

# **THE IMPLEMENTATION AND EVALUATION OF A NUTRITION EDUCATION PROGRAMME DEVELOPED FOR CAREGIVERS**

**By**

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**Dedicated to my beloved parents  
and my dearest friend, Dr Charlene Henn.**

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***“The true character of a society is revealed in how it treats its children”***

Tata Mandela

# **ABSTRACT**

## **Background**

South Africa is one of the developing countries faced with the co-existence of undernutrition and overnutrition, often experienced within the same household. On the one hand, hunger, undernutrition and micronutrient deficiencies are linked to poverty and household food insecurity. Simultaneously, South Africans are exposed to 'nutrition in transition', where overweight and chronic diseases of lifestyle, such as diabetes mellitus, cardiovascular diseases and cancer are on the rise as part of the overnutrition profile. Sound nutrition is important throughout the lifecycle to combat under- and overnutrition and nutrition-related diseases. In urban areas, the grandmother or another senior female family member is often responsible for caring for the children in the household during the day. This includes physical, emotional and nutritional care. It is therefore essential for the caregiver to have good nutrition knowledge, to provide not only in her own needs, but also in those of the children. A nutrition education programme is one strategy for improving the nutrition knowledge of caregivers of children.

## **Objective**

The primary objective in this study was to develop, tailor, implement and evaluate a nutrition education programme (NEP) for Sesotho-speaking females and caregivers of children in the Boipatong Township in the Vaal Region of South Africa and to test its impact in the short and longer term. Nutrition knowledge regarding four South African food-based dietary guidelines (FBDGs) was empirically tested before and after the intervention and then compared to a control group. In addition, dietary intake was assessed to detect any changes after the intervention in the medium term.

## **Methodology**

In this study, both quantitative and qualitative methodologies were applied. Two frameworks, the United Nations Children's Fund (UNICEF) Framework of Malnutrition (2004) and the Food and Agriculture Organisation (FAO) Framework for Nutrition

Education (1997), gave structure to the planning, implementation and evaluation of the research project. This study's nutrition education programme was based on a socio-ecological model to guide behavioural change in terms of healthy food choices.

In the *preparation phase*, a situational analysis was performed by means of a cross-sectional analytical design using descriptive statistics. Socio-demographic and self-reported health information was obtained. Nutrition knowledge, based on the South African food-based dietary guidelines (FBDGs), was measured, and dietary intake was assessed and compared with the estimated average requirements (EARs) for their age categories.

Phase two, the *formulation phase*, used an experimental design. The acceptability and understanding of the existing national nutrition education (NE) material for individuals with low living standards (LSM) was investigated in this phase of the nutrition education programme (NEP). A culturally tailored booklet was developed in English, translated into Sesotho, pilot tested and implemented as part of the nutrition education programme. Lesson plans were developed and pilot tested.

A non-randomised control trial was used in the *implementation and evaluation phases*. The effect of the nutrition education programme on nutrition knowledge was quantitatively measured in a pre- and post-test design at each discussion session in the short term, using paired t-tests in the experimental group of caregivers.

The evaluation phase tested the impact of the nutrition education in the longer term. Nutrition knowledge was measured quantitatively in a before-after intervention test design by means of a self-completed structured questionnaire, based on the four South African FBDGs included in the programme. A control group who was not subjected to any intervention was used to complete the same questionnaire before and after the intervention in the same time period as the experimental group. In the experimental group, dietary intake was assessed before and after the intervention to detect changes in dietary intake. No dietary intake was measured in the control group, as changes could be attributed to influences beyond the control of this study. Two randomly selected focus groups of the experimental group were run to provide deeper insight into

their perceptions regarding the acceptability and understanding of the NEP and NE material.

## Results

The situational analysis of the *preparation phase* revealed a poor community that displayed typical patterns of nutrition in transition, at risk of malnutrition. The median age of the sample of caregivers was 44 years (IQR 32-62). Income and consumption poverty was confirmed by 80.5 percent of households spending R300 or less on food, with 75 percent of households having between four and seven people living in the dwelling. Dietary results were indicative of food poverty and poor food choices, possibly due to monetary constraints. A low energy intake (median 5323 kJ/day; IQR 3369-7949), was observed. Only 13.9 percent reached the estimated energy requirement (EER) of 7855 kJ per day for their age category. The overall mean average requirements of the diet was 0.7 but the possibility of micronutrient deficiencies could not be excluded with a MAR of 0.6 for vitamins and minerals respectively. The median nutrition knowledge was 50 percent (IQR 42-54%) The lowest score was obtained for the FBDG 'Enjoy a variety of food' (33.4%; 95% CI 1.1), followed by the FBDG on animal protein (40.3%; 95% CI 1.0). It was decided to augment these two FBDGs with the plant protein FBDG (54.3%; 95% CI 1.8). Despite a relatively good knowledge measured in the caregivers, none of the plant protein food items appeared in the top 20 food items most frequently consumed.

The *formulation phase* included the testing of existing nutrition education material. Messages were well understood (60.5%). However, caregivers found the images contained in the pamphlets and the design of the pamphlets confusing. A definite need was identified for new, culturally acceptable NE material in the caregivers' home language, Sesotho (74%).

During the *implementation phase* the lectures were presented and the change in the short-term nutrition knowledge of the FBDGs was measured at every session by means of a pre-post-test design. The median age of the caregivers was 63 years (52-78). A significant change in nutrition knowledge was found for each FBDG in terms of the



mean number of questions answered correctly by the participants between the results of each pre- and post-test.

In the evaluation phase, the impact of the NEP was measured in the Boipatong experimental group and compared, regarding nutrition knowledge, to a control group in the longer term (three months after completion of the intervention). Median nutrition knowledge before the intervention was 49 percent (IQR 46-57) compared to 70 percent (IQR 68-73) after the intervention – an increase of 21 percent. In contrast, the control group showed an increase of only five percent.

The results showed that the eating habits of many of the caregivers still fell substantially short of internationally recognised standards (estimated energy requirement (EER) and estimated average requirement (EAR)), and this could contribute to undernutrition as well as to an increased risk of diet-related chronic disease. A median kilojoule intake of 4788 kJ (IQR 3415-6596) per day before and 4651 kJ (IQR 3369-6664) per day after the intervention was registered. Carbohydrate foods remained an important source of energy. Calcium presented a major concern, as none of the participants reached the EAR despite a slight increase in the intake of milk (volume and frequency) after the intervention, as validated by the top 20 food lists and as measured by a nutrient average requirement (NAR) of 0.1 to 0.7 before and after the intervention respectively. The mean average requirements (MAR) remained relatively stable, at 0.7 (median) before the intervention and 0.6 after the intervention. The NEP thus had an insignificant positive effect on dietary intake, except for calcium, iodine and vitamin C intake, which showed significant increases.

No relationships could be found between the MAR as an indicator of dietary quality and nutrition knowledge. However, this does not mean that an NEP is not a suitable strategy. Changes in food choices and dietary intake should be measured in the longer term, since lifestyle changes are challenging to adopt when people, especially those in deprived communities, do not have the financial means to make healthy food choices.

## **Conclusion**

When planning nutrition education strategies to improve the health status of communities in deprived areas, one is faced with the difficulty of households with a low socio-economic status and poor dietary intake, which increases the risk of food and nutrition insecurity. The nutrition education programme, developed, tailored and implemented as an intervention strategy to address an identified need of caregivers, was effective in improving nutrition knowledge. Four of the South African dietary guidelines were used in the nutrition education programme tailored to the specific profile that emerged from the situational analysis and the development of supportive nutrition education material. Lesson plans and the Sesotho and English booklets are available for use in other nutrition education programmes.

The study contributed to the understanding of food choices of the urban community of Boipatong as well as of the nutrient inadequacies observed. Nutrition knowledge alone is not enough to bring about changes in food choices when the means to do so are lacking. Poverty and nutrition are closely linked and thus difficult to separate.

## **Keywords**

Nutrition education programme, nutrition knowledge, dietary intake, child caregivers, food-based dietary guidelines (FBDGs), poverty, low socio-economic status (SES).

