

# DEVELOPMENT OF NUTRITION EDUCATION PROGRAMME FOR HIV/AIDS AFFECTED ORPHANS IN PERI-URBAN INFORMAL SETTLEMENT

Research Dissertation submitted in fulfillment of the requirements for the degree  
Magister Technologiae: Food Service Management  
in the Faculty of Human Sciences.

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**Date: September 2011**

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

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This dissertation is being submitted in partial fulfilment of the requirements for the degree of Masters Technologiae: FOOD SERVICE MANAGEMENT

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The dissertation is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references.

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## DEDICATION

I would like to dedicate this study to my beloved parents for their patience and support.

## ACKNOWLEDGEMENTS

- First and foremost, I thank God my heavenly father, the Son, and the Holy Spirit for His divine strength through, the years in my studies because without his divine guidance this would be impossible.
- Immense thanks and appreciation to my advisors Dr Adbulkadir Egal, Dr Carin Napier and Prof Wilna Oldewage-Theron for assisting and believing in me. Again Prof Wilna for affording me the much needed opportunity to work with you - in completing my studies.
- The National Research Foundation (NRF), VUT grant and Hubbs and Spokes Model for support and funding throughout my studies.
- Many thanks to the management of Tshireletso Safehouse, and the respondents.
- The BTech students of the VUT who acted as fieldworkers for conducting this research.
- To my loving parents Mmakubuesele and Senoelo Senoelo without whom I would not have made it this far, I love and appreciate you two very much and thank you so much for everything.
- To my siblings, Mainole, Nthakeng, Motjie and Kgomotso Senoelo, thank you for all your love, encouragement, emotional, physical, spiritual support throughout my studies.
- To my friends Dr Medoua-Nama G, Dr H Acham, Marumo K, Holeni F, Makhetha M, Dube AL, Mokgatlhane BE, Oosthuizen D, Nyatela T, Zulu E, Mokote L and other friends who are too many to mention as well as VUT staff, thanks for talking, listening, sharing, answering, giving, caring and friendship through the years.
- This acknowledgement will be incomplete without saying thank you to Mrs Glynne Case for conducting language editing of this study, as well as the Post-graduate Office for offering support in small and great ways that contributed in this study.

- Thank you all and may the grace and spirit of the Lord ever shine upon each one and the fellowship of the Holy Spirit be with each one in all your trials and victory in your vision and achievements.

## **ABSTRACT**

**Introduction and purpose:** This empirical study was carried out to determine the nutritional status and level of nutritional knowledge amongst orphaned children. A cycle menu will be developed after sensory evaluations of all protein enhanced dishes.

**Method:** Anthropometric measures were used to determine the nutritional status and to measure the nutrition knowledge of 100 orphaned children aged 9 to 13 years old in Boipatong, Vaal region. A nutritional knowledge questionnaire was administered to the study group. Furthermore the anthropometric measurement was carried out and analysed with World Health Organization software (AnthoPlus) using  $\pm 2$  standard deviations cut off points, and data on nutritional knowledge were captured on Microsoft Excel and analysed for frequencies, mean and standard deviation (SD) using the Statistical Package for Social Science (SPSS) version 17.

**Results:** The results for nutritional status revealed that 59% of the population studied were underweight, 40% were stunted and 25% were wasted. Most of the respondents (70%) scored less than 50% on the nutrition knowledge questionnaire. The mean correct answer for multiple choice questions was 29.65% and for true/false question was 50.34%.

**Conclusion:** The orphaned children are under-nourished and wasted. Further to this, the nutrition knowledge of the orphans is poor. It is recommended that a nutrition education programme be implemented so as to address the issue of poor food choices and malnutrition.

**Keywords:** HIV/AIDS orphans, nutrition status, nutrition knowledge, nutrition education, Vaal region

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## LIST OF ABBREVIATION

AI	Adequate intake
AIDS	Acquired Immune Deficiency Syndrome
ARV	Antiretroviral Treatment
BTech	Baccalaureus Technologiae
CSO	Central Statistics Office
DD	Dietary Diversity
DDS	Dietary Diversity Score
DoH	Department of Health
DSD	Department of Social Development
EFA	Education for All
EFNEP	Expanded Food and Nutrition Education Programme
<i>Et al</i>	et alii (meaning 'and others')
EU	European Union
FANTA	Food and Nutrition Technical Assistance
FAO	Food Agriculture Organization
FBDG	Food Based Dietary Guidelines
FFQ	Food Frequency Questionnaire
FRESH	Focusing Resource Effective School Health
FV	Food Variety
FVS	Food Variety Score
HIV	Human Immune Virus
ICN	International Conference of Nutrition
IFSW.ORG	International Federation of Social Workers Organization

INP	Integrated Nutrition Programme
IRIN	Intergrated Regional Information Network
ISN	Intergrated Strategy Nutrition
KAIPPG	Kenya AIDS Intervention Prevention Project Group
MTech	Magister Technologiae
NACCT	National Control Council Taskforce
NCHS	National Center Health Statistics
NEP	Nutrition Education Programme
NERCHA	National Emergency Response Council on HIV/AIDS
NETP	Nutrition Education Training Programme
NFHS	National Family Health Survey
NFSM	National Food Science Management
OVC	Orphans Vulnerable Children
PCD	Partnership for Child Development
PLWHAS	People Living with HIV and AIDS
SA	South Africa
SAFBDG	South Africa Food Based Dietary Guidelines
SAPRN	Southern Africa Poverty Regional Network
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
SSA	Sub Saharan Africa
RDA	Recommended dietary allowance
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS

UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Education, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UoM	United of measurement
USA	United States of America
USDA	United States Department of Agriculture
USAID	United States Agency for International Development
VUT	Vaal University of Technology
WFP	World Food Organization
WISHH	World Initiative for Soy in Human Health
%	Percentage
<	Less than
N=	Population size
-	Asterisk

# CHAPTER 1

## INTRODUCTION AND PROBLEM SETTINGS

### 1.1 INTRODUCTION

Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome (HIV&AIDS) is mostly prevalent in Sub-Saharan Africa where they are exacerbated by the presence of other diseases such as malnutrition and various opportunistic infections. It is wreaking devastation on livelihoods of many families, communities and nations. The epidemic incidences vary from country to country as do national responses to this complex emergency. This is illustrated by the cases of Botswana, South Africa (SA) and Uganda (Anabwani & Navario 2005:96). AIDS is caused by the human immunodeficiency virus that weakens human immunity against diseases (Burgess, Bijlsma & Ismael 2009:199).

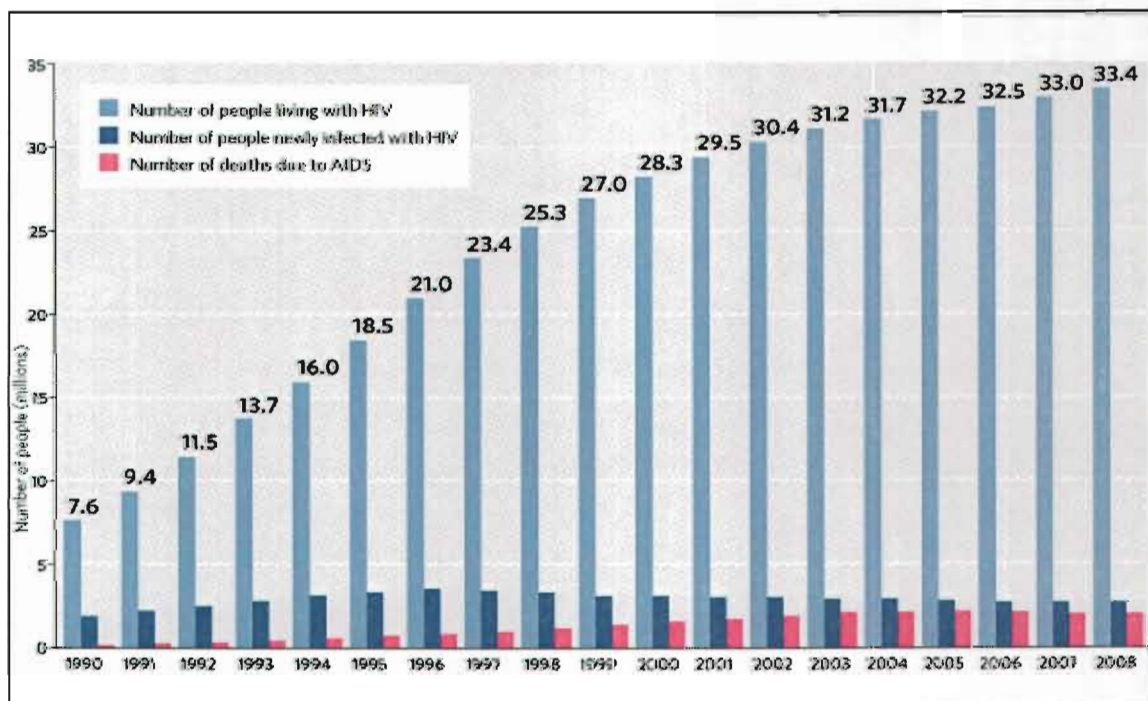


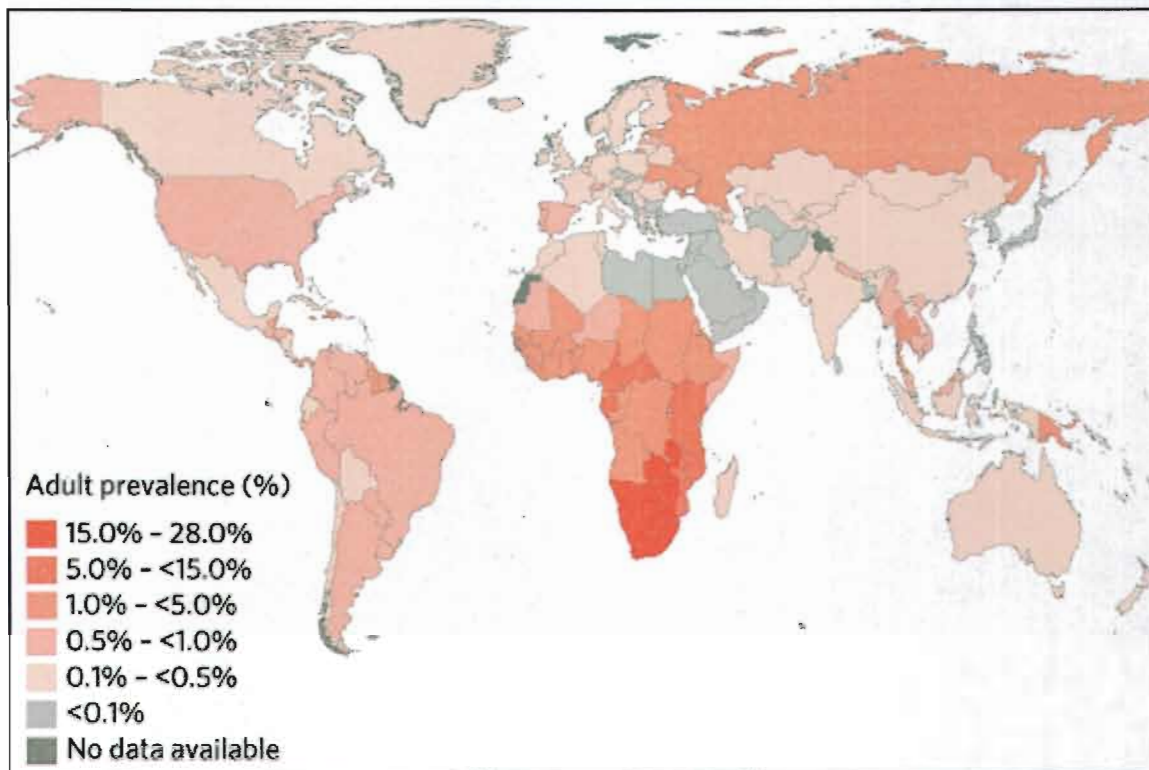
Figure 1: Number of people infected by HIV&AIDS globally (Adapted from WHO/UNAIDS/ UN 2009:32)



The HIV&AIDS epidemic has been a challenging public health concern in South Africa with over 3 million of people being infected and 1.4 million children affected through loss of both or one parent and/or caregivers due to the epidemic (DSD 2006:4). In most parts of the world one percent of the child population is orphaned by this pandemic. According to the data from SA Department of Social development (DSD) 2006, already in six African countries, over 20 percent of the children have lost one or both parents due to the HIV&AIDS epidemic. This epidemic generates not only orphans, it kills and discourages the caregivers and other family members who contribute to their upbringing of the growing children (UNICEF 2006:32; DSD 2006:4).

According to the World Health Organization (WHO) an orphan is defined as a child who has lost one or both parents whereas the vulnerable ones are those living with chronically ill parents, children living in households fostering orphans, or any other children who meet the definition of extreme poverty in their communities (WHO 2005a).

AIDS orphans experience inadequate access to education, health, shelter and nutrition. Consequently, many orphans live on the street, and are drawn into criminal activities such as house breaking, stealing and the drugs dilemma at a younger age. Therefore, under these circumstances, the orphaned children are themselves exposed to getting infected with HIV&AIDS (Ssemakuwa 2006:46). Due to the death of parents, most orphaned children lack support of family and the community support to offer guidance and education that are necessary for normal growth and well being in later adult life. This has an alarming implication for the reintegration of these children into society, and even more serious implications if they are not reintegrated into society (Ssemakuwa 2006: 46-48).



**Figure 2: A global view of affected areas in Southern Africa (Adapted from World Health Organization (WHO) 2009).**

HIV&AIDS is also affecting more people in Eastern and Southern Africa than can be treated by the weak health systems of the afflicted nation (WHO 2005:2a). The pandemic demoralizes a larger number of children than the educational system can motivate, creating more orphans than communities can care for, destroying families, and threatening food systems. The scourges of this epidemic are being worsened by factors such as malnutrition, poverty, food shortage emergencies and inequalities. In urgent response to this situation, a call was made by WHO for the integration of nutrition into the essential package of care, treatment and support of people living with HIV&AIDS, as well as for efforts to prevent infection (WHO 2005:3-5a).

The HIV&AIDS pandemic has had dire consequences for affected children and their families and communities. Sub-Saharan Africa has been the worst affected. The overall number of orphans affected by HIV&AIDS in this region, which had more than one million in 1990, is projected to rise to approximately 18.4 million by 2010. A small



proportion of these AIDS-affected children are said to be reached by assistance and support (United Nations AIDS Programme on HIV&AIDS (UNAIDS), United Nations Children's Fund (UNICEF) & United States Agency for International Development (USAID) 2004: 5-7).

The nutritional status of young children is one of the most sensitive indicators of sudden changes in health status and food availability of a community, acting as an early warning sign of distress, ill health, famine and eventual death (Kikafunda & Namusoke 2006:62). Some researchers, however, indicated no difference between the nutritional status of orphans and non orphaned children.

According to Isaranurug and Chompikul (2009:138) many affected children are being cared for by their grandparents and/or caregivers thus their wellbeing and nutritional as well as health status was improving. According to UNICEF & UNAIDS (2005:7), as overwhelming as the numbers already are, the orphan's crisis in sub-Saharan Africa is just starting to unfold, as more young parents are dying due to HIV&AIDS related disease thus leaving more children vulnerable.

## **1.2 BACKGROUND TO THE PROBLEM**

In Africa, numerous programmes have been implemented to address nutritional challenges faced by children and many have exponentially addressed HIV&AIDS over the last few years. This has moved Africa's programme from a one-dimensional view of food security through food distribution to one that addresses HIV&AIDS and the nutritional needs of all sectors of the population including orphans who are at high risk of malnutrition (Kadio, Kaba, Blackett-Dibinga, Sedibe, Annah & Fleming 2005: 271).

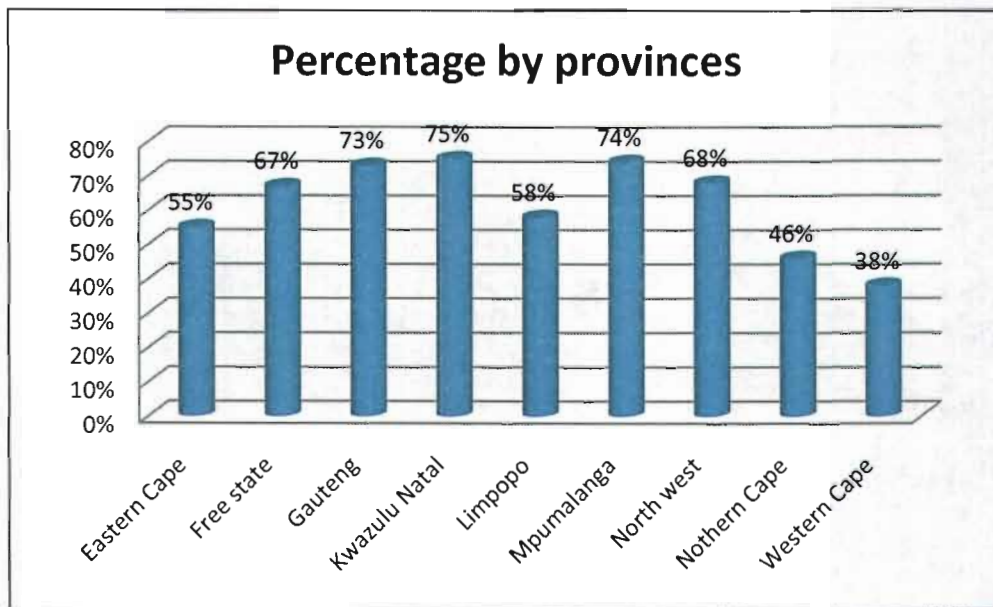
Food and nutrition interventions are critical components in the response to the HIV pandemic. HIV compromises the nutritional status of infected individuals, and malnutrition in turn can worsen the effects of the disease. Nutrition interventions can help break this cycle by helping people living with HIV to manage their symptoms,

reduce susceptibility to opportunistic infections, improve nutritional status and improve overall quality of life (Food and Nutrition Technical Assistance (FANTA) 2005:1-2).

Children affected by HIV&AIDS are often observed as one group although there is a wide difference in age, situation and degree of vulnerability (UNAIDS 2004:26). There are millions of young people in Sub-Saharan Africa who have been orphaned by the pandemic; about 16 percent are six years of age (Hsiao 2007:2). The 2006 worldwide nutrition interventions report has not been well integrated into national treatment plans and in SA, only 6 percent of children on antiretroviral drugs have access to nutritional support, such as fortified maize-meal and milk formula. Furthermore there is insufficient staff to advise patients on nutritional issues (Knight 2005:1).

The above mentioned negative impact in nutrition and health of the children can be reduced through the formulation of special dietary intervention programmes (Tomkins 2005:190). However there is a need to expand and intensify food assistance in order to act in response to the needs of groups who are at risk of malnutrition in the dynamic vulnerability context of HIV&AIDS. Nutrition interventions are helping the increasing number of affected populations, including People Living With HIV&AIDS (PLWHAS) and Orphans and Vulnerable Children (OVC) (Kadiyala & Gillespie 2005:271).

Figure 3 displays statistics of children affected by HIV&AIDS by provinces in 2006 according to the Department of Social Development of South Africa. The figure indicates that numbers of orphans affected by HIV&AIDS are higher in Kwa-Zulu Natal, Mpumalanga, Gauteng whereas the lowest affected province is the Western Cape with 38 percent.



**Figure 3: Statistics of orphans affected by HIV&AIDS by provinces in South Africa (DSD 2006:32).**

In 2006 an estimated 1 577 200 children aged 0-17 years were affected by HIV&AIDS and were living in houses with sick or elderly caregivers. The provincial governments of the provinces (shown in Figure 3) are supporting orphans and vulnerable children with child support grants and foster care grants. Other forms of support include feeding schemes, care centres and distribution of food parcels to households of those who are affected (DSD 2006:30-31).

On the other hand, the number of HIV&AIDS orphans increased while resources are limited, concomitantly the affected children were getting involved in antisocial behaviour for survival and thus contribute to poverty abuse figures. Other affected children stay with their respective grandparents who are also living in poverty (Coskun 2007:3; Dalen, Nakitende & Musisi 2009:1).

### **1.3 PREVALENCE OF THE HIV&AIDS AFFECTED ORPHANS**

#### **1.3.1 Prevalence of HIV&AIDS affected orphans globally**

The HIV&AIDS global pandemic has particularly affected economically poorer countries, particularly in sub-Saharan Africa. The progression of HIV&AIDS has been indicated; in the first stages people are infected with the virus; in the second stage, people become ill and develop symptoms. In the third stage known as full blown stage whereby infected people will commence dying of HIV&AIDS and related complications. Many countries, particularly in Africa, are already in the third stage pandemic (Greenall 2008:13-14).

Globally, many people are undernourished and die of starvation every day. Likewise, food crises faced in Southern Africa is rising on a yearly basis whereby affected households end up with less food for the family. This problem is sensitive for both extended and foster families who have more children to feed with no additional income (UNICEF 2006; Landis 2009:4). HIV&AIDS positive children or those vulnerable due to AIDS are less likely to be educated than other children. These children are often more underfed, abused and depressed compared to normal children. Central parts of Asia, America and Europe are experiencing severe epidemics at the national or local level with the fastest growing HIV&AIDS epidemic in the world (WHO 2005:5a).

The nutritional status of these young orphaned children is a sensitive indicator of unexpected changes in health status due to chronic food shortages (Tindyebwa, Kayita, Musoke, Eley, Nduati, Coovadia, Bobart, Mbori-Ngacha, & Kieffer, 2006:69). Furthermore, the pandemic has harsh effects on the health of affected orphans. In countries where severe HIV&AIDS epidemics prevail, the mortality has also increased (Tindyebwa *et al.* 2006:70).

#### **1.3.2 Prevalence of HIV&AIDS affected orphans in Africa**

In Africa there are 54 African countries of which 48 are in Sub-Saharan Africa. In Sub-Saharan Africa, 65 percent of children experience poverty and others are affected by HIV&AIDS. Over 12 million children have lost one or both parents due to AIDS and



many more have been orphaned due to other causes. In Africa, vulnerable children in households with less food security are at risk of missing schooling. Furthermore schools often serve as entry points for children who need to receive health service, protection, support and meals (UNICEF 2008).

In 2009, UNICEF stated that an increase of child nutritional needs in Africa has negatively impacted on those infected and affected by HIV&AIDS. Researchers have indicated that orphans suffer from higher rates of malnutrition and under nutrition than the general population.

Research done by the United States Agency for International Development (USAID) (2009) confirms that Sub-Saharan Africa is the hardest hit by HIV&AIDS and is home to 67 percent of the most infected and affected people worldwide. The most severely hit African countries include, Zimbabwe, South Africa, Namibia, Lesotho, Central African Republic, Malawi, Kenya and Uganda (United Nation Population division (UNDP) 2006 & UNICEF 2006:65).

Africa and particularly Sub-Saharan Africa remains the global epicentre of the epidemic. HIV&AIDS poses a major threat to social developments, as most infections occur in young economically active adults. To make matters worse, the region is faced with falling life expectancy, rising infant mortality, and an increase in the number of AIDS orphans (Avert 2010:1). Consequently, the massive and growing number of orphans constitutes a humanitarian and development crisis of unprecedented proportions.

The AIDS epidemic has affected large numbers of children generating serious psychological and economic problems throughout Africa. Many affected children suffer the consequences of prolonged parental illness and others have lost both parents. It was estimated that by 2010, the number of children losing both parents in Sub-Saharan Africa increased from 12 million to 18 million (UNAIDS 2004).

### **1.3.3 Prevalence of HIV&AIDS affected orphans in South Africa**

In South Africa, orphaned children are being cared for by the extended families and elderly grandparents. Cluver and Gardner (2007) reported that AIDS orphans are exposed to multiple stressors which compound and complicate the negative impact of HIV&AIDS. By 2020 an estimated 2.3 million children in South Africa will be orphaned and 19 percent are already affected, and most of them showed a higher level of psychological problems due to AIDS deaths of family members (Cluver, Gardner & Operario 2008:414).

As South Africa remains the worst-affected by the HIV&AIDS epidemic, poverty, sexually transmitted disease, violence and the high mobility of people still need to be addressed by the government in order to fight this pandemic (Coovadia & Hadingham, 2005: 1-2).

In 2006 UNICEF reported that South Africa has over 1 400 000 AIDS orphans. At that time a total of 15.2 million children worldwide had lost their parents and many more of these children live with their chronically ill parents. In South Africa, more than 7.1 million children under 14 years are living in poverty and 79 percent of those eligible for social grants are benefiting from the child support grant. By April 2006 more than 325 000 children were benefiting from foster care grants (Vukukhanye 2007:46).

According to Baingana, Thomas and Comblain (2006:7), the AIDS pandemic is worsening in South Africa and poverty is becoming a considerable factor. Poor nutrition, insignificant housing, health care, water and sanitation, together with the myths about the cure for HIV&AIDS have encouraged the spread of the virus.

### **1.3.4 Prevalence of HIV&AIDS affected orphans in Botswana**

Botswana has experienced one of the severest impacts of HIV&AIDS crises in the world. Despite impressive social and economic improvements since the independence in 1966 after the independence, in 2009 about thirty-seven percent of the adult populations in Botswana were infected and 120 000 children were orphaned as a result

of HIV&AIDS alone (Owusu-Ampomah, Naysmith & Rubincam 2009:40). The United Nations Development Programme indicated that in Botswana more than 20 percent of children will be orphaned by 2011 alone and most of these children will be left with extended families especially grandparents (Avert 2010:2).

In Botswana where there is social emergency and the biggest social and economic growth, HIV is slowing down the developments, including improvements in child health, nutrition and education. As a consequence, the population growth was in the negative region. This means that of course, there were more people dying from AIDS than babies being born (Avert 2008:1). Besides AIDS there was also a challenge in Tuberculosis and Malaria outbreak which also worsen the epidemic. According to a study conducted by World Initiative for Soy in Human Health (2003) children orphaned by HIV&AIDS were experiencing under nutrition as well as nutrition related problems in both urban and rural areas of Botswana (Endres, Barter, Theodora & Welch 2003).

### **1.3.5 Prevalence of HIV&AIDS affected orphans in Swaziland**

Within Africa Swaziland is the smallest of all countries and has the highest prevalence of HIV&AIDS (UNICEF & NERCHA 2008). In 2006, the National Emergency Response Council on HIV&AIDS in Swaziland (NERCHA) estimated that there were about 67 000 orphans struggling daily for the bare necessities of life and more than 15 000 households in Swaziland are headed by children raising their little brothers and sisters (Ashford 2006:2-3).

With the multiplying number of orphans in Swaziland, the government and NGOs are still battling to develop child support programs to assist orphans and vulnerable children (Whiteside, Hickey, Ngcobo & Tomlinson 2003:10).

The majority of households in Swaziland are food insecure, an estimated 22 percent of the population are reported to be undernourished and 18 percent are orphaned due to HIV&AIDS (Von Grebmer, Fritschel, Nestorova, Olofinbiyi, Pandya-Lorch, Were, Ohiokpehal, Okeyo-Owuor, Mbagaga, Kimiywe, Mbithe & Okello 2010:18).

The Central Statistics Office (CSO) in Swaziland (2008:263) found that most of the orphans are cared for by the elderly and receive no assistance from external resources. The nutritional well-being of these children decrease with age normally in more girls than in boys and this may lead to malnutrition.

### **1.3.6 Prevalence of HIV&AIDS affected orphans in Zimbabwe**

Zimbabwe is also one of the countries that experience the HIV&AIDS epidemic. However HIV incidences have declined despite higher mortality rates (USAID 2009:1). Children affected by the epidemic in Zimbabwe are somehow incidentally contracting the disease from the parents through the routine care. About 1.3 million children under the age of eighteen years are affected which is almost 24 percent of all the countries children (UNICEF 2008:6). Benini, Spizzichino, Trapanotto and Ferrante (2008:13) reported that one in every four children has lost at least one parents due to this incurable disease.

Some researchers in Zimbabwe found that orphaned children are also underweight and stunted. This malnutrition is higher amongst orphans than non-orphaned children which can be attributed to the food crisis in that country (Avert 2010). Many orphans in this country have been forced to drop out of schools because of not having enough financial support. In 2007 enrolments rates dropped by 30 percent, this is an indication that most of the children in need of support are outside the education system. The educational support programmes from UNICEF assist most of the schools with funds but the money is still not enough to cater for all vulnerable children. At the current moment the Ministry of Education initiates community based projects to cater for those out of schools (UNICEF 2010:3).

There are other organisations such as MOVE and Tsungirirai that implemented pilot projects designed to care and provide support for orphaned children due to HIV&AIDS. These programs are implemented to provide assistance in gardening and other food supplies which has led to the improved availability of food throughout the year (Integrated Regional Information Network report (IRIN) 2007:2).



