|

6.8 Where do your children eat most of their meals?

| Home | Friends | School | Other, specify……. |
|---|---|---|---|

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

| | **Yes** | **No** | **Quantity** |
|---|---|---|---|
| Electrical stove | | | |
| Gas stove | | | |
| Primus or paraffin stove | | | |
| Microwave | | | |
| Hot plate | | | |
| Radio | | | |
| Television | | | |
| Refrigerator | | | |
| Freezer | | | |
| Bed with mattress | | | |
| Mattress only | | | |
| Lounge suite | | | |
| Dining room suite | | | |
| Electrical iron | | | |
| Electrical, kettle | | | |

6.10What type of fuel do you usually use for food preparation?

| Wood fire | Paraffin | Electricity | Gas | Coal | Other, specify…… |
|---|---|---|---|---|---|

6.11What 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 I

DURBAN UNIVERSITY of TECHNOLOGY

FOOD AND NUTRITION CONSUMER SCIENCES

Anthropometric measurements

**Section A:**

1. Number/Name of the subject……

2. Community:……..…

| 3. Date of birth | Year | Month | Day |
|---|---|---|---|

| 4. Gender | Male | Female |
|---|---|---|

**Section B:**

| 1. Body weight (kg) | 1. Body weight (kg) | 2. Height/Length (cm) | 2. Height/Length (cm) |
|---|---|---|---|
| kg | kg | cm | cm |

| 3. Waist circumference | 3. Waist Circumference | 4. Blood pressure | 4. Blood pressure |
|---|---|---|---|
| cm | cm | / | / |

## ANNEXURE J

MENU PLAN NAME OF INSTITUTION:

| DAY | BREAKFAST | TEA | LUNCH |
|---|---|---|---|
| MONDAY | | | |
| TUESDAY | | | |
| WEDNESDAY | | | |
| THURSDAY | | | |
| FRIDAY | | | |

## ANNEXURE K

NAME OF RECIPE NAME OF INSTITUTION _____

INGREDIENTS

| | |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

METHOD

| |
|---|
| |

## ANNEXURE L

NAME OF INSTITUTION_____ DAY & DATE _____

MEAL _____ AGE GROUP _____ PLATE WEIGHT (P W) _____

| ID.No | Food + Plate weight | A = Menu Item 1 cooked cereal-PW | B = Menu Item2 Protein/Curry -A | C = Menu Item 3 Vegetable - B | Total Served A + B + C - PW | Plate waste of Menu served |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**ANNEXURE M**

## FOOD HANDLER'S QUESTIONNAIRE

| School #: | |
|---|---|

**Information to be obtained from the Food Handlers at the school**
***Imininingwane edingekayo kubapheki esikoleni***

---

**Explain the following to the interviewee:**
***Chazela umuntu obuzwayo loku okulandelayo:***
The following set of questions aims to investigate some of the aspects of the day to day running of the National School Nutrition Programme (NSNP) at your school.
*Lemibuzo elandelayo ihlose ukuthola ngezinto ezenzekayo nsukuzonke nge National School Nutrition Programme (NSNP) esikoleni sakho.*

Please answer only Yes or No or answer one of the choices you are given. You will be given the chance to make other comments at the end.
*Ngicela uphendule ngo Yebo noma Cha noma phendula okukodwa khalokhu okunikiwe. Uzonikezwa ithuba lokuphawula ekugcineni.*

---

Please insert the interviewee's answer to the following questions by placing a cross (X) in the right hand box or filling in the relevant information e.g. number. Y = Yes and N = No.
*Faka izimpendulo zobuzwayo kumibuzo elandelayo ngokubeka isiphambano ebhokisini elingakwesokudla noma ugcwalise imininingwane efanele njenge nombolo, Y=Yebo kanye no C=Cha*

---

**GENERAL:**
***OKUJWAYELEKILE:***

1. How many cooks / food handlers are there?
1. *Bangaki abapheki abakhona?*

| Number | *Nombolo* | |
|---|---|---|

2. How long have you been a cook / food handler for? Record the number of years and months.
2. *Sewunesikhathi esingakanani upheka? Bhala inombolo yeminyaka kanye nezinyanga.*

| | | FH 1 | FH 2 | FH 3 | FH 4 |
|---|---|---|---|---|---|
| Years | *Iminyaka* | | | | |
| Months | *Izinyanga* | | | | |