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## GLOSSARY OF TERMS AND SYMBOLS

AI	adequate intake
AMDR	adequate macronutrient distribution range
BIWPG	Boipatong Interdenominational Women's Prayer Group
Cal	calories
CDL	chronic diseases of lifestyle
DAFF	Department of Agriculture, Forestry and Fisheries
DBE	Department of Basic Education
DDQ	dietary diversity questionnaire
DDS	dietary diversity score
DOA	Department of Agriculture
DOH	Department of Health
DRI	dietary reference intakes
DSD	Department of Social Development
EAR	estimated average requirement
ECD	early childhood development
EER	estimated energy requirement
EFNEP	Expanded Food and Nutrition Education Programme, USA
FAO	Food and Agricultural Organisation
FDBGs	food-based dietary guidelines
FG	food guides
FGVS	food group variety score
FVS	food variety score
g	gram
GDP	gross domestic product
GMP	Growth Monitoring Programme
HSRC	Human Sciences Research Council
IDD	iodine deficiency disorders
IES	income and expenditure survey
IFPRI	International Food Policy Research Institute
IFSNP	Integrated Food Security and Nutrition Programme
INP	Integrated Nutrition Programme
IOCU	International Organisation of Consumer Unions

kJ	Kilojoules
LSM	living standard measures
MAR	mean average requirements
MDG	Millennium Development Goals 2015
mg	milligram
ml	millilitre
MRC	Medical Research Council
NAR	nutrient average requirement
NCD	non-communicable disease
NE	nutrition education
NEP	nutrition education programme
NFCS	National Food Consumption Survey
NFCS-FB-1	National Food Consumption Survey - Food Fortification Baseline-1
NICUS	Nutrition Information Centre University Stellenbosch
NKQ	nutrition knowledge questionnaire
NPC	National Planning Commission: Department The Presidency, RSA
NPFNS	National Policy on Food and Nutrition Security
NSNP	National School Nutrition Programme
NTP	Nutrition Therapeutic Programme
PPP	purchasing power parity
PSNP	Primary School Nutrition Programme
RDA	recommended dietary allowances
RDP	Reconstruction and Development Plan, RSA
RSA	Republic of South Africa
SA	South Africa
SADHS	SA Dietary Household Survey
SAIIR	South African Institute for Race Relations
SANHANES-1	South African National Health and Nutrition Examination Survey -1
SCT	social cognitive theory
SD	standard deviation
SDGs	sustainable development goals
SES	socio-economic status
SPII	Studies in Poverty and Inequality Institute
SPSS	software package for statistical analysis in social sciences

TUT	Tshwane University of Technology
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USA	United States of America
VAD	Vitamin A deficiency
VUT	Vaal University of Technology
WHO	World Health Organization

# CHAPTER 1

## INTRODUCTION AND BACKGROUND TO THE STUDY

### 1.1. INTRODUCTION

Despite pooled efforts from many governments and organisations to eradicate hunger and malnutrition globally, malnutrition (including under- and overnutrition) remains a worldwide problem. Malnutrition and poverty co-exist globally. Poverty affects nutrition throughout the whole lifespan in manifestations such as increased vulnerability to infectious and non-communicable diseases (Black *et al.* 2013:428–30). Epidemiological evidence suggests that there is a strong relationship between maternal and early childhood malnutrition and increased risk to various adult chronic diseases (Allen & Gillespie 2001:1-2; Leach & Kilama 2009:6). Poor nutrition can be seen as both a cause and a consequence of poverty (Vorster 2010; Prentice 2006:93). Malnutrition and an inability to lead a productive life may be a root cause of poverty. Malnourished adults cannot work as hard as their well-nourished peers, with negative consequences for household income and often an extended family (Bain *et al.* 2013:115). Malnutrition is an effect of poverty when households do not have the means to access food or the knowledge to utilise food optimally (Leach & Kilama 2009:17).

Women are customarily responsible for food and nutrition in households and for taking care of children. NE could help maintain caregivers' health and well-being (Silver & Wellman 2002:S53), as well as that of the household. New knowledge creates a basis for new behaviours. To increase integration of knowledge and behaviour in the household, it is important to identify and support the specific knowledge that is necessary to facilitate the ability to take action (Pratt & Bowman 2008:2). Women can therefore contribute meaningfully to the reduction of food insecurity and malnutrition worldwide. However, gender discrimination, resulting in greater poverty among women, is widespread throughout the

developing world (UNICEF 2007a:4; Bain *et al.* 2013:117). The depth of poverty among women and their vulnerability are particularly marked in Sub-Saharan African countries as a result of gender dynamics and intra-household relations (McFerson 2010:52; Nanama & Frongillo 2012:218).

Caregiving is a major role of women throughout their lives; many function as unpaid, middle-aged family caregivers. Globally, many grandparents, especially grandmothers, are taking care of grandchildren, assuming the role of the parent for a number of reasons, despite their own health problems that do not allow for the extra demands, the increasing emotional, intellectual and physical stress, the need for multi-tasking, and the lack of leisure time (Williams 2011:952–7). This was also true for the sample of female child caregivers in this study, which included grandmothers and women of the extended family as child caregivers. Mothers were mostly working to contribute to the income of the household. In the preparation phase (situational analysis), the mean age of the caregivers was median 44 (IQR 32-55) years of age, but the median age of the sample increased to 62 (IQR 52-72) years in the formulation, implementation and evaluation of the tailored nutrition education programme (NEP) as a subsample from the situational analysis (refer to section 4.1.1).

Societies around the world acknowledge that grandmothers as caregivers play an influential role in the socialisation, acculturation, education and care of children as they grow and develop. In many developing countries, grandmothers and older caregivers are culturally expected to advise and supervise younger generations in the household. Elders are respected in community systems and should be viewed as key actors in any NEP. Traditionally, in South Africa (SA), the grandmother has played a very important role in caring for the offspring of all the children in the household on all levels. This comprises emotional care, including warmth, verbal interaction and the encouragement of cognitive learning. Care is as important for good nutritional status, growth and development as correct feeding (Allen & Gillespie 2001:70). Most grandmothers, including illiterate ones, are capable of learning new things when the educational approach

is based on respect and discussion. However, most development programmes neither acknowledge their influence nor explicitly involve them in efforts to strengthen household and community survival strategies (Aubel 2006:2–4).

It is crucial for caregivers' well-being and ability to work, as well as for the health of the children they care for, that they have a good nutritional status. Sadly, undernutrition and overnutrition are still growing problems among caregivers globally. In a study in an informal settlement in the Vaal region, Oldewage-Theron and Slabbert (2008:4) and Oldewage-Theron *et al.* (2006:803) found that the region was poverty-stricken and suffered from chronic food insecurity. It was further found that in 56 percent of cases the households were headed by females, 24 percent of households had no parent, only a caregiver, and 10 percent were headed by a grandparent. Acham *et al.* (2012a:24) also found in the same region that age-group comparisons revealed that those aged 36 years and older were at risk of low micronutrient intake, particularly of calcium and vitamins C and A. NE, as a medium-term solution, could make an important contribution towards healthy food choices, dietary diversity and lifestyle changes. Very little research has been done either globally or in SA on the effect of NEPs in lower socio-economic populations (Oldewage-Theron & Napier 2011:283).

## **1.2. IMPORTANCE OF THIS STUDY**

“Food is a basic need for human existence” (Nnakwe 2009:122). This statement highlights the critical role of nutrition in health and disease during the lifecycle. Current research explores mechanisms that link enteric infections and stunting (due to chronic malnutrition in early childhood) with an increased incidence of risk factors for cardiovascular disease later in life, including dyslipidaemia, hypertension and glucose intolerance (Black *et al.* 2013:1; DeBoer *et al.* 2012:642).

Malnutrition includes both overnutrition and undernutrition. Malnutrition is not a simple problem with a simple solution. When treating malnutrition, an

understanding of its complex nature and its causes and effects is imperative before deciding on a suitable strategy (Bain *et al.* 2013:115).

### **1.2.1. Undernutrition**

Undernutrition is characterised as a nutrient deficiency that may arise because of inadequate intake, impaired digestion or absorption, or increased excretion of essential nutrients. The most vulnerable at greatest risk of undernutrition are infants, children, pregnant women, individuals with low incomes and older people, often with devastating effects (Boyle & Holben 2006:422; Mahan & Escott-Stump 2008:384–385). Vulnerable households include chronically poor urban dwellers and female-headed households.

Undernutrition can be subdivided into protein-energy malnutrition and micronutrient deficiencies (Faber & Wenhold 2007:393). Micronutrient deficiencies (vitamins and minerals) are sometimes referred to in the literature as “hidden hunger”. Three micronutrient deficiencies are of particular concern in adults: vitamin A deficiency (VAD), the world’s most common cause of blindness; iron-deficiency anaemia; and iodine deficiency, which causes goitre (Boyle & Holben 2006:418; Faber & Wenhold 2007:393-396). In the adult population iron deficiency is reflected in poor health and increased vulnerability to illness (Pratima *et al.* 2012:2422). Anaemia might be a risk factor for cardiovascular disease and early death (Shisana *et al.* 2013:159). In the comprehensive SA National Health and Nutrition Examination Survey-1 (SAHANES-1) the prevalence of VAD was found to be 13.3 percent in females in SA, reflecting a moderate public health problem (Shisana *et al.* 2013:156,165-167).

The greatest burden of undernutrition is often among the poorest households, which are more likely to experience food and nutrition insecurity as a result of lack of resources and food, low levels of education and nutrition health information, and poor access to and utilisation of health care (Pena & Ballacao 2002:243; FAO 1997).

### **1.2.2.        Overnutrition**

Overnutrition reflects an energy imbalance where energy intake exceeds energy expenditure, leading to overweight and obesity. Overnutrition is the result of people eating too much and following unhealthy diets, which cause the development of nutrition-related chronic diseases. These non-communicable diseases (NCDs) are also referred to as chronic diseases of lifestyle (CDL). They are associated with a low-grade inflammation and C-reactive protein and pro-inflammatory cytokines, which are associated with coronary heart disease (Mahan & Escott-Stump 2008:385–387).

Overweight and obesity are recognised as global public health problems because they are associated with an increased risk of many diseases, including hypertension, type 2 diabetes, cardiovascular diseases, stroke, osteoarthritis, and some cancers (Ly *et al.* 2013:35). The poor are affected by dietary deficiencies in industrialised as well as developing countries, but also by obesity and its associated chronic adult diseases (Pena & Ballacoo 2002:241). In the SANHANES-1 study, overweight in women (25%) and obesity (40.1%) was of concern and was indicative of the nutrition transition to NCDs in SA (Shisana *et al.* 2013:9–10). Overweight is not only experienced in adults, but also in children. Childhood obesity is associated with short-term health problems, but also long-term health consequences, including an increased risk of obesity, cardio-metabolic disease and impaired social and economic productivity in adulthood (DeBoer *et al.* 2012:642; Kimani-Murage 2013:193).