### **1.3.7 Prevalence of HIV&AIDS affected orphans in Lesotho**

The AIDS epidemic in Lesotho has had a distressing impact on the country. The poverty and the AIDS epidemic has caused life expectancy to drop to 40 years for both women and men. Half of Lesotho's population experience food shortages and the HIV&AIDS epidemic is still worsening the situation. Children orphaned by HIV&AIDS become heads of families due to older family members being unable to function due to sickness and thus could not provide food and care for the children (Avert 2009:1).

Lesotho has the largest percentage of orphaned children due to the epidemic and the younger generations face growing up without parental support. A household survey analysis done in 2008 showed that orphanhood of all causes does not exceed 5 percent in most countries, whereas in Lesotho over 20 percent of children are orphaned (UNICEF 2008:1).

Safe houses and orphanages are unable to accommodate and support all affected orphans since the number of orphan are increasing dramatically (Avert 2009). Churches, the government of Lesotho, European Union (EU) and UNICEF are busy strategizing to implement programmes to assist AIDS orphans but the problem is out of hand whereby the estimated figure scored to over 120 000 affected orphans in 2009. The Ministry of Health and Social welfare have not yet reached 60 000 HIV/IADS affected orphans (UNAIDS 2004:3).

## **1.4 MALNUTRITION IN CHILDREN**

Malnutrition is the cellular imbalance between the supply of nutrients and energy, and the body's demand for them to ensure normal growth, maintenance, and specific tissue functions. This can result from not eating enough nutritious food or from increased nutrient requirements (Hogan & Burstein 2007:6).

Malnutrition may refer to any medical conditions caused by an excess or a deficiency in food, energy or nutrient intake, imbalance of nutrients and poor nutrition (Pourafshar, Rosentrate & Krishnan 2010:1). According to Mukherjee, Chaturvedi & Bhalwar

(2008:1) malnutrition contributes directly and indirectly to 60 percent of 10 million child deaths every year, and most parts of developing countries have an average percentage of stunted children.

## **1.5 FORMS OF MALNUTRITION**

### **1.5.1 Under-nutrition**

Under-nutrition is characterised by comparing the weights or heights of children at a specific age and sex and it is actually a type of malnutrition. Under-nutrition is less common than over-nutrition and more often found in children who are poor, homeless and those with psychiatric disorders (Thomas 2007:1). Severe under-nutrition can cause a deficiency called protein-energy malnutrition.

About 3.5 million children worldwide are dying of hunger every year and Africa remains the only region where undernourished and child mortality rates have increased (World Food Programme (WFP) 2008:1-3). Data from the United Nations office for West Africa (UNOWA) showed that millions of children continue to be affected by malnutrition despite the efforts for mitigation from all stakeholders (United Nations 2010).

Africa is currently facing a double burden of obesity and hunger malnutrition, amongst millions of people living in urban centres. The recent global financial crisis hit rural population's food security thus exacerbating the already higher under nutrition and over nutrition. In 2009 the Integrated Regional Information Network (IRIN) global indicated that 32 percent of the world's hungry people live in Sub-Saharan Africa and cannot afford staple food (IRIN 2009:28). Over the last decade, findings have shown that in South Africa alone, child malnutrition rates and child health has deteriorated (Berry & Hendricks 2009:5).

### **1.5.2 Protein Energy Malnutrition**

Protein malnutrition is not as easily recognised as protein-energy malnutrition, but is associated with significant increases in the rates of morbidity and mortality. Low

consumption of nutrients, mal-absorption, drug nutrient interaction and protein loss may contribute to protein energy malnutrition (Tsiaousi, Hatzilotos, Sotirios & Christos 2008:527). Protein-energy under-nutrition has two main forms, namely marasmus and kwashiorkor.

#### **1.5.2.1 Marasmus**

Marasmus is classified as a shortage of calories and protein that tends to develop in very young children. It naturally results in weight-loss and dehydration (Thomas 2007:2). Children with marasmus have lower weight-for-age than children with kwashiorkor; they are often sicker and more difficult to treat and have a higher mortality rate (Badaloo, Forrester, Reid & Jahoor 2002:1283).

#### **1.5.2.2 Kwashiorkor**

Kwashiorkor usually occurs mostly within areas where staple foods, which usually provide sufficient kilojoules and carbohydrates. But lack protein, are consumed by babies as weaning foods (Van Voorhees 2006:2). Kwashiorkor tends to be restricted to certain parts of the world where staple foods and foods used to wean babies are deficient in protein, even if enough kilojoules and carbohydrates are being provided (Thomas 2007:2).

#### **1.5.3 Over-nutrition**

Over-nutrition is a disease that develops over a long period of time, with the diets providing excess energy and a lack of physical exercise (Burgess, Bijlsma & Ismael 2009:78). Anyone with an excess amount of fat than the body needs can be overweight (Senekal, Mchiza & Booley 2008:488).

Overweight and obesity are normally evaluated by means of using the body mass index (BMI), which is the weight in kilograms divided by the square of the height in metres

(kg/m<sup>2</sup>). A BMI of over 25kg/m<sup>2</sup> is defined as overweight in adults, and a BMI of over 30 kg/m<sup>2</sup> as obese (WHO 2010:2-3). The BMI values differ with the age and sex of an individual child. The main focus on children is the specific percentile of the BMI according to age and gender. BMI-for-age is a recommended method for screening overweight and underweight status in all children from 2 year to 20 years old (Skybo & Ryan-Wenger 2003:172; Kovalskys, Herscovici & De Gregorio 2010:1).

#### **1.5.3.1 Obesity**

Obesity is an excess of body fat that frequently results in a significant impairment of health and this is seen as a risk factor for chronic disease of lifestyle and cardiovascular disease (Burgess *et al.* 2009:118).

Obesity in children is an outbreak and is still rising in South Africa and is also rising in other countries. Globally, 22 million children under five years of age are estimated to be overweight. The number of overweight children and adolescents has dramatically increased, while the number of overweight and the prevalence of obesity is still multiplying in children. The problem is global and increasingly extends into the developing world (WHO 2006:3).

### **1.6 MALNUTRITION IN CHILDREN AFFECTED BY HIV&AIDS**

Many researchers have found higher malnutrition rates amongst children affected by HIV&AIDS. In most African countries orphans are more stunted and wasted than non-orphaned children. A poor nutritional status is the outcome of a combination of household food insecurity, poor health services and lack of sound child care (De Wagt & Connolly 2004:4a).

Globally orphaned children receive poorer care and supervision, lacking access to available health services and are more likely to suffer from malnutrition because of higher care costs in the family. On the other hand, food consumption could drop and



families often go into debt to care for infected members (Xu, Wu, Duan, Han & Rou 2010:105-6). HIV&AIDS has created a devastating problem in orphans in the poorer communities. These vulnerable children often develop malnutrition, which later complicates their ability to heal from a curable disease that they might contract (Kenya AIDS Intervention Prevention Project Group (KAIPPG) 2009:1).

The World Food Programme is finding ways of meeting the nutritional needs of children affected by HIV&AIDS in schools. Linnemayr, Alderman and Kak (2008:7) stated poverty and nutrition is a two-sided problem: poverty is linked with economic growth and leads to reduced nutrition. On the other hand, good nutrition is the key ingredient for human capital formation, and is associated with fundamental factors of growth. The current economic crisis and food hikes affect infants, children and youth differently, increasing poverty in households affected by HIV&AIDS (Harper & Jones 2010:2).

Malnutrition is a problem of considerable magnitude in several parts of the world. Bose and Das (2009:85) stated that children living in rural areas suffer unduly from under nutrition compared with those in the urban areas and malnutrition being the main public health problem in the developing countries (World Hunger Facts 2010:1). In Africa malnutrition rates are increasing among young children and this crisis has highlighted the dire nutritional needs of all children who are HIV positive or affected by HIV&AIDS (UNICEF 2005:92).

The HIV&AIDS epidemic has caused many children to be orphaned and live with grandparents and extended families that were already struggling for their own livelihoods. These situations increase children's vulnerability to poverty, malnutrition, HIV&AIDS and other illness (Githinji 2009:11). The literature indicates that one billion children are currently living in poverty; more than 9 million children are dying of malnutrition and 77 million are out of school (Global Action for Children 2010:1-2).

In South Africa a growing number of children and youth are faced with multiple problems of malnutrition. Malnutrition occurs together with an entire range of problems such as reduced intake of nutrients or energy. Due to the abovementioned problems

associated with under nutrition an increasing number of children are suffering from diseases caused by unbalanced diets (Steyn, Fourie & Temple 2006:29).

## **1.7 POTENTIAL SOLUTIONS TO OVERCOME MALNUTRITION AND THE IMPORTANCE OF NUTRITION EDUCATION**

Malnutrition has been labeled as a serious drain on the economy, costing low-income countries billions of dollars every year (Nelson 2006:4). In developing countries, including South Africa, malnutrition in women and children is mostly a macro-nutrient deficiency that is increasing by the year (Pourafshar *et al.* 2010:2). According to Alasfoor, Rajab & Al-Rassasi 2008:20) and Pourafshar *et al.* (2010:5) lack of micro-nutrient components such as iodine, zinc, vitamin A and iron contribute to chronic malnutrition which leads to poor nutritional status.

Strategies such as food fortification, dietary diversification, nutrition education and food production have been developed to minimize micronutrient deficiencies in most parts of the world. A study conducted in West Africa outlined that people do not consume enough minerals and vitamins to meet their nutritional requirements and this could be attributed to a lack of knowledge about nutrient values and by not consuming enough of other nutritious foods such as indigenous fruit and vegetables (Gelmesa 2010:2).

Indigenous food items have a huge potential for addressing part of the under-nutrition problem as well as the health and income needs of the poor. Researchers are convinced that when developing strategies to fight rural and urban food insecurity indigenous food plant should be considered as one of the assets (Gelmesa 2010:1). Mbhenyane, Venter, Voster and Steyn (2005:32) revealed that the meal composition of a traditional diet that consists of indigenous food would be beneficial in preventing micro-nutrient deficiencies and other lifestyle related diseases. There are little data on food intake that involve indigenous foods in the current diets of black South Africans. In rural and urban areas diets of people are influenced by availability of processed food and the better socio-economic status of families involved.

Inadequate diet and lack of knowledge increase the risk for childhood under-nutrition. Poor nutrition knowledge plays an important role in most multi-sectoral factors involved in the development of malnutrition (Walsh, Dannhauser & Joubert 2003:89). Nutrition education is most effective in a supportive environment whereas nutrition and health interventions promote the preferred behavioural change to good food choices. For several years nutrition education has been changing dietary intake habits. Poor diet induces growth failure in children, thus causing damage to the physiological well-being and to the immune system as well as other clinical conditions like anaemia which later leads to impaired cognitive development and death (Iran & Butt 2006:18).

A solution to this problem can be nutrition education which can play an important role in dietary improvements and wellbeing of these children. Children themselves are the future parents, they can pass on good dietary habits to their children and influence eating habits in their families by passing on the preparation of certain foods (FAO 2009:2).

The main purpose of this study is to determine, among other things, the level of nutritional knowledge of the orphaned children and to develop a valid and reliable nutrition education programme with the aim of improving their nutrition knowledge in order to make informed food choices. People need protein and macronutrients through a balanced diet (Priya 2010:1-3).

An inadequate diet has been developed by other scientists as a lack of micro and macronutrient intake, therefore interventions such as nutrition education and food aid programmes are some of the solutions to combat this problem (Lewis 2010:1-2).

## **1.8 RATIONALE AND MOTIVATION**

The HIV&AIDS epidemic in South Africa started worsening at the end of 2006, and an estimated 5.5 million people out of the population of 47.4 million were found to be HIV positive (Akinboade 2008:857). Furthermore the epidemic marked infections among



young women (Abdool-Karim & Abdool-Karim 2005:48) leaving about 1 577 200 children affected by HIV&AIDS and living in houses with sick or elderly caregivers (DSD 2006:31).

According to De Wagt and Connolly (2004:4a), higher malnutrition rates are found in HIV&AIDS affected orphans. Poverty in childhood is a root cause of many diseases. Child orphans can grow up to be impoverished parents who in turn raise up their own children in poverty. Poverty reduction must begin with children by teaching them at a younger age to practise good eating habits (UNICEF 2004:15).

Food insecurity and malnutrition are prevalent in children of the Vaal region. The township of Boipatong has a problem of poverty and hunger that is badly affecting woman and children especially those affected by HIV&AIDS (Oldewage-Theron, Dicks & Napier 2006:795). This study will thus develop a nutrition education programme for the affected orphans in the Vaal region. Vaal University of Technology (VUT) agreed that a nutrition education programme (NEP) be developed for these HIV&AIDS-affected orphans at the Care Centre in Boipatong. This project is a result of the collaboration between the Care Centre, the church and the VUT.

## **1.9 RESEARCH QUESTIONS**

The main objective of this study is to develop a reliable and valid nutrition education programme (NEP) for the HIV&AIDS affected orphans attending Tshireletso Safe House, in terms of nutritional knowledge and their dietary intake practices in order to sustain good health for the orphans. This nutrition education training programme (NETP) will be based on the South African Food Based Dietary Guidelines (SA FBDG). This study is guided by the following research question:

- What are the determining factors of the orphans' inadequate food intake?
- To what extent did the nutrition education programme influence food choices, nutritional behaviour and nutritional status of affected orphans?



## **1.10 OBJECTIVES OF THE STUDY**

The specific objectives for this project are to:

- Determine the nutritional status of the HIV&AIDS affected orphans by means of anthropometric measurements.
- Determine a current knowledge in nutrition and the dietary practices of the orphans.
- Develop a Nutrition Education Programme (NEP) based on the South African food-based dietary guidelines (SA FBDG) to improve nutrition knowledge with the aim of improving dietary the existing practices. A cycle menu (inclusive soy) will be developed after sensory evaluations of all dishes.

## **1.11 OUTLINE OF THE PROJECT**

An outline of this research will be presented as follows:

### **Chapter 1: Introduction and problem setting**

The focus will be on matters such as background of the study, nature of the problem, rationale and motivation, research questions and study objectives.

### **Chapter 2: Literature review**

Chapter 2 will deal with a brief impact of HIV&AIDS on affected orphans, understanding their nutritional status, level of household food insecurity, and current knowledge and practices regarding nutrition of orphans affected by HIV&AIDS in South Africa. The literature review serves as the basis for the research.

### **Chapter 3: Methodology**

This chapter will describe the methods applied in this study to collect data.

### **Chapter 4: Research findings and discussion**

This chapter will comprise an analysis of the results, findings as based on the five phases together with discussion of the results.

### **Chapter 5: Conclusion and recommendations**

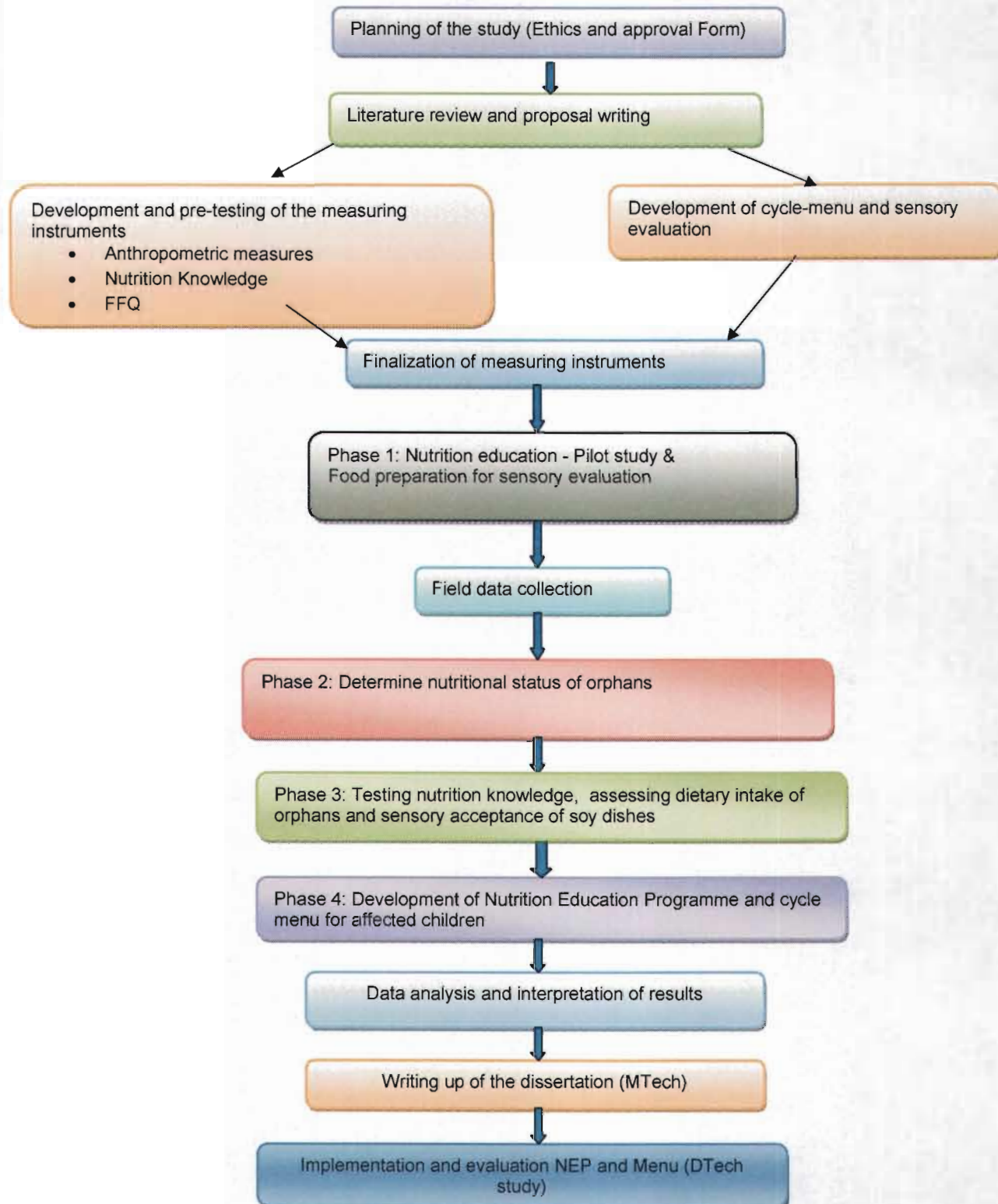
Chapter 5 will constitute the conclusion, with a summary of the problems and the recommendations.

## **1.12 CONCLUSION**

In this chapter in the introduction, the background describing the problem statement, aims and objective of the research followed by the outline of the study is presented.

In the next chapter, different aspects on HIV&AIDS affected orphans are discussed in detail by means of the literature review.

Figure 4 indicates the summary of the study.



**Figure 4: Conceptual framework of the study**

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

The main objective of this chapter was to obtain an understanding about the nutritional status, level of household food insecurity, and current knowledge and practices regarding nutrition of orphans affected by HIV&AIDS in South Africa. From the literature the researcher will gather enough insight information into the topic to define the problem being studied. Subsequently a feasible and up-to-date Nutritional Education Programme (NEP) was developed.

The purpose of this study was to determine the nutritional status and level of nutritional knowledge amongst orphaned children (n=100), and to develop a nutrition education programme training manual with the aim of improving their nutritional knowledge, which may ultimately assist them to make informed food choices.

The nutritional status of children is usually influenced by a combination of factors which include level of education of caregivers in large household sizes with orphans both infected and affected. With agreement from other studies which found malnutrition most prevalent amongst children whose mother and caregivers have no formal education; this had the influence that the nutritional status of these affected children was more malnourished (Miller 2007:5).

#### **2.2 ORPHANS AFFECTED BY HIV&AIDS AND IT IS ASSOCIATED FACTORS**

Orphans are defined in a number of ways by different researchers. An orphan is regarded as a child who has lost a father, mother or both. Hence orphans are classified into three categories, namely, the maternal or paternal or double orphan, depending on which parent was lost (USAID 2004:13).

UNAIDS, UNICEF and USAID (2004: 13) also suggested that words such as “AIDS orphan” result in an appropriate stigma to children and hence should be avoided, but instead prefers the term “children affected by AIDS” or “Orphans due to AIDS”. However other researchers use the word vulnerable child rather than defining who is an orphan. “Vulnerable” means susceptible to be hurt and vulnerability is more likely to differ from country to country. Therefore, many children may be vulnerable in some extent since all children need protection, care of an adult for food, warmth, love and access to services (Partnership for Child Development (PCD) team & World Bank 2007:8; United Nations Children’s Fund Team (UNICEF) 2002:8).

A study carried out in Kenya found that maternal orphans are considered to be more vulnerable than paternal orphans. Zimmerman (2005:882) indicated that this is caused by the father marrying another woman after the death of the first wife which in-turn worsens the situation of the orphan because most women would favour their own biological children.

Children are affected in various ways, such as those who live with infected parents or adults, hence putting children at a high infection risk. Others are required to take an indefinite break from school to take responsibility of the household or care giving. These child headed households go through greater poverty as a result of the disease (UNICEF 2005). UNICEF (2008:1) indicated that if no dramatic interventions are put in place, at least 5.7 million children will be orphaned by AIDS by the year 2015. Children affected are often viewed as a single group but in reality there is great diversity in their ages, circumstances and degrees of vulnerability. According to Garcia, Pence and Evans (2007:1) when caregivers of young children are also caring for someone who is chronically ill with AIDS or chronically ill themselves, they are then unable to provide adequate support, which can therefore lead to neglect of the special needs of young children for proper nutrition and stimulation required for healthy development.



## 2.3 IMPACT OF HIV&AIDS ON ORPHANS AND VULNERABLE CHILDREN

The impact of the HIV&AIDS epidemic on children and family is increasing in an unprecedented manner. Poor communities are usually the worst hit due to limited access to basic services and poor infrastructure. Therefore the impact of HIV&AIDS on children is amplified by poverty. Consequently children are usually pushed to conditions of desperate hardships due to the illness or death of caregivers (Richter 2004:13). Most of the deceased parents, whose children are left as orphans, are of reproductive age (United Nations Joint Programme on HIV&AIDS (UNICEF&UNAIDS 2005). The crisis is already a fact and most orphans are then cared for by the extended family members where the grandparents usually become the primary caregivers. ,

Orphans and other children living with families affected by HIV&AIDS are increasingly amongst the most vulnerable children in Africa. These vulnerable children are at higher risk of food insecurity and malnutrition as well as dropping out of school, abandonment and homelessness (De Wagt & Connolly 2004:1b; Greenblot & Greenaway 2007:31). Poor health and malnutrition prevent children from attending school and from learning while there at the school. An equivalent of more than two hundred children are lost each year in low income countries as a result of ill health and lack of learning. School health and nutrition programs contribute to health outcomes and are cost effective for school access and completion (World Bank Team 2008:2).

In this study the researcher intends to develop a nutrition education programme (NEP) designed to educate orphans and other vulnerable children affected by the pandemic of HIV&AIDS with the aim of encouraging children to make better informed food choices. The NEP is based on the South African Food Based Dietary Guideline (FBDG) and Soy foods.

According to the National AIDS Control Council Taskforce (2006) on orphans and vulnerable children, the following are some of the problems that children affected by AIDS experiences:



- **Anxiety about safety:** children living in affected families are concerned about the future, this leads to behavioural problems such as emotional withdrawal.
- **Lack of parental nurturing:** parents are unable to deal with their children's physical and emotional needs. Children may also be unable to express their mixed feelings
- **Lack of basic needs:** children affected by HIV&AIDS may experience food insecurity, shortage of clothing and inability to pay medical care. Their caregivers may need additional income.
- **Less education:** children's chances of going to school are reduced or they spend less time at school.
- **Stigma and discrimination:** most communities fear people living with HIV&AIDS and their children; parents also fear informing their children about their status and this increases the children's anxiety and fear of not knowing what is happening to their parents.

## 2.4 FOOD INSECURITY FOR HOUSEHOLDS AFFECTED BY HIV&AIDS

Food security is regarded as one of the essentials in the situation of care and support of families affected by HIV&AIDS (Gillespie & Kadiyala 2005:271). Vulnerable groups such as widows and orphans are dispossessed of land by greedy relatives and they therefore cannot engage in meaningful farming (Datta & Njuguna 2009:171). There are high levels of poverty, food insecurity and hunger in South Africa that worsen the situation into more food insecure situations (Ladabarios, Steyn, Mgijima & Dladla 2005:100). As a remedy most organizations in South Africa have tried different strategies such as food for labour programs and gardening projects to improve the needs of an individual and households with special emphases to those affected by HIV&AIDS. These statements are further supported by Schonfeldt and Gibson (2009:60) indicating that the majority of South African households dwell in poverty with a limited variety of staple foods available in the home where the need to implement food gardening for HIV&AIDS affected households is the most appropriate coping strategy.

Food security means “people at all times have both physical and economic access to sufficient food of good quality and quantity to meet their dietary needs for a productive life. Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (FAO 2003:5).

Food and Nutrition Technical Assistance (FANTA 2005:54) and Cook and Jeng (2009:13) reveal that household food security requires a household that has access to enough quality and culturally acceptable food for the whole family including young children throughout the year. There is currently literature which links migration and HIV&AIDS in rural food security. Similarly there are also links between HIV&AIDS and food security (Crush, Frayne & Grant 2006:1).

The common occurrence of hunger and malnutrition has dramatically increased in the past five years due to the shortage of main staple foods. Other factors like droughts, high prevalence of HIV&AIDS, land fragmentation and population growth are the main sources contributing to food insecurity. As a result globally, about 44 percent of children are reported to be undernourished because of the abovementioned factors (UNDP 2006:17; Akinboade 2008:867).

HIV&AIDS and urban food security interact in complex ways that are researched and understood in the Southern and Eastern African context. To this date research on urban food security has been concerned with the urban system of acquisition and protection, with an emphasis on the informal sector and more recently on urban agriculture (Crush, Frayne & Grant 2006:2). According to the study done by Schmidt and Acho (2005:03) maize meal which is primarily used by poor households as their main source of food has become more expensive than other basic products, therefore people are forced to make trade-offs between food, water, medicines, school fees, transportation and other essential goods and services.

Availability of foods is necessary for keeping people living healthy and longer life span. The stronger and healthier the body the more the body can resist opportunistic infections and the risk may be reduced. Food security and nutrition are fundamental to HIV treatment (UNAIDS, WHO & WFP 2008:1). Young children must be encouraged to eat enough of different foods that are rich in energy and protein together with fruit and vegetables for body maintenance and good growth (UNAIDS, WHO & WFP 2008).

## **2.5 ANTHROPOMETRIC EVALUATION OF NUTRITIONAL STATUS OF CHILDREN**

Anthropometric evaluation “is a physical measurement of an individual, which relates to the standards that reflect amongst other factors, the health and nutritional status of an individual”. In children, the measurements of weight, height and age are widely used to form the weight-for-age, height-for-age and weight-for-height indicators (Joubert & Ehrlich 2007:299). These measurements will be compared to the World Health Organization (WHO: 2007) growth charts. Many studies around the world use these indicators to assess the anthropometric status, as growth monitoring is one of the essential components of health care for all children (WHO 2007:3). These also ensure healthy growth and development (Dietician of Canada 2010:1).

**2.5.1 Weight-for-age (underweight)** is the most frequently used anthropometric indicator, it compares the weight of a child to the weight of a normal child of the same age (WHO 2007).

**2.5.2 Height-for-age (stunting)** compares the height of a child to the height of a normal child of the same age (WHO 2007).

**2.5.3 Weight-for-height (wasting)** compares the weight of a child to the weight of a normal child with the same height and takes body size differences into consideration (WHO 2007).



## 2.6 FACTORS AFFECTING THE NUTRITIONAL STATUS OF ORPHANS

According to studies conducted in Africa consistent factors affecting nutrition of the orphaned children, includes environment, economic status, education, and culture and food security affect the nutritional status of children (Kikafunda and Namusoke 2006:11). Matheson, Varady, Varady and Killen (2002:1) and Rose- Jacob, Black, Casey, Cook, Cutts, Chilton, Hereen, Berkowitz, Frank, Ettinger, Cuba and Appuguese (2008:875) reveal that food insecurity is a critical variable for understanding the nutritional status of low-income populations and limited research is available on the relation between household food insecurity and children's nutritional status. Children's body mass index is allied with food insecurity and household food supplies but not with the children's food intakes. Some studies show those children affected with food insecurity are forced to reduce the intake of meat and energy since there are no foods to provide them with the necessary nutrients.

In developing countries it has been reported that 43 percent of children are stunted, meaning a reduced growth rate in human development. During childhood, stunted children are more likely to have infections and die, because they may have had a period of under-nutrition (King & Burgess 2000:186). The National Family Health Survey (NFHS 2006) reported that both chronic and acute under-nutrition are prevalent amongst children world-wide (Mukherjee, Chaturvedi & Bhalwar 2008:1). Under-nutrition often results primarily from food insecurity, however data from other countries often suggest that food is not the only cause of under-nutrition (World Bank Team 2006:53).