3. Do you have previous experience in food service?
3. *Unalo yini ulwazi ngaphambilini lokusebenza ngokudla?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

4. Is there a menu?
4. *Likhona yini iphepha ekubhalwe kulo ukudla okuzodliwa ngokulandelana kwakho?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

## FOOD STORAGE
***INDAWO YOKUGCINA UKUDLA***

5. Are the expiry dates checked on the foods?
5. *Niyakuqikelela ukubheka imibhalo emaphaketheni okudla eshoyo ukuthi ukudla konakala nini?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |
| Not applicable | *Akufanele* | A/F | |

6. If the expiry date on the food packaging is 16 AUG 07, what does this mean? (take a sample and show it to the cook / food handler)
6. *Uma usuku lokonakala ephaketheni lokudla lingu 16 AUG 07, kusho ukuthini? (Thatha isampula utshengise umpheki)*

_____

_____

## FOOD PREPARATION
***UKULUNGISA UKUDLA***

7. Where is the food prepared? (Select one).
7. *Kulungiselwa kuphi ukudla? (Khetha okukodwa).*

| | | | |
|---|---|---|---|
| Designated kitchen | *Endlini yokuphekela* | 1 | |
| Temporary / makeshift kitchen | *Ekhishini lesikhashana* | 2 | |
| Classroom | *Endlini yokufundela* | 3 | |
| Outbuilding / "Lean-to" | *Endlini engaphandle* | 4 | |
| Outside | *Ngaphandle* | 5 | |
| Other (please specify) | *Okunye (Chaza)* | 6 | |
| | | | |

8. Who prepares the food?
*8. Ubani olungisa ukudla?*

| | | | |
|---|---|---|---|
| Principal | *Uthishanhloko* | 1 | |
| Head teacher/vice principal | *Usekela kathishanhloko* | 2 | |
| NSNP Site manager | *Imenenja yakwaNSNP* | 3 | |
| Cook/Food handler | *Umpheki* | 4 | |
| Teacher | *Uthisha* | 5 | |
| Community volunteer | *Ilunga lomphakathi elisizayo* | 6 | |
| Other (please specify) | *Omunye (Chaza)* | 7 | |
| | | | |

9. Is there adequate space for food preparation?
*9. Yanele yini indawo yokulungisela ukudla?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

10. Is there adequate space for cooking?
*10. Yanele yini indawo yokuphekela?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

11. Is there enough water for food preparation?
*11. Anele yini amanzi okulungisa ukudla?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

12. Are there enough food preparation utensils? (Answer all options).
*12. Zanele yini izitsha zokulungisa ukudla? ( Phendula konke okunikiwe).*

| | | | | |
|---|---|---|---|---|
| 12.1 | Knives | *Imibese* | Y | C |
| 12.2 | Boards | *Amabhodi okuqobela* | Y | C |
| 12.3 | Measuring equipment | *Izitsha zokukala* | Y | C |
| 12.4 | Spoons | *Izipuni* | Y | C |
| 12.5 | Mixing tools | *Amathuluzi okuhlanganisa* | Y | C |

13. Are recipes available?
*13. Ikhona yini indlela yokupheka ukudla ebhalwe phansi? Kusho amarecipe.*

| | | | | |
|---|---|---|---|---|
| Yes | *Yebo* | Go to Q14 | Y | |
| No | *Cha* | Go to Q16 | C | |

14. Are the recipes used?
*14. Ziyasetshenziswa yini izindlela zokupheka ukudla ezibhalwe phansi? Kusho amarecipe.*

| | | | | |
|---|---|---|---|---|
| Yes | *Yebo* | Go to Q15 | Y | |
| No | *Cha* | Go to Q16 | C | |

15. Where were these recipes obtained?
*15. Zatholakala kuphi lezizindlela zokupheka ukudla? Kusho amarecipe.*

| | | | |
|---|---|---|---|
| Department of Health | *Kumnyango wezeMpilo* | 1 | |
| Department of Education | *Kumnyango wezeMfundo* | 2 | |
| Cook/Food handler | *Kumpheki* | 3 | |
| Parent | *Kumzali* | 4 | |
| Other (please specify) | *Komunye (Chaza)* | 5 | |
| | | | |