In SA, household food insecurity, hunger and undernutrition are closely linked to poverty and rapid urbanisation, which is now producing a second “silent emergency” – overnutrition and obesity (Crush *et al.* 2011:1; Vorster 2010; Faber & Wenhold 2007:393-4).

Obesity is not restricted to richer neighbourhoods but is actually more prevalent in deprived neighbourhoods and among groups with lower education and incomes, since the latter influence food behaviours, diet quality, and body weight (Drewnowski 2009:s37). A typical effect of urbanisation is the amount of food



eaten outside the home. People moving to urban centres were unfamiliar with an industrialised food supply and their way of living changed to one where the availability of convenience and processed foods became coping strategies to relieve time constraints. The diet of urbanised people is often more varied, and is accompanied by an increase in the energy density of the diet, while physical activity may be relatively low in comparison with that of their rural counterparts. Intakes of total and animal-source protein increase, as do intakes of total and saturated fat, and when this is accompanied by decreased fibre intake it may give rise to NCDs (DBSA 2008:13; Vorster & Bourne 2008: 237).

### **1.2.3. Nutrition transition**

Dietary changes appear to be shifting universally with urbanisation towards a diet of higher intakes of saturated fats, added sugars and lower intakes of fibre, which are detrimental to health and which, together with inactivity, could lead to chronic non-communicable diseases (NCDs) (Vorster 2010; Steyn *et al.* 2012a:229). Drewnowski (2009:S36) and Popkin (2012:9-10) painted a bleak picture of a food system with fewer fresh produce markets and more supermarkets, multi-national chains, convenience stores and fast food outlets that drive changes in household food expenditure, where economic deprivation encourages the urban poor to consume lower-quality foods that are obesogenic. Urban low-income families with an inability to grow food or earn an inadequate income to purchase food will select cheaper food items from the available choices. One key predictor of weight gain might be a low-cost diet.

Prevention of malnutrition in all its forms has to address undernutrition in all its forms and at the same time control the progression of diet-related NCDs (obesity, diabetes, cardiovascular disease and cancer) (Drewnowski 2009:37; Newson *et al.* 2013:3). Urban nutrition transition changes experienced during the past two decades in SA can be attributed to a number of factors, including rapid urbanisation, socio-demographic changes, socio-economic and technological development, sedentary lifestyles and free global markets (Pena & Ballacao, 2002:244; Zeba *et al.* 2012:2210; Drimie *et al.* 2013:911). These changing

dietary patterns and lifestyles contribute to a rapid rise in obesity among children and adults and diet-related chronic diseases of lifestyle (CDL), while progress with reducing undernutrition is slow (FAO 2006). Malnourished adults are less capable of performing work and are severely disadvantaged in terms of their social and economic security (Basu *et al.* 2010:101).

Unfortunately, the double burden of malnutrition, with undernutrition and overnutrition co-existing in different populations in people with different cultures and eating habits, is found predominantly in developing countries, including SA (Vorster 2010; FAO 2006). This situation has been compounded in Africa by the devastating consequences to households, workplaces and the health sector of the HIV/AIDS pandemic during the past two decades. In SA, the effects of the unprecedented HIV/AIDS epidemic compromised health and well-being (Chopra *et al.* 2009; Drewnowski 2009:38). A shift in migration, demographics, and labour force could lead to poor nutrition and food insecurity in urban communities (Drimie *et al.* 2013:911).

Food is often bought from street vendors and food stalls. This sector has opened up opportunities for women to escape from poverty by earning an income in the informal self-employment street-vending sector as micro-entrepreneurs (Magidimisha & Gordon *et al.* 2015:276).

Malnutrition is a multi-faceted problem that has yet to be solved. Current efforts emphasise looking at the malnutrition problem from a more holistic perspective. The causes of malnutrition are known and many research studies cover the topic of household food insecurity, but we have still to develop effective nutrition strategies to improve and prevent malnutrition in SA. Nutrition knowledge and healthy food choices to improve nutritional quality of the diet are key issues in the prevention of many of the causes and effects of malnutrition. This research study is a report on the development and implementation of a nutrition education programme (NEP) for Sesotho-speaking child caregivers (>40 years) in Boipatong in the Vaal Region.

#### **1.2.4. The global challenge of malnutrition**

The World Health Organisation (WHO) reports that 795 million people, the majority of whom live in developing countries, are undernourished in terms of energy intake and unable to lead a healthy, active life. Sub-Saharan Africa has the highest prevalence of hunger, with one in four people being hungry (WHO 2015). Statistics of the United Nations Food and Agriculture Organisation (FAO) show that two billion people suffer from one or more micronutrient deficiencies and 1.4 billion people are overweight, with 500 million of them being obese. The common denominator in all types of malnutrition is a nutritionally inappropriate diet (FAO 2013a:3).

#### **1.2.5. Malnutrition in South Africa**

SA is undergoing a process of epidemiological transition in which undernutrition, notably stunting and micronutrient deficiencies and infectious diseases (including HIV/AIDS and TB), co-exists with an emerging epidemic of overweight and obesity that contributes to an increase in NCDs (DOH 2013:11; Shisana *et al.* 2013:xvii). NCDs account for around 35 percent of the disease burden in SA, often causing loss of income from affected breadwinners and increasing the demand for informal care; a burden often borne by women. Correct eating habits are therefore equally important for both undernutrition and overnutrition in strategies in this country (Chopra *et al.* 2009).

The existence of the nutrition transition experienced in SA is in line with trends reported globally, where nutrition-related diseases of undernutrition are seen simultaneously with those of overnutrition (Popkin 2006:289; Vorster 2002:239-243; Crush *et al.* 2011:9). Efforts to prevent malnutrition over time could succeed by focusing on the underlying causes of malnutrition such as inadequate income, food insecurity, unsafe food and water and gender inequality (DOH 2013:15). However, complementary short-term actions (addressing immediate causes of malnutrition) and medium-term interventions (such as nutrition education (NE)) should not be neglected.

The standard definitions of the WHO (WHO 2000) for adult underweight, overweight and obesity as measured by body mass index (BMI) are:  $\leq 18.5 \text{ kg/m}^2$ , 25 to  $<30 \text{ kg/m}^2$ , and  $\geq 30 \text{ kg/m}^2$  respectively. The results of SANHANES-1 (Shisana *et al.* 2013:136-140) indicated that SA females had a mean BMI of  $28.9 \text{ kg/m}^2$  with a prevalence of 24.8 percent overweight (27.9 percent in informal urban areas) and 39.2 percent obesity (35.3 percent in informal urban areas). In contrast, underweight was reported to be 4.2 percent (six percent in informal urban areas) and 31.7 percent normal weight (30.9 percent in informal urban areas) in females of all ages. The study showed an increase in overweight and obesity compared to the Dietary Health Survey (DHS) 2003. Both VAD (mean prevalence 13.3%) and anaemia (22%) were found amongst women in SA, reflecting moderate public health problems but showing an improvement from the National Food Consumption Survey (NFCS) in 2005 (Shisana *et al.* 2013:136-140,156,167).

A number of studies were performed in urban areas of the Vaal Region between 2002 and 2006 (Oldewage-Theron *et al.* 2005; Oldewage-Theron & Slabbert 2008). Results indicated the prevalence of poverty and household food insecurity, resulting in malnutrition, stunting and underweight in children, as well as micronutrient deficiencies throughout the lifespan. High levels of low literacy (Oldewage-Theron *et al.* 2005:13) and low nutrition knowledge aggravated the nutritional situation in that region.

NE is a tool that assists people in expanding their personal nutrition knowledge and in becoming motivated to adopt healthy and safe eating habits. It also helps to influence the public, encouraging people to select healthy foods by making informed choices and to address their own food and nutritional problems (WHO 2010:2). Proper NEPs that include households with young children can help reduce the risk of food insecurity in the community (Sharafkhani *et al.* 2010:388).

This study builds on the United Nation's Millennium Development Goal (MDG) 1, to eradicate hunger, as well as on the related goal of the empowerment of women (MDG 3), as part of human development through increased food and

nutrition knowledge and enhanced child care (UN 2006). It also fits into the comprehensive SA National Development Plan 2030 (NPC 2011:24), which is focused on the economic and non-income aspects of poverty and inequality as well as on ensuring food and nutrition security. Faber *et al.* (2011:21) state that nutrition security should be high on SA's development agenda to address this country's malnutrition challenge. In accord with Leach and Kilama (2009:6), who state that food intake is determined by the amount and quality of food available to promote food and nutrition security, the study aims to leave a permanent footprint in terms of better quality food choices. Once established, good food choices can be passed on from caregiver to children as secondary beneficiaries in this study, from generation to generation within families and households.

This research was tailored to a predominantly Sesotho culture and incorporated socio-demographic and cultural dynamics as determined in the preparation phase of the NEP in the community studied. When programmes are culturally sensitive and based on locally consumed foods, impacts are intensified (Shi & Zang 2011:98). In the past two decades a more holistic approach to food and nutrition security has emphasised the multidimensional nature of the challenge, including food, health and caring practices. These are classified as the immediate causes of malnutrition in the UNICEF conceptual framework (UNICEF 1998:24; Kruger *et al.* 2008:665).