Children within poor communities suffer from poor nutritional intake and ill health, with outward signs of failure to thrive and poverty. FANTA (2007:66) demonstrated that the nutritional status of children below five years old has been used as indicators of vulnerability during food emergencies and measuring the overall community food security status. The findings by FANTA (2005) in the HIV&AIDS context show that the nutritional status of children will continue to be a good indicator of food security. Other

factors contributing to the poor nutritional status of children included the quality and quantity of food given to the children and also availability of household resources such as fuel wood and other important things (Kikafunda & Namusoke 2006:13).

## **2.7 FOOD CONSUMPTION PATTERNS OF CHILDREN**

The consumption of food means eating a variety of food groups that are nutritionally different from each other. Healthy diet consists of eating a large diversity of foods and it is associated with positive healthy outcomes such as reduced incidence of cancer and protection against chronic diseases such as macronutrient deficiencies (Drescher, Thiele & Mensink 2007:647).

The majority of orphaned children live in households where there is no variety of food choices and where they then consume monotonous and low nutrient density diets. Poverty has been described as the root cause of poor diets and malnutrition (Schonfeldt & Gibson 2009:68). Oldewage-Theron & Kruger (2008:7) also indicated that poor food consumption patterns cause malnutrition and consuming a variety of food is a key component of dietary adequacy. Affected orphan households are food insecure and lead to low food consumption, either in quality and quantity as some micronutrients, especially crops, are replaced by reduced nutritional quality vegetables since some crops grow more easily. Studies done in Kenya households affected by food insecurity showed that where there is a chronically ill person, foods are insufficient and this reduces the food consumption patterns of the affected children (Datta & Njuguna 2009:176).

Research outlined that dietary diversity (DD) and frequency of food intake are a good proxy measure of food security. Using a seven day food frequency questionnaire (FFQ), based on the food groups of the Food and Agriculture Organization (FAO), information can be collected on the variety and frequency of different food and food groups and calculated for food consumption (Swindale & Ohri-Vachasati 2005:20). One of the latest trends in measuring the global diet quality is to assess diet quality in characterising food variety and patterns as measured by dietary diversity score (DDS). Dietary diversity is

quantified by the number of nutritious food groups compared to the number of different food items in each food group known as food variety score (FVS) (Ruel 2003).

## **2.8 MICRONUTRIENT DEFICIENCIES IN SOUTH AFRICAN CHILDREN**

According to Darnton-Hill and Webb; Harvey, Hunt, Dalmiya, Chopra, Ball, Bloem and De Benoist (2005:1198) micronutrient malnutrition is one of the largest nutritional problems, affecting both children and adults worldwide. It has been emphasized that good health and education are the important components of human capacity. Iron deficiency is reported as the major micronutrient deficiency encountered by children and adolescent these days (Liu, McCauley, Zhao, Zhang & Pinto-Martin 2009:2). School aged children are faced with nutritional problems such as iron deficiency or vitamin A, lower body weight and stunting (Jayatissa & Rambanda 2006:2). A factor contributing to malnutrition and growth retardation is improper diet choice (Musaiger, Al-Jedar & D'Souza 2007:246).

Acute malnutrition and micronutrient deficiency are more prevalent in most children. In 2005b Oldewage-Theron *et al.* reported that 10 percent of children in the Vaal Triangle were iron deficient and one in twenty was severely iron depleted. Anaemia and poor iron status were said to be most common in urban areas where most children are affected. Children who suffer from severe iron deficiency are disadvantaged in learning especially as they enter adolescence (Lozoff 2008:1). Furthermore children's physical and mental capacities are affected by poor nutrition, malnutrition have long term effects which can reduce individuals educability and productivity later in life (Berry & Hendricks 2009:1).

The causes of iron deficiency are complex and children at early stages of life are prone to iron deficiency because of the micro-nutrient requirements and other factors affecting iron intake (Berry & Hendricks 2009:2). It has been urged that "protein gap" results from the diagnosis of Kwashiorkor and energy deficiency underlies malnutrition.



The human body needs important nutrients such as vitamins and minerals for proper functioning. Iron plays a major role in energy generating and transporting oxygen through haemoglobin and blood. Iron is also obtained by two forms in the human's body: iron found in meats, fish and poultry and in legumes and other plants. The body standardises the level of iron as too much can cause toxicity, which can cause bacterial infection while on the other hand adequate iron levels will provide protection against bacterial infection (Lozoff 2008:1-3).

## **2.9 NUTRITIONAL REQUIREMENTS OF CHILDREN**

Nutrition is important for all people and children functioning and whether infected or affected by; food nourishes the body for healthy well-being. An individual becomes malnourished because of inadequate or inappropriate dietary intake and illness reduces the appetite and therefore nutrient requirements increase while inadequate food intake makes the body more susceptible to illness (Southern African Regional Poverty Network (SAPRN) 2008b:53).

There is limited research done on the nutritional requirements of affected orphans, only research for those infected by HIV&AIDS since the infection suppresses their immune system and they will need more nutritional food than a normal child. The energy requirements for children with malnutrition are often set above the requirements for healthy children.

The following nutritional needs are for a normal child affected and infected by HIV&AIDS (Garant 2007:1-2).

- Food should contain a higher proportion of body building nutrients which are protein, mineral elements and vitamins.
- Children's diets must be made up with special care to include mainly foods which are readily digestible.

### **2.9.1 Roles of macro- and micronutrients in the body**





Nutrition is defined in a number of different ways; some researchers say "it is the science of food and its relationship to health" and the study of food, diets, how nutrients are used in the body and of food related behaviour and factors affect nutritional status (Burgess, Bijlsma & Ismael 2009:201).

Different foods are composed of wide varieties of nutrients, which have specific metabolic effects on the human body. Some nutrients are considered to be essential and some non-essential; essential nutrients include vitamins, minerals, amino acids, fatty acids and carbohydrates. Non-essential nutrients are those nutrients which the body has the ability to synthesise from other compounds of food sources (Krachenfels 1999:1).

#### **2.9.1.1 Macronutrients**

Macronutrients are nutrients that are needed in large amounts in the body (Burgess, Bijlsma & Ismael 2009:201). They constitute the majority of an individual's diet, "thereby supplying energy, and the essential nutrients that are needed for growth, maintenance, and activity" (Krachenfels 1999:1). Global deficiencies in intake and status of micronutrients and macronutrients are reflected in segments of the South African population (Scholtz, Vorster & Matshego 2001:39).

**TABLE 1: The role of macronutrients in the body (Burgess, Bijlsma & Ismael 2009; Krachenfels 1999; Medical guide 2010; Journal of nutrition 2009; Brokegratitude 2008).**





	Nutrient	Functions	Good Sources	Servings
MACRONUTRIENTS	<b>Protein</b> 	Helps us to grow, develop and repair muscles and tissues. Some protein foods such as milk and eggs give us strong bones and teeth.	Marula nuts, eefulwa, ground nuts, pumpkin seeds, mopane worms, beef, pork, goat, fish, chicken, eggs, dried beans, peas, mealies, lentils, cheese and yoghurt	2 – 3 servings daily
	<b>Carbohydrate</b> 	Provides energy for the body. There are three kinds of carbohydrates: sugar, starch and fibre.	Mahangu, sorghum, brown bread, rice, macaroni and other pasta, mealie, sugar and honey	6 -8 servings daily
	<b>Fats</b> 	Provides energy for the body and carries certain vitamins through the body.	Marula nuts, ground nuts, butter, margarine, cooking oil and seeds	5 teaspoons daily
	<b>Water</b> 	Water carries nutrients in the body and waste products out of the body. It also helps to control body temperature.	Water, milk, fruit juice, soups, tea, fruits and vegetables with high water content such as lettuce, apples and potatoes	6 – 8 glasses daily

### 2.9.1.2 Micronutrients

Micronutrients are nutrients (vitamins and trace minerals) that are needed in small amounts by the body. Wilson (2005:1) said “micronutrients are like water it does not provide energy, though needed in adequate amounts to ensure that all body cells function properly. These nutrients are also known to be essential and indispensable to life processes and the body cannot function without them”.



**TABLE 2: The role of some micronutrients in the body (Wilson 2005; NYSOPEP 2009; Natural Nutrition Foods 2008; Foods tv 2009; Women-health 2010).**

MICRONUTRIENTS	Nutrient	Functions	Good Sources	Servings
	Vitamin A 	For vision, healthy skin, teeth and bone development. Protection against infections. Also plays a role in the proper development of the brain.	All dark green, yellow, orange and red fruits and vegetables (such as spinach, pumpkin, green pepper, carrots, mango, peach), egg yolks, milk and liver	5 servings daily
	Vitamin C 	Helps to protect the body from infection and aids in recovery from illness. Builds healthy bones, teeth and gums.	Citrus fruits (oranges, grapefruit, lemons, mango), tomatoes and potatoes	5 servings daily
	Iron 	Needed for oxygen exchange in the blood and needed by enzymes to work properly.	Liver, meat, eggs, dark green vegetables, sorghum and seafood	5 servings daily
	Zinc 	Important for the immune system and aids in wound-healing.	Meat, fish, poultry, shellfish, maize, beans, peanuts and milk	5 servings daily

## 2.10 THE EXCELLENT SOYBEAN

Soybean is a leguminous bean that comes from the soy plant. Soybean is a hard dry bean which can be brown, yellow or black; it belongs to the same family as peas and lentils (WISHH 2003:5). Soy food plays a valuable role in a healthy child's diet since it is an excellent source of high quality protein (Silk Soy Nutrition Centre 2009:1). In China and India soybean has been used for almost thousands of years as a staple diet, whereas in countries like the United States, the Department of Agriculture has ruled that unlimited amounts of soy protein can be used in schools and other centres of food

soybeans are processed into flavoured dry base products and marketed extensively as a meat substitute prepared as a main meal at homes and consumed with pap, rice or bread. Shelf stability and affordability characteristics make soy products appealing to South Africans from the low income sectors and vegetarians.

Soybean composition includes varying amounts of protein content from 30 percent to 40 percent, 18 percent fat which is unsaturated and high in phytic acids as well as 15 percent of soluble carbohydrates. The soybean contains 30 percent carbohydrates in which 15 percent is insoluble and other 15 percent soluble carbohydrates (United Soybean Board 2009:5).

### **2.10.1 Main benefits of soy foods**

Soy foods are known to have a range of health benefits, ranging from the cholesterol-lowering effects of soy protein which lowers the risk of cardiovascular disease to the potential benefit of decreasing bone loss. Soy is a complete protein and most soy foods are rich in vitamins and minerals including folate, calcium, iron, zinc, magnesium and omega 3 fatty acids. Soy foods are low in saturated and trans fats and have potassium and fibre. Scientists around the world have officially recognized the cholesterol-lowering effects of soy protein and recent findings suggested that 25 grams of soy protein per day can reduce the risk of heart disease (American Heart Association 2009:2-4).

Health benefits of soybean:

- Soybean has a high lecithin content which plays a role in fat metabolism, energiser and as a brain food.
- Lecithin also lowers blood cholesterol through fats and is valuable tool against the development of hardening arteries and the complications of the heart, brain, kidneys and eyes (WISHH 2003:18).
- Soybeans prevent cardiovascular diseases and cancer.

- Soybeans are good for mental fatigue and protection against cholesterol.
- Is excellent to aid growth and development for growing children.
- Is easily digested and is one of the most nourishing and body building foods in the world.
- Soybean is an excellent food for the diabetic (Fabiya 2006:6).

### **2.10.2 Why soy is important for children**

Nowadays more nutritional problems are found mainly in children and interventions combating these problems should provide alternative programmes addressing dietary needs, portion controls and healthy food choices. As mentioned by researchers soybean is an exclusive plant high in protein with essential fatty acids as compared to animal based products

(Mahgoub, Silo & Fields-Gardner 2009:2).

Children allergic to milk or not consuming dairy products because of cultural and religious beliefs can consume fortified soymilk which is high in vitamin D and calcium. Soy can also improve the nutritional status with its high quality protein, fibre and vitamin D and can ease diarrhea, constipation and high cholesterol (WISHH 2003:4).

### **2.10.3 Factors influencing soy nutrient quality**

Soy foods are available all over the world in a wide variety. Some are produced by modern processing methods and others still in more traditional ways. Soy foods are divided in two categories: the non fermented, which include food like whole dry bean, soy nuts, soy sprouts, whole fat soy flour and soymilk products like tofu and okara. The fermented foods include temper, soy sauces and fermented tofu and soymilk products (Saidu 2005:16).

Hershey (2010:1-3) reported that high quality proteins are missing from the diets of the worlds hungry children and adults. Emergency groups have created high energy ready-



to-use formulas containing peanuts and soy protein isolates. Soy isolates are a nutrient dense cost-effective source of protein that are saving the lives of severely malnourished children.

#### **2.10.4 Soyfoods as a good and cheap source of Protein**

Soy food has been regarded as a bean that is very rich and that has high quality protein and is a good alternative to traditional protein sources which are often laden with excess calories, fat, saturated fat and cholesterol and are expensive. The majority of scientific research and data on soy strongly supports the value of soy protein as part of healthy diet for the growing children and the healthy function of the heart, breasts, prostate and skeleton bone (Sutherland 2009:1-2).

Soymilk is one of the popular traditional products consumed as a nutritious and cheaper protein food in most countries. Most people in western countries consume soymilk mainly as a replacer of cow's milk due to lactose intolerance or allergic reaction to cow's milk and as low cost source of food of quality protein and energy (American Heart Association 2009).

In spite of its good nutritional profile, soymilk suffers from two main drawbacks:

- Limited acceptance by consumers due to the unpleasant beany flavour developed during processing.
- The adequate amount of protein and isoflavone per serving to meet recommended FDA requirements is set at 6.25g of soy protein per serving for a total of at least 25g of soy protein daily and 44 – 50mg of isoflavor per serving (American Heart Association 2009:2-4).

Corn soy blend is the most common food. Recently the government agencies as well as private voluntary organizations requested high protein soy products such as textured

Corn soy blend is the most common food. Recently the government agencies as well as private voluntary organizations requested high protein soy products such as textured soy protein and the deflated soy flour that are easily combined with locally available ingredients (United Soybean Board 2009:1-4).

**TABLE 3: Protein content of various foods (Padayachi 1999).**

Various foods	Percentage (%)
Soybeans	38
Meat and fish	16-22
Dairy products	3-26
Wheat	14
Eggs	12

## **2.11 NUTRITION EDUCATION**

Nutrition education is one solution for upgrading the skills and the motivational need to eat well. Providing nutrition education can be a challenge when it comes to the situation of low income areas (FAO 2003:1). The researcher expects even greater challenge when it comes to Soy NEP.

Nutrition is essential for survival, physical growth, psychological development, performance and health from an early stage to adulthood (WHO 2010:2). Nutrition education can help one in achieving a positive change in food habits to result in improved nutritional status and this also stresses the relationship between nutrition and good health (DoH 2006:1).

The necessity to study the impact of HIV&AIDS on the educational development of children in Africa and the rest of the World is already beset with major obstacles to child development. In turn the HIV pandemic creates and sustains further immoderation, making it possible for children in poverty to benefit from development (Ravinder 2008).

Orphans and affected children are often deprived of an education and are obliged to assume 'adults' responsibilities at a very young age, and are not given the same opportunities as other children to learn skills and seek advice (WFP 2008:2).

### **2.11.1 Definition of nutrition education**

Nutrition education is "an innovative and promising tool to motivate people to make healthy dietary changes". It provides respondents with individualised feedback about their dietary behaviours, motivations, attitudes, norms, and skills and mimics the process of "person-to-person dietary counseling" (Brug, Oenema & Campbell 2003). The international Conference of Nutrition (ICN) (1992) and WHO (2009:2) describe nutrition education as a 'component strategy to improve the nutritional status of a population' and it is crucial for the well-being of people in general.

According to the Colosi (2009:9) nutrition education is intended to help people attain knowledge, skills and behavioural change in order to improve the diet and nutritional well-being of an individual. It also has a huge effect on nutritional status of children. Lack of nutrition education in caregivers has an effect on lack of nutrition knowledge in children.

### **2.11.2 Components of nutrition education**

- **Increasing the nutritional knowledge and awareness of public policymakers** – this can be achieved by providing information on diet and health, nutritional status, needs of the population, quality and safety of the food supply, causes of nutrition disorder and benefits of food labelling (Nestle 2008).
- **Promoting desirable food behaviour and nutritional practices** - this one can be attained by providing information on nutritional value of foods, adequate diet, suitable food choices and purchases, hygienic food preparation and correct handling of food and storage, intra household's food distribution according to the nutritional needs of the households (Galbally 1992:4; Molotja 2008:24).



- **Increasing the diversity and quantity of family food supplies** - these cover the methods of improving food production, crop selection and diversification, proper storage preservation, conservation of nutrients during food preparation and prevention of food waste (Galbally 1992:4; Molotja 2008:24).

### **2.11.3 Purpose of nutrition education**

Nutrition is a major environmental influence on physical and mental growth and development in early life. Food habits during infancy and adolescence can influence preference and practices in later life and some evidence suggests that moderation tracking of food habits from childhood to adolescence is important. Nutrition education is a key element to promoting lifelong healthy eating and exercise behaviours and should start from an early stage of life. It should address the specific nutritional needs associated with pregnancy and breastfeeding. Community trials suggest that nutrition education is an accessible tool in healthy promotion programs with a focus on the development of healthy eating practices (Perez-Rodrigo & Aranceta 2001:131).

### **2.11.4 Framework for nutrition education**

The framework of a nutrition education programme (NEP) was planned to prepare and evaluate programs and tools by an extension system for community service providers as a practical method for systematically collecting impact data (Medeiros, Butkus, Chipman, Coks, Jones & Little 2005:197).

One of the main aims of this framework was to expand the role of NEP together with programmes which do not address an existing problem but are promoting and enhancing nutritional health. The programmes in this framework must be designed to promote knowledge, skills and supports needed to provide adequately nutrition education and eliminate the social and economical costs of malnutrition and diseases (FAO 1997:1-4).

The NEP framework was not developed as a prescriptive model but proposes and promotes the appropriate concerns, parameters and processes of nutrition education programmes. The framework describes four component fundamentals in planning NEP; it is also to try to enlarge the traditional focus of nutrition education in two ways (FAO 1997):

- Deal with social health and epidemiology indicators of a population group and this ought to lead the development of a health improvement programme as well as a disease prevention intervention.
- It should help in analyzing the environmental social factors which add to the low health status of the population and this leads to promote appropriate settings and methods in planning the programme (FAO 1997:3).

#### **2.11.4.1 The food supply**

The main role of nutrition education is to increase the ability of the household to use the food resources available to maximum advantage, especially in the feeding of the children, dietary practices and food hygiene (Cornelia, Menon, Ruel & Pelto 2003:30). It also enables sustainable and long-term behavioural changes in the field of food consumption and other nutrition related subjects such as health practices. In many developing countries, food supply is changing rapidly as a result of economic growth and most of the available foods provide poor nutritional value for money and may displace affordable and more nutritional foods (FAO 1997; FAO 2003; WHO 2009a).

For children heading households and caring for the younger siblings, living with the elderly and others living with caregivers, food access is a problem and state grants are used for survival. Therefore malnutrition is prevalent in their households (Kikafunda *et al.* 2006).



#### **2.11.4.2 Nutrition Issues**

The NEP framework model identifies the nutrition issues affecting the population sub-group based on regular national monitoring and surveillance of the dietary intake and nutritional status of the population. In this regard the nutrition education goals are considered to be described as guidelines and provide directions for dietary changes. The development of environment, social and intrinsic indicators which contribute to nutritional status, addressing the nutritional needs of population will also be included and other issues such as sustainability of the food supply and the need for countries to maximize food self-sufficiency will be excluded (FAO 1997; FAO 2003; WHO 2006:10-11).

For this study some of the orphaned children are faced with micronutrient deficiencies resulting in their being stunted, wasted or under or overweight, as shown by the baseline results from this study.

The literature shows that surviving older grandparents are caring for both maternal and paternal orphans and their diets are nutritionally unbalanced; this was further supported by the results showing weight-for-height ratios which were a 0.3 standard deviation lower than the normal orphans (Lindblade, Odhiambo, Rose & De Cock 2003:67).

#### **2.11.4.3 Target group**

Using a life-cycle approach is considered a way of ensuring that the needs of a whole population are assessed whilst taking the developmental needs into account (FAO 1997; FAO 2003; WHO 2009a).

#### **2.11.4.4 Settings and sectors**

The use of key settings allows population-subgroups to be reached at the work-place, where they live and play. Using a wide range of settings and organization offer optimistic links across the disciplines and encourage a wider community involvement in

nutrition issues as well as targeting the population and develop methods appropriate to the measurable and perceived needs of the chosen areas (FAO 1997 ; FAO 2003).

Setting approach can change the situation of the organization and supports individuals with policy development at the organizational level which will commit the organization to practise and support healthy eating, healthy food choices or nutrition information services (FAO 2003; WHO 2009a).

#### **2.11.4.5 Methods**

In this study most of the orphans affected by HIV&AIDS are enrolled in school and as a result they access their food through the school feeding programme in which their food is prepared by caregivers from the community, therefore it is vital that the nutrition education programme be developed for caregivers since they play an important role for planning the meals for the school children. Furthermore this study will assist the orphaned children to make informed food choices in the future.

Most of the educational methods are based on what is appropriate for the target group. Teaching method is described as the principle and method used for instruction depending on the information the teacher or the trainer is trying to communicate (Pica 2000:1-2). Teaching methods are adaptable to different settings including small or large groups and may be combined with other teaching methods to give direction and other meanings (Ball 2003:15). Teaching methods are also used as a traditional approach to nutrition education (FAO 2003).

##### **a) Selection of channel used in teaching methods**

Teaching method can be used for:

- Introduction of new subjects
- Summarizing new ideas
- Showing relationship between theory and practical

### **\*Advantages of teaching method**

- It has specific learning targets.
- Students are told reasons why content is important - helps to clarify lesson objective.
- it is relatively easy to measure student gains.
- it is a widely accepted instructional method.
- It can be useful and successful and can successfully supplement other teaching devices and methods.
- It grounds a common understanding of important principles and facts.
- Provide social supports.
- Allows personalizing and allows modeling
- Appropriate sequencing easy and follow up also easy (Pica 2000:2).

### **\*Disadvantages of teaching method**

- Requires well-organized content preparation and good oral communication skills.
- Steps must be followed in prescribed order.
- May not be effective for higher-order thinking skills, depending on the knowledge base and skill of the teacher (Pica 2000:2).

### **b) Food guidance system**

There are varieties of graphic forms such as (food wheel, pyramid, target, plate and block) used to develop a food guide. These forms can also be used to communicate nutritional information. A food guide can also be used as a tool in the food public education programme (Goldberg, Belury, Elam, Finn, Hayes, Lyle, St Jeor, Warren & Hellwig 2004:1142).

The issues of concerns regarding the nutrition energy balance of diets, whether the total diet should form the basis of food guidance and several guidelines depending on the countries standards have already been discussed. Some of the issues arising were



whether the guide should reflect the current food supply and food practices (FAO 1997:3; Yates 2001:1331).

For the purpose of this study a six days cycle menu based on soy foods was developed focusing on the food items that will improve the nutritional status of the HIV&AIDS affected orphans. The developed Nutrition Education Training Programme covered topics on how to construct a plate with different nutritious food items.

## **2.12 NUTRITION EDUCATION PROGRAMME**

### **2.12.1 Planning of Nutrition Education Programmes**

The Nutrition Education Programme is an important component of strategies for influencing individual behaviour to solve nutritional problems. Successful efforts have been made in the past decades, while others failed and these experiences have brought a more realistic perspective on implementing a nutrition education programme and the impacts (FAO 1995:1). Nutrition education programmes have been viewed as tools for transferring messages and food assistance aid for children (Stalker 1999:7).

In 1997 the USDA developed nutrition and training programmes that were created by the national legislation. The rationale of nutrition education training is to be a team program that involves teachers and parents in becoming knowledgeable about nutrition and good dietary habits in everyday life (USDA 1992:2).

The main important aspect is that nutrition education provides necessary knowledge, inspiration and reinforcement in order for people to make informed food choices and to also address their nutritional issues (FAO 2007:1).

Good nutrition programmes may assist in reducing the need to invest in future nutrition programmes. Apart from its contribution to equity, knowledge about nutrition may be shared between neighbours (Alderman 2009:20). Nutrition education is such an intervention. It provides people with the knowledge, skills and motivation to make wise



dietary and lifestyle choices, thus building a strong basis for a healthy and active life. Food and nutrition education thus plays a vital role in promoting food security, as it is especially important for poor households to make optimal use of local foods and practice healthy eating patterns. Effective nutrition education is also important for combating the rise in non-communicable, diet related disease seen in many countries (WHO 2000:21).

The main goal of nutrition education programmes is to promote the integration of nutrition education into all curriculum areas and to influence children's eating behaviour that build nutrition knowledge and skills, which help children make healthy eating and physical activity choices (Smyrna School District 2006:1). The latter will further:

- Integrate nutrition education into orphanage homes and schools as a respective subject with help from nutrition professionals, Government Department and other resources.
- Educate caregivers to integrate nutrition education programme
- Promote healthy foods including fruits, vegetables and whole grain
- Promote nutrition knowledge to caregivers, parents and communities through offering healthy eating programmes or health promotion programmes and nutrition information and tips and providing nutrient analyses of school menus (Smyrna School District 2006:1).

AIDS is amongst the key factors exerting pressure on the education system, particularly in countries in transition and least developed countries. While progress has been made in recent years in efforts to achieve education for all, in 2007 about 77 million children in the world were still attending a primary school, 55 percent of them were girls. There is growing recognition that efforts aimed at achieving Education For All (EFA) goal of universal primary education, goal 2: must be strongly linked with interventions supporting gender equality in education and lastly goal 3 addressing educational needs for young people and adults through appropriate learning and lifeskills programmes (United Nations Educational, Scientific and Cultural Organization(UNESCO) 2007:65).

Every child has the right to education and it is vital for children's future that they attend school and take full advantage of this right. Education equips children with skills to lead a better life as they grow up and it can also reduce children's risk of HIV infection by increasing relevant knowledge awareness, skills and opportunities (UNICEF 2005:10).

Several developing countries have been promoting nutrition education through various governments' ministries (FAO 2007:12). The first step in planning an effective intervention is knowing the facts of the problem and population that will be obtained through a proper needs assessment. When a nutrition education intervention is designed it is important to have more time for the needs assessment. According to Makanjana (2006:35) needs assessments for the population can be gathered through few aspects such as literature review and baseline data collected for the proposed project.

#### **2.12.2 Development of Nutrition Education Programmes**

It is well known that health promotion involves more than just providing people with knowledge about the functions of the body, preventing disease and helping people to maintain well-being. The nutrition education process assists in applying knowledge from nutrition science and the relationship between diet and health to their food practices (Barasi 1997:309).

The significance of nutrition for school aged children has been highlighted because malnutrition in growing children can decrease both physical and mental development and learning ability of children (Semba, De Pee, Hess, Sun, Sari & Bloem 2008:439). Malnutrition in children especially AIDS affected children, is one of South Africa's (SA) major public health problems. Even though there are a number of programmes addressing micronutrient deficiencies in children through food fortification and feeding schemes, the problem is worsening daily and many still face hunger (Klugman 2005:3).

Generally poor diet leads to growth failure in children, thus inducing damage to their physiological well-being and immune system as well as other clinical conditions like anaemia which later leads to impaired cognitive development and death (Iran & Butt 2006). A solution to this problem can be nutrition education which can play an important role in dietary improvements and well-being of these poor children.

## **2.13 NUTRITION EDUCATION IN SOUTH AFRICA**

In 1994 the Nutrition Committee was appointed by the South African Minister of Health to develop and recommend a nutritional strategy and an integrated nutrition program (INP). One of INP main aims is to implement programmes that are suitable, integrated, community-driven, people orientated and which are focused on the most targeted vulnerable groups in the population of the country ( DoH 2004:1a).

In 1995 the South African DoH tasked the Directorate of Nutrition to implement the integrated nutrition strategy (INS) to resolve the problems of the nutrition and health approaches. The INS which operates as the integrated nutrition program (INP) aims to facilitate a coordinated inter-sectoral approach to solving the nutrition problems in SA. The aim of Integrated Nutrition Program is educating the communities to be self sufficient in terms of food and nutritional needs while simultaneously protecting and improving the health of the most vulnerable groups: women, children and the elderly (Schonfeldt & Gibson 2009:68).

### **2.13.1 The principles of the Integrated Nutrition Programme**

The principles of the Integrated Nutrition Programme (INP) include:

- “Social and economic development should use nutritional programmes as an outcome measure and a basic human right for all South Africans.
- Nutrition programmes must be integrated, sustainable, environmentally sound in the communities.
- Promotion of nutritional well-being.



- Cooperation should be encouraged between countries and international agencies at all times.