**FOOD HOLDING:**
***UKUGCINWA OSEKUPHEKIWE:***

16. How long is the food held after cooking and before serving? (Select one).
*16. Kubekwa isikhathi esingakanani ukudla emva kokuphekwa naphambi kokuphakwa? (Khetha okukodwa).*

| | | | |
|---|---|---|---|
| Less than 15 minutes | *Ngaphansi kwemizuzu engu15* | 1 | |
| 15 – 30 minutes | *Phakathi kwemizuzu engu15 kuya kwewu30* | 2 | |
| 30 – 45 minutes | *Phakathi kwemizuzu engu30 kuya kwewu45* | 3 | |
| More than 45 minutes | *Ngaphezulu kwemizuzu engu45* | 4 | |

17. Is the food kept warm at this time?
*17. Ukudla kugcinwa kufudumele yini ngalesisikhathi?*

| | | | | |
|---|---|---|---|---|
| Yes | *Yebo* | Go to Q18 | Y | |
| No | *Cha* | Go to Q19 | C | |

18. How is the food kept warm?
*18. Kugcinwa kanjani kufudumele ukudla?*

_____

_____

**SERVING:**
***UKUPHAKWA KOKUDLA:***

19. Is there adequate space for serving / portioning?
*19. Yanele yini indawo yokuphaka?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

20. Are there adequate food serving utensils? (Answer all options).
*20. Zanele yini izitsha zokuphaka? (Phendula konke okunikiwe).*

| | | | | |
|---|---|---|---|---|
| 20.1 | Ladles | *Izipuni ezinkulu* | Y | C |
| 20.2 | Measuring equipment | *Izitsha zokukala* | Y | C |
| 20.3 | Spoons | *Izipuni* | Y | C |
| 20.4 | Tins | *Amakopi* | Y | C |
| 20.5 | Cups | *Izinkomishi* | Y | C |
| 20.6 | Saucers | *Amasoso* | Y | C |

21. Are there adequate eating utensils? (Answer all options).
*21. Zanele yini izitsha zokudlela? (Phendula konke okunikiwe).*

| | | | | |
|---|---|---|---|---|
| 21.1 | Plates | *Amapuleti* | Y | C |
| 21.2 | Bowls | *Izindishi* | Y | C |
| 21.3 | Spoons, forks, knives | *Izipuni, izimfoloko, imibese* | Y | C |

22. How is the food allocated following cooking? (Select one).
*22. Kuphiwa kanjani ukudla emuva kokuphekwa? (Khetha okukodwa).*

| | | | | |
|---|---|---|---|---|
| Class portioning (served to each class in bulk) | *Kuphakwa ngamakilasi* | Go to Q23 | 1 | |
| Individual portioning (served directly to each learner) | *Kuphakelwa umfundi ngayedwa* | Go to Q25 | 2 | |
| Other (please specify) | *Enye indlela abadla ngayo (Chaza)* | | 3 | |
| | | | | |

23. Do all classes get the same amount regardless of the number of learners in the class?
*23. Ngabe wonke amakilasi athola ukudla okulinganayo ngaphandle kokubheka iminyaka yabafundi ekilasini?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |
| Not applicable | *Akufanele* | A/F | |

24. Do all classes get the same amount regardless of the age of learners in the class?
24. *Ngabe wonke amakilasi athola ukudla okulinganayo ngaphandle kokubheka iminyaka yabafundi ekilasini?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |
| Not applicable | *Akufanele* | A/F | |

25. What time is the meal normally served?
25. *Kujwayele ukudliwa ngasikhathisini?*

| | | |
|---|---|---|
| Time | *Isikhathi* | |

26. Who serves the food? (Answer all options).
26. *Ubani ophaka ukudla? (Phendula konke okunikiwe).*

| | | | | |
|---|---|---|---|---|
| 26.1 | Principal | *Uthishanhloko* | Y | C |
| 26.2 | Head teacher | *Usekela kathishanhloko* | Y | C |
| 26.3 | NSNP Site manager | *Imenenja yakwaNSNP* | Y | C |
| 26.4 | Cook/Food handler | *Umpheki* | Y | C |
| 26.5 | Teacher | *Uthisha* | Y | C |
| 26.6 | Community volunteer | *Ilunga lomphakathi elisizayo* | Y | C |
| 26.7 | Learner | *Umfundi* | Y | C |
| 26.8 | Other (please specify) | *Omunye (Chaza)* | Y | C |
| | | | | |