In the urban setting of this study and within the nutrition in transition situation in SA (see 2.2.3.) the use of the South African food-based dietary guidelines (FBDGs) as a platform will make a valuable contribution to the body of scientific knowledge and experience in the design of NEPs aimed at helping less educated and poorer communities to make better food choices within their specific environment. Improving the nutrition knowledge of child caregivers regarding food choices, sanitation and common disease prevention should logically reduce malnutrition-related children's' diseases and deaths (Bain *et al.* 2013:117). Yousafzai *et al.* (2014:367-372) state that further investigations are needed into how to provide support to caregivers, enabling them to implement appropriate care, feeding and stimulation in combined interventions to help families in high-

risk settings. Children require food, stimulation, responsive care and interaction. Living in areas of concentrated poverty poses numerous risks to children, including developmental challenges (emotional, intellectual and behavioural) and physical health problems (Komro *et al.* 2011:111). Food security, sound child care and health form an encapsulated triad essential for optimal child development. Intervention strategies that can provide female child caregivers with social and emotional support are not only essential for their own well-being, but are also part of the critical pathway of care, resulting in improved growth and development for the child (Engle 2009; Ruel & Alderman 2013:540).

Alan Bergh argued in 1993 that, because of the lack of progress in reducing malnutrition, more focus should be placed on the 'how' and 'what to do' than on the 'why' and 'who.' He argued, "We want better understanding of the nuts and bolts of a programme and its cultural setting so that we can figure out how to make it work better ... Rarely do doctoral dissertations focus on broad-based applied research." These words still hold true today.

This study, therefore, aims to address the 'how to' by developing, implementing and evaluating an NEP for women in Boipatong in the Vaal Region. It is based on the South African FBDGs for people older than five years. In SA, the Department of Health (DOH 2008) developed the Integrated Nutrition Programme (INP) in 1994 to address the causes of malnutrition in the country. One of the key focus areas identified was NE. To enhance the implementation of this focus area, eleven country-specific FBDGs were approved in 2003 after extensive consumer testing (DOH 2008; UNSCN 2013:64). These were reviewed in 2012 by a team of expert nutritionists (Vorster *et al.* 2013a:s5-s12). Previous NEPs had not had much impact on the health/disease status of SA people and their food consumption patterns. Conflicting and confusing NE messages were given, independently or together, in a variety of food guides adapted mostly from westernised countries (Love *et al.* 2001:10).

In many countries around the world, the nutritional status of people has been improved by means of concerted NEPs. Examples of this include the Women,

Infants and Children (WIC) programme and school nutrition programmes in the United States of America (USA), which are to a large extent based on improving the knowledge of participants. Ritchie *et al.* (2010:s6) found that coordinated NE in WIC families can significantly influence the consumption of more healthful food choices. Similarly, Walsh *et al.* (2003:3) found that a community-based NEP contributed to the knowledge of balanced economical nutrition and dietary practices in low-income communities in the Free State and Northern Cape provinces in SA. In a study undertaken by Peltzer (2004:24) in urban areas in the Limpopo Province, results showed a reasonable knowledge of dietary recommendations and sources of nutrients, but participants were less knowledgeable about the diet–disease relationship, and about choosing everyday foods that are healthier. Also, black women had a significantly lower level of nutrition knowledge than their white female counterparts.

The rationale for this research intervention with its community-based capacity-building approach is that Boipatong is situated in a poverty-stricken area in the Vaal Region of Gauteng (Oldewage-Theron & Slabbert 2008:4; Oldewage-Theron *et al.* 2006:803; Acham *et al.* 2012a:24). The development of a tailored NEP with complementary NE material translated into Sesotho could reinforce nutrition messages in the home language of most of the community members. NE is a tool that assists people in expanding their personal knowledge and in becoming motivated to adopt healthy and safe eating habits. It also helps to influence the public, encouraging them to select healthy foods by making informed choices and to address their own food and nutritional problems (WHO 2010:2). Proper NEPs that include households with young children could help to reduce the risk of food insecurity in the community (Sharafkhani *et al.* 2010:388).

Good nutrition starts in the womb and should be maintained throughout one's lifespan to enable one to live a healthy and productive life. It is the parents and the child caregivers who are directly responsible for providing food and proper meals, nursing sick children, and delivering stimulation with appropriate care and interaction (Burgess *et al.* (2009:vii); Yousafzaki & Aboud 2014:40). Thus, improved nutrition knowledge of child caregivers could lead to improved food

choices in future generations in the Boipatong area. Such an approach has the potential to influence the underlying nutritional, social and care determinants of health in a flexible, sustainable and safe manner.

#### **1.2.6. *The nutrition education programme***

A literature study has indicated NE as a suitable strategy for addressing malnutrition and poor food choices. NE is part of human capital development and, as such, must address the development of knowledge and skills to meet the changing needs of people coping with transition and poverty in order to improve households' standard of living and quality of life (Alderman 2009:20-25). After assessing information obtained from the baseline study, it was decided to develop and implement an NEP for the older child caregivers in Boipatong. If children are to develop to their full potential, ongoing parental care and support of families, communities and caregivers are crucial (Mejia *et al.* 2012:163-4).

Child caregivers, who are predominantly female, are frequently more exposed to nutrition problems and food insecurity because of their low economic status. In many places, food prices are high and many households have difficulty in buying enough food or enough different sorts of food for a healthy diet. The main reason for food insecurity is a lack of money, often worsened by a lack of information on how to choose food with the best value (Burgess *et al.* 2009:24). The empowerment of women is also entrenched in the SA NDP 2030 (NPC 2014:33). Lessons learned about NE as a strategy in this study could lead to the development of similar programmes tailored to the particular eating habits and written in the home languages of the various cultures found in SA. Such NEPS could be fruitfully utilised by many healthcare workers.

#### **1.2.7. *The cost benefit of investing in nutrition***

One of the key messages of the FAO (2013b) report is that malnutrition imposes unacceptably high costs on society in human and economic terms. The health consequences of inadequate nutrition are enormous, both in financial terms and in loss of quality of life. Malnutrition in childhood is known to have important long-



term effects on the work capacity and intellectual performance of adults (Bain *et al.* 2013:116). Malnutrition slows the economic growth of a country and can contribute to poverty in three ways:

- Poor physical status, contributing directly to productivity losses
- Poor cognitive function and deficits in schooling, contributing to indirect losses
- Losses as a result of increased health care costs (World Bank 2006:2)

Vorster (2010:2) argues that because of the interrelationships between poverty and malnutrition, it is important to have a nutrition intervention component in every poverty alleviation programme. Poverty as a cause of malnutrition is where household food and nutrition insecurity exists because of a multitude of economic reasons, as indicated in the basic and underlying factors (see Figure 1.2) of the UNICEF framework (Vorster 2010:1).

The economic costs associated with malnutrition are thus substantial and can be as high as two to three percent of the gross domestic product (GDP). Investing in nutrition is as much an issue of economics as one of welfare, social protection and human rights, and should be addressed (World Bank 2006:2). Improving nutrition is pivotal for economic growth. Income growth and food production programmes, coupled with birth-spacing and the education of women, are important for decreasing malnutrition, but these are all long-term solutions. Solutions in the medium term include the provision of NE together with services such as basic maternal and child services (World Bank 2006:2). However, poverty has to be seen in a broader perspective as encompassing more than low consumption and low income. Culture and social status form the core of a sociological view of poverty. Poverty can also be viewed in terms of human rights, education, unstable employment, health, nutrition and well-being, as well as a lack of empowerment, low job status and low security (Mauder *et al.* 2008:8–10).

Poverty as an effect of malnutrition has to do with an inability, due to ill health, to be productive enough to earn a living wage. (Vorster 2010; Bain *et al.* 2013:115). Chronic, severe poverty has lasting harmful effects on society. It results in hunger, malnutrition, poor physical status and increased healthcare costs (Oldewage-Theron & Slabbert 2010:5). The World Bank (2006:2) has indicated that poor health due to hunger can contribute to a two to three percent loss in the gross domestic product (GDP). The debate around poverty is ongoing worldwide. Food insecurity has a substantial impact on the physical, social, and psychological status of individuals in poor communities (Sharafkhani *et al.* 2010:385).

Nnakwe (2009:123–4) states that “poverty has become a women’s issue” and that women have less access to jobs in the formal market, less access to basic education, work irregular hours (often on weekends and at night), receive only one tenth of the world’s income, and own less than one percent of property. In one third of households worldwide, women are the sole breadwinners. Caregiving is a major role for women throughout their lives. About 72 percent of unpaid family caregivers are women, the majority of whom are middle-aged.

Women are often more vulnerable to nutritional problems because of their lower social and economic status, which results in hunger, a lack of shelter, and illiteracy. Gender equality and food security could contribute significantly to efforts to improve the nutrition and health status of women (McFerson 2010:50; Patel 2012:1). In SA, scientific explanations providing a good understanding of the position of women and food security are still lacking. Evidence thus far indicates that women should be considered more vulnerable to food insecurity in SA because of their socio-cultural and political standing and limited access to and control of resources (income, land, water, support systems) when compared to men. Therefore, generic policies to address food insecurity might be inappropriate (Altman *et al.* 2009:6).