Adequate financial, human and institutional resources must be provided to ensure effective and efficient nutritional policies, strategy, programmes and services” (DoH 2004:1a).

### **2.13.2 Nutrition education in orphanage homes**

Orphans and vulnerable children have many different needs: for love, security, attention, health, shelter, nutrition and many others. One of the most important needs that orphans have is education. Education is a basic human right for all children, as recognised in the Convention on the Rights of the Child. A child who has access to quality primary schooling has a better chance in life than a child who looks after their sick parents and other relatives. In 2001 very few students were adversely affected by the above conditions, without appropriate interventions to reduce the burden of care, which could lead to a major problem during the next decade (Bennel, Chilisa, Hyde, Makgothi, Malobe & Mpotokwane 2001:45).

### **2.13.3 Nutrition education in schools**

Education plays a key role in safeguarding the health and well being of vulnerable children. According to the World Food Programme (WFP) (2008:2) by missing out on school, these children are more likely to be abused, exploited and exposed to HIV and other diseases, the final link in a vicious circle of poverty and illness. School plays a major role in improving children's dietary habits and can also promote healthful eating because while at school a large share of daily food may be consumed (Izumi, Alaimo & Hamm 2010:83).

Children worldwide face many health risks as a result of environmental factors, poverty and violence. In this regard the school may play a major role in addressing the health



needs of learners, specifically those in the intermediate phase of South African schools (Petersen, Bhana, Flisher Swartz & Richer 2010:1).

Around 10 percent of schoolchildren in Botswana are maternal and double orphans; by 2010 it will increase to 35-40 percent. One third of these orphans suffer from material or emotional depression which adversely impacts on their education. Also orphans from poorest households have the most difficult problem that relate specifically to orphan hood, it is the existence of endemic poverty that is largely responsible for many of the difficulties faced by orphans (Bennell *et al.* 2001:46).

Children may be withdrawn from school due to lack of income to pay for school fees, having to care for ill relatives, or insufficient funding within households to pay for medical and health care bills (United Nations Economic Commission for Africa (UNECA) Organization 2010:08).

Educating schoolchildren about healthy nutrition is one of the most effective strategies for overcoming malnutrition and chronic diet-related diseases but it has been neglected far too long (FAO 2007:1). Good nutrition education can make children aware of how to achieve a nourishing diet with limited means, on how to prepare and handle food safely and how to avoid food related risks (FAO 2007:1). Nutrition and good health are natural companions. Good nutrition and good health both mean stamina, reduced incidence of disease, enjoyment in activity and in the food, and an opportunity to live a well-balanced lifestyle (Bustamante 2006:1).

#### **2.13.4 Modifying health and nutrition education in schools with children living and affected with HIV&AIDS**

##### **(a) Health and nutrition education for all children**

Skills-based health education is one of the four pillars of Focusing Resource on Effective School Health (FRESH). Life skills that are build on knowledge of human health, appropriate to the age and development of children. Life skills

must also be built on knowledge of HIV and the body's defenses against viral infection is best delivered when incorporated into general health education and promotions. The concepts upon which a child builds a sense of self and bodily health become elaborated as part of cognitive and emotional development (Cooper, Rinsley, Drake & Bundy 2007:10).

(b) Health and nutrition education specifically useful to the child living with HIV (Cooper, Rinsley, Drake & Bundy 2007:10):

In the case of HIV affected and especially infected children clinical psychologists have found that young children respond to the idea of protection within themselves, e.g. immune defenses can be symbolized as a wall. The idea of being protected by a wall from something bad outside corresponds to a young child's concentric view of the world.

- General health and nutrition education combined with specific HIV education to promote the idea of building and strengthening the wall. Nutrition, hygiene and desirable social behaviour can be integrated in giving the child a sense of power in building their defenses generally.
- According to psychologists, HIV infected and affected children respond better when they are 7-10 years, because at this age children respond to concrete ideas, understand rules and can keep personal information.

## **2.14 MENU-PLANNING IN INSTITUTIONS**

Menu planning can be defined as determining the dishes and quantity by considering selectable nutrient intake and its main aim is to plan a well balanced menu (Briley & Roberts-Gray 2005:981-982). The main dishes in a menu must satisfy nutritional requirements and the user must consume the dishes for health purposes regardless of the preferences. The menu is the main factor in the success of the nutrition programmes. Successful menu planning promotes the programme of child nutrition (Briley & Roberts-Gray 2005:981-982).

Nowadays most menus are being reviewed by nutrition professionals; this encourages meal-planners to ensure that nutritious meals and snacks provided to children in care units consists of planned accurate menus which communicate nutrition information to caregivers, parents and children. Menu-planning includes understanding how to plan menus, use food and standardized recipes and understand food labeling (Briley & Roberts-Gray 2005:981-982). For every food service unit menu-planning is the main tool to assist food service units to prepare and serve acceptable food consistently according to the objective of the programme. The main initiative in designing a menu-pattern is to outline the food item to be served each day. The meal of the day is the key influence on the menu pattern, although it may vary according to the operation (Briley & Roberts-Gray 2005:984).

#### **2.14.1.1 The meals must follow the following nutrition goals:**

- Meet the recommended dietary allowance
- For breakfast
- For lunch
- Age appropriate kilojoules goals
- Dietary guidelines of the specific group
- Nutrient standards for kilojoules, calcium, iron, protein and vitamins (Burke & Maugham 2002:147).

#### **2.14.2 Every meal should consist of food chosen from five food groups:**

- Meat (protein)
- Dairy products
- Fruits and vegetables
- Bread and cereals
- Fats and oils (Burke & Maugham 2002:147).

### **2.14.3 Cycle-menu**

Cycle-menu is a planned set of menus that is rotated at definite intervals with the length of cycle depending on the type of foodservice. The menus will differ everyday during the cycle and at the end the cycle repeats the menu in the same order (Payne-Palacio & Theis 1997:99).

#### **2.14.3.1 Factors to consider when planning a cycle-menu**

- Collect all materials such as meal-plan requirements and recipes which are needed for menu-planning.
- Decide on the number of weeks the cycle-menu will include.
- Plan the main dishes first (food such as protein, starch and vegetables) then add breakfast and snacks.
- Do not repeat any one food too often.
- Include a variety of food to supply the nutrients needed.
- The foods must be nutritious, appealing and taste good.
- Include favourite foods (United States National Food Service Management Institute (US NFSMI) 2006:2).

#### **2.14.3.2 Advantages of cycle-menus**

- It reduces menu planning time.
- Serves as a training tool.
- It streamlines food procedure.
- It aids in evaluating food service.
- It helps the food service become more efficient (US NFSMI 2006:3).

### **2.15 South Africa Food Based Dietary Guidelines**

Food Based Dietary Guidelines are guidelines that express nutrition education as a dietary pattern other than as a nutrient or food component, therefore Food Based



Dietary Guidelines (FBDG) reinforce the linkage among foods, dietary patterns and prevalence of nutrition-related diseases relevant to a population (Schneeman 2003:6).

The Food Agricultural Organization (FAO 2007:1) indicated that FBDG are one strategy that is commonly used by many countries to fight diet related public health problems. Some of the main motives of developing and using FBDG include: preparation and cooking methods influencing the nutritional value of foods, foods are more than a compilation of the nutrients but form a good diet.

### **2.15.1 Development of Food Based Dietary Guidelines**

In 1999 the Food and Agricultural Organization and the World Health Organization held a joint consultation to outline the key principles in the process of developing FBDG's. In South Africa workshops were conducted in various regions and it was initiated that the development of FBDG's that were relevant to the needs of the population (Schneeman 2003:7).

Public health issues that are the most relevant to the targeted group and the determination of which of these issues are diet related is the key principle for developing FBDG's. The FBDG's are also compiled with the intention to be used as an effective and key element of a nutrition education tool for promotion of nutrition to combat the growing burden of chronic diseases as well as nutrition disorders associated with malnutrition and poverty (DoH 2003:1)

According to Smuts and Meltzer (2008:1) these dietary guidelines are different from the traditional accepted food pyramid which provides quantities of various food groups required in the diet. Furthermore implementation of these guidelines has a major impact on diseases and rates of death due to over- and under nutrition. The South African food based dietary guidelines are as follows:

- Enjoy variety of food

- Be active
  - Make starchy food the basis of most meals
  - Eat plenty of vegetables and fruit everyday
  - Eat dry beans, peas, lentils and soya often
  - Meat, fish, chicken, milk and eggs can be eaten every day
  - Eat fat sparingly
  - Use salt sparingly
  - Drink lots of clean safe water
  - Use food and drinks containing sugar sparingly and not between meals
- If drinking alcohol, drink sensibly (Voster, Love & Browne 2001:3).

### **2.15.2 Characteristics of food based dietary guidelines**

The South African existing FBDG's are nutrient based and aimed only at the population eating a typical western diet. WHO (1998) recommended specific characteristics for FBDG in order to improve eating behaviours effectively and they are as follows:

- Guidelines should be easy to use and not confusing.
- Each guideline must have only one easy, logically simple message.
- Guidelines should be prepared in a positive way and message should not use words or phrases such as avoid, decrease, limit or eat less.
- Guidelines should be created or illustrated in such a manner that people from diverse cultures and literacy backgrounds grasp their meaning.
- Guidelines should be well suited to different cultures and eating patterns of the target population.
- Guidelines should be based on reasonably priced foods, which are available broadly consumed.
- Guidelines should emphasise the enjoyment of eating.
- Guidelines should address both over- and under-nutrition and should assist people to select the most suitable and affordable diet which people can afford.
- Guidelines should be sustainable.

- Guidelines should be devised and communicated to the target population using marketing ability, based on knowledge, attitude and behaviour.
- Guidelines should lead to an assortment of foods that are usually consumed together in groupings that are well matched with existing dietary practice.
- Guidelines should reinforce agriculture appropriate to the environment (Voster, Love & Browne 2001:1-2).

### **2.15.3 Food Based Dietary Guidelines in South Africa**

Over the past few years, a set of unique food-based dietary guidelines was developed specifically for South Africans over the age of 7 years, recognizing the varying nutritional needs of the population (Smuts & Meltzer 2008:1). In 2003 evidence based guidelines were officially approved and adopted by the South African Government for use. There is increasing emphasis placed on nutrition in health promotion and preventing diseases within the primary health care setting (Faber & Wenhold 2007:394).

Children's and adolescent's nutritional needs are different to those of adults because children are still growing and developing. According to Faber and Wenhold (2007:394) the growing consensus on dietary guidelines must include children in general terms as well as specifically in respect of intakes.

### **2.15.4 Formulating each of the food based dietary guidelines**

These guidelines form the core government nutrition education message in order to promote healthy lifestyles to all South Africans. These guidelines contain the principles of healthy eating and living in a nutshell (Duyff 2006:676).

#### **2.15.4.1 Enjoy a variety of food**

According to Maunder, Matjie and Hlatshwayo-Molea (2001:7) nutritional knowledge in terms of nutrients and non nutrients that are present in food may impact on public health. In order to ensure the positive outcome on health due to the limitation of our knowledge it is important to advocate the consumption of a variety of food. Literature

published in 1999 indicated that in the households of South African children, aged one to nine years, there is limited nutritious food, therefore a lack of dietary variety is thought to worsen micronutrient intakes, low energy intakes and contribute to the risk chronic diseases of lifestyle (Labadarios, Steyn & Maunder 1999:64).

#### **2.15.4.2 Be Active**

Exercising regularly helps keep the body and mind healthy, as well as offering many other health benefits such as developing muscle strength, strengthen immune system and bone density, leads to a higher life expectancy and improved quality of life by reducing weight and managing body fat. Regular physical activities promote good health and lower the risk of lifestyle diseases (FLORA 2000:1; Lambert, Bohlmann & Kolbe-Alexandra 2001:12).

#### **2.15.4.3 Make starchy foods the basis of most meals**

Starchy foods includes the intake of cereals and grains such as maize, wheat, sorghum, oats and bread, pasta, rice, samp and maize meal rice. The following should be included in most daily meals (Vorster & Nell 2000:17).

Eating non-fatty starchy food is a key part of a healthy diet and this will help control kilojoules intake as fat is a concentrated source of kilojoules. Bread and cereals encourage children to fill up and they are cheaper sources of energy and healthy sources of carbohydrates rather than unhealthy snacks (School Food Trust 2008:1). Most starchy food contains two types of fiber: soluble and insoluble. Soluble fibre slows down the rate of glucose absorbed in the system which provides a sustained level of energy. Insoluble fibre helps to speed the passage of food through the digestive tract which ensures that food is digested properly (Rios 2007:2).



#### **2.15.4.4 Eat plenty of vegetables and fruits everyday**

Vegetables and fruit are an important source of many vitamins, minerals, fibre and other substances. Eating fruit and vegetables is part of a healthy diet for both children and adults alike and plays a significant role in human nutrition. Vegetables and fruits also supply 16 percent of magnesium, 19 percent of iron and 9 percent of kilojoules (Kader 2001). Kader (2001:4) also indicated that some components of vegetables and fruit are strong antioxidants and function in modifying the metabolic activation and detoxification and they even influence processes that alter the course of tumour cells.

Vegetables should be a sustained proportion of each meal to ultimately improve the human diet and also increasing benefits of skin, hair and general health. High intake of vegetables and fruit also help a person to be more alert, increases attention span and reduces tiredness (Kader 2001).

#### **2.15.4.5 “Eat dry beans, peas, lentils and soy often”**

Legumes are a good dietary source of protein and are very rich in carbohydrates, soluble and insoluble dietary fibre components and a wide variety of minerals and vitamins. Legumes are also good foods to increase dietary fibre consumption and people can incorporate legumes into the diet without difficulty. Legumes are included in a health promotion diet to meet the major dietary recommendations to improve the nutritional status of undernourished and overnourished South Africans and also to reduce the risk of chronic diseases such as cancer, osteoporosis, diabetes mellitus and cardiovascular disease (Venter & Van Eyssen 2001:32).

Grain legumes such as chick pea and soybean have a protein content ranging from 17-40% and when cereal and grains are combined, families may achieve good protein balance and nutritional improvement (Jones, MacRoberts & Chandiramani 2009:2).

#### **2.15.4.6 Meat, fish, chicken, milk and eggs can be eaten everyday**

Meat, fish, chicken, milk and eggs can be eaten daily. These foods contribute valuable nutrients to the diet, preventing under-nutrition of calcium, iron, zinc and Omega 3 fatty acids. Scholtz, Vorster and Matshego (2001:39) are of the view that the evidence that overconsumption of these foods increases risk of chronic diseases which are evaluated with a particular emphasis on the role of saturated fats, omega 3 fatty acids and cholesterol in relation to the risk of coronary heart disease and cancer.

Facts about lean meat, fish, chicken, milk/ other dairy products and eggs:

- "Try to choose chicken and fish more often than red meat"
- Meat, fish, chicken, milk and eggs can be eaten daily
- Eat fish at least once a week, either tinned in tomato sauce or water, fresh or frozen and try to avoid tinned fish in oil.
- Use skimmed, fat-free or low fat milk, maas, plain or fruit yoghurt and a low fat cheese.
- Try to choose cheese which contains 10 – 15g or less fat per 100g product.
- Home-rearing of chicken, rabbits, sheep and goats can provide meat, milk and eggs.
- Buy real dairy milk instead of blends, coffee creamers and condensed milk; these are all expensive and offer little nutritional value" (DoH 2001:2).

#### **2.15.4.7 Eat fat sparingly**

Dietary fat plays an important role in the health and functioning of the human body but overconsumption is linked to heart and other diseases like obesity and cancers such as breast, colon or prostate cancer. This guideline is primarily aimed at lowering the prevalence of these chronic diseases of lifestyle among South Africans (Wolmarans & Oosthuizen 2001:48). Fatty foods can result in weight gain and can also increase risks of lifestyle chronic disease such as heart disease.

#### **2.15.4.8 Eat salt sparingly**

Charlton and Jooste (2001:55) indicated that eating salt sparingly will not interfere with the current nutritional and legal requirements regarding iodine in table salt. Salt intake as low as 5g per day would provide an adequate amount of iodine provided the salt is sufficiently iodated.

Many people have a tendency of using too much salt when they are cooking and / or on the table:

- “Some canned foods may also be high in salt, check the product label for its salt content; a low salt product contains 120mg sodium/100g products.
- Ensure foods which are tinned in salt water are either drained or rinsed.
- To use less salt and still keep a great taste, use herbs, curry powder, garlic, onion and pepper (DoH 2004:25a)”.

#### **2.15.4.9 Drink lots of clean water**

Water is an essential nutrient and the most important compound in the human body. This guideline is unique and very important for all South Africans living in a hot and relatively dry climate. Water is essential to life and there is no other substance that is widely involved in so many diverse functions of the human body as water (DoH 2004:27a).

One of the main functions of water is to absorb heat where it is generated and to dissipate it over the fluid component of the body. Fluid consumption is a primary source of water daily and Bourne and Seager (2001:65) indicated that the fluid content of food contributes greatly to daily water balance and this is universally appreciated. Combined water intake in fluids and in food consumed at meal times is the normal route for maintaining fluid balance.

## **2.16 CONCLUSION**

In this chapter the researcher covered an overview of the impact of HIV&AIDS on orphans, food insecurity, food consumption patterns, nutritional status and the nutrients, to address the identified problems. The second section included the importance of soyfoods, nutrition education programmes and the South African Food Based Dietary Guidelines.

The measuring instruments used in this study will be discussed in the next chapter.



## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

This study was carried out to determine the nutritional status and nutrition knowledge of HIV & AIDS affected orphans in Boipatong, an informal settlement in the Vaal region. In order to achieve this objective, the study was carried out in four phases namely, phase 1: Pilot study, phase 2: Determining the nutritional status, phase 3: Testing nutrition knowledge, dietary intake and sensory acceptance, phase 4: Development of NEP and cycle-menu. The current chapter presents the detailed methodology used throughout this study.

#### **3.2 PLANNING AND ADMINISTRATION**

##### **3.2.1 Geographic demarcation**

The Vaal industrial area is situated 70km south of Johannesburg, Gauteng Province with a population of about 794 599 people, of which 51 percent are unemployed and 46 percent of households live in poverty (Oldewage -Theron & Kruger 2008:314). Within this geographic area lies the Boipatong informal settlement where this study was carried out. Boipatong (Figure 4) is an area in which most of the children are living in poverty and families suffer from poor housing conditions with limited service delivery. Tshireletso Safehouse is a local NGO daycare centre based in Boipatong and assists more than 500 HIV & AIDS affected orphan children between the ages of 7 to 15 years with provision of food once a day. The centre has 35 staff members including volunteers who prepare and provide the food on a daily basis for the orphan children studied.



**Figure 5: Map of Boipatong informal settlement.**

### **3.2.2 Obtaining of permission**

Oral permission was obtained from the management of the Tshireletso Safe-house. In the initial meeting the research question was well defined according to the community needs and preferences. Consequently before the commencement of the programme, a meeting was held with the guardians to discuss the project and obtain written approval by completing a letter of consent. Furthermore, all the children involved in the study were older than 7 years and also had to give their consent according to the Helsinki protocol.

### **3.2.3 Ethical Clearance**

This study was submitted for ethical approval to the Medical Ethics Committee for Research on Human Beings at the University of the Witwatersrand (M080365) (**ANNEXURE A**). In accordance with the ethical clearance of the study, the children and caregivers participated on a voluntary basis. Anonymity was ensured with regard to personal and sensitive information as each participant was issued with a project number to mask identity and records of these numbers were kept by the supervisor of this project only. The dissemination of results took place in a responsible and professional manner.

### **3.2.4 Recruitment and training of fieldworkers**

This study involved the use of fieldworkers who were recruited from the Department of Hospitality, Tourism & Public Relations Management of VUT. Most of these fieldworkers were Sotho speaking male and female students. All recruited fieldworkers received training on the correct completion of anthropometric measurements, 24 hour recall, sensory evaluation and administering FFQ, consent forms, nutrition knowledge questionnaire and socio-demographic questionnaire. Detailed instructions on how to conduct fieldwork as well as the interview techniques were given by the researcher and other BTech students. All the fieldworkers were responsible for distributing and completing the questionnaires as well as weighing and measuring the children. The researcher explained the objective and importance of the project as well as the importance of completing the questionnaires without bias, to the fieldworkers before the survey commenced and no student without proper training was used as a fieldworker.

### **3.2.5 Intellectual Property Rights**

The information generated was reported for the purpose of an MTech (Food and Beverage Management) qualification. The intellectual property right of this study belongs to the VUT.



### 3.3 STUDY POPULATION

All 500 HIV and AIDS affected orphaned children attending the Tshireletso safehouse were eligible to participate in the study. However, only those children who met the inclusion criteria and for whom consent forms had been signed by parents were used for the random sample.

#### 3.3.1 Sampling procedure

Initially the population was (N=500) depending on the daily attendance register. The selection criteria were as follows:

- Attending the surrounding three primary schools namely, Makapane, Dr Nhlapo and Tshirela primary schools.
- Children aged nine to thirteen years.
- Both male and female
- Orphans affected by HIV&AIDS

The formula below was used to determine the sample size for the study, based on 95% power for statistical significance (Survey System 2007):

$$SS = \frac{Z^2 * (p) * (1-p)}{C^2}$$

Where:

Z = Z value (e.g. 1.96 for 95 percent confidence level)

p = percentage picking a choice, expressed as decimal  
(.5 used for sample size needed of 50 variables)

c = confidence interval, expressed as decimal  
(in this study 0.14)<sup>2</sup>

This is how sample size was calculated using the formula above

$$\frac{1.96^2 \times (1) (0.5)}{0.3^2}$$

$$\frac{3.8416 \times 0.50}{0.0198}$$

$$= 98$$

A sample size of 104 randomly selected children was to be used for this study to make provision for possible drop-outs, therefore an extra 6 percent of the respondents were



added and included in the study. Each child, whose assent had been obtained, had an equal chance to be selected in the sample. assent was obtained for 130 children. Therefore, 24 pieces of red paper and 104 pieces of green paper were placed in a plastic bag and circulated amongst the 130 HIV and AIDS affected orphans. Each had to put their hand in the bag to select a piece of paper. Those 104 who drew the green pieces were included in the sample.

### **3.4 STUDY DESIGN**

This study followed an empirical design approach whereby four phases of the study were carried out as follows:

**Phase 1:** Pilot study - the purpose of the pilot study was to determine the current nutrition education practices, nutrition education tools and textbooks available and needed in Department of Basic Education (DBE) schools as well as the nutrition education topics to be included in the DBE nutrition education manuals (**ANNEXURE B**).

**Phase 2:** Determining the nutritional status – the focus of this phase was to assess the growth status of the orphaned children and comparing it to WHO standards.

**Phase 3:** Testing nutrition knowledge, dietary intake and sensory acceptance - this phase involved assessment of knowledge and dietary intake of the children with the aim of improving their awareness and knowledge in order for them to make informed food choices. A cycle menu will be developed after sensory evaluations of all dishes.

**Phase 4:** Development of nutrition education programme and cycle-menu – the NEP was designed to improve knowledge and dietary practices in nutritional behaviour that will sustain good health.

### **3.5 Measuring instrument and data gathering**

The procedures for the abovementioned four phases of the study were presented as follows:

**3.5.1 Phase 1:** Pilot study - The pilot study was conducted in the month of October 2009 and used a nutrition education questionnaire which was developed by Oldewage-Theron and Egal (2009) from the Centre of Sustainable Livelihoods (CSL), then the Centre of Sustainable Livelihoods (ISL) at VUT. The purpose of the pilot study was to determine the current nutrition education practices, nutrition education tools and textbooks available and needed as well as the nutrition education topics to be included in the DBE nutrition education manuals which were developed by the abovementioned authors. Prior to the fieldwork arrangements to conduct the pilot study permission was obtained from the provincial office of the Department of Education and the provincial primary schools were informed by the regional offices. Trained fieldworkers (MTech students) including the researcher visited the purposively selected forty five primary schools representing all nine provinces in SA. The researchers explained the purpose and the objective of the study to the subject (teachers and principal). The NE questionnaire was given to two teachers and the school principal in each of the forty five purposively selected schools by DBE to complete with the assistance of the fieldworkers.

**3.5.2 Phase 2:** Determining the nutritional status of the 104 randomly selected orphaned children to assess the growth status. In order to determine the nutritional status, anthropometric measurements were used.

### 3.5.2.1 Anthropometric measures

#### \*Weight

Two fieldworkers were responsible for measuring weight and recording the results in a fieldwork control form (**Annexure C**). Body weights were measured to the nearest 0.1 kg using digital scales (Kupper, Bartz, Schultink, Lukito and Deurenberg 1998:50) and the procedure was done as follows:

- The scale was placed on an even uncarpeted area with the spirit level indication in the middle.
- The scale was switched on and waited until zero indication.
- The participant was weighed with light clothes and without shoes
- The participant was placed on the scale, standing upright in the middle of the platform facing the fieldworker and looking straight ahead.
- The feet were flat and apart and standing still until the measurement was recorded in the space provided on the data collection forms.
- The participant had to step down from the scale and wait for the zero reading on the digital display should a second weight be needed.
- The reading had to be within 100g of each other (Kupper, *et al* 1998:50).
- Where the readings were not identical a mean of the two readings were used.

#### \*Height

Two fieldworkers were responsible for height measurement and recording the results in the fieldwork control form. The height was measured to the nearest 0.1 cm using a stadiometer and was done as follows:

- The participant had to remove shoes.
- The participant stood with shoulders relaxed, body touching the measuring board and legs and knees together and straight, feet flat heels touching the wall.

- The participant looked straight ahead.
- The fieldworker recorded the reading in mm.
- The procedure was repeated and the two readings were not to vary by more than 5 mm (Kupper *et al.* 1998: 51).
- Where the readings were not identical, a mean of the two readings were used.

### **\*Data analysis**

Anthropometric data, namely weight-for-age, height-for-age, BMI-for-age z-scores were assessed using WHO ANTHRO PLUS 2007 software, and Z-scores were considered to be normal between -2 and +2 standard deviations. The Z-score of the children were then compared to the existing World Health Organization growth standards (WHO 2007).

### **3.5.3 Phase 3: Testing nutrition knowledge, dietary intake and sensory acceptance**

This phase involved assessing of knowledge, dietary intake and the sensory evaluation with the aim of using the results to develop a NEP to be implemented and assessed as part of DTech studies.

#### **3.5.3.1 Nutrition knowledge Questionnaire**

#### **\*Development and administration of the Nutrition Knowledge Questionnaire (Annexure D)**

The Nutrition Knowledge Questionnaire differs from other assessments of knowledge because it incorporates a broad range of nutrition concepts, including knowledge of dietary recommendations, healthy food choices, nutrient sources and some diet-disease relationships (Hendrie, Cox & Coveney 2008:1). The instrument was used to collect information on nutritional knowledge, food consumption, physical activity and background information such as age and gender.



The nutrition knowledge and dietary intakes practices of orphans were determined by means of the Nutrition Knowledge Questionnaire that was compiled by the researcher. Twelve multiple-choice nutritional knowledge questions (**Annexure D**) were included. The questions were selected using validated questionnaires previously used in nutrition education studies within the region during the nutrition education programme. These included nutritional topics that were adapted from the nutrition education activity book developed by Oldewage-Theron 2008, Oosthuizen 2010 and Du Plessis (2009) and topics included food groups, healthy food consumption patterns, South African Food Based Dietary Guidelines, macronutrients / micronutrients and their functions, and physical activity recommendations. Five true or false questions, based on Soy foods were also included in the Nutrition Knowledge Questionnaire. Soy gardening projects have been implemented by other researchers in the Vaal region to address deficient energy and protein intake amongst children in the area as well as to address household food insecurity due to poverty (Oldewage-Theron & Slabbert 2010:1). However, the Vaal region community is not familiar with soy and its uses, and all the researchers in the Center of Sustainable Livelihoods (CSL) thus include soy as part of all the nutrition education programmes implemented to sensitize the community and make them aware of the advantages of including soy in their daily diets. Alternative protein choices that are more cost effective are also included in all the nutrition education programmes.

#### **\*Data analysis**

The baseline data were captured from the Nutritional Knowledge Questionnaire on an Excel spreadsheet and the SPSS version 17.0 programme was used to analyse the data. Results were displayed as percentages, mean + standard deviation (SD). Thereafter the analyzed data were presented in tables and graphs in order to report the findings. Thus results of this questionnaire led to the development of the NEP.

### **3.5.3.2 Food Frequency Questionnaire (FFQ)**

#### **\*Description and administration of FFQ**

Dietary variety was assessed using a Food Frequency Questionnaire. The Food Frequency Questionnaire was used to find out the usual foods consumed by the children in the previous seven days. Dietary assessment food frequency questionnaires (FFQ) are pre-printed lists of food that are important contributors to the population's intake of energy and nutrients. FFQs are good to use for checking intake of groups of people rather than individuals, and are commonly used also in epidemiological research investigating the relationships between diet and disease (Joubert & Ehrlich 2007:295). An adapted validated seven days Food Frequency Questionnaire (FFQ) (**Annexure F**) was administered with the assistance of trained fieldworkers. The fieldworker had to tick all the food items consumed by the respondents during the past seven days. No frequency or amounts were needed.