27. How long does the service take? (Select one).
27. *Kuthatha isikhathi esingakanani ukuphaka? (Khetha okukodwa).*

| | | | |
|---|---|---|---|
| Less than 15 minutes | *Ngaphansi kwemizuzu engu15* | 1 | |
| 15 – 30 minutes | *Phakathi kwemizuzu engu15 kuya kwengu30* | 2 | |
| More than 30 minutes | *Ngaphezulu kwemizuzu engu30* | 3 | |

28. Is the same amount of food served to each learner (standardized portion size)?
28. *Ngabe isikali sokudla siyafana yini nsukuzonke esiphakelwa umfundi ngamunye?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

29. Are the learners happy with the amount of food they get most of the time?
29. *Ingabe isikhathi esiningi abafundi bayasijabulela yini sikali sokudla abasitholayo?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

**TRAINING & FOOD SAFETY:**
***UKUQEQESHA NOKUPHEPHA KOKUDLA***

38. Has any training about food safety and hygiene been provided?
38. *Ngabe kukhona yini ukuqeqeshwa ngokuphepha nangokuhlanzeka kokudla?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

39. Have you received training regarding the following? (Answer all options).
39. *Usuke wakuthola yini ukuqeqeshwa mayelana nalezinto ezilandelayo? (Phendula konke okunikiwe)*

| | | | | |
|---|---|---|---|---|
| 39.1 | Menu planning | *Ngohlelo olulandelwayo lokupheka* | Y | C |
| 39.2 | Food preparation | *Ngokulungisa ukudla* | Y | C |
| 39.3 | Preventing food contamination | *Ngokuvikela ukundla emagciwaneni* | Y | C |
| 39.4 | Preventing cross-contamination of food | *Ngokuvikela ukushintshana kwamagciwane ekudleni* | Y | C |
| 39.5 | Illness in the workplace | *Ngokugula endaweni yokusebenza* | Y | C |
| 39.6 | Injury in the workplace | *Ngokulimala endaweni yokusebenza* | Y | C |
| 39.7 | First aid | *Ngosizo lokuqala* | Y | C |
| 39.8 | Personal hygiene | *Ngokuhlanzeka komuntu* | Y | C |
| 39.9 | Hand washing | *Ngokugeza izandla* | Y | C |
| 39.10 | Other (please specify) | *Ngokunye (Chaza)* | Y | C |

40. If you have received training, whom did you receive the training from? (Answer all options).
40. *Uma ubusukutholile ukuqeqeshwa, ngabe ukuthole kuphi? (Phendula konke okunikiwe)*

| | | | | |
|---|---|---|---|---|
| 40.1 | Department of Education | *Kumnyango wezeMfundo* | Y | N |
| 40.2 | Department of Health | *Kumnyango wezeMpilo* | Y | N |
| 40.3 | Principal / Head teacher / vice principal | *Uthishanhloko / Usekela kathishanhloko* | Y | N |
| 40.4 | NSNP Site manager | *Imenenja yakwaNSNP* | Y | N |
| 40.5 | Another cook/food handler | *Omunye umpheki* | Y | N |
| 40.6 | Teacher | *Uthisha* | Y | N |
| 40.7 | Community member | *Ilunga lomphakathi elisizayo* | Y | N |
| 40.8 | Previous employment | *Umsebenzi odlule* | Y | N |
| 40.9 | Other (please specify) | *Omunye (Chaza)* | Y | N |

41. When last was training conducted? (Select one).
*41. Ukuqeqeshwa kwakugcine nini? (Khetha okukodwa).*

| | | | |
|---|---|---|---|
| Ongoing | *Kusaqhubeka* | 1 | |
| Last week | *Ngeviki eledlule* | 2 | |
| Last month | *Ngenyanga eyedlule* | 3 | |
| Last term | *Ngethemu edlule* | 4 | |
| Last year | *Ngonyaka odlule* | 5 | |
| Never | *Akukaze kubekhona* | 6 | |