The first Millennium Development Goal (MDG-1) acknowledges a close relationship between poverty and malnutrition when it addresses “the eradication

of poverty and hunger”, declaring that poverty and food and nutrition security should be addressed simultaneously (UN 2006). The immediate, underlying and basic causes of malnutrition are generally accepted as being dimensions of poverty (UNICEF 1990; Vorster 2010:1).

### **1.2.8. The relation between poverty and malnutrition**

Poverty has generally been described by means of three themes, namely ‘basic needs’, ‘multidimensional’ and ‘deprivation’ (Misturelli & Hefferman 2011:S3). Ahmed (2004) unites economic and sociological views when he measures poverty by the following dimensions: income, food poverty, assets, consumption, capability (health and education), well-being, and safety and hygiene (Table 2.1).

**Table 1.1 Poverty indicators and socio-demographic correlations**

Poverty indicators (dependent variables)	Socio-demographic correlations
<ul style="list-style-type: none"> <li>• Income per household (employment, number contributing, frequency of shortage in income)</li> <li>• Assets (type of dwelling, number of rooms, electrical appliances available)</li> <li>• Consumption (household expenditure on food)</li> <li>• Capability (health status, emotional and physical well-being, educational level)</li> <li>• Safety and hygiene (source of energy, access to safe water and sanitation, waste removal, rodents)</li> <li>• Food (nutrient) intake</li> </ul>	<ul style="list-style-type: none"> <li>○ Gender</li> <li>○ Age</li> <li>○ Marital status</li> <li>○ Household size</li> <li>○ Occupation/Role in the household</li> <li>○ Geographic location</li> <li>○ Responsibility for monetary decisions</li> <li>○ Permanent residents in the household</li> <li>○ Children in the household</li> <li>○ Length of stay in the house</li> <li>○ Responsibility for food procurement decisions, food preparation, feeding</li> <li>○ Number of meals enjoyed in the house per day</li> <li>○ Procurement (frequency of shopping, supplier)</li> </ul>

(Source: Adapted from Ahmed 2004).

Certain groups, by virtue of their gender, age, health status or disability, are more susceptible to vulnerability. Living standard measures (LSM) also provide information about socio-demographic characteristics, segmenting target groups

into fairly homogeneous groups in SA. The population is divided into ten groups (LSM1–10, with LSM1 being the lowest group), based on 29 variables (Behr & Ntsie 2008:338; Bureau of Market Research (BMR) 2005). Differences exist between countries with regard to how living standards are viewed. Narayan *et al.* (2000:21–45) identified some universal characteristics as follows: having adequate food and assets, having work from which to derive an income, being healthy and well, having self-respect, raising and caring for a family, experiencing peace and harmony, experiencing a safe environment, having freedom of choice, and being confident about the future.

SA is ranked as an upper-middle-income economy by the World Bank (2011), and is considered to be a newly industrialised country. In 2000, when SA became a signatory to the United Nations' MDGs, it undertook to halve the proportion of people who suffer from hunger (NPC 2011). Most of the urban poor are engaged in informal sector activities as they lack adequate education and skills, face relatively poor working conditions, are subjected to social stratification, and are the most vulnerable to economic shocks and health inequity (WHO 2008:1-4).

Crush (2011:291) reported that 70 percent of SA's poor households experienced 'significant' and 'severe' food insecurity. Although food secure at the national level, a large proportion of the population is food insecure with an unequal distribution of income, with the poorest 40 percent of the population receiving less than seven percent of household income (Faber *et al.* 2011:22). The poverty headcount for SA is 56.8 percent, with females (58.6%) still more impoverished than males (54.9%) in SA.

The urban divide that characterises many modern African cities as places of great inequality between the haves and have-nots is the result of locally specific conditions and broad trends in African history, including colonialism, land alienation, and post-colonial dictatorships (Riley 2012:13). Cohen's projections (2006:70–78) on trends in urbanisation in developing countries predicted that by 2030 the world's urban population would be around 61 per cent of the total population, compared to a projection of 70 percent for SA by Frayne (2009).

Urban areas in SA generate 85 percent of all economic activity. The urban system is a complex network where different areas require a distinct approach (NPC 2012:237). The trend for urbanisation seems to be growing at an increasing rate. This will create major challenges for metropolitan areas with regard to living conditions, infrastructure, accompanying environmental health issues and sustainable development.

One in five people in developing regions still lives on less than \$1.25 per day (UN MDG report 2014:4, 8). In SA, 7.4 percent of the population (2011) is reported to live below the poverty line of \$1.25 per day. Despite the target of 8.5 percent for MDG1 being met earlier than the set date of 2015 (SA MDG Rport 2013:26), the battle against hunger and malnutrition will be continued globally post-2015 in the proposed 17 Sustainable Development Goals (SDGs) that are currently being debated to be reached in 2030 (UN 2015). The large inflationary trend in food prices observed since 2008 is an example of short-term shocks that have a major effect on the food security (including both the quantity and quality of food) of those people surviving in poverty (FAO 2013b:13-14, 29).

City dwellers are mostly consumers, not producers, of food. Food purchases form the largest part of the household expenditures of the urban poor (World Bank 2007b). Cash is the primary source of urban food security in SA (Frayne *et al.* 2014:17). The combined processes of rapid urbanisation and globalisation of food trade (production and distribution) have resulted in rapid changes in the SA food environment (Igumbor *et al.* 2012). Among the myriad of social problems urban food insecurity is a concern because urban households are increasingly squeezed between rising food prices and stagnant or deteriorating real incomes (Crush 2011:285-6).

The food poverty line was R148 in 2000 and R209 in 2006 (SA–MDG report 2010). In 2014 terms, poor households spent an average of R8 485 per annum (R707 per month) on food, which accounted for roughly 34 percent of their total household expenditure. This contrasts sharply with non-poor households, who spent an average of R14 020 on food per annum (R1168 per month). This

constitutes only 10% of their total household expenditure (SASTATS 03 April 2014).

### **1. 3. AIM AND OBJECTIVES OF THIS STUDY**

The purpose of this study was to develop, implement and evaluate an NEP to improve the nutrition knowledge and dietary intake of child caregivers in the district of Boipatong, within the Vaal Region of Gauteng, SA.

#### ***1.3.1. Study objectives***

This study focuses on NE as an intervention strategy to address malnutrition. The NEP developed and implemented was based on the 11 South African FBDGs.

By using the Food and Agricultural Organisation (FAO) framework for planning nutrition promotion and education programmes for the public (see Figure 1.3 for the FAO framework) (FAO & ILSI 1997), it was determined that the specific objectives of this project were to:

- 1.3.1.1 determine a socio-demographic profile and the perceived health status of caregivers of children (5-15 years) in a situational analysis in the preparation phase (Chapter 3);
- 1.3.1.2 assess the existing nutrition knowledge, food consumption patterns and dietary intake of the child caregivers as part of the situational analysis (Chapter 3);
- 1.3.1.3 determine the acceptability to and understanding of the child caregivers of the existing South African FDBGs (2003) pamphlets produced by the South African Department of Health (DOH) (Chapter 4);
- 1.3.1.4 develop (Chapter 4) a community-based, culturally tailored NE intervention based on the South African FDBGs, to improve nutrition knowledge in the sample of child caregivers;

1.3.1.5 develop and tailor NE material for Sesotho-speaking child caregivers to support the NEP (Chapter 4);

1.3.1.6 implement the NEP (Chapter 5) and measure the child caregivers' short-term change in nutrition knowledge at each session of the NEP (Chapter 5); and

1.3.1.7 evaluate the medium-term impact of the NEP on the child caregivers of children (5-15 years) in terms of nutrition knowledge, dietary intake and perceptions regarding the impact of the NEP (Chapter 6).

### **1.3.2. Unit of analysis**

Sesotho-speaking female caregivers of children aged 5-15 years from the Sesotho culture, living in the township of Boipatong and belonging to the Boipatong Care Centre and/or the Boipatong Interdenominational Women's Prayer Group.

### **1.3.3. Study area: *The township of Boipatong***

This research study was undertaken in Boipatong, next to Sharpeville in the Vaal Region. This is an industrial area situated approximately 70 km south of Johannesburg, the largest metropolitan city and economic hub of SA. Yet the Vaal region has a 48 percent unemployment rate and 46 percent of the households live in poverty (McIlrath & Slabbert 2003:5). A previous survey in the Vaal Triangle indicated that urban poverty is associated with poor food choices (Oldewage-Theron *et al.* 2005a:13). This is indicative of malnutrition in the area.

Boipatong was established in 1955 to house black residents who worked in this industrial area. Boipatong means 'the place of hiding' in Sesotho. Along with other surrounding townships (Sharpeville and Sebokeng), it was a pool of cheap labour for the steel industry, then known as ISCOR. Today it is a small township consisting mostly of brick houses, with an ageing population of pensioners existing on government pensions. Nowadays, young unemployed couples (and their children) move in with their parents, which give rise to poverty. Sometimes

the pensions of the elderly have to serve as an income for these extended families (Catholic mission 2012).