#### **\*Data analysis**

Dietary diversity (DD) was measured using food groups consumed by 100 orphaned children in the Vaal region. The data was collected with an adapted validated seven days food frequency questionnaire (FFQ) with nine nutritious food groups recommended by the FAO (Swindale & Ohri-Vachaspati 1999). Data were captured on an Excel spreadsheet and statistically analysed for frequencies and ranges in the period of seven days using the Statistical Package for Social Sciences (SPSS), version 17.0.

DD was measured by quantifying the number of individual foods, thereafter referred to as the Food variety score (FVS) and the number of food groups utilized as the food groups diversity score (FGDS) calculated for a seven days period for the study.

### **3.5.3.3 The Sensory Evaluation Form**

#### **\*Selection of alternative protein dishes**

The ingredients available in the household (top 20 results) were used to search for recipes in a variety of cook books, matching these ingredients. Furthermore, the recipes with the commercially available convenient soy products were selected for the sensory analyses. All the recipes were prepared by the researcher in the Vaal region as well as the caregivers to evaluate the suitability of these recipes in this community. Four soy recipes, three bean and legume dishes, three of hake and pilchards fish recipes were selected for inclusion in the sensory analysis.

#### **Description and administration of Sensory evaluation**

The same 100 (104-4 drop outs) randomly selected orphaned children from the centre were used for the sensory evaluation of soy food and other protein dishes. The evaluation forms and pencils were distributed to the respondents. Each group evaluated four different dishes of soy foods, three bean and legume dishes and three hake and pilchards' dishes.

The aim was to determine the respondent's sensory experiences regarding all the dishes and their acceptance to be included in the cycle menu to be developed for the centre. The sensory analyses of all the dishes were filled in the hedonic (facial scale) sensory acceptability questionnaire. The five-faced scale (**Annexure E**) with different hedonic facial scale expression to communicate experiences was selected as it is a common and approved method that renders reliable results, which is also an approved sensory test method (Bruin & Minnaar 1994:25) especially for children. The hedonic scale method with different ratings was utilized to measure the level of liking of the foods. In hedonic tasting, a sample is offered in sequence and the respondents are told to make a decision on how much he or she likes or dislike the product and to mark the scale as a result (Bruin & Minnaar 1994:25).

Instructions on how to evaluate were presented weekly to each group in Sesotho to explain the testing procedure and the evaluation forms. The instructions were given as simply as possible. The respondents were informed that all the dishes were mainly protein rich but had no knowledge of the specific ingredients, as this could lead to bias (Bruin & Minnaar 1994:27). The respondents had to follow all the steps regarding the smell, taste, colour, texture and whether they would like the dish to be part of their school or centre feeding programme. After the first tasting, the respondents cleared the mouth with water and then tasted the second food item, following the same procedure for the rest of the dishes. This procedure was followed for three consecutive weeks, week 1 being soy dishes, week 2 for beans and legumes and week 3 for fish dishes. The children were sitting with their backs to each other to avoid eye contact and no talking was allowed, so that they could not influence each other.

#### **\*Data analysis**

The assessments were collected and captured on Microsoft Excel and then converted into an SPSS version 17.0, for statistical analysis in descriptive statistics (frequencies). The cycle-menu was developed from the acceptance results in this questionnaire.

#### **3.5.4 Phase 4: Development of NEP and cycle-menu**

The NEP was developed to improve knowledge and dietary practices in nutrition behaviour that will sustain good health. The cycle-menu was designed to complete the NEP outcomes to sustain good health outcomes again.

##### **3.5.4.1 Development of Nutrition Education Programme**

The main aim of this study was to develop a Nutrition Education Programme (NEP) (**Annexure G**) that is reliable and valid. The NEP was based on the results of the nutrition knowledge and South African food-based dietary guidelines as well as soy



foods and alternative protein food items that can be included in a school based NEP. The rationale of NEP was to include:

- Information on healthy eating food choices and the importance of soy food to promote growth.
- Information on dietary requirements and physical activities for children
- Improving the orphan's nutrition knowledge on the SAFBDG as they were specifically developed for the South African population.
- Based on the needs of the children and their inadequate nutrition knowledge (results of phase 2), a training programme was developed. The purpose of the NEP was to improve their nutrition knowledge and practices. The training programme was tested for validity with the assistance of the Department of Visual Arts and Design.

#### **3.5.4.2 Development of a cycle-menu**

A nutritionally balanced seven day cycle-menu (**Annexure H**) based on soy foods and alternative protein dishes that were accepted by the children were developed. Different recipes were identified and adapted as to meet nutritional needs of the orphans. Other food items that were of major importance to this group were fish dishes, legumes, samp and beans. These were included in the menu due to the nutritional content and affordability of the items.

- Cycle-menus in child care centres have many advantages; they allow menu planners to offer a variety of menu selections; it can be repeated; it saves time; and it can control food costs in a number of ways (USDA 2009:5). The main purpose of this cycle-menu is to ensure that the orphans get adequate dietary intakes as recommended by experts and to provide these poor children with appetizing and nourishing meals in order to improve their nutritional status.

Orphaned children chose the facial expression from the evaluation form to show what they preferred to be included in the menu.

- The cycle-menu was analysed on food finder for nutritional content and dietary adequacy.

### **3.6 RESEARCHER'S ROLE IN THIS PROJECT**

The researcher was responsible for the following in this study:

- Proposal writing and literature search
- The involvement with fieldworkers in the training and collection of data
- Capturing data and interpretation of results
- Developing a cycle-menu and analyses thereof
- Developing a nutrition education training programme
- Preparing measuring instruments and dishes for sensory evaluation
- Writing of abstracts leading to oral and poster presentations.

### **3.7 CONCLUSION**

This chapter described the methods used and different phases that were implemented. The researcher specified the purposes and procedure followed to gathered, capture and analyse data from all four phases of this study. The results will be presented and discussed in Chapter 4.

## CHAPTER 4

### RESULTS AND DISCUSSIONS

#### 4.1 INTRODUCTION

The main focus of this study entailed developing a reliable and valid nutrition education programme for HIV&AIDS-affected orphans in Boipatong informal settlement, in terms of nutritional knowledge and their dietary intake pattern that will sustain good health. The objective of this chapter is to present the results and discussion for this study. The study followed a four-phased approach namely:

**Phase 1:** Pilot study - the purpose of the pilot study was to determine the current nutrition education practices, nutrition education tools and textbooks available and needed and the nutrition education topics to be included in the DoE nutrition education manuals.

**Phase 2:** Determining the nutritional status – the focus of this phase was to assess the adequacy growth status of the orphaned children.

**Phase 3:** Testing nutrition knowledge, dietary intake and sensory acceptance - this phase involved assessing of knowledge and dietary intake with the aim of improving their awareness and knowledge in order for them to make informed food choices. A cycle menu will be developed after sensory evaluations of all dishes.

**Phase 4:** Development of NEP and cycle-menu – the NEP was developed to improve knowledge and dietary practices in nutritional behaviour that will sustain good health.

#### 4.1.1 Phase 1: Pilot study results

The Department of Basic Education (DBE) recognized the need for nutrition education to be included in the schools nationally, not only as part of Life Orientation, but in all learning areas so that the whole school community could be made aware of the importance of good nutrition. For this reason, the DoE, in collaboration with the United Nations Food and Agriculture Organization (FAO), sent out a tender for nutrition education manuals to be developed for educators, the national school nutrition programme (NSNP) volunteers as well as for the parents/caregivers. The CSL, then Institute of Sustainable Livelihoods (ISL), was awarded the tender to carry out the development of NEP manuals in September 2009. As part of these tender, schools in all nine provinces had to be visited in order to determine the nutrition education needs.

**TABLE 4: Grades in which nutrition education is presented**

Grade	Number of schools (45)	Percentage (%)
0	31	68.9
1	42	93.3
2	42	93.3
3	41	91.1
4	41	91.1
5	41	91.1
6	43	95.6
7	42	93.3

In an unpublished study carried out by the researchers of CSL, a total of 45 teachers and the principals from selected schools, representing all nine provinces in SA completed the questionnaires. The results showed that the majority of the nutrition education syllabus (97.8 percent) formed part of Life Orientation, with 2.2 percent also included in Natural Science. The results in Table 4 further indicated that the majority of the schools included nutrition education in all primary school grades (0 to 7).



**TABLE 5: Total amount of time spent per week on nutrition education**

Time	Number of schools (45)	Percentage (%)
≤ 30 minutes	12	26.7
31-60 minutes	15	33.3
1-2 hours	6	13.3
≥ 2 hours	9	20.0

The results in Table 5 showed that the majority of the schools (60.0 percent) spent less than one hour per week, with a small percentage (20.0 percent) spending more than two hours per week on nutrition education.

**TABLE 6: Nutrition education tools available and methods used for nutrition education by the schools**

Tools	Number of schools (45)	Percentage (%)
Textbook	43	95.6
Lectures	11	24.4
Videos	4	8.9
Pamphlets	31	68.9
Food models	20	44.4
Playing cards	3	6.7
Food puzzles	12	26.7
Nutrition education games	5	11.1
Posters and wall charts	3	6.6
Real food models	2	4.4
Food pictures	1	2.2

The results in Table 6 show the nutrition education tools that the educators have available in the schools. The results showed that the majority of schools (95.6 percent) had textbooks available for nutrition education, but only 24.4 percent of nutrition education is offered through formal lectures. Although 44.4 percent indicated the use of food models and 26.7 percent the use of food puzzles, these results are doubted as

food models and puzzles are not readily available in SA and would have to be imported from the United States of America at enormous prices (R 6800 for 50 food models in 2005) (Health Edco® 2005). The same is true for nutrition education games and cards used by a small number of schools, 11.1 percent and 6.7 percent respectively.

**TABLE 7: Teachers sources of nutrition education information**

Sources	Number of schools (45)	Percentage (%)
School attended	10	22.2
Teacher training college	15	33.3
In-service learning	12	26.7
Seminars	35	77.8
Self-learning	22	48.9
Textbooks	40	88.9
Colleagues	28	62.2
Local clinic	28	62.2
Library	18	40.0
Television	33	73.3
Magazines	31	68.9
Doctor	16	35.6
Parents	9	20.0

The results in Table 7 indicated that the educators obtained their nutrition knowledge mainly from textbooks (88.9 percent), attending seminars (77.8 percent) and the local television (73.3 percent).

**TABLE 8: Nutrition education topics covered**

Topics	Number of schools (45)	Percentage (%)
Role of nutrition in health	38	84.4
Food and nutrient composition of foods	40	88.9
Therapeutic role of food in health	22	48.9
Factors contributing to malnutrition	39	86.7
Under-nutrition	31	68.9
Diseases of lifestyle	39	86.7

**TABLE 8 continued: Nutrition education topics covered**

<b>Topics</b>	<b>Number of schools (45)</b>	<b>Percentage (%)</b>
Over-nutrition	28	62.2
WHO growth standards	8	17.8
<b>Topics</b>	<b>Number of schools (45)</b>	<b>Percentage (%)</b>
Signs of malnutrition	38	84.4
Cycle of malnutrition	18	40.0
Strategies employed to address malnutrition	26	57.8
Healthy eating habits for children	37	82.2
Factors influencing food intake of children	26	57.8
Dietary needs of children	25	55.6
Healthy food choices	40	88.9
Meal planning	34	75.6
Food labelling	33	73.3
Food security causes	13	28.9
Strategies to combat food insecurity at community level	14	31.1
Food safety and hygiene	35	77.8
Food contamination prevention	32	71.1
Oral/dental health care	36	80.0
Behavioural hygiene	31	68.9
Environmental hygiene	31	68.9
Personal care and hygiene	36	80.0
Relationship between nutrition and HIV&AIDS	32	71.1
Nutritional complications of HIV&AIDS	28	62.2
School feeding programmes	34	75.6
Objectives of school feeding	32	71.1

In Table 8, the existing topics covered in nutrition education are indicated. The topic tested included those recommended by the DBE to form part of the nutrition education manuals to be developed. The results showed that the majority of schools already included most of these recommended topics, however, only a few schools (n=8, 17.8 percent) included the World Health Organisation (WHO) growth standards. Food security is also not covered in many schools as only 28.9 percent indicated that the

causes of food security and strategies to combat food insecurity at community level (31.1 percent) were included in the nutrition education topics. The results further indicate that the nutrition education materials/tools needed by most of the respondents were colouring books (71.1 percent), videos (71.1 percent), posters and wall charts (60.0 percent) and nutrition education card games (51.1 percent). These should be designed in bright colours (95.5 percent), with either photographs (62.2 percent) or colour drawings (62.2 percent) used to illustrate the text and should preferably be in both English and the local language (75.6 percent).

**TABLE 9: Nutrition education topics to be included in the DBE manuals**

Topics	Number of schools (45)	Percentage (%)
Role of nutrition in health	29	64.4
Food and nutrient composition of foods	12	26.7
Therapeutic role of food in health	9	20.0
Factors contributing to malnutrition	17	37.8
Under-nutrition	6	13.3
Diseases of lifestyle	11	24.4
Over-nutrition	5	11.1
WHO growth standards	7	15.6
Signs of malnutrition	5	11.1
Cycle of malnutrition	3	6.7
Strategies employed to address malnutrition	7	15.6
Healthy eating habits for children	18	40.0
Factors influencing food intake of children	3	6.7
Dietary needs of children	12	26.7
Healthy food choices	7	15.6
Meal planning	4	8.9
Food labelling	1	2.2
Food security causes	4	8.9
Strategies to combat food insecurity at community level	4	8.9
Personal care and hygiene	9	20.0
Exercise and its relation to nutrition	10	22.2
Relationship between nutrition and HIV&AIDS	4	8.9
Nutritional complications of HIV&AIDS	10	22.2
School feeding programmes	10	22.2
Objectives of school feeding	5	11.1

Although there are some topics not covered in the majority of the schools, the results in Table 9 showed that the majority of the respondents indicated that it was not necessary to include these topics in the nutrition education manuals, except for the role of nutrition in health (64.4 percent) which was also high in (84.4 percent) of the topics.



**TABLE 10: Nutrition education tools needed by the schools**

Tools	Number of schools (45)	Percentage (%)
Textbook and lectures	19	42.2
Colouring books	32	71.1
Videos	32	71.1
Pamphlets	19	42.2
Crossword puzzles	10	22.2
Food puzzles	14	31.1
Nutrition education board games	15	33.3
Nutrition education card games	23	51.1
Posters and wall charts	27	60.0

The results in Table 10 showed that the nutrition education materials/tools needed by the most of the respondents were colouring books (71.1 percent), videos (71.1 percent), posters and wall charts (60.0 percent) and nutrition education card games (51.1 percent).

**TABLE 11: Design needs for nutrition education materials/tools**

Design needs	Number of schools (45)	Percentage (%)
Bright colours	43	95.6
Photos to be included	28	62.2
Colour drawings to be included	28	62.2
Cartoons to be included	24	53.3
Both English and local language	34	75.6
English only	4	8.9

Table 11 showed that the NEP should be designed in bright colours (95.5 percent), with either photographs (62.2 percent) or colour drawings (62.2 percent) used to illustrate the text and should preferably be in both English and the local language (75.6 percent).

#### **4.1.2 Phase 2: Nutritional status results**

The final study population consisted of 100 children including 55 males and 45 females aged 9 to 13 years old attending the Tshireletso Safehouse in Boipatong informal settlement. All children were enrolled at three primary schools namely Dr Nhlapo, Makapane and Tshirela all in close proximity to the Tshireletso Safe house.

One of the objectives of this study was to determine the nutritional status of the HIV&AIDS affected orphans, aged 9 to 13 years old, in an informal settlement found in the Vaal region.

The nutritional status of the children was determined in accordance with the current WHO growth standards (Abdulkadir, Sohoni & Agoi 2009: 968), anthropometric measurements of weight for age, and the percentage of the population with weight less than -2SD below that expected from the international growth reference for a child age and sex were deemed to indicate children were malnourished (Kabubo-Mariara, Ndenge & Mwabu 2009: 7, Abdulkadir, Sohoni & Agoi 2009: 968). Thus this study used the following definitions and cut-off points for the anthropometric results.

**TABLE 12: Anthropometric results: Underweight (Weight-for-age)**

Cut-off points	Classification	Boys (n=22)	Girls (n=23)	Total group (n=45)
<-3 SD	Severely underweight	0	4 (18.7%)	4 (9.6%)
>-3<-2 SD	Underweight	5 (20.5%)	17 (75.6%)	22 (49%)

The anthropometric result in Table 12 indicated that 18.7 percent of the girls were severely underweight and none of the boys was severely underweight. However, 20.5 percent of the boys were underweight and 75.6 percent of the girls were underweight.

**TABLE 13: Anthropometric results: Stunting (Height-for-age)**

Cut-off points	Classification	Boys (n=54)	Girls (n=44)	Total group (n=98)
<-3 SD	Severely stunted	7 (14.3%)	5 (10.2%)	12%
>-3<-2 SD	Stunted	17 (30.9%)	11 (25.9%)	28%

The information in Table 13 indicates that 14.3 percent of the boys were severely stunted and 10.2 percent of the girls were severely stunted; 12 percent of the total

groups were found to be severely stunted. A large number of the population (28 percent) was found to be stunted, with boys (30.9 percent) and girls (25.9 percent).

**TABLE 14: Anthropometric results: Wasting (BMI-for-age)**

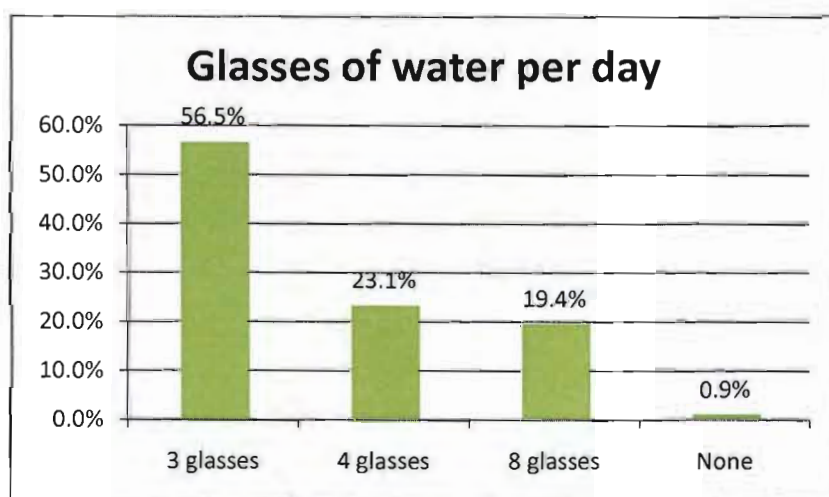
Cut-off points	Classification	Boys (n=54)	Girls (n=44)	Total group (n=98)
<-3 SD	Severely wasted	0	5 (10.2%)	(5%)
>-3<-2 SD	Wasted	6 (10.3%)	14 (31%)	(19.6%)

For BMI for age results in Table 14 show that (10.2 percent) of the girls were severely wasted and yet none of the boys was severely wasted and only 10.3 percent were wasted. However, more girls (31 percent) were wasted than the boys (10.3 percent).

#### 4.1.3 Phase 3: Nutrition knowledge, dietary intake and sensory evaluation

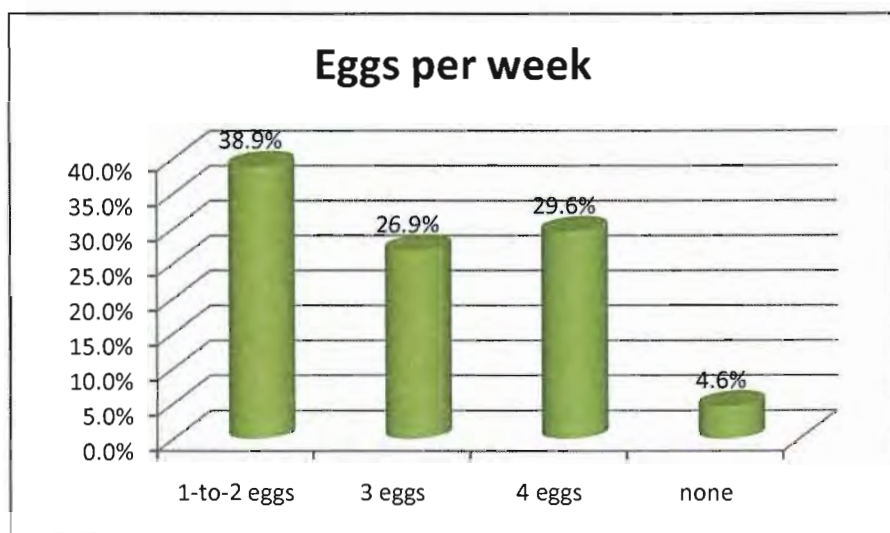
##### 4.1.3.1 Nutrition knowledge results

The results in Figure 6 report that 19.4 percent of the respondents correctly answered the question of 'how many glasses of water to drink per day', while 56.5 percent answered only three glasses of water is enough for the day, and 0.9 percent said there is no need to drink water daily.



**Figure 6: Knowledge of water per day (n=100)**

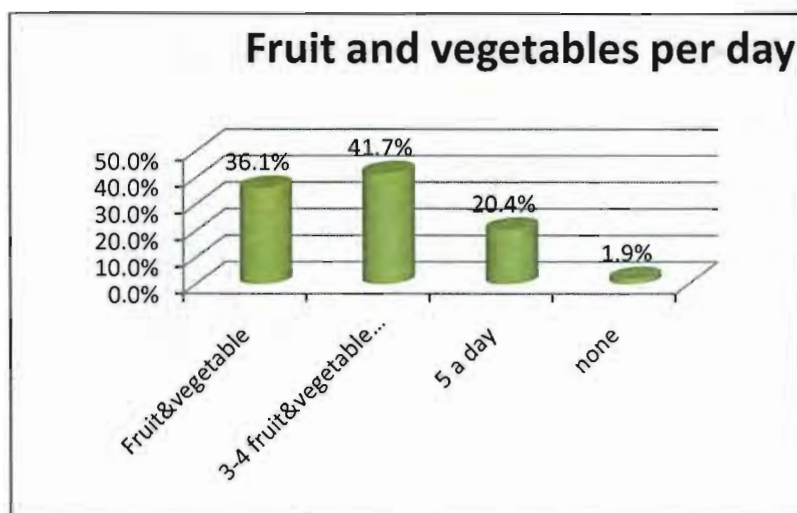
The results in Figure 7 showed that only 38.9 percent of the respondents correctly answered the question 'How many eggs can be eaten weekly', while 4.6 percent indicated there is no need to eat eggs at all.



**Figure 7: Eggs per week (n=100)**

According to the information summarised in Figure 8, the respondents did not know "how many fruit and vegetables should be eaten daily", as only 41.7 percent of the respondents said 3-4 servings of fruit and vegetables are enough for the day, followed by 31.1 percent saying one fruit and/or vegetable, only 20.4 percent answered the question correctly saying 5 a day are needed. Again the nutritional knowledge with regard to fruit and vegetables was low.

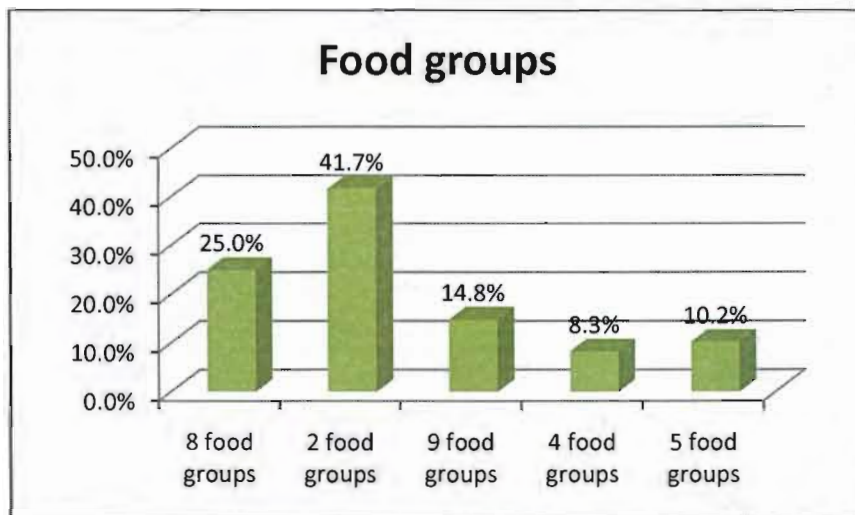




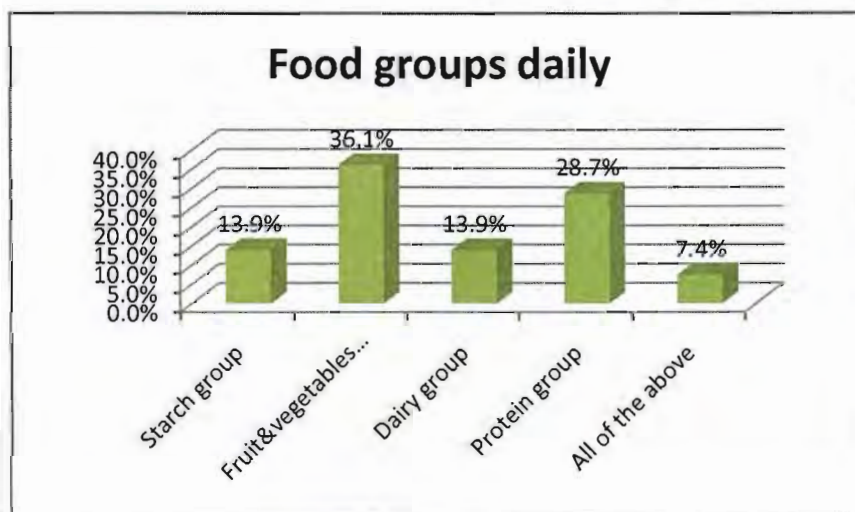
**Figure 8: Fruit and Vegetables (n=100)**

In figure 9 the out of the five food groups only 41.7 percent of the respondents knew of two food groups amongst the five groups, followed by 25 percent who said eight food groups, 14.8 percent assumed nine food groups and only 10.2 percent managed to answer correctly that we have five food groups.

The question relating to daily consumption of food groups, 36.1 percent of the respondents answered that they know the fruit group must be eaten daily, which is a good indication that they know that vegetables and fruit were important for micronutrients followed by 28.7 percent saying protein must also be eaten daily. For both starch and dairy 13.9 percent of the respondents indicated that these should be eaten daily.

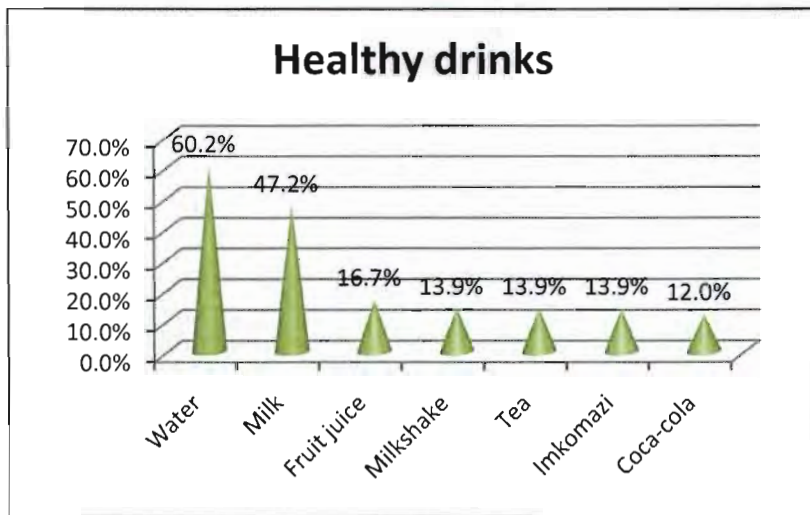


**Figure 9: Food groups (n=100)**



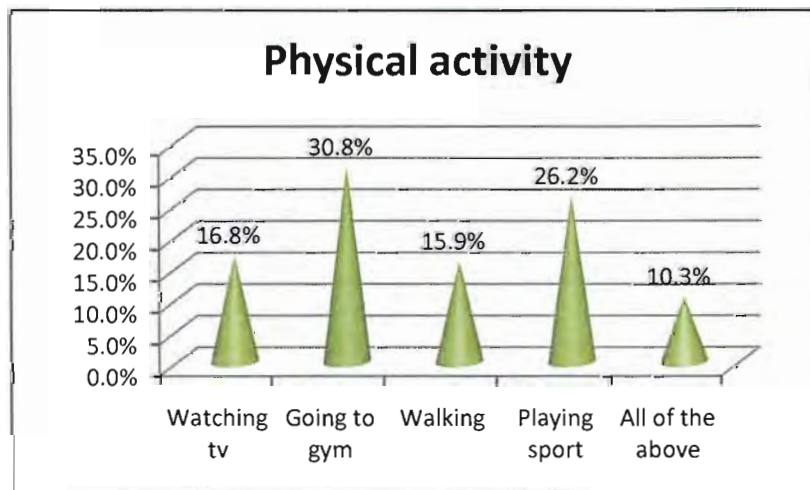
**Figure 10: Food groups daily (n=100)**

According to Figure 11, the respondents knew what the healthiest drinks were, but did not make healthy choices. Although lot of drinks and concentrated juice were consumed most (60.2 percent) still chose water as the healthiest drink, followed by milk (47.2 percent) and 16.7 percent said fruit juice is healthy. Amongst the lowest chosen were inkomazi (13.9 percent), coke (12 percent), milkshake (13.9 percent) and tea (13.9 percent) which are not the healthiest of drinks.