42. How frequently is training conducted? (Select one).
*42. Ngabe ukuqeqeshwa kwenziwa kangaki? (Khetha okukodwa).*

| | | | |
|---|---|---|---|
| Ongoing | *Kusaqhubeka* | 1 | |
| Weekly | *Njalo ngeviki* | 2 | |
| Monthly | *Njalo ngenyanga* | 3 | |
| Once a term | *Kanye ngethemu* | 4 | |
| Once a year | *Kanye ngonyaka* | 5 | |
| Never | *Akukaze kubekhona* | 6 | |

43. Is there soap available for hand washing?
*43. Ngabe ikhona insipho yokugeza izandla?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

44. Is there running tap water available for hand washing? (Answer all options).
*44. Ngabe akhona yini amanzi ompompi okugeza izandla? (Phendula konke okunikiwe).*

| | | | | |
|---|---|---|---|---|
| 41.1 | Hot | *Ashisayo* | Y | C |
| 41.2 | Cold | *Abandayo* | Y | C |
| 41.3 | None | *Awekho* | Y | C |

45. How frequently are utensils washed? (Mark all relevant options).
*45. Zigezwa kangaki izitsha? (Khetha konke okufanele).*

| | | | |
|---|---|---|---|
| During preparation | *Ngesikhathi kulungiswa ukudla* | 1 | |
| After the food is ready | *Uma ukudla sekulungile* | 2 | |
| After the work is finished | *Ekugcineni komsebenzi* | 3 | |

46. How frequently is the stove cleaned? (Mark all relevant options).
*46. Sihlanzwa kangaki isitofu? (Khetha konke okufanele).*

| | | | |
|---|---|---|---|
| During preparation | *Ngesikhathi kulungiswa ukudla* | 1 | |
| After the food is ready | *Uma ukudla sekulungile* | 2 | |
| After the work is finished | *Ekugcineni komsebenzi* | 3 | |
| No stove | *Asikho* | 4 | |

47. Are the correct cleaning chemicals available to clean the kitchen?
*47. Ngabe imithi yokuhlanza ikhishi okuyiyo ikhona?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

48. Are there enough cleaning tools to clean the kitchen e.g. broom, mop, cloths, sponge, etc?
*48. Anele yini amathuluzi okuhlanza ikhishi njenge mishanelo, imophu, izindwangu zezitsha, isiponji nokunye?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

49. How often is the food preparation area cleaned? (Mark all relevant options).
*49. Indawo yokulungisa ukudla ihlanzwa kangaki? (Khetha konke okufanele).*

| | | | |
|---|---|---|---|
| During preparation | *Ngesikhathi kulungiswa ukudla* | 1 | |
| After the food is ready | *Uma ukudla sekulungile* | 2 | |
| After the work is finished | *Ekugcineni komsebenzi* | 3 | |

50. Are the work areas ever sanitized?
*50. Iyasetshenziswa yini imithi yokubulala amagciwane?*

| | | | |
|---|---|---|---|
| Yes | *Yebo* | Y | |
| No | *Cha* | C | |

50.1 If yes, how often? (Select one)
*50.1 Uma kunjalo, kangaki? (Khetha okukodwa)*

| | | | |
|---|---|---|---|
| Frequently | *Njalo* | 1 | |
| Daily | *Nsukuzonke* | 2 | |
| Weekly | *Masonto onke* | 3 | |
| Seldom | *Akuvamile* | 4 | |

**ANNEXURE N**

# CCF MENUS AND PORTION SIZES

| CCF ONE | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday to Friday | Maize meal porridge | 183g | 171g | 192g | 185g |
| | Monday and Friday | Maltabella porridge | | 209g | 225g | 230g |
| | Friday | Boiled egg | | 1 | 1 | 1 |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday | Vegetable Soup | 127g | | | |
| | | Rice | 95g | | | |
| | | Samp and Beans | | 197g | 220g | 241g |
| | Tuesday and Thursday | Dhall Soup | 160g | | | |
| | | Rice | 87g | | | |
| | | Vegetable Soup | | 131g | 116g | 106g |
| | | Rice | | 94g | 105g | 103g |
| | Wednesday and Friday | Potato Vegetable Soup | 130g | | | |
| | | Rice | 97g | | | |
| | | Beans | | 133g | 136g | 95g |
| | | Rice | | 107g | 101g | 91g |