The non-governmental organisation (NGO), Sharpeville Care of the Aged, who oversees matters of the aged in the townships of Sharpeville and Boipatong, contacted the Centre of Sustainable Livelihoods, Vaal University of Technology (CSL VUT), for research assistance at the Boipatong Day Care Centre in the Vaal Region. A group of female volunteers, who were mostly caregivers (>40 years) of children (5-15 years) in the Boipatong community, assisted in providing food to needy children in the community at this centre. These women provided food to approximately 500 children from 200 households on Wednesdays after school. Some of the children had lost their parents to HIV/AIDS and related diseases. The food was donated by sponsors and companies around the Vaal Region.

The situational analysis in the preparation phase (Chapter 3) was completed successfully at the Boipatong Care Centre. Proper feedback was given to the non-governmental organisation, Sharpeville Care of the Aged, who had initiated the research. A follow-up study was discussed and approved by means of a participatory approach to design a culturally sensitive region-specific NEP to address the specific nutrition needs of this community. Unfortunately, the home from which this project was launched and which was centrally situated near schools in the Boipatong area became unavailable in the following year. Also, the effects of the global slowdown in the economic climate were felt in the industrialised Vaal Region. Donations from companies in the area became scarcer and it became unsustainable to continue feeding the children.

Some of the caregivers who had been participants in Phase 1 approached the researchers and suggested that the research project be transferred to the auspices of the Boipatong Interdenominational Women's Prayer Group (BIWPG), of which they were also members. The effects of such a decision were evaluated by all the stakeholders and it was agreed to carry on with the research in the new



setting. Since the women's group was from the same community, their socio-demographic profile remained unaffected.

The sample in the formulation phase (Chapter 4), the implementation phase (Chapter 5) and the evaluation phase (Chapter 6) of the study was therefore drawn from members belonging to the BIWPG who had previously also belonged to the Sharpeville NGO. There was a change in the governing structure as means of communication and organisation. Venues changed from the Day Care Centre to churches in the Boipatong District. This caused an increase in the age of the sample in the preparation phase from median 44 (IQR 32-62) to 63 (IQR 52-73) years of age in the formulation, implementation and evaluation phases. As the main objective of the preparation phase was to compile a profile of the caregivers of children (5-15 years) in Boipatong, the research team decided to restrict the rest of the research project to female child caregivers older than 40 years of age, of the Sesotho culture and belonging to the BIWPG. Younger caregivers performed odd jobs and indicated that they would not be able to attend the discussion sessions on a regular basis. *The situational analysis (Chapter 3) was used to inform, but not measure results in the rest of the study.*

Oldewage-Theron *et al.* (2005b:24) and Oldewage-Theron and Slabbert (2008:93) undertook research studies in the Vaal Region, where it was found that 58 percent of the households in the area earned an income of less than R1 000 per month, which indicated at that stage that those households were living in poverty. However, no previous studies have been published about the situation in Boipatong. This study will thus contribute new knowledge regarding the situation in Boipatong. A map of the area where the study was undertaken is shown in Figure 1.1



**Figure 1.1 Map of Boipatong (Google map)**

Economically, SA is considered a developing country. Daunting economic problems with regard to poverty and economic empowerment among the disadvantaged remain in the post-apartheid era. Several studies undertaken in SA (Oldewage-Theron *et al.* 2006:795; Steyn *et al.* 2006a:645) indicate that urbanisation has not necessarily brought about a reduction in poverty or an improved nutritional status. The purpose of this study was, therefore, to provide NE, and develop supportive written NE material based on the SAFBDGs 2012 for the caregivers of children in Boipatong, according to their needs and with their participation. The unit of analysis was the individual child caregiver.

#### **1. 4. RESEARCH QUESTION**

Will a community-based NEP, developed, tailored and implemented to improve the nutrition knowledge and dietary diversity of female child caregivers in Boipatong in the Vaal Region, be effective as an intervention strategy as compared to a control group in the longer term?

The above question was tested empirically to evaluate both the process and the changes in short- and medium-term knowledge and dietary intake as part of the SANPAD project in the Vaal Region in the experimental group of child

caregivers. A control group of child caregivers with socio-demographic profiles similar to those of the experimental group was used.

Insights and impressions of the child caregivers regarding the effect of the NEP were evaluated qualitatively in two focus groups in the experimental group.

The detailed methodology will be discussed separately in each phase of the study, as this varied between the different phases of the NEP.

## **1. 5. ETHICAL CONSIDERATIONS**

The Research Medical Ethics Committee for research on human beings at the Witwatersrand University approved the ethical considerations for this study (R149/49) (Annexure A). All participants were invited to participate and they signed a letter of consent before their inclusion in the study. Personal information gathered from participants during the study was treated with respect and confidentiality. Participation was voluntary and respondents could withdraw from the study at any time.

Throughout the study, the researcher followed the ethical guidelines for research on human beings of the SA Medical Research Council (MRC) as well as the guidelines set out by the Helsinki Agreement. Only those respondents who completed informed consent forms were used for the baseline survey.

### ***1.5.1. Permission to conduct this project***

Permission was obtained from the management of the Boipatong Day Care Centre, managed by the Sharpeville Care of the Aged, the Boipatong Women's Interdenominational Prayer Group (WIPG) and the ministers of the various denominations of the different churches in Boipatong. Visits were made to these community organising structures in Boipatong and a planning meeting with all stakeholders was held to discuss the study with the managements. The objectives of the study were discussed at that meeting, as were the methods to be followed. A meeting with the child caregivers followed to explain all the procedures and to obtain informed consent from them. Upon obtaining their

consent, all communication was channelled through the executive committees who actively participated throughout the study.

### ***1.5.2. Intellectual property rights***

This study forms part of the larger Sharpeville/Boipatong Integrated Nutrition Project and was a team effort. The intellectual property right of the study belongs to the Vaal University of Technology (VUT).

## **1.6. FRAMEWORKS USED IN THIS STUDY**

The frameworks used in this study were the framework of malnutrition of the United Nations International Children's Emergency Fund (UNICEF) (as discussed in par. 1.6.1) and the framework for an NEP of the Food and Agriculture Organisation (FAO 1997) mentioned in par. 1.6.2.

### ***1.6.1. The conceptual UNICEF framework for malnutrition***

In 1990, the United Nations Children's Fund (UNICEF) introduced a conceptual framework to foster common intersectoral understanding among members of a community of diverse scientific perspectives, enabling them to view malnutrition through a common lens (Menon 2012:282), and to provide a guide for assessment, analysis and action (UNICEF 1990; Levitt *et al.* 2009:156) in the combating of malnutrition. The general usefulness of the UNICEF framework stems from its generic nature, concentrating on the causality of malnutrition at the different levels of basic causes of malnutrition in society, underlying causes (related to families and households) and immediate causes (affecting individuals). The framework also draws attention to the multisectoral challenges and to a human rights approach to nutrition strategies (Menon 2012:285; Maunder *et al.* 2008:5–6). The conceptual framework recognises that hunger and poverty are complex and interrelated. It further recognises that food security alone is not sufficient to sustain good nutritional status and that health status and child care must complement food intake (Gross *et al.* 2000). However, the framework has not been applied much outside the field of nutrition, resulting in

ongoing biases that influence assessment, analysis and actions related to nutrition (Levitt *et al.* 2009:156).

Allen and Gillespie (2001:4) used this framework as an organising framework for debating aetiology and remedial intervention to combat malnutrition throughout the lifecycle. The same approach was followed in this study to include relevant underlying causes in households and the community.

The framework was adapted by Ruel and Alderman (2013:537) to include nutrition sensitive interventions and nutrition-specific interventions to vulnerable groups such as those with lower incomes or with less access to adequate food. A nutrition-specific intervention was addressed in this study as part of the NEP that was developed, implemented and evaluated.

The conceptual UNICEF framework forms an integral part of the NEP developed in this study and emphasises the important role of the caregiver in the underlying causes and consequences of malnutrition. The NEP specifically addressed inadequate access to food in the household due to a lack of nutrition knowledge and nutrition information. Complementary NE material in the form of a booklet was tailored to the predominant ethnic culture in the region. It is clearly essential to combine all the underlying causes in a behaviour change communication strategy. Since synergies between these factors exist, they should be addressed in the design of the NEP so that the combined effects are more than the sum thereof.

Underlying causes of malnutrition in the household and at the community level include household food insecurity, inadequate care, an unhealthy household environment, and a lack of health services (UNICEF 1998:23-29). The concept 'care' was conceptualised as a set of behaviours that converted resources at the household and community level into food and caring practices for household members, including the children. In addition, the immediate, underlying and basic causes of the UNICEF framework have all been documented and defined as dimensions of poverty (Vorster 2010:1).

#### 1.6.1.1. Immediate causes of malnutrition

At the most immediate level, nutrition outcomes are determined by the food and nutrients intakes and the nutrient losses due to acute or prolonged illnesses. The immediate causes are inadequate dietary intake, psycho-social stress and trauma, as well as disease, leading to high infant mortality. In SA, these 'diseases of poverty' account for 20 percent of all deaths in children under five years of age (Matji 2008:842).

#### 1.6.1.2. Underlying causes of malnutrition

The underlying causes include 1) inadequate access to food in a household 2) inadequate care for children and women 3) the poor education and nutrition knowledge of caregivers and 4) insufficient health services and an unhealthy environment (Menon 2012:288).