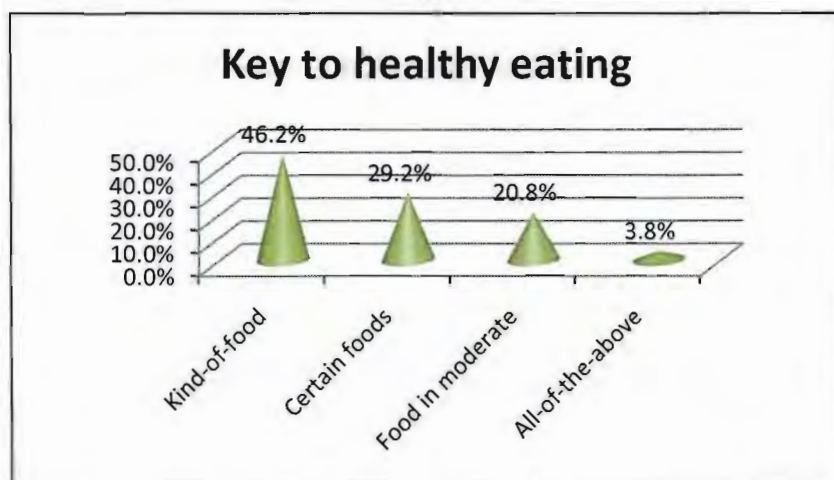
**Figure 11: Healthy drinks (n=100)**

Figure 12 reveals that the children knew the importance of physical activities; even though the question was asked in a tricky manner, 10.3 percent were still able to answer correctly.



**Figure 12: Physical activities (n=100)**

Figure 13 shows that 46.2 percent know the importance of eating a variety of foods and 29.2 percent knew that certain foods are important in the diet, while 20.8 percent chose 'eating certain kinds of food moderately'.



**Figure 13: Healthy eating**

In Table 15, the food most frequently consumed was from the starch group (56.1 percent) on the daily basis and 31.8 percent weekly, which is an indication of a high intake of starchy foods, followed by fruit (47.2 percent) consumed daily and 23.1 percent weekly and dairy products with 44.4 percent daily and 38 percent weekly. The respondents indicated that meat is consumed by 42.6 percent and eggs 39.3 percent on a daily basis. In the vegetable group, vegetables were eaten by 34.7 percent of the respondents daily and 43.0 percent weekly. Most of the food items such as bread, porridge and fruits were regularly consumed due to the school feeding programmes.

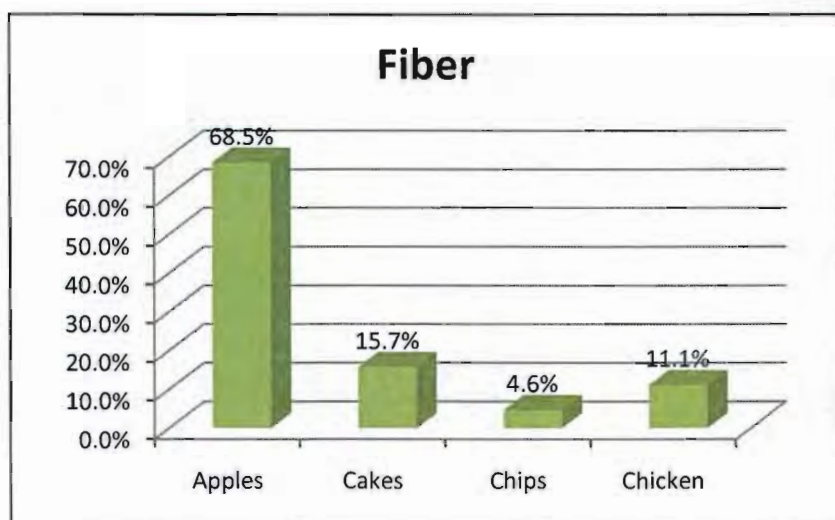
**TABLE 15: Consumption frequency of food items**

Food Items	Daily (%)	Weekly (%)	Seldom (%)	Never (%)
Bread and porridge	56.1	31.8	11.2	0.9
Fruit	47.2	23.1	24.1	5.6
Dairy Products	44.4	38.0	13.9	3.7
Meat	42.6	22.2	28.7	6.5
Eggs	39.3	24.3	24.3	12.1
Chips & sweets	38.0	24.1	26.9	10.2
Vegetables	34.7	43.0	20.6	1.9

In Figure 14 the respondents were asked “which foods can increase the amount of fibre in their diets” and the children indicated that eating more apples and carrots (68.5



percent) could increase the amount of fibre in the diets, unlike cakes and biscuits (15.7 percent), chips and pies (4.6 percent) and chicken and fish (11.1percent)



**Figure 14: Fibre (n=100)**

True or false questions were also included to specifically measure the respondents' knowledge about soy foods. The results in the same table (Table 16) showed that (48.1%) of the orphaned children knew that soy is good and protects against diseases, likewise most of the respondents (54.6%) answered correctly that soy foods promote growth and boost bone health. About 43.5% indicated that the beans group can be added in vegetable and meat dishes, 44.4% of respondents said soy mince is as healthy as meat and 61.1% agreed that meat can be eaten daily.

**TABLE 16: Soy Knowledge**

Soy Knowledge questions	Number of children who answered correctly (48)	Number of children who did not answer correctly (52)
Soy is good for everyone	48.1%	51.9%
Soy promotes growth and boost bones	54.6%	45.5%
Beans group can be included in meat and vegetables dishes	43.5%	56.5%
Soy mince is as healthy as meat	44.4%	55.6%
Meat can be eaten daily	61.1%	38.9%

#### **4.1.3.2 Dietary intake results**

The nine nutritious FAO food groups (FAO 1996) presented in the food frequency questionnaire were used to determine food variety score (FVS) and dietary diversity (DD).

At baseline, (refer Table 17) a total of 88 different foods were included by the respondents in the seven day data collection. However, the mean FVS was  $\pm 13$ , indicating the items of food consumed by an individual in the 7 day period. The fruit group showed the most variety with 19 different food items, followed by the vegetables, cereal group and the flesh group with 18, 15 and 12 individual food items respectively. Variety within the food groups is summarized in Table 17.

Only one of the food groups, namely the cereal was consumed by all the respondents. The majority of the respondents did not consume any eggs (74%) and legumes (52%) with a large 42 percentage not consuming any fruit and or juice at all.

TABLE 17: Household food access as measured by the food variety within the food groups consumed over a period of one week at baseline (n=104)

Table 17

Flesh	Egg	Dairy	Cereal	Legumes	Vitamin A	Fruit & juice	Vegetable	Oils&	Total individual of food item
n=12	n=1	n=5	n=15	n=5	n=8	n=19	n=18	n=5	n=88
0=2	0=77	0=25	0=0	0=54	0=22	0=44	0=12	0=26	0-5= 2
1=28	1=27	1=54	1=1	1=43	1=43	1=44	1=24	1=47	6-9= 22
2=46		2=18	2=6	2=4	2=32	2=5	2=36	2=27	10-15=59
3=17		3=3	3=27	3=2	3=5	3=8	3=22	3=4	16-20=16
4=6		4=0	4=36	4=1	4=1	4=2	4=5	4=0	21-25=8
5=3		5=4	5=20	5=0	5=1	5=1	5=4		25-30=6
6=0		6=0	6=6		6=0	6=0	6=1		
7=1			7=1				7=0		
			8=3						
			9=2						
			10=0						
			11=1						
			12=1						
			13=0						
			14=0						

Low= 0-3 food groups or< 30 individual foods; medium = 4-5 food groups or 30-60 individual foods; high= 6-9 groups or> 60 individual foods

**Fruit group:** Although the fruit group showed the most variety with 19 individual food items, a mean of  $1.52 \pm 0.97$  individual fruit was consumed by the sample during the seven day period. None of the respondents consumed more than 10 different varieties of fruit, except for two outliers consuming 16 different fruit varieties during the 7 day period. However, 44% did not consume any fruit during the seven day period.

**Vegetable group:** For the vegetable group there were 18 individual food items, but the FVS for the vegetable groups indicated  $2.26 \pm 1.11$  individual vegetables items were consumed by the group. Twelve percent (12%) of the respondents did not eat any vegetables.

**Cereal group:** The cereal group is one of the most consumed food groups within poor communities with maize meal being consumed as a main source of energy. Out of all 100 respondents, 33.9 percent children consumed 4 cereals. A mean of  $4.29 \pm 1.75$  individual cereals was consumed by the respondents in seven days.

**Flesh group:** The flesh group consisted of 12 individual food items. In the seven day period 44.3 percent respondents consumed 2 flesh items, 26.4 percent consumed only 1 item, 17.0 percent consumed 3 items. 4.7 percent children consumed 4 items, 2.8 percent consumed 5 items, and 2.8% consumed 6 flesh items. The highest was 0.9 percent respondents consuming 7 flesh items however at the other end 1.8 percent consumed no flesh item for the whole week.

**Oils and fats group:** Amongst the fats group, 44.3 percent respondents consumed 1 item, 25.5 percent consumed 2 items and only 4 respondents consumed 3 items of fat. The mean of  $1.45 \pm 0.60$  individual oils and fats were consumed by all respondents.



**TABLE 18: Summary of the food variety within the food groups**

<b>Food group</b>	<b>Mean</b>	<b>±SD</b>	<b>Range</b>
Group 1: Flesh Foods Diversity	2.17	1.21	1 - 12
Group 2: Eggs Diversity	1.00	0.00	1 – 1
Group 3: Dairy Products Diversity	1.12	1.07	1-5
Group 4: Cereals, Roots & Tubers	4.29	1.75	1 - 15
Group 5: Legumes & Nuts	1.22	0.62	1-5
Group 6: Vitamin A Rich Fruits & Vegetables	1.60	0.77	1-8
Group 7: Other Fruits and Juice	1.52	0.97	1-19
Group 8: Other Vegetables Diversity	2.26	1.11	1-18
Group 9: Oil and Fats Diversity	1.45	0.60	1-5
Total food items (FVS)	13.50	5.30	

At baseline, a total of 88 different foods were included by the respondents in the seven day data collection. However, the mean FVS was  $13.5 \pm 5.3$ , which indicates the items food consumed by an individual. The fruit group showed the most variety with 19 different food items, followed by the vegetables ( $n=18$ ), cereal group ( $n=15$ ) and the flesh group with 18, 15 and 12 individual food items respectively. All nine nutritious food groups were consumed by the respondents, except from the egg group in which 79 respondents (74.5 percent) did not consume any eggs. Variety within the food groups is depicted in Table 19.

The respondents consumed 6-9 food groups, indicating a high food variety. However, the FVS indicated a low food variety. The results showed that the respondents consumed a few food items, but these were represented as 6 – 7 food groups as shown in the above table. About 0.9% of the respondents had low FGDS, 22.9 % and 59.9% had medium and high FGDS respectively.

**TABLE 19: Summary of food group diversity**

Number of food group consumed	Baseline	
N=9	Frequency	Percentage
1	1	0.9
2	0	0
3	0	0
4	7	6.7
5	17	16.2
6	31	29.5
7	24	22.8
8	17	16.2
9	8	7.6
<b>TOTAL</b>	104	99.9

#### 4.1.3.3 Sensory evaluation results

The majority of the respondents liked the pilchard's fish and spinach. These respondents liked the pilchard's fish and spinach a lot when evaluating taste 70 percent, colour 66 percent, only the texture was rated lower, but majority 80 percent liked it a lot 46 percent or liked it a little 34 percent. Refer to table 20.

**TABLE 20: Pilchards fish and spinach (n=100)**

	Taste (%)	Texture (%)	Colour (%)	Smell (%)	Portion Size (%)	Receiving the Product (%)
<b>Like a lot</b>	70.0%	46.0%	66.0%	64.0%	58.0%	68.0%
<b>Like a little</b>	24%	34.0%	22.0%	24.0%	16.0%	26.0%
<b>Not like</b>	4.0%	14.0%	4.0%	6.0%	12.0%	4.0%
<b>Dislike a little</b>	2.0%	2.0%	6.0%	2.0%	8.0%	2.0%
<b>Dislike a Lot</b>	0%	4.0%	2.0 %	4.0%	6.0%	0%

The results shown in table 21 indicated that 79.6 percent of the respondents liked the taste of the hake, 12.2 percent liked it a little, 2.0 percent neither liked nor disliked it and 6.1 percent disliked it little. A 69.4 percent liked the texture, 69.4 percent liked colour, 81.6 percent liked the smell, 67.3 percent liked the portion size but less than 5 percent

of the indicated disliking the product. 2.0 percent disliked the taste, 4.1 percent for texture, 4.1 percent for colour and 4.1 percent disliked the smell. About 75.5 percent indicated that they would like to receive the product at the centre.

**TABLE 21: Fish hake (n=100)**

	<b>Taste %</b>	<b>Texture %</b>	<b>Colour %</b>	<b>Smell %</b>	<b>Portion %</b>	<b>Receiving the Product %</b>
<b>Like a lot</b>	79.6%	69.4%	69.4%	81.6%	67.3%	75.5%
<b>Like a little</b>	12.2%	20.4%	18.4%	12.2%	20.4%	12.2%
<b>Not like</b>	2.0%	4.1%	4.1%	2.0%	4.1%	2.0%
<b>Dislike a little</b>	6.1%	6.1%	8.2%	4.1%	8.2%	2.0%
<b>Dislike a Lot</b>	0%	0%	0%	0%	0%	8.2%

About 83.7 percent of the respondents indicated that they liked both the taste and the texture of the fish and vegetables. Refer to table 22.

**TABLE 22: Pilchards fish and mixed vegetables (n=100)**

	<b>Taste %</b>	<b>Texture %</b>	<b>Colour %</b>	<b>Smell %</b>	<b>Portion %</b>	<b>Receiving the Product %</b>
<b>Like a lot</b>	83.7%	83.7%	61.2%	77.6%	67.3%	79.6%
<b>Like a little</b>	8.2%	14.3%	18.4%	16.3%	8.2%	6.1%
<b>Not like</b>	4.1%	2.0%	8.2%	2.0%	2.0%	10.2%
<b>Dislike a little</b>	4.1%	0%	12.2%	4.1%	4.1%	4.1%
<b>Dislike a Lot</b>	0%	0%	0%	0%	18.4	0%

In table 23 it is indicated that the respondents liked the taste of the samp and beans a lot as indicated by the percentage rating of 98.0 percent. Respondents liked the texture a lot and 77.6 percent and only 4.1 percent did not like it. The overall liking of the colour was indicated by the percentage rating of 77.6 percent, 10.2 percent liked the colour and smell a little. The results showed that 59.2 percent liked portion size a lot and 30.6 percent disliked the portion size a little. 95.9 of all the respondents indicated they would like to receive the product at the centre.

**TABLE 23: Samp and sugar beans (n=100)**

	<b>Taste %</b>	<b>Texture %</b>	<b>Colour %</b>	<b>Smell %</b>	<b>Portion %</b>	<b>Receiving the Product %</b>
<b>Like a lot</b>	98.0%	77.6%	77.6%	75.5%	59.2%	95.9%
<b>Like a little</b>	2.0%	18.4%	10.2%	10.2%	8.2%	2.0%
<b>Not like</b>	0%	4.1%	12.2%	14.3%	2.0%	2.0%
<b>Dislike a little</b>	0%	0%	0%	0%	30.6%	0%
<b>Dislike a Lot</b>	0%	0%	0%	0%	0%	0%

The respondents also tasted the baked beans roll, and they were asked if they liked it and 61.2 percent liked the taste a lot, 75.5 percent liked the texture a lot, 42.9 percent liked the colour a lot, while 69.4 percent liked the smell a lot and 71.4 percent liked the portion size a lot. Only a very small percentage of the respondents indicated that they disliked the item. Refer to table 24.

**TABLE 24: Baked beans Roll bread (n=100)**

	<b>Taste %</b>	<b>Texture %</b>	<b>Colour %</b>	<b>Smell %</b>	<b>Portion %</b>	<b>Receiving the Product %</b>
<b>Like a lot</b>	61.2%	75.5%	42.9%	69.4%	71.4%	69.4%
<b>Like a little</b>	18.4%	12.2%	10.2%	20.4%	4.1%	8.2%
<b>Not like</b>	4.1%	4.1%	12.2%	2.0%	24.5%	10.2%
<b>Dislike a little</b>	16.3%	2.0%	2.0%	8.2%	0%	12.2%
<b>Dislike a Lot</b>	0%	6.1%	32.7%	0%	0%	0%

Table 25 indicate that 59.2 percent stated that they liked the taste of the lentil soup a lot and 2.0 percent and 22.4 percent did not like the taste. About 71.4 percent indicated that they liked the texture a lot and 16.3 percent did not like the texture of the product. About 61.2 percent indicated that they liked the colour of the product while 63.3 percent liked the smell of the product. A total of 67.3 percent indicated that they would like to receive lentil soup at the centre.



**TABLE 25: Lentil soup (n=100)**

	<b>Taste %</b>	<b>Texture %</b>	<b>Colour %</b>	<b>Smell %</b>	<b>Portion Size %</b>	<b>Receiving the Product %</b>
<b>Like a lot</b>	59.2%	71.4%	61.2%	63.3%	51.0%	<b>67.3%</b>
<b>Like a little</b>	16.3%	12.2%	6.1%	18.4%	8.2%	<b>12.2%</b>
<b>Not like</b>	2.0%	16.3%	8.2%	2.0%	2.0%	20.4%
<b>Dislike a little</b>	22.4%	0%	2.0%	16.3%	6.1%	0%
<b>Dislike a Lot</b>	0%	0%	22.4%	0%	32.7%	0%

About 69.4 percent of the respondents liked the taste of the soy bread a lot, 40.8 percent liked the texture, 65.3 percent liked the colour, 75.5 percent liked the smell and 34.7 percent liked the portion size. Less than 5 percent of the respondents indicated not liking the item, with 2.0 percent disliking the taste, 2.0 percent not liking the texture and 4.1 percent did not like the colour, 2.0 percent the smell and 4.1 percent the portion size. A total of 63.3 percent for all the respondents indicated that they would like to receive the item at the centre. Refer to table 26.

**TABLE 26: Soy bread (n=100)**

	<b>Taste %</b>	<b>Texture %</b>	<b>Colour %</b>	<b>Smell %</b>	<b>Portion size %</b>	<b>Receiving the Product %</b>
<b>Like a lot</b>	69.4%	<b>40.8%</b>	65.3%	75.5%	34.7%	63.3%
<b>Like a little</b>	14.3%	46.9%	20.4%	12.2%	12.2%	12.2%
<b>Not like</b>	2.0%	2.0%	4.1%	2.0%	4.1%	6.1%
<b>Dislike a little</b>	8.2%	2.0%	2.0%	4.1%	2.0%	8.2%
<b>Dislike a Lot</b>	6.1%	8.2%	8.2%	6.1%	46.9%	10.2%

Table 27 states that 81.6 percent of the respondents liked the taste of the soy sausage salad, 85.7 percent liked the texture, 85.7 percent liked the colour, 83.3 percent liked the smell and 41.7 percent liked the portion size. Less than 5 percent of the respondents indicated not liking the item with 2.0 percent not Table 27 states that 81.6 percent of the respondents like the taste of the soy sausage salad, 85.7 percent like the texture, 85.7 liked the colour, 83.3 percent liked the smell and 41.7 percent liked the portion size. Less than five percent of the respondents indicated not liking the item with two percent not liking the taste, texture and colour respectively, and four point two

percent disliking the smell and two point one percent are not impressed with the portion size. A large number 76.6 percent would like to receive the item at the centre.

**TABLE 27: Soy sausage salad (n=100)**

	<b>Taste</b> %	<b>Texture</b> %	<b>Colour</b> %	<b>Smell</b> %	<b>Portion</b> %	<b>Receiving the Product %</b>
<b>Like a lot</b>	81.6%	85.7%	85.7%	83.3%	41.7%	76.6%
<b>Like a little</b>	16.3%	12.2%	12.2%	12.5%	6.3%	12.8%
<b>Not like</b>	2.0%	2.0%	2.0%	4.2%	2.1%	4.3%
<b>Dislike a little</b>	0%	0%	0%	0%	8.3%	2.1%
<b>Dislike a Lot</b>	0%	0%	0%	0%	41.7%	4.3%

For overall liking of the product 90.4 percent of the respondents indicated they liked the taste of the product soy bean soup a lot, 88.5 percent liked the texture, 86.5 percent liked the colour, 86.5 percent liked the smell. Most of the respondents (51.9 percent) liked the portion size a lot. Less than 4 percent indicated disliking the product at the end of the scale. With 1.9 percent did not like the taste, 1.9 percent the texture, 3.8 percent the colour, 1.9 percent the smell and 1.9 percent for the portion size. But 90.4 percent of the respondents want to receive the product at the centre. Refer to table 28.

**TABLE 28: Soy bean soup (n=100)**

	<b>Taste</b> %	<b>Texture</b> %	<b>Colour</b> %	<b>Smell</b> %	<b>Portion size %</b>	<b>Receiving the Product %</b>
<b>Like a lot</b>	90.4%	88.5%	86.5%	86.5%	51.9%	90.4%
<b>Like a little</b>	3.8%	9.6%	9.6%	9.6%	17.3%	3.8%
<b>Not like</b>	1.9%	1.9%	3.8%	1.9%	1.9%	1.9%
<b>Dislike a little</b>	1.9%	0%	0%	1.9%	7.7%	3.8%
<b>Dislike a Lot</b>	1.9%	0%	0%	0%	21.2%	0%

For the cottage pie product 85.7 percent indicated they liked the taste of the product a lot, 83.7 percent liked the texture and 83.7 percent liked the colour, 73.5 percent the smell and 61.2 percent portion size. A smaller group of 4.1 percent said they did not like the taste of the product, 6.1 percent did not like the texture, 4.1 percent the colour, 4.1 percent the smell and 2.0 percent disliked the portion size. 83.3 percent of the

respondents indicated that they would like to receive the product at the centre. Refer to table 29.

**TABLE 29: Cottage pie (n=100)**

	<b>Taste %</b>	<b>Texture %</b>	<b>Colour %</b>	<b>Smell %</b>	<b>Portion size %</b>	<b>Receiving the Product %</b>
<b>Like a lot</b>	85.7%	83.7%	83.7%	73.5%	61.2%	83.3%
<b>Like a little</b>	8.2%	10.2%	10.2%	18.4%	8.2%	6.3%
<b>Not like</b>	4.1%	6.1%	4.1%	4.1%	2.0%	4.2%
<b>Dislike a little</b>	2.0%	0%	2.0%	2.0%	2.0%	2.1%
<b>Dislike a Lot</b>	0%	0%	0%	2.0%	26.5%	4.2%

#### **4.2.1 Phase 4: Development of a nutrition education programme and cycle-menu**

The developed nutrition education programme was adjusted, implemented and its impact on knowledge and dietary intake behaviour will be measured as part of DTech studies, following the completion of this MTech study.

Table 30

CYCLE MENU FOR 7 DAYS							
	Day 1	Day 2	Day3	Day 4	Day 5	Day 6	Day 7
<b>Breakfast</b>							
<b>Porridge/ Cereal 100g</b>	Oats	Maize-meal soft porridge	Maltabella	Mabele	Maize-meal soft porridge	Oats	Mabele
<b>Milk, fresh 200 ml</b>	Milk	Milk	Milk	Milk	Milk	Milk	Milk
<b>Sugar 20g/ 10ml</b>	Optional	Optional	Optional	Optional	Optional	Optional	Optional
<b>Brown bread 72g</b>	Brown Bread	Brown Bread	-	Brown Bread	Brown Bread	Brown Bread	Brown Bread
<b>Spread 1 medium 46g</b>	*	*	*	*	*	*	*
<b>Snack</b>							
<b>Bread 72g</b>	Scones	Brown Bread	-	Vanilla Muffins	Toasted brown bread	Scones	-
<b>Spread 20g</b>	-	Peanut butter	-	-	Cheese	-	-
<b>Fruit juice 200ml</b>	Tea	Glass milk	Rooibos tea	Milk	Orange Juice/Tea	Glass of milk	Rooibos tea
<b>Scones 60g</b>	-	-	-	-	-	-	-
<b>Fat cakes 60g</b>	-	-	Fat-cakes	-	-	-	Fat-cakes
<b>Lunch</b>							
<b>Protein 90g</b>	Soy beans Soup	Pilchards Fish	Sugar beans	Hake	Soy sausage Hot dogs	Cottage Pie	Lentils
<b>Starch 200g</b>	Pap	Macaroni	Samp	Baked potatoes	Rolls		Mealie-rice
<b>Vegetable 40g</b>	Pumpkin	Mixed Vegetables	Beetroot	Carrot salad	Spinach	Beetroot	Carrot salad
<b>Fruit</b>	Orange	Apple	Banana	Orange	Apple	Banana	Oranges

\*Margarine/ Apricot jam/ Peanut butter



TABLE 31: Analysis of a cycle-menu

Table 31 Analysis of a cycle menu

NUTRIENTS	UOM	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7			Both sexes 9- 13 years	
		MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	MEAN	SD	#RDA/ AI*	% of RDA/ AI
Energy <sup>1</sup>	kJ	3882	2120	1010	1158	756	997	480	1486.1	1173.4	2199.4	67.6
Total protein*	g	18.3	26.8	8.1	15.5	7.1	16.0	4.0	13.7	7.9	34	40.3
Plant protein	g	11.3	1.2	5.0	2.8	2.2	0.3	1.6	3.5	3.8	-	-
Animal protein	g	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.2	-	-
Total fat	g	34.3	15.4	7.9	8.9	6.1	5.8	3.5	11.7	10.6	25-35%	29.8
Carbohydrates	g	11.8	67.2	34.4	34.8	24.1	32.6	17.4	31.8	18.0	130.0	24.4
Total dietary fibre	g	18.0	5.3	3.4	2.5	2.6	1.9	0.4	4.9	6.0	31.0	15.7
Calcium*	Mg	514.0	477.0	126.0	124.0	102.0	162.0	46.0	221.6	190.6	1300.0	17.0
Iron	Mg	11.8	4.0	1.5	2.7	2.0	4.4	0.7	3.9	3.7	8.0	48.3
Zinc	Mg	5.0	2.9	1.1	1.3	1.6	2.0	0.6	2.1	1.5	8.0	25.8
Vitamin A	Iu	974.0	1595.0	110.0	305.0	1130.0	341.0	50.0	643.6	590.8	600.0	107.3
Thiamin	Mg	0.8	0.5	0.1	0.2	0.2	0.3	0.1	0.3	0.3	0.9	33.7
Riboflavin	Mg	1.1	0.8	0.2	0.2	0.3	0.3	0.1	0.4	0.4	0.9	46.3
Nicotinic Acid	Mg	2.0	7.4	0.0	3.0	1.3	1.5	0.1	2.2	2.5	12.0	18.2
Vitamin B6	Mg	0.7	0.3	0.6	0.4	0.1	0.2	0.0	0.3	0.2	0.8	41.6
Folic acid	µg	149.0	102.0	25.0	24.0	48.0	105.0	14.0	66.7	51.9	300.0	22.2
Vitamin B12	µg	1.0	0.9	0.4	0.8	0.3	0.4	0.2	0.6	0.3	1.8	31.7
Ascorbic acid	Mg	8.0	3.0	1.0	9.0	2.0	5.0	2.0	4.3	3.1		

UoM - Unit of measurement

RDA - Recommended dietary allowance

\*AI - Adequate intake

Estimated Energy Requirements (EER) (calculated mean for boys and girls) with ACTIVE physical activity<sup>1</sup>

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Acceptable Macronutrient Distribution Range (AMDR)\* for three daily meals (Wenhold, Kruger, Muelhoff 2008:448)

**TABLE 32: Acceptable Macronutrient Distribution Range (AMDR)\* for three daily meals (Wenhold, Kruger, Muelhoff 2008:448).**

Macronutrients	AMDR	Energy distribution of two meals
Carbohydrates	45-65	41.5
Fat	25-35	29.8"
Protein	10-30	15.5

This cycle-menu was designed to supply a variety of foods that are sources of proteins, carbohydrates, fats, vitamins and minerals that can improve the nutritional status of orphans. Although the RDA for certain nutrients are not being met by this cycle-menu, it must be noted that the subject menu covers only two meals of the day and not the ideal three meals a day. The carbohydrate contribution of this meal-plan is lower than the Acceptable Macronutrient Distribution Range (AMDR) as mentioned table 32. However, the energy distribution from fat and protein is within the AMDR thus the cycle-menu provides mean values for energy 67.6 percent of RDA. The energy from protein is 40.3 percent and 24.4 percent from carbohydrates. The total fat supplied by the cycle-menu meets 30 percent of adequate intake (AI). For the macronutrient contribution, the cycle-menu suppliers over 100 percent of vitamin A and almost half RDA of certain micronutrients namely iron 48.3 percent riboflavin 46.3 percent and Vitamin B6 41.6 percent. Refer to table 31.