| CCF TWO | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday to Friday | Maize meal porridge with Morvite | 115g | 155g | 182g | 225g |
| | | | | | | |
| | **TEA TIME** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday and Thursday | Apple | 45g | 45g | 45g | 45g |
| | Tuesday and Friday | Orange | 55g | 55g | 55g | 55g |
| | Wednesday | Marie biscuits | 2 | 3 | 3 | 4 |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday and Thursday | Egg Soup | 81g | 98g | 102g | 83g |
| | | Rice | 98g | 106g | 100g | 145g |
| | Tuesday and Friday | Fish Soup | 67g | 92g | 100g | 106g |
| | | Rice | 76g | 100g | 94g | 118g |
| | Wednesday | Minced meat Soup | 71g | 90g | 98g | 79g |
| | | Rice | 78g | 87g | 98g | 118g |

| CCF THREE | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday to Friday | Maize meal porridge | 118g | 132g | 142g | 167g |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday | Cabbage Soup | 65g | 81g | 82g | 97g |
| | | Phuthu | 62g | 64g | 72g | 77g |
| | Tuesday | Fish Soup | 78g | 77g | 81g | 79g |
| | | Rice | 65g | 76g | 81g | 89g |
| | Wednesday | Samp and Beans | 53g | 69g | 86g | 100g |
| | Thursday | Dhall Soup | 50g | 63g | 64g | 72g |
| | | Phuthu | 37g | 45g | 54g | 59g |
| | Friday | Vegetable Soup | 62g | 76g | 94g | 98g |
| | | Rice | 40g | 47g | 42g | 53g |

| CCF FOUR | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday to Thursday | Maize meal porridge | 108g | 117g | 118g | 131g |
| | Friday | Morvite | 90g | 101g | 104g | 108g |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday | Chicken Curry | 75g | 79g | 86g | 75g |
| | | Rice | 87g | 91g | 97g | 106g |
| | Tuesday | Fish Curry | 62g | 77g | 71g | 63g |
| | | Rice | 70g | 80g | 78g | 73g |
| | Wednesday | Beans | 70g | 54g | 42g | 40g |
| | | Rice | 78g | 86g | 94g | 98g |
| | Thursday | Beef Sausage Curry | 46g | 44g | 46g | 47g |
| | | Rice | 65g | 73g | 80g | 81g |
| | Friday | Polony sandwich, polony | 20g | 20g | 20g | 20g |
| | | Brown bread | 40g | 40g | 40g | 80g |
| | | Diluted Juice | 125ml | 125ml | 125ml | 125ml |

| CCF FIVE | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday to Friday | Maize meal porridge | 161g | 167g | 161g | 155g |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday and Thursday | Chicken vegetable soup | 104g | 87g | 93g | 97g |
| | | Rice | 82g | 114g | 139g | 145g |
| | Tuesday | Dhall and canned fish Soup | 81g | 84g | 83g | 85g |
| | | Rice | 119g | 109g | 145g | 137g |
| | Wednesday | Mince and vegetable soup | 105g | 92g | 98g | 101g |
| | | Rice | 89g | 109g | 135g | 144g |
| | Friday | Fish and Dhall curry | 119g | 103g | | |
| | | Rice | 81g | 94g | | |
| | | Samp and beans with Fish | | | 184g | 188g |

| CCF SIX | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday to Friday | Maize meal porridge | 73g | 136g | 176g | 205g |
| | **TEA (5YRS ONLY)** | | | | | **5yrs** |
| | Mon to Friday | Rooibos tea | | | | 125ml |
| | | White or brown bread | | | | 40g |
| | | margarine | | | | 5g |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday | Chicken Curry | 32g | 36g | 51g | 71g |
| | | Rice | 36g | 51g | 101g | 147g |
| | Tuesday | Beans and Vegetable Curry | 27g | 40g | 41g | 55g |
| | | Rice | 48g | 90g | 128g | 150g |
| | Wednesday | Fish Curry | 42g | 37g | 50g | 51g |
| | | Rice | 55g | 83g | 116g | 164g |
| | Thursday | Samp and Beans | 52g | 113g | 172g | 230g |
| | Friday | Maas and Phuthu | 54g | 114g | 154g | 183g |