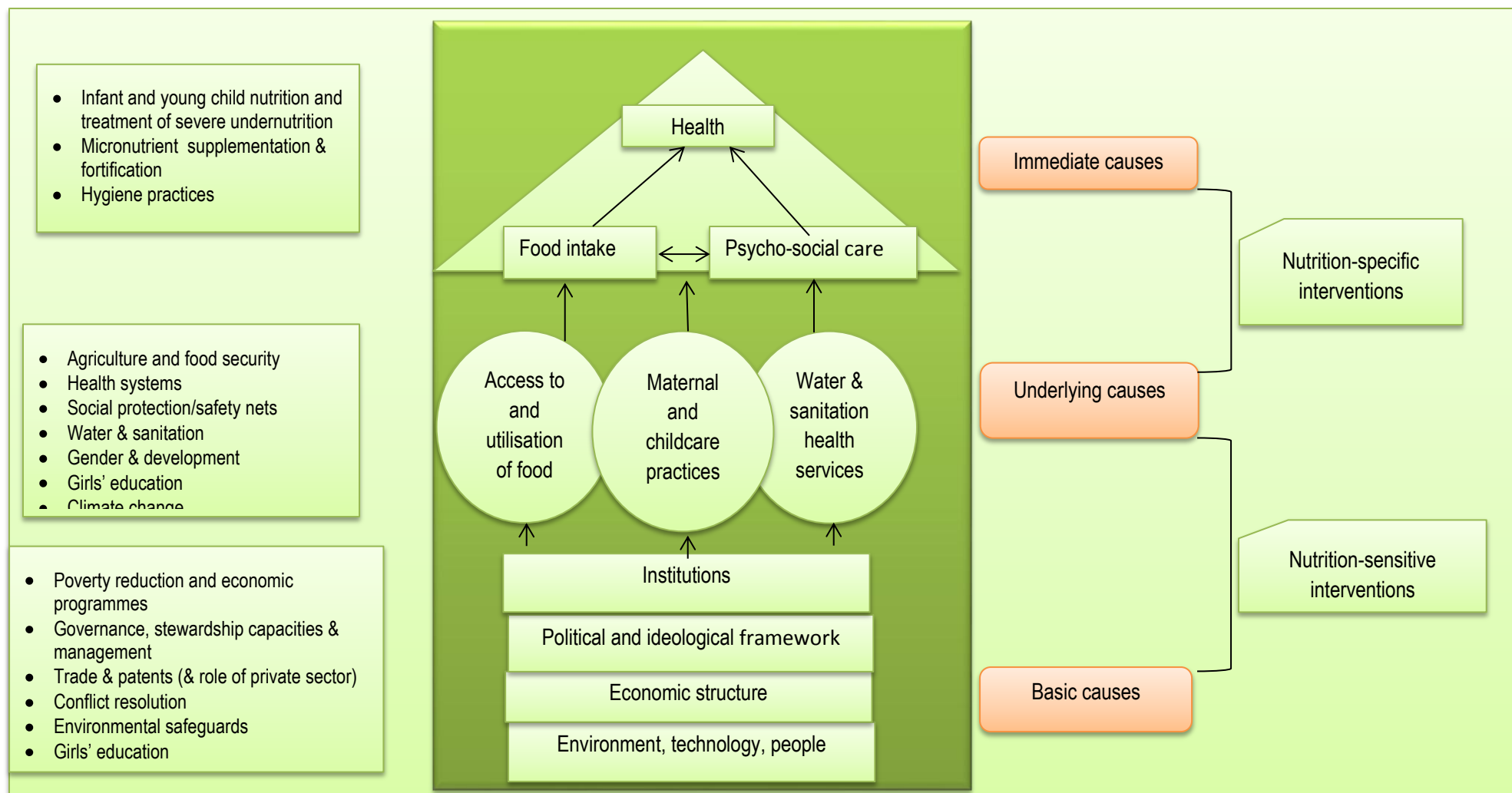
Inadequate or inappropriate knowledge limits household access to vital resources (Nnakwe 2009:127; Burgess *et al.* 2009:80–83; WHO 2010:2). Household food insecurity predisposes family members to protein and/or energy or micronutrient malnutrition. Another factor that also contributes largely to malnutrition is poor environmental sanitary conditions (UNICEF 1998:23-31; Maunder *et al.* 2008:01–06; Burgess *et al.* 2009:80).

Engle *et al.* (1999:1309) unpacked the 'care' component, highlighting underlying and societal causes that may compromise the ability of women as the primary caregivers of infants and children to provide care for themselves and their children. A lack of physical, emotional and intellectual stimuli is critical to poor growth and development of children, but family well-being is dependent on the nutritional and physical well-being and intellectual capacity of the adults (Pena & Ballacoo 2002:242). The ways in which caregivers interact with children and act as role models and teachers for them have a significant effect on children's overall development and health. They are also important gatekeepers for health, hygiene and the provision of healthy food (Komro *et al.* 2011:125).

#### 1.6.1.3. Basic causes of malnutrition

A broader understanding of the different types of resources necessary for good nutrition is required (UNICEF 1998:33). The use of available resources is determined by leading economic, ideological and political conditions. Basic causes include poverty and other inequalities, urban pressures, the political instability of a country and natural disasters (Matji 2008:842). The use of potentially available resources is determined by the political, cultural, religious, economic and social systems of a specific country or community, including women's status (Nnakwe 2009:126).

Using the UNICEF malnutrition framework (Figure 1.2) as a guide, existing conditions in Boipatong were analysed in a formative assessment. These community-level data were obtained in a sample baseline study.



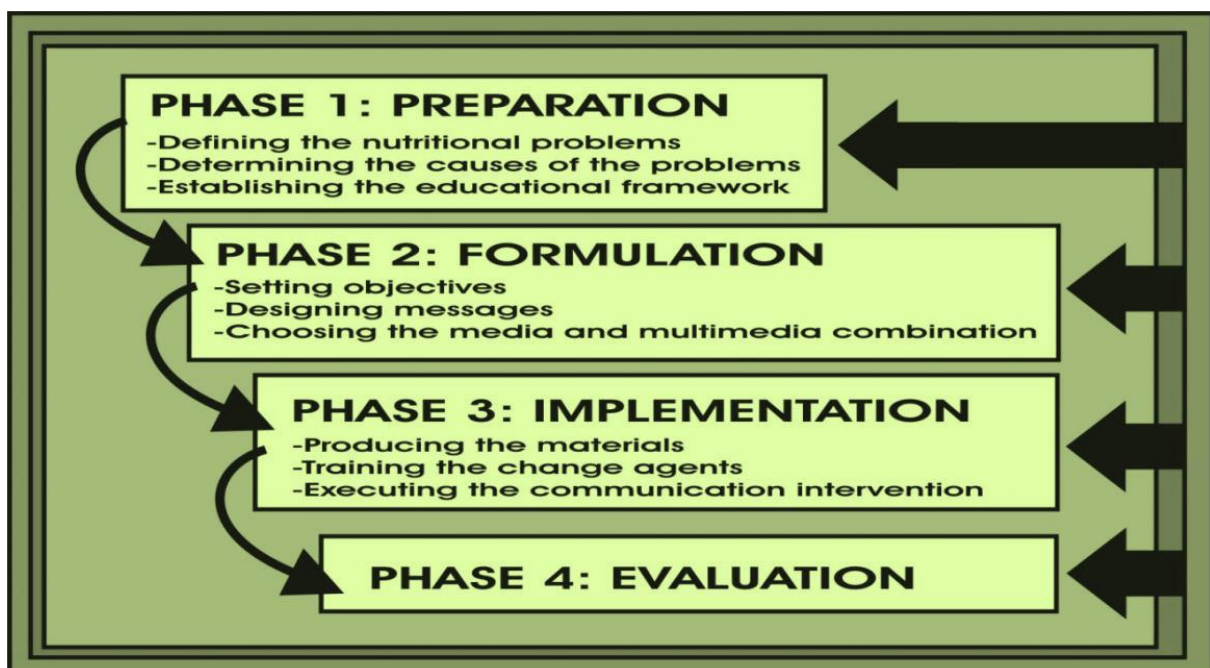
**Figure 1.2 Adapted UNICEF Conceptual Framework of Malnutrition** (Sources: UNICEF 1998; Ruel & Alderman 2013; World Bank Draft 2011; Menon 2012)



### **1.6.2. The FAO framework for the development of nutrition education programmes (1997)**

Many conceptual frameworks have been designed to guide the effective planning and execution of a programme. According to Nnakwe (2009:245), a programme is a collection of activities to produce a particular outcome. Various suitable frameworks, approaches or models could be followed to provide structure to the programme. The fundamental question of finding the most effective delivery method for community NE is still unsettled. In community nutrition there are three broad phases: programme planning, programme implementation and programme evaluation, with high-quality health and well-being as the ultimate outcome.

The framework decided on for this study is that of the FAO. It consists of four phases: the preparation, formulation, implementation and evaluation phases. The four components of the programme should be seen as interdependent. The framework is based on a continuous feedback and evaluation process. It is generic and integrative in that it allows for the incorporation of different theories and approaches. The framework can be utilised in smaller settings (subgroups) so that the NEP is able to reach people where they work, live and play. The framework calls for community participation in the development of the NEP (Smith & Smitasiri 1997:10). The NEP framework for this study is shown in Figure 1.3 below.



**Figure 1.3 NEP framework (Adjusted from FAO 1997)**

Once the nutritional problem(s) and causes have been defined, the programme can be categorised into one of two broad categories: health enhancement or reduction of risk factors (Nnakwe 2009:246).