## **4.3 DISCUSSIONS**

### **4.3.1 Phase 1: pilot study Discussion**

No pilot studies of this nature have been done in South Africa but in other developing countries similar studies have been completed. In 2009 a similar study was done in Argentina whereby food and nutrition education was introduced into the school curriculum of Grades 1-7 where education models, namely nutrition issues affecting children and their families were to be taught; the national health and nutrition policy now equals to primary school education. The aims of the nutrition education programme implemented were to promote the use of a set of education materials for school directors and teachers. In order to develop and validate a capacity building programme to train school directors in all primary schools of Argentina (FAO 2009).

Although in South Africa nutrition education is offered in the majority of the schools and to the learners in all the grades in primary schools, not much time per week is allocated to the subject. Furthermore, although the respondents indicated that the majority of the recommended Department of Basic Education nutrition education topics are covered in the syllabi, there are still gaps that are not covered. These include food security and the WHO growth standards. However, these were not identified as needed topics by the respondents. These findings are supported by Sherman, Bphil and Muehlhoff (2007:335) who stated that the profile of nutrition education in school curricula across the world is still low, the time dedicated for this subject progress is small resulting from lengthy curriculum revision processes, pressure on school timetables and conceptual innovations.

Nutrition education is seen to be important for learners, their caregivers, educators and the NSNP volunteers; the need for nutrition education manuals was indicated. These should be illustrated by colourful drawings or photographs and preferably be in both English and the local language. The manuals should be supplemented by posters or wall charts as well as videos. Photographic visual aids that are colourful are regarded as the best tool for making teaching effective and for the best dissemination of knowledge. Educators prefer visual aids to reinforce their teaching in the context and activities based on the lessons (Chand 2010).

#### **4.3.2 Phase 2: Nutritional status**

The children's nutritional status was assessed anthropometrically using weight for age, height for age and weight for height growth standards (WHO 2010). The results revealed that (4.3 percent) were found to be severely underweight, (12 percent) severely stunted and (45 percent) found to be severely wasted. Stunting is an indication of chronic malnutrition (shortage of food during a long period).

Thus malnutrition was prevalent in Boipatong despite that many malnutrition relief programmes were already implemented during the data collection of this study. These results are similar to the studies done in South Africa and published in 2007 and



Uganda in 2006, where the researchers looked at the HIV&AIDS orphans nutritional status and found that orphans living with grandparents are at higher levels of under-nutrition. These studies further illustrate that elderly people (being the important group of caregivers in SA) are malnourished themselves with macro- and micronutrient deficiencies which lead to being underweight and wasted due to Protein-Energy Malnutrition (PEM) (Kikafunda & Namusoke 2006:59).

The results in Table 13 indicate that 88 percent of the respondents were normal and 10 percent were found to be wasted. For children to be wasted is an indication that children were unable to access sufficient nutritious food to enable them to grow and develop to their full potential. Wasting occurs when an acute shortage of food over a period of time has been experienced.

The number of orphaned children who were underweight and stunted was significantly higher than those who were wasted. This reveals that some of these orphaned children had poor growth and development. Napier (2006) conducted a study in the same region and found related results in children aged 9-13 years.

The results relating to soy knowledge were low (mean 50.0%) amongst the orphaned children. Very little literature is available to conduct comparisons regarding soy knowledge amongst children. However, one question relating to soy mince being as healthy as meat, was also asked during a baseline survey (Oosthuizen 2010:82) and was answered correctly by 61.9% of the children (n=45) compared to 44.4% of the children (Table 16) in this study.

#### **4.3.3 Phase 3: Testing nutrition knowledge, dietary intake and sensory acceptance discussions**

##### **4.3.3.1 Nutrition knowledge**

This study was designed to test the nutrition knowledge of the HIV&AIDS affected orphans in order to gain information for planning a reliable and valid nutrition education



programme with the aim of improving their nutrition knowledge to make informed food choices.

The results revealed that the nutrition knowledge of the orphans was poor with the basic nutrition questions relating to the importance of daily water intake, fruit and vegetable intake and being physical active, being answered below 40 percent. In addition the respondents scored low on the questions related to food groups; similar results were found in a study conducted in QwaQwa in children age 9-13 years which revealed poor knowledge on the food groups as reflected in the FBDG (Oldewage-Theron & Egal 2010:153).

This finding revealed that the orphaned children's nutrition knowledge was limited when it comes to water drinking habits that are essential in good nutritional behaviour. Chung, Lee & Known (2004) has found that school-aged children without prior nutrition education interventions always scored low. This statement supports the results of this study. Furthermore, the orphaned children had no knowledge about healthy eating habits; this could in part be due to their low economic status mentioned in a study carried out by another researcher on the same targeted group.

Several studies have shown that regardless of adequate nutrition awareness, knowledge and positive attitude towards healthy nutrition as well as lack of food availability and accessibility practised by orphaned children in low income households may remain as an important prevention in the achievement of a healthy nutritious diet (Shariff, Bukhari, Othman, Hashim, Ismail, Jamil, Kasim, Paim, Samah & Hussein 2008:5).

The finding of this study suggests that nutrition education through a nutrition education programme may lead to an increase in nutrition knowledge. Nutrition education may have a positive effect on attitude towards nutrition and increased nutrition knowledge may influence eating behaviour (Pirouznia 2001) and healthy food choices improve a child's well-being and ability to learn and play normally (Oldewage-Theron & Egal

2010:149). DOH (2006) further indicated that nutrition knowledge can help in achieving a positive change in food habits to result in an improved nutritional status and to stress the relationship between nutrition and good health.

Lee & Pang (1999) stated that dietary habits for school-aged children change when they get older and it is not easy to change from the foods they grew up with. Therefore it is important to provide nutrition education as early as possible. Limited research has been done on the relationship among nutrition knowledge, nutrition attitude and dietary patterns (Choi, Shin, Jung, Park, Lee & Song 2008:313). However, nutrition is not the factor that determines the dietary intakes.

Orphans aged 9-13 years are often responsible for looking after their siblings and are sometimes sent out for household's purchases (Ntozi, Ahimbisibwe, Odwee, Ayiga, Okurot 1999; Mukumbira 2009). Therefore the NEP will lead to having future informed caregivers or parents as also supported by Napier and Oldewage-Theron (2005:10).

#### **4.3.3.2 Dietary intake**

The dietary intake results show that these orphaned children have a poor daily intake of foods. Notably, the meals consumed are highly carbohydrate (pap, samp and bread), with a small diversity of side dishes such as flesh foods, legumes, vegetable and other groups. South Africa has implemented a food fortification programme. Maize and wheat are fortified to cover people needs for micronutrients (iron, zinc, vitamins A and E). Thus maize and wheat-based products do not provide only carbohydrates, but also minerals and vitamins.

As indicated in Table 17, the highest frequency for consumption of flesh foods diversity (with twelve food items) was 0.9 percent of respondents consuming only seven items of flesh in a seven days period. For the vegetable group there were (18 individual food items) 0.9 percent respondents consumed 6 vegetable items within a week.

The food variety score (FVS) and (FGDS) are measured by means of a scale where by 0-30 food items refer to a low variety, 4-5 food groups refer to medium and  $\geq 6$  and 6-9 groups refer to the high variety is reflected by standard deviation ( $\pm$ SD). The results showed the cereal group had the highest mean of food variety with a 4.29 ( $\pm 1.75$ ), followed by vegetable diversity 2.26 ( $\pm 1.11$ ) and flesh food diversity 2.17 ( $\pm 1.21$ ), vitamin A rich foods 1.60 ( $\pm 0.77$ ) respectively.

Among the lowest was the oils and fats group 1.45 ( $\pm 0.60$ ), legumes and nuts 1.22 ( $\pm 0.62$ ), dairy products 1.12 ( $\pm 1.07$ ) and lastly the egg diversity 1.00 ( $\pm 0.00$ ). From these results it can be seen that a low variety amongst the food groups occurred. Unfortunately the results reflect inadequate variety for the orphaned children aged 9-13 years old as they are still growing, items such as dairy products which are a good source of calcium necessary for healthy bones, teeth, blood-clotting and healing wounds. Eggs are amongst the lowest consumed; eggs are a good source of protein that should be eaten 2-3 times weekly for supplying energy; and children need protein for growth.

Orphaned children are highly vulnerable to malnutrition which is caused by severe shortage of food or food that is nutritionally insufficient to meet the daily energy and nutrient needs of the children (Kalimbira & Chipwatali 2007:6). According to McPherson, Hoetscher, Alexandra, Scanlon & Serdula (2000), the description of dietary intake behaviour amongst children is important to nutritional monitoring, research and intervention efforts.

Sadik (2003) found that in Vaal region the six most frequently consumed foods included maize-meal and bread. Similar results were also found in this study, in that the four most consumed foods were the cereal group such as maize-meal, bread and other vegetables and fruit, and this was due to the school feeding programmes. The population in the Vaal is homogenous, and the above statement confirms that in the Vaal region feeding habits are the same.



#### **4.3.3.3. Sensory acceptance**

##### **\*Selection of alternative protein dishes**

Through the sensory evaluation it can be observed that the majority of children enjoyed all food items evaluated. The results showed that the HIV&AIDS orphaned children were underweight and soy, fish and beans dishes can enhance their nutritional status since these dishes are a good source of many nutrients.

For the fish dishes the orphaned children chose pilchards fish and mixed vegetables as their favourite amongst all three fish dishes prepared; 83.7 percent of the respondents liked the taste of the fish and vegetable dish and 79.6 percent would like to receive the dish at the care centre. Fried hake was the second choice with 79.6 percent liking it; the least favoured amongst all the fish dishes was baked fish and spinach with 70 percent liking it a lot. All the fish dishes scored more than 50 percent liking, which is good when looking at the nutritional content of fish which provides essential nourishment, especially quality protein and fats (macronutrients), vitamins and minerals (micronutrients). Fish also contributes to food security as an important accompaniment to rice-based diets in Asia and Africa. Fish is also a good source of vitamins A and D, thiamin, riboflavin and niacin which are important for energy metabolism (Chilima 2008:1-4).

In the South African FBDG's it is recommended that children from 7 years and older should eat dry beans, split peas, lentils and soybeans regularly in order to stay healthy. Beans, lentils and peas are rich in protein and can be eaten with starchy food and vegetables (DoH 2006). The beans groups are cheaper and people in the low-income households can afford them. For the beans and lentils dishes samp and sugar beans dish were the favourite dish amongst all dishes prepared, with overall liking of 98.0 percent and 95.9 percent would like to receive the dish at the centre. Baked beans roll bread was the second favoured with 61.2 percent of the respondents liking the taste and 69.4 percent would like to receive it at the centre. A green lentil dish was the least favoured with 59.2 percent. A child needs protein in order for the body to grow and maintain muscles. According to Paul, Barston and Segal (2010:11) children need 45



grams of beans daily in order to meet the recommended daily allowance for protein needs in order to increase the protein intake.

Soy foods are viewed as substitute foods for animal protein or other dairy products. Soy foods have more health benefits including combating heart disease, cancer, and assisting weight control and is an alternative food for those with food allergies (Schwyer and Smith 2005:296). The results for soy dishes revealed that soy bean soup was the second best amongst all dishes and it scored 90.4 percent overall liking, followed by cottage pie with 85.7 percent of the respondents liking the taste and 83.3 percent want to receive the dish at the care centre. Soy bread was the least favoured with only 63.3 percent of the children wanting the dish at the centre. Soy foods are said to fulfill all or part of the meat alternative component and can meet the nutritional needs of children in day-care programmes (Endres, Barter, Theodora & Welch 2003:346-347).

#### **4.4 Development of the nutrition education programme**

##### **4.4.1 Development of the nutrition education programme discussion**

A nutrition education programme was developed, based on the results of the nutrition knowledge questionnaire, anthropometric measurements and diet patterns. The NEP consists of 4 chapters with the following section: Chapter 1 Enjoy variety of food, Chapter 2 Be active, Chapter 3 Drink lots of clean safe water, Chapter 4 Eat dry beans, peas, lentils & soy often and Chapter 5 Hygiene practices.

##### **4.4.2 Development of a cycle menu**

The analysis of the cycle menu was done by using the Dietary Manager® 2000, based on food composition tables. All major nutrients were indicated and analysed, and shown in table 30 and 31. The menu was analysed and compared to the DRI of adolescent.

#### **4.5 CONCLUSIONS**

The results of the study were presented in the phases indicated in the conceptual framework. This chapter also provides the discussion of the results of the study.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATION

#### 5.1 INTRODUCTION

Households affected by HIV and AIDS experience shortage of food due to parents being ill and unemployed amongst other reason. Most orphaned children are cared for by grandparents or caregivers who already also have families to support (Demmer 2010:1).

This chapter consists of a summary of the findings reported for all the four phases. In order to address the main objective of the study the following four-phased model was carried out:

**Phase 1:** Pilot study - the purpose of the pilot study was to determine the current nutrition education practices, nutrition education tools and textbooks available and needed in the Department of Basic Education (DBE) schools and the nutrition education topics to be included in the DBE nutrition education manuals.

**Phase 2:** Determining the nutritional status – the focus of this phase was to assess the adequacy growth status of the orphaned children.

**Phase 3:** Testing nutrition knowledge, dietary intake and sensory acceptance - this phase involved assessing of knowledge and dietary intake of the children with the aim of improving their awareness and knowledge in order for them to make informed food choices. A sensory acceptance of soy food and other alternative protein dishes was tested in order for some of these dishes to be included in the cycle-menu for nutritional contribution and affordability.

**Phase 4:** Development of the nutrition education programme and cycle-menu – the NEP was designed to improve knowledge and dietary practices in nutritional behaviour that will sustain good health.

## **5.2 OBJECTIVES OF THIS STUDY**

- To determine the nutritional status of the HIV&AIDS affected orphans by the means of anthropometric measurements.
- To determine the current knowledge in nutrition and the dietary practices of the orphans.
- To develop the Nutrition Education Training Programme (NETP) based on the South African Food Based Dietary Guidelines (SA FBDG) to improve nutrition knowledge with the aim of improving dietary the existing practices. A cycle menu will be developed after sensory evaluations of all protein enhanced dishes.

## **5.3 LIMITATIONS**

### **5.3.1 Grants**

The department of Social development (DSD) sponsored the centre with grants for food for the orphans and later during the study discontinued the grant for reasons beyond the researcher's knowledge. Unfortunately the research team has to fill in the gap created by the DSD in terms of food sources for the cycle-menu. However, another challenge arises with regard to attendance that used to be in one place, i.e. the feeding centre. Luckily most of the study protocol was covered before the abrupt withdrawal of DSD and only the sensory evaluation was not covered as yet. Therefore the researcher had to go to the surrounding schools to look for all the orphaned children who had participated in this study in order to complete the outstanding sensory evaluations.

### **5.3.2 Stakeholders**

Another bottleneck was that unnecessary disputes between the stakeholders delayed the project further from its targeted timeline. The nature of the dispute was around the management of the centre by various NGO members and some community leaders.

## **5.4 THE MAIN FINDINGS ARE PRESENTED AS FOLLOWS**

### **5.4.1 Phase 1: Pilot study**

A pilot study was carried out to determine the current nutrition education practices as well as the nutrition education tools to be included in the Department of Education (DOE) manuals. Most countries implemented school health and nutrition programmes (FAO 2007), yet the implementation as a pilot project on the educational material focusing on children has not yet been developed in most African countries including South Africa. The findings of this study indicated that the nutrition intervention will produce significant improvements in increasing the nutrition knowledge in children. Sherman *et al.* 2007:342 indicated that in order to make the project of this nature more effective as well as cost-effective specific skill-based training of curriculum developers is required.

### **5.4.2 Phase 2: the nutritional status**

Malnutrition remains a constant problem amongst HIV&AIDS orphaned children in South Africa especially in poorer communities. This study was based on about 286 households in the Boipatong informal settlement, living in poverty, and most households are female-headed (Oldewage-Theron & Slabbert 2010:4). Furthermore, literature depicts that orphaned children and woman are at higher risk of poverty and under nourishment (World Bank Team 2009:1). The poor nutritional statuses of orphaned children are influenced by household's large sizes and low levels of incomes (Kikafunda & Namusoke 2006).

The results of this study found that the nutritional status of the orphaned children indicated prevalence of under-nutrition and wasting owing to acute malnutrition; most probably this is due to current causes of household food insecurity, while stunting represents chronic malnutrition.



### **5.4.3 Phase 3: Testing nutrition knowledge, dietary intake and sensory acceptance**

#### **5.4.3.1 Nutrition knowledge**

The nutrition knowledge was low and the generally poor diet leads to growth failure in children, thus inducing damage to their physiological well-being and immune system as well as other clinical conditions like anaemia which later leads to impaired cognitive development and death (Iran & Butt 2006). One of the solutions to this problem can be a structured nutrition education programme which can play an important role in influencing dietary intakes and thus the well-being of these poor children.

#### **5.3.3.2 Dietary intake (FFQ)**

From this study it is concluded that the dietary intake of the orphaned children was poor as they did not consume much of a variety of different foods. From the findings of the study it was found that a low variety amongst the food groups occurred. Notably, the meals consumed are carbohydrates, with small diversity of other foods such as legumes, vegetables, fats and oil other groups.

#### **5.4.3.3 Sensory evaluation- \*Selection of alternative protein dishes**

Most of the respondents (over 50%) accepted all the protein dishes. The soy, fish and beans dishes can be used as many possible solutions to address under-nutrition as they supply the daily requirements of energy, protein, vitamin A and fat. Children who are still growing may be more likely to try and accept soy products than adults, as promoting soy foods to this population may be successful in establishing a preference for health-promoting foods as well as establishing food familiarity at an early stage (Endres *et.al* 2003:347).

This study indicated high acceptance of the dishes by the orphaned children. The samp and sugar-beans group was the most favourable dish, followed by the fish and soy foods group.

#### **5.4.4 Phase 4: Development of the nutrition education programme and the Cycle-menu**

##### **5.4.4.1 Development of the nutrition education programme**

The finding of this study revealed that nutrition knowledge of the orphans were poor, the respondents scored low on questions related to food groups, healthy eating habits. The findings suggest that nutrition education through a nutrition education training programme may lead to an increase in nutrition knowledge. Nutrition education may have a positive effect on attitude towards nutrition and increased nutrition knowledge may influence eating behaviour.

##### **5.4.4.2 Development of a cycle-menu**

Stunted growths have been observed in most HIV&AIDS orphans and in most times orphans with stunted growth are often viewed as HIV infected individuals. Malnutrition and HIV&AIDS have similar physical symptoms, so it follows that a diet rich in protein, energy, micronutrients such as vitamin A is essential to bring about a change in health and physical appearance in such orphans (Good Health Organisation 2010:2). Thus the cycle-menu developed for this study will supply most of the nutrients which will enhance the nutritional status of the orphaned children.

#### **5.5 CONCLUSION**

This study found that an early pilot nutritional intervention will both improve nutritional status of the children as well as be a very effective model to cost saving issues. The literature supports the above finding (FAO 2007).

Likewise the finding of this study reconfirmed that utilization of nutrition education skills in school based curriculum will improve nutritional knowledge of the children thus step towards healthy food eating behaviours as published by Sherman et al. (2007:342). Furthermore the outcome of this suggests that nutrition education through a nutrition education training programme may lead to an increase in nutrition knowledge.

The results of this study found that the nutritional status of the orphaned children indicated prevalence of under-nutrition and wasting owing to acute malnutrition; most probably this is due to current causes of household food insecurity, while stunting found in this study represents chronic malnutrition.

All above nutritional issues can be addressed effective through a tailor-made cycle-menu targeting the nutritional imbalance for both over- and under nutrition problems.

## **5.6 RECOMMENDATIONS**

- 5.6.1 The results showed that malnutrition and possibly poverty is prevalent in this community in terms of food variety and choices therefore a nutrition education programme can address the issue of healthy food choices.
- 5.6.2 There is a long-term consequence of poor diet that can be predicted from this investigation. Thus there is a need for nutrition education to these poor children and their families, more especially the caregivers so that they can provide a well balanced diet including the available inexpensive nutritious food from each food group to these children.
- 5.6.3 The outcome will lead to developing a cycle-menu based on soy foods and alternative cost-effective protein dishes to help address the problem of malnutrition found in the orphaned children. Protein-enhanced foods will add variety to the children's diet with good taste, energy and nutrient value.

5.6.4 In future the implementation of this programme would require the validity testing of the questionnaire to determine suitability for used to pre and post testing of nutrition knowledge.

## **5.7 RESEARCH OUTPUTS**

### **5.7.1 Oral - presentations**

**5.7.1.1** Oral presentation at the ISL/SANPAD nutrition education symposium held 04 November 2009 at Quest Conference centre in Vanderbijlpark, South Africa.

**5.7.1.2** Oral Presentation at the Health in Education - Brown-bag seminar held 19 July 2010 at Sol Plaatjie House Conference Centre in Pretoria.

### **5.7.2 Poster presentations**

**5.7.2.1** Poster presentation at the Nutrition Congress held 20-22 September 2010 at Durban ICC in Durban.

**5.7.2.2.** Poster presentation at the 4<sup>th</sup> Africa Nutritional Epidemiology Conference (ANEC IV) Conference held 4<sup>th</sup>-8<sup>th</sup> October 2010 at Safari Park Hotel Nairobi, Kenya.

### **5.7.3 Articles**

From this study one article which is about to be language edited will be published. The article will reveal "Assessing the nutritional knowledge of HIV&AIDS orphans in the Vaal, SA: A baseline survey".



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## ANNEXURE A

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

21/4/09 Oldewage-Theron

CLEARANCE CERTIFICATE

PROTOCOL NUMBER M080365

PROJECT

Open controlled trial of protein enhancement of dietary intake in HIV-infected or AIDS orphaned children in South Africa

INVESTIGATORS

Dr W Oldewage-Theron

DEPARTMENT

NRF

DATE CONSIDERED

08.03.25

DECISION OF THE COMMITTEE

Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE

08.04.07

CHAIRPERSON

*P. E. Cleaton Jones*

(Professor P E Cleaton Jones)

\*Guidelines for written 'informed consent' attached where applicable

cc: Supervisor:

Prof CS Venter

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and ONE COPY returned to the Secretary at Room 10004, 10th Floor, Senate House, University.  
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. I agree to a completion of a yearly progress report.

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES





## ANNEXURE B

### FACULTY OF HUMAN SCIENCES

#### RESEARCH – INSTITUTE OF SUSTAINABLE LIVELIHOODS

#### DEPARTMENT OF EDUCATION- NUTRITION EDUCATION QUESTIONNAIRE

Please tick the answer you think is the correct one

1. Do any of the primary school syllabi cover nutrition education?

Yes

☐

No

☐

2. If no, has it ever been done in the past?

2.1 If yes, which subject?

3. In which grades are nutrition included in the syllabus? (tick all the relevant options)

Grade 0	
Grade 1	
Grade 2	
Grade 3	
Grade 4	
Grade 5	
Grade 6	
Grade 7	

4. What resources do you use for nutrition education at the moment? (tick all the relevant options)

Textbook

☐

Pamphlets

☐

Puzzles

☐

Lecture

☐

Food models

☐

NEP games

☐

Video

☐

Playing cards

☐

others, specify

☐

5. How much time is allocated for nutrition education during the year?

Nothing

☐

30 minutes per week/every week

☐

1 hour per week/ every week

☐

2 hours and more per week/every week

☐

30-60 minutes/week – randomly throughout the year

☐

6. Which of the following topics are at present covered in the nutrition education syllabus? (tick all the relevant options)

Role of nutrition in health	
Foods and nutrient composition	
Therapeutic role of food in health	
Factors contributing to malnutrition	
Undernutrition,	
Diseases of lifestyle related to diet	
Overnutrition	
WHO growth standards	
Signs of malnutrition	
Cycle of malnutrition	
Strategies employed to address malnutrition	
Healthy eating habits for children	
Factors influencing food intake of children	
Dietary needs of children	
Healthy food choices	
Meal planning	
Food labeling	
Food security causes	
Strategies to combat food insecurity at community level	
Food safety and hygiene	
Food contamination prevention	
Oral/dental health and care	
Behavioral hygiene	
Environment hygiene	
Personal care hygiene	
Exercise and its relation to nutrition	
Relationship between malnutrition and AIDS	
Nutritional complications of HIV/AIDS	
School feeding programmes	
Objectives of school feeding	

7. Do you think there is a need for nutrition education?

Yes

☐

No

☐

8. If yes, who do you think should receive nutrition education? (tick all the relevant options)

Children(primary school)	
Parents	
Educators	
NSNP workers/volunteers	
Others, specify	
All of the above	

	Yes/No	Priority/importance
Role of nutrition in health		
Foods and nutrient composition		
Therapeutic role of food in health		
Factors contributing to malnutrition		
Undernutrition,		
Diseases of lifestyle related to diet,		
Overnutrition		
WHO growth standards		
Signs of malnutrition		
Cycle of malnutrition		
Strategies employed to address malnutrition		
Healthy eating habits for children		
Factors influencing food intake of children		
Dietary needs of children		
Healthy food choices		
Meal planning		
Food labeling		
Food security causes		1
Strategies to combat food insecurity at community level		
Food safety and hygiene		
Personal care hygiene		
Exercise and its relation to nutrition		
Relationship between malnutrition and AIDS		
Nutritional complications of HIV/AIDS		
School feeding programmes		
Objectives of school feeding		

10. A) What tools/materials do you think would be needed by educators teaching nutrition education to the children? (tick all the relevant options)  
B) Rank according to priority

	A Yes	B Priority/importance
Card Games		
Board games		
Role playing		
Activity/colouring books		
Video		
Posters		
Lectures		
Pamphlets		
Puzzles		
Cross word puzzles/work searches		
Other, specify		

11. Should the nutrition education materials/tools be:

Black and white

Bright colours

Pastel colours

☐  
☐  
☐

12. In your opinion, what do you think should be included for clarification?

Photo's ☐  
Colour drawings ☐  
Cartoons ☐  
Other, specify ☐

13. Should the nutrition education materials be in the

Home language ☐  
English, or ☐  
Both ☐

14. Did you ever receive any nutrition education through the following (tick all relevant options):

Schools attended	
Teachers training college	
In-service after completion of studies	
Seminars/workshops	
Self-learning	
Others, please specify	

15. Where do you mostly get your nutritional advice from? (tick all relevant options)

Textbooks	
Colleagues	
Sister at clinic	
Library	
TV	
Magazines	
Doctor	
Parents	
None of the above	
Other, specify	

16. Do you think that having nutrition education materials available in the classroom will enhance nutrition learning?

Yes ☐  
No ☐

Thank you very much for your help!!  
Prof WH Oldewage-Theron and Dr AA Egal



## ANNEXURE C

### NUTRITION EDUCATION FOR ORPHANS

#### 1. GENERAL INFORMATION

Subject Name: .....

Grade: .....

Age/ Year born: .....

#### 2. DATA COLLECTION

Date:

Date:

Station	Activity	Pre-test	Post-test
Station 1: Anthropometry	Weight:.....kg Height:.....m		
Station 2: Health Questionnaire	Health Questionnaire		
Station 3: Nutrition education	Knowledge questionnaire		
Station 4 Check/ Control	Control that all Fieldwork is complete		

## ANNEXURE D

### NUTRITION EDUCATION: FOR ORPHANS AFFECTED BY HIV/AIDS NUTRITION KNOWLEDGE QUESTIONNAIRE

#### Introduction:

This questionnaire will be used to test your nutrition knowledge and help to improve your nutrition status and dietary behavior.

The purpose of this study is to develop a reliable and valid nutrition education programme for HIV/AIDS-affected orphan's peri urban informal settlement, in terms of nutritional knowledge and their dietary intake behaviour that will sustain good health. A randomly selected sample will be drawn from the orphans who receive food at Tshireletso Safe House.

#### 1. GENERAL INFORMATION

Date: .....