| CCF SEVEN | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday, Tuesday and Thursday | Corn meal porridge | 185g | 187g | 196g | 213g |
| | Wednesday | Cornflakes | 20g | 35g | 35g | 35g |
| | | Milk | 110ml | 125ml | 125ml | 125ml |
| | Friday | Banana Morvite | 180g | 182g | 180g | 193g |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5 yrs** |
| | Monday | Fish Curry | 50g | 37g | 66g | 41g |
| | | Rice | 80g | 139g | 142g | 149g |
| | Tuesday | Chicken Curry | 88g | 86g | 77g | 80g |
| | | Rice | 71g | 106g | 112g | 143g |
| | Wednesday | Beef sausage Curry | 85g | 84g | 78g | 81g |
| | | Rice | 72g | 98g | 108g | 126g |
| | Thursday | Mince meat and Cabbage | 57g | 84g | 83g | 69g |
| | | Rice | 90g | 86g | 113g | 125g |
| | Friday | Maas and Phuthu | 210g | 210g | 220g | 240g |

| CCF EIGHT | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday, Wednesday and Thursday | Maize meal porridge | 82g | 110g | 118g | 135g |
| | Tuesday | Maltabella porridge | 82g | 97g | 107g | 124g |
| | Friday | Cornflakes | 35g | 45g | 45g | 70g |
| | | Milk | 50ml | 75ml | 75ml | 125ml |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday | Beef Curry | 33g | 47g | 47g | 67g |
| | | Butternut | 12g | 14g | 14g | 15g |
| | | Rice | 66g | 107g | 104g | 121g |
| | Tuesday | Maas and Phuthu | 77g | 85g | 94g | 105g |
| | Wednesday | Fish Curry | 53g | 34g | 44g | 46g |
| | | Rice | 58g | 72g | 76g | 64g |
| | Thursday | Soup | 80g | 95g | 115g | 125g |
| | | Bread | 20g | 35g | 35g | 35g |
| | Friday | Samp and Beans | 70g | 82g | 90g | 107g |

| CCF NINE | BREAKFAST | | 2yrs | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|---|
| | Monday to Friday | Maize meal porridge | 220g | 184g | 196g | 210g |
| | **LUNCH** | | **2yrs** | **3yrs** | **4yrs** | **5yrs** |
| | Monday | Fish Soup | 33g | 45g | 52g | 48g |
| | | Rice | 34g | 59g | 64g | 73g |
| | Tuesday | Beans | 49g | 63g | 61g | 58g |
| | | Phuthu | 30g | 57g | 63g | 62g |
| | Wednesday | Vegetable Curry | 33g | 52g | 43g | 38g |
| | | Rice | 31g | 67g | 67g | 78g |
| | Thursday | Samp and Beans with Fish | 71g | 121g | 126g | 137g |
| | Friday | Chicken Curry | 32g | 52g | 55g | 53g |
| | | Butternut | 11g | 10g | 10g | 10g |
| | | Rice | 37g | 70g | 65g | 83g |

| CCF TEN | BREAKFAST | | 3yrs | 4yrs | 5yrs |
|---|---|---|---|---|---|
| | Monday, Wednesday and Thursday | Maize meal porridge | 85g | 138g | 155g |
| | Tuesday | Maltabella porridge | 91g | 138g | 155g |
| | Friday | Morvite | 90g | 126g | 148g |
| | **LUNCH** | | **3yrs** | **4yrs** | **5yrs** |
| | Monday | Mixed Vegetable Soup | 53g | 75g | 85g |
| | | Rice | 73g | 105g | 123g |
| | Tuesday | Chicken Curry | 77g | 85g | 93g |
| | | Rice | 67g | 93g | 120g |
| | Wednesday | Fish Soup | 58g | 75g | 65g |
| | | Rice | 68g | 78g | 90g |
| | Thursday | Samp and beans | 72g | 175g | 253g |
| | Friday | Fish Curry | 59g | 60g | 35g |
| | | Crumbly Phuthu | 67g | 93g | 120g |