The phases of the NEP should be seen as *interactive* and the different parts as *interdependent*. The NEP should have as its aim to address health, well-being and disease-prevention simultaneously (Smith & Smitasiri 1997). Programme planning is not always a logical and linear process (Behr & Ntsie 2008:328; Nnakwe 2009:246).

#### 1.6.2.1. Preparation phase

The starting point of the preparation phase is the analysis of nutrition issues for specific smaller groups. The preparation phase is important, but often neglected when designing NE interventions (Lutter *et al.* 2013:102). Poverty and socio-demographic factors must be taken into account when designing the programme.

When developing programmes, nutrition messages should be crafted on local practices and informed by the social norms, cultural beliefs and environmental factors of the community to influence behaviour effectively (Lutter *et al.* 2013:102). Matji (2008:315) states that it is important to determine the current nutrition knowledge and dietary intake of the group concerned before planning and implementing an NEP. In addition, social and behavioural change communication to promote healthy eating is central to any NE intervention (Lutter *et al.* 2013:101).

#### 1.6.2.2. Formulation phase

During this phase, networking with the identified secondary and tertiary targeted groups should start. They should participate throughout this process in order to be involved. These target groups might also need some training in nutritional aspects, and also management training for leadership in the programme (Smith 1997; Makanjana 2006:39). Also, in this phase an action plan and suitable communication strategy, based on the outcomes of Phase 1, should be described. When an educational method is selected, the needs of the target group should be taken into consideration. Clear objectives must be defined. This phase includes: a) setting of objectives for the NEP, b) designing the messages and materials developed and field-tested and c) choosing the media. All communication activities should be integrated with each other (FAO 1997).

#### 1.6.2.3. Implementation phase

The implementation phase is characterised by the production of the support material. To communicate the messages effectively, implementers of the strategy need to be adequately trained on the message content and the techniques (FAO 1997). During this phase paired t-tests delivered results of the pre- and post-tests at each session of the NEP. A short-term control group was not practical in this study, as participants could not be deterred from attending the prayer meetings since discussions formed an integral part of the prayer meeting. No measurements were done in the control group in the short-term evaluation, as they were not subjected to any intervention (Erhlich & Joubert 2014:91).

#### 1.6.2.4. Evaluation phase

It is important for nutrition educators to know whether the intervention achieved its stated goals, whether the messages and content were suitable, and what lessons were learned; what worked and what not (Johnson *et al.* 2011). Monitoring and evaluation are essential parts of any NEP. They have two main functions: to improve and develop programme activities as they are carried out (formative evaluation and monitoring) and to measure the outcome of an activity (summative/outcome evaluation). Continuous evaluation and feedback are necessary to redefine strategies and actions during the course of the project (FAO 1997). The evaluation phase derives its legitimacy from the existence of the planning phase. A common methodology to evaluate impact of a programme is the 'before-after intervention analysis', which means that data collected at the beginning (before project implementation) are compared with data collected at some point after project implementation (Levinson *et al.* 1999a:61-2).

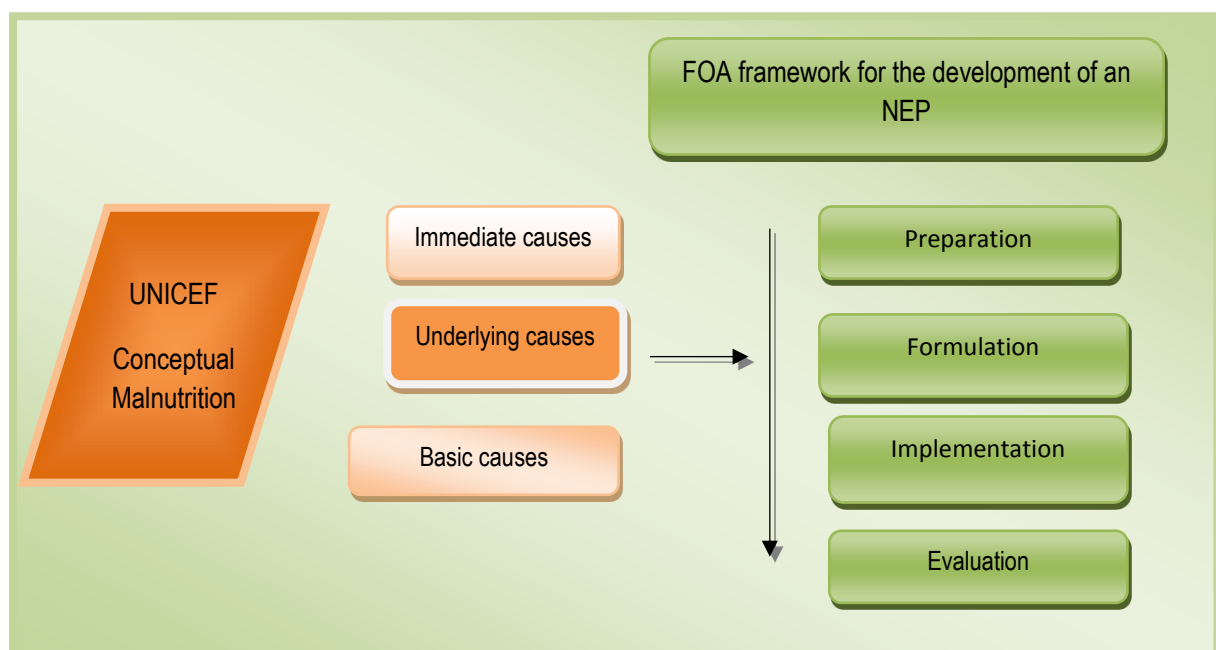
In this study, longer-term evaluations compared nutrition knowledge (a) before and after intervention data in the experimental group and control groups, and (b) utilised a non-randomised control group that was considered acceptable for field-based nutrition projects (Levinson 1999:63) to determine the impact of the intervention. No 24-hour recall was done in the control group as dietary intake was not expected to change much in the medium term. A brief survey of the recent literature showed that the evidence for the influence of nutrition knowledge on dietary intake in the medium term is mixed (see section 2.5). It is also known that dietary intake is also subjected

to confounding factors such as family traditions and personal preferences that would cloud scientific conclusions (Ehrlich & Joubert 2014:91).

Summative evaluation provides retrospective information about the performance of the NEP (Nnakwe 2009). From the empowerment view of the NEP, a social development programme pays attention mainly to the effectiveness of the development programme. It answers questions about:

- Why do we do it? What the programme is doing in terms of enablement?
- How well it is doing? Is it worth doing in terms of resources applied (monetary and human capital) and what is the value added?
- What do we do with the results? What are lessons learned from the implementation of the programme that could be applied to other programmes?

This research study took place in four phases, as depicted in Figure 1.4, utilising both the UNICEF framework, mainly for guiding the underlying causes of malnutrition, and the four phases of the FOA framework in the development of the NEP.



**Figure 1.4 Illustration of the application of the FAO (1997) and UNICEF (2004) frameworks in the design of the NEP for child caregivers in Boipatong**

The FAO framework for developing an NEP as a framework was utilised in the design of this thesis as part of the vertical process. The UNICEF framework was

used as a horizontal guide for the causes (with special attention to the underlying factors) of malnutrition in the development of the NEP (Figure 1.4).

## **1.7. STRUCTURE OF THE THESIS**

This thesis is divided into seven chapters. The content of the remaining chapters of the thesis is briefly described below.

**Chapter 2** provides an overview of the literature on malnutrition and the dynamics of poverty, explores different nutrition interventions, and then turns to NE specifically as a strategy.

**Chapter 3** covers Phase 1, the preparation phase of the NEP, according to the FAO framework. The results of a socio-demographic, self-assessed health status, as well as food intake and existing nutrition knowledge are presented in a situational analysis to develop a profile of the Boipatong community. Preferences regarding options for the format of an NEP for this area are given. These data were utilised to serve as a basis for the NEP to be developed during the formulation phase.

**Chapter 4** deals with Phase 2, the formulation phase of the NEP, namely the setting of objectives and deciding on the messages for the NEP. The chapter includes results of the testing of existing South African DOH NE material and the understanding of text and images of a sample of child caregivers in Boipatong. The results informed the further development of the tailored NE material for this research project. Lesson plans were designed and a booklet consisting of four of the SAFBDGs (2012) was designed in English and then translated into Sesotho. The process of producing and pre-testing the NEP and newly designed NE material in a pilot setting is discussed.

**Chapter 5** outlines Phase 3, the implementation of the NEP. Lesson plans were implemented and discussion groups run. Changes in short-term knowledge retention in the experimental group were determined by means of structured questionnaires. Results regarding short-term knowledge changes of the experimental group at each NE session in a pre- and post-test are provided.

**Chapter 6** is devoted to Phase 4, the longer-term evaluation of the NEP. Dietary intake and nutrition knowledge were assessed before commencement of the NEP intervention and compared with after-intervention data in order to assess the longer-

term impact. The results of the before- and after-intervention assessments are presented and discussed.

Perceptions of the caregivers regarding the NEP and NE material developed were evaluated by two focus groups. The results of qualitative research probing participants' perceptions regarding the impact of the NEP were analysed and presented.

**Chapter 7** concludes the NEP with an overall discussion of results, findings, the limitations of the study, conclusions and recommendations for future investigation. Recommendations are offered based on lessons