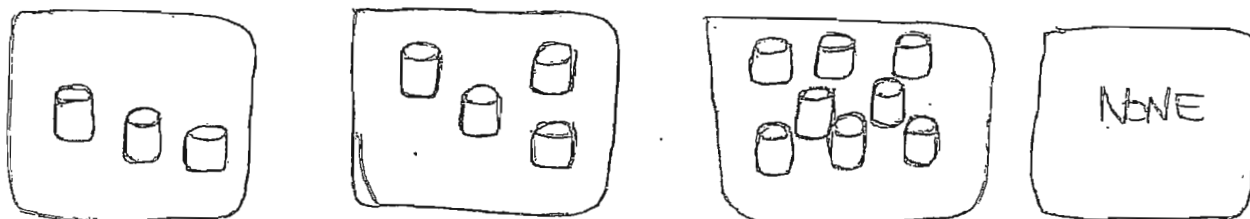
Subject Name: .....

Age:.....

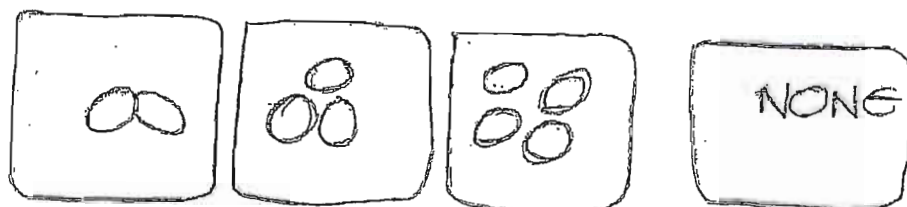
Please answer all questions by making the correct answer with x, except where indicated otherwise.

#### 2. Section A: Nutrition Information

2.1 How many glasses of water can one drink per day?



2.2 How many eggs can be eaten daily?



2.3 How many fruits and vegetables should be eaten daily?

1 fruit and vegetable a day
3-4 fruits and vegetables daily
5 or more fruits and vegetables daily
There is no need to eat fruits and vegetables daily

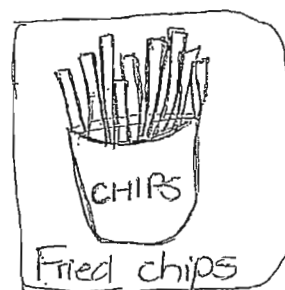
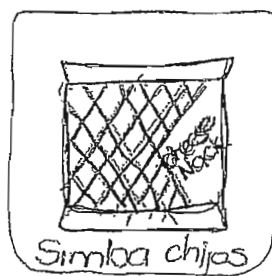
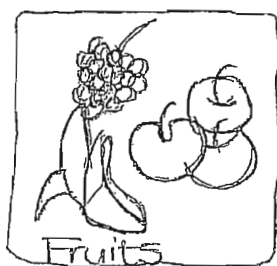
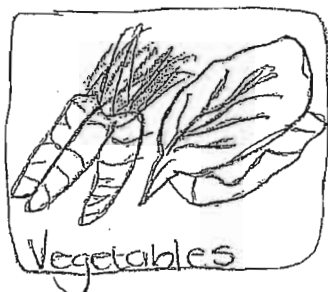
2.4 How many food groups do we have?

8 food group	2 food groups	9 food groups	4 food groups	5 food groups
--------------	---------------	---------------	---------------	---------------

2.5 Amongst the food groups we have, which food groups do we need to eat everyday?

Bread, Samp, rice, porridge
Apple, Banana, spinach, Carrots
Milk, Yoghurt, Cheese
Chicken, Fish, Beans, Eggs
All of the above groups

2.6 Choose only the healthy food items out of the following?



2.7 Which ones of the following are the healthiest drinks?

coke	milkshake	water	inkomazi	milk	Tea	Fruit juice
------	-----------	-------	----------	------	-----	-------------

2.8 The key to healthy eating is to eat:

Eat many different kinds of foods
Eat some food more than other foods
Eat certain kinds of food in moderate or small amount
All of the above

2.9 Being physically active means:

Not sitting in front of the TV or PC
Going to the gym
Walking a lot
Playing sports like soccer or netball
All of the above

2.10 When do you eat the following food items?

Food items	Daily	weekly	seldom	Never
Dairy products E.g. Milk, cheese, yoghurt				
Vegetables				
Fruits				
Snacks e.g. Simba chips, sweets, chocolate				
Bread/ Porridge				
Eggs				
meat				

2.11 If a person want to increase the amount of fiber in his/her diet, which one of the following should be eaten more?

Apples and carrots	
Cakes and biscuits	
Chips and Pies	
Chicken and fish	



### Section 3: Answer the following questions with true or false

3.1 Soya food is good for everyone because it protects a person against diseases such as cholesterol, heart disease and cancer

True	False
------	-------

3.2 During childhood Soya food has shown to promote growth and boosting bone health

True	False
------	-------

3.3 Dried beans, peas and lentils can be included in many dishes such as meat, vegetables and samp

True	False
------	-------

3.4 Soya mince is as healthy as meat

True	False
------	-------

3.5 Meat can be eaten as much as you want everyday






True	False
------	-------

## Sensory evaluation Acceptance testing






Name: \_\_\_\_\_ Surname: \_\_\_\_\_

Grade: \_\_\_\_\_ Date: \_\_\_\_\_






1. Please mark with a cross (X) under the face which best describes how you feel about the taste of the product.

				
Like a lot	Like a little	Neither like or dislike	Dislike a little	Dislike a lot






2. Please mark with a cross (X) under the face which best describes how you feel about the texture of the product.

				
Like a lot	Like a little	Neither like or dislike	Dislike a little	Dislike a lot






3. Please mark with a cross (X) under the face which best describes how you feel about the color of the product.

				
Like a lot	Like a little	Neither like or dislike	Dislike a little	Dislike a lot






4. Please mark with a cross (X) under the face which best describes how you feel about the smell of the product.

				
Like a lot	Like a little	Neither like or dislike	Dislike a little	Dislike a lot

5. Please mark with a cross (X) under the face which best describes how you feel about the portion size of the product.

				
Like a lot	Like a little	Neither like or dislike	Dislike a little	Dislike a lot

6. Please mark with a cross (X) under the face which best describes how you feel about receiving this product as part of the school feeding program.

				
Like a lot	Like a little	Neither like or dislike	Dislike a little	Dislike a lot



## FFQ LIST OF FOODS AND FOOD GROUPS DIVERSITY

Name/Subject number:.....

Date:.....Fieldworker:.....

Gender:.....Age:.....

Location:.....

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

GROUP 1: Flesh foods (meat, poultry, fish) diversity	Y
Chicken	
Beef, including steak, minced meat	
Pork	
Fish (tinned pilchards/tuna, fresh hake/whole)	
Lekgotlwane (finely chopped, cooked meat)	
Mutton, including chops	
Chicken runners and heads, livers	
Goat (meat)	
Mogodu and malana	
Dried meat (biltong)	
Viennas / polony / Russians	
Sausage (wors)	
Other:	
Group 2: Eggs diversity	
Eggs	
Other:	
Group 3: Dairy products diversity	
Evaporated milk (unsweetened)	
Maas/ inkomasi	
Powdered milk	
Milk, full cream, 2% or low fat (pasteurized or unpasteurized)	
Cheese	
Custard / Ultramel	
Ice cream	
Yoghurt / Yogisip	
Other:	

<b>Group 4: Cereals, roots and tubers diversity</b>	<b>Y</b>
Rice	
Maize meal porridge / Pap	
Macaroni/pasta/spaghetti	
Maize rice (mielierys)	
Samp (stampmielies)	
Bread / Buns / bread rolls (white / brown / wholewheat)	
Dumpling / "Vetkoek"	
Scones	
Biscuits	
Mabela (soft porridge)	
Corn flakes / wheat bix / rice krispies / other breakfast cereals	
Oats	
Mageu	
Potatoes	
Sweet potatoes	
Umqombothi / Traditional beer	
Other:	
<b>Group 5: Legumes and nuts</b>	
Sugar or other dried beans	
Peas (dried)	
Baked beans, tinned	
Peanut butter / peanuts	
Other nuts	
Soya	
Other:	
<b>Group 6: Vitamin A rich fruits and vegetables diversity</b>	
Pumpkin	
Carrots	
Wild leafy vegetables (morogo)	
Fresh and dried	
Spinach	
Butternut	
Apricots (Appelkoos)	
Peach (yellow cling)	
Mango	
Other:	
<b>Group 7: Other fruits (and juices) diversity</b>	
<b>Deciduous fruits</b>	
Apple	
Peaches	
Pear	
Grapes (black/green)	
Plum	



<b>Sub – tropical fruit</b>	<b>Y</b>
Lemon	
Orange	
Naartjie	
Banana	
Pineapple	
Avocado	
Blueberry	
Cherry	
Kiwi fruit	
Raspberry	
Watermelon	
Wild watermelon(tsamma)	
Guava	
Other:	
<b>Juices</b>	
Juice (100% pure juice e.g. Ceres/Liquifruit)	
<b>Group 8: Other vegetables diversity</b>	
Onions	
Cabbage	
Beetroot	
Rhubarb	
Turnips (raap)	
Gem-squash (lemoenpampoen)	
Tomatoes	
Green beans (fresh)	
Peas (fresh – green)	
Cauliflower	
Chili (red/green)	
Lettuce	
Mushroom	
Baby marrow	
Green pepper	
Sweet-corn (baby)	
Corn-on-the-cob(white)	
Garlic	
Other:	
<b>Group 9: oils and Fats diversity</b>	
Butter	
Sunflower oil	
Margarine	
Lard	
Salad oil	
Other:	

Thank you.

## **ANNEXURE G**

### **NUTRITION EDUCATION PROGRAMME FOR HIV/AIDS AFFECTED ORPHANS**

## South African Food Based Dietary Guidelines

Enjoy variety of food  
Be active  
Make starchy food the basis of most meals  
Eat plenty of vegetables and fruits everyday  
Eat dry beans, peas, lentils and Soya often  
Meat, fish, chicken, milk and eggs can be eaten daily  
Eat fat sparingly  
Use salt sparingly  
Drink lots of clean safe water.  
If drinking alcohol, drink sensibly

Enjoy variety of food  
Be active  
Drink lots of clean safe water  
Eat dry beans, peas, lentils & Soya often  
Hygiene

Learning outcomes:

- ✓ At the end of this programme the learner will be able to:
- ✓ Know and understand the importance of eating variety of food.
- ✓ Classify the five different food groups, serving and their functions.
- ✓ Identify the South African food based dietary guidelines.
- ✓ Know the importance of healthy eating.
- ✓ Know the importance of drinking water every day.
- ✓ Know and understand facts about soy foods



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## MODULE 1: DIETARY GUIDELINES

### 1.1 ENJOY VARIETY OF FOODS



#### Introduction:






Variety of meals includes eating food from the five major food groups to get all kinds of nutrients. Eating variety of foods from the five major food groups with the recommended servings every day will help provide a balanced diet. Some amounts may have to be regulated depending on the servings that suit your activity level over a period of time.

Why eating variety of foods?

- To increase chances of getting all the nutrients needed for good health in the right amounts.
- To provide us with nutrients (vitamins and minerals) a child needs
- To help us keep the intake substance like salt, fat and sugar at healthy levels

During childhood a healthy diet can assist in preventing diseases like anaemia, cancer, heart disease, diabetes, osteoporosis and obesity at the later stage of life (Clarke 2007:1).

## 1.2 Five food group

Food group	Daily servings	Portion size	Function
 <p>Carbohydrates group</p>	6 – 8 servings daily	1 slice of bread 1 small potato Half cup of soft porridge(Pap), rice & Pasta	Provides energy for the body.
 <p>Fruits &amp; vegetable group</p>	5 servings daily	Half a cup of sliced fruits Half a cup of vegetables 1 medium fruit	For vision, healthy skin, teeth and bone development. Protection against infections. Also plays a role in the proper development of the brain.
 <p>Protein group</p>	2 – 3 servings daily	1 egg (3 weekly) 75-100g= (the size of your palm of your hand) cooked fish or chicken or meat	Helps us to grow, develop and repair muscles and tissues. Some protein foods such as milk and eggs give us strong bones and teeth.
 <p>Dairy group</p>	2 – 3 servings daily	1 cup of milk or yoghurt 40-50g=size of a match box cheese	Good source of calcium and calcium is necessary for: <ul style="list-style-type: none"> <li>• building healthy bones and teeth</li> <li>• Needed for blood-clotting,</li> <li>• Healing wounds</li> </ul>
 <p>Fat group</p>	5 teaspoons daily	1 teaspoon of powdered milk and /1 teaspoon of mayonnaise. 1teaspoon of oil, butter or margarine	Build cells and to help body processes. Supply energy and fat-soluble vitamins

(Burgess, Bijlsma & Ismael 2009; Krachenfels 1999; Medical guide 2010; Journal of nutrition 2009; Broke-graditute 2008)

### 1.3 Healthy eating

Making poor food choices and not having healthy food available has been linked to overweight and or underweight in children (Raine 2004:8). Adequate nutrition as well as healthy eating behaviours can assist in preventing health problems (Napier & Oldewage-Theron 2007:13). As many researchers said Nutrition is essential for good health and well being, it is particular importance for children to have high nutritional needs for growth and development.



Ways to promote healthy eating and active living for school age children:

- Avoid food such as soft drinks, candy and fried snack food less often.
- Involve children in planning and preparing breakfast, lunch and dinner.
- Choose food such as baked, broiled or roasted items instead of deep fried, drink lots of milk and fruit juices.
- Be physically active, plan family activities like hiking, cycling, walking and cleaning or gardening.
- Teach children to include at least one choice from each of the five groups to create nutritionally balanced meals. (Healthy eating guide for school age children 2004:2-4)



Worsley and Crawford 2004 define “Healthy eating” as the consumption of a wide variety of fresh fruits and vegetables, legumes, wholegrain cereal food, dairy products as well as animal protein.

Healthy eating includes:

- Eating to satisfy the appetite or hunger
- Enjoying variety of different foods
- Eating to stay healthy
- And having regular meals and snacks

### **Important message**

Fact: Do not skip breakfast

- Breakfast is the most important meal of the day
- It gives our body the necessary energy and nutrients our body needs for concentration while keeping hunger symptoms like headaches, sleepiness and restless.
- It also gets our metabolic rates up
- And it is therefore vital to ensure adequate intake at breakfast time.

## Lesson Plan A

- **Subject:** Food Groups
- **Duration:** 37 minutes

Topic	Activity		Time
Break down and key point	Trainer Activity	Trainee activity	
Introduction	Ask trainee of any previous knowledge	Answer or give ideas	5 minutes
Step 1 What the topic is all about	Discuss the topic	Listen Attentively	5 minutes
Step 2 Content of the topic	Discuss and explain the factors	Listen Attentively	10 minutes
Application	Demonstrate with food puzzles		10 minutes
Conclusion	Emphasis the key points	Ask questions	7 minutes
measure	Ask Questions	Answer the questions	

## Lesson Plan B

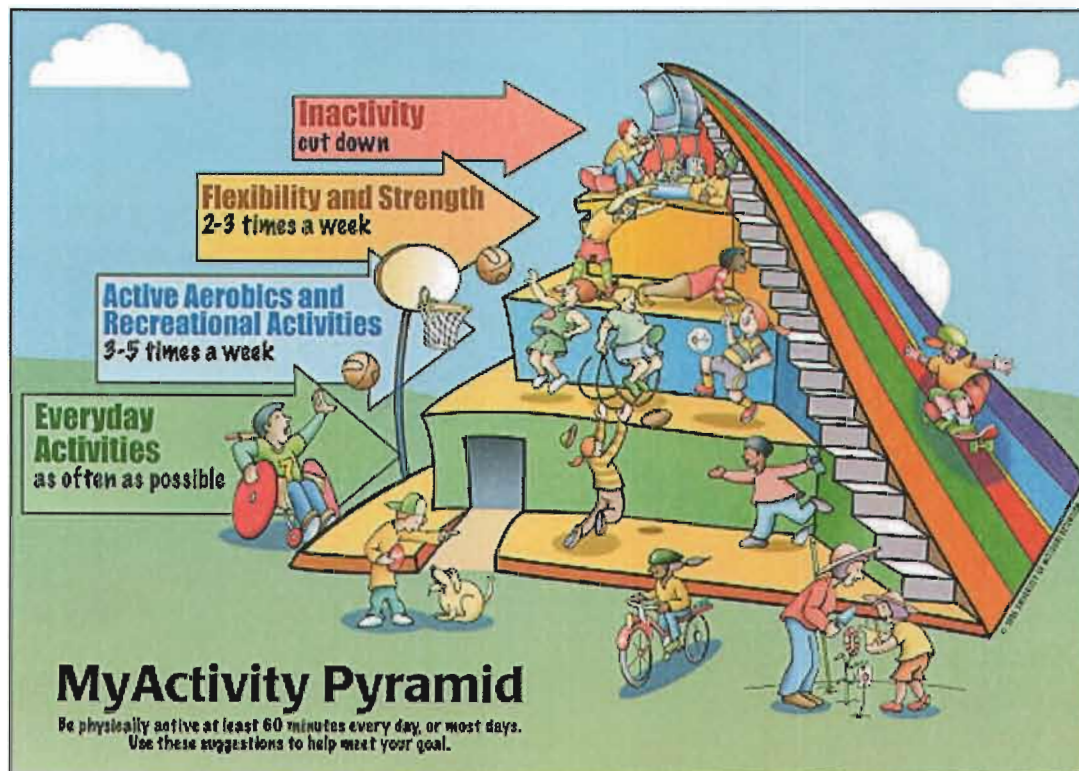
- **Subject:** Meal Plan
- **Duration:** 35 minutes
- **Goal:** To promote the enjoyment of nutrition, reinforce the food groups, Promote balanced meal choices and to promote health nutrition message

Topic / Tasks	Breaking key points	Trainer Activity	Learners Activity	Time
Reinforce the food groups	Introduction	Explain what makes a balanced meal and identify food changes required to make a balanced meal	Learners must listen attentively since they will be required to make a group role play	10 minutes
Promote balanced meal choices	Discussion of the topic	Ask the learners to pair their self into groups to participate activity of plan a meal in a plate	Group work: Learners will select foods to place and should determine what food group each belongs to.	15 minutes
Promote health Nutrition messages	Application	Demonstrate using food models	Planning a simple meals in a plate	10 minutes

## Module 2: Being active

### 2.1.1 Introduction:

Physical activity simply means the movement of the body that uses energy (USAID 2009). Kohi and Hobbs (1997:1) define physical activity as the key components of energy balance that is promoted in children and adolescents as lifelong positive health behaviour.



The following are the examples of better way to start exercises that will bring about personal behaviour changes which increase activity on a day to day basis:

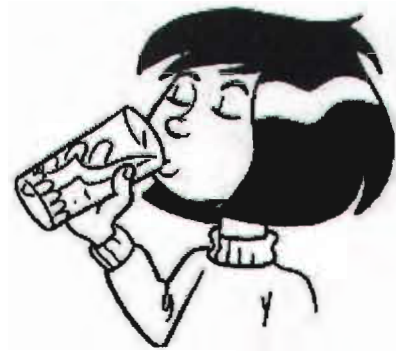
- Take a 20-minutes walk during your lunch break
- Walk to the shops and other surroundings with friends
- Carry shopping parcels rather than using trolley
- Sweeping, cleaning and mowing also helps
- Improve your posture by using your abdominal muscles when sitting or standing



- Plan to do some physical activities over the weekend and encourage other family members and friends to join you.

#### **2.1.2 These are some types of physical activities that are beneficial:**

- Aerobic activities – breathing faster improves heart and lung fitness. For example brisk walking, jogging and swimming
- Strength building activities – building and maintain bones and muscles by sweeping the floor, carrying a child around and walking
- Balance and stretching activities – enhancing physical stability and flexibility, reduces risk of injuries. Example gentle stretching and dancing



## **2.1 Drink lots of clean safe water**

### **2.2.1 Introduction:**

Every part of the body contains large of water. A person can live without food for a few weeks but cannot live without water for more than a few days. About two thirds of the weight of the human body is made up by water, 95 percent in the brain alone, 82% in the blood and 90% in the lungs, so water plays an important role in the human's body. Drinking six to eight glasses of water daily reduce the risk cancer and other chronic disease and always drink clean safe water (Medical guide 2010).

### **At times the body may seek food as:**

- A source of water since about 37 percent of our daily water intake comes from the foods we week.
- About 70 – 95 percent of water is usually found in fruit and vegetables,
- 50 – 60 percent from cooked meat and
- 20 – 35 percent of water from bread, furthermore the body may indicate hunger in order to get water through food



### **Why people need water**

A 10kg child contains about eight litres of water

- To make body cells and fluids such as blood, digestive juice and tears
- For body processes such as digestion, which take place in water ;
- To keep lining of the month, gut, lungs, and other parts of the body moist and healthy
- For urine which carries away body waste;
- For sweat to cool the body
- To moisten oxygen for breathing
- To help carry nutrients and oxygen to cells
- To help converts food to energy and helps the body to absorbs nutrients

### **2.1.3 Sources of water**

- About all foods contains some water, especially fresh fruits and vegetable, and roots such as potatoes.
- Dry cereals, and dried cereals or roots flours contains a little water before they are cooked. Some foods when cooked with water, they absorb a lot of water which makes them bulky.
- Fats and oils contain very little water; for an example cooking oil contains almost no water. Food which is cooked in fat or oil contains much less water than food which is cooked in water.
- Sugar contains no water.

## Lesson plan C

**Subject:** Physical Activity

**Time required:** 32 Minutes

Key point	Activity		Time
	Trainer	Trainee	
Introduction	Brief description about the topic	Listen attentively	5 Minutes
Aerobics			
Step 1: Stand and sit down	Lead the learners	participate	5 minutes
Step 2: Hands up and down	Lead the learners	participate	5 minutes
Step 3: Step with high knees and toe touches	Lead the learners	participate	5 minutes
Step 4: Cool down and joking slowly	Lead the learners	participate	5 minutes
Step 5: wrap up the topic	Discuss with learners the importance of exercising	Listening and asking questions	7 minutes



## Lesson plan D

**Subject:** Water

**Time required:** 30 Minutes

Key point	Activity		Time
	Trainer	Trainee	
Introduction	Brief description about the topic	Listen attentively	5 Minutes
	Lead the learners	participate	5 minutes
	Lead the learners	participate	5 minutes
	Lead the learners	participate	5 minutes
	Lead the learners	participate	5 minutes
	Discuss with learners the importance of exercising	Listening and asking questions	7 minutes

## Module 3: Soy

### 3. Eat dry beans, peas, lentils and Soya often

#### Soy foods

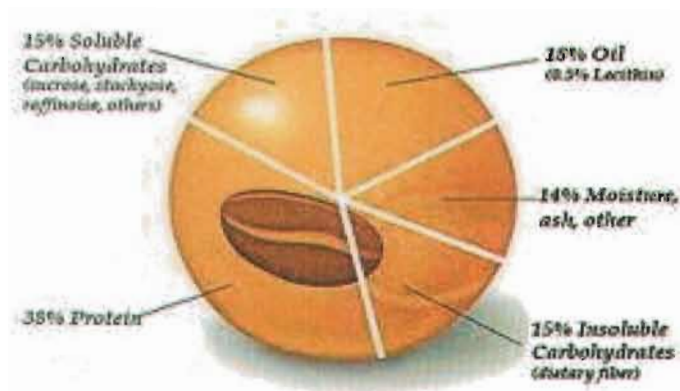


#### 3.1 What is soy?

- Soy food as been regarded as a bean very rich and have high quality protein nutrition
- Soy comes from the soybean plant and is the only vegetable that has complete protein.
- Soybeans belong to the legume family the same family as peas and lentils
- Soybean is a hard dry bean which can be brown, yellow or black, it is belongs to the same family as peas and lentils



### 3.1.1 Composition of soy



Soy beans contains all three macro-nutrients needed for good health such as complete and healthy protein, carbohydrates and fat as well as vitamins, minerals, calcium and iron.

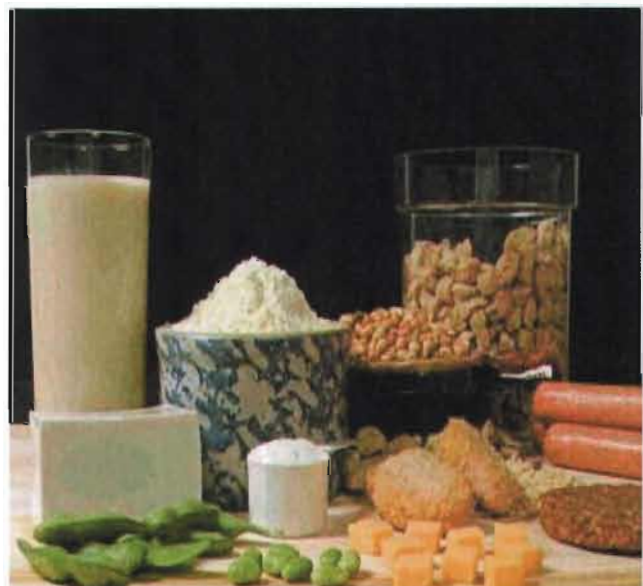
### 3.1.2 What are the benefits of soy?

- Soybean is good for mental fatigue and protection against cholesterol.
- It is excellent for growing children to aid growth and development.
- It is easily digested and is one of the most nourishing and body building foods in the world.
- Soybean is an excellent food for diabetic
- Some soy products are good source polyunsaturated fatty acids

### 3.1.3 Soy products

There is various soy Products such as:

- Soy milk, soy sauce
- Soy flour, soy nuts
- Soy cereals, which are highly recommended for both adults and children as nutritious foods and



- Some soy ingredients are added in noodles, breads, sausages and meat patties.



## Lesson plan E

**Lesson:** Soy

**Duration:** 35 minutes

Key points	Activities		Time
	Trainer	Trainee	
Introduction	Introducing the topic	Listen alternatively	5 minutes
Step 1	Discussing the topic	Listen alternatively	7 minutes
Step 2: Content of the topic	Explaining the importance	Listen alternatively	10 minutes
Step 3:	Showing them the product (Soybeans)	Looking and asking questions	6 minutes
Step 4: Closure	Wrapping up the lesson and asking question to check if they understood the lesson	Listen alternatively and answering the questions	7 minutes



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## ANNEXURE H

### CYCLE MENU FOR 7 DAYS

	Day 1	Day 2	Day3	Day 4	Day 5	Day 6	Day 7
<b>Breakfast</b>							
<b>Porridge/ Cereal 100g</b>	Oats	Maize-meal soft porridge	Maltabella	Mabele	Maize-meal soft porridge	Oats	Mabele
<b>Milk, fresh 200 ml</b>	Milk	Milk	Milk	Milk	Milk	Milk	Milk
<b>Sugar 20g/ 10ml</b>	Optional	Optional	Optional	Optional	Optional	Optional	Optional
<b>Brown bread 72g</b>	Brown Bread	Brown Bread	-	Brown Bread	Brown Bread	Brown Bread	Brown Bread
<b>Spread 1 medium 46g</b>	*	*	*	*	*	*	*
<b>Snack</b>							
<b>Bread 72g</b>	Scones	Brown Bread	-	Vanilla Muffins	Toasted brown bread	Scones	-
<b>Spread 20g</b>	-	Peanut butter	-	-	Cheese	-	-
<b>Fruit juice 200ml</b>	Tea	Glass milk	Rooibos tea	Milk	Orange Juice/Tea	Glass of milk	Rooibos tea
<b>Scones 60g</b>	-	-	-	-	-	-	-
<b>Fat cakes 60g</b>	-	-	Fat-cakes	-	-	-	Fat-cakes
<b>Lunch</b>							
<b>Protein 90g</b>	Soy beans Soup	Pilchards Fish	Sugar beans	Hake	Soy sausage Hot dogs	Cottage Pie	Lentils
<b>Starch 200g</b>	Pap	Macaroni	Samp	Baked potatoes	Rolls		Mealie-rice
<b>Vegetable 40g</b>	Pumpkin	Mixed Vegetables	Beetroot	Carrot salad	Spinach	Beetroot	Carrot salad
<b>Fruit</b>	Orange	Apple	Banana	Orange	Apple	Banana	Oranges

\*Margarine/ Apricot jam/ Peanut butter

ANNEXURE I

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19 December 2010

TO WHOM IT MAY CONCERN

*M. Tech. Food Service Management dissertation: Development of Nutrition Education Programme for HIV/AIDS affected orphans in peri-urban informal settlement*

I hereby certify that I have edited and proofread the *M. Tech. Food Service Management Dissertation: Development of Nutrition Education Programme for HIV/AIDS affected orphans in peri-urban informal settlement*, being submitted to the Vaal University of Technology by Joy Senoelo.

I, furthermore, hereby state that before submission of this dissertation for examination the onus is on this student to completely perform all the corrections and alterations that I had marked as being necessary.



(Mrs) Glynne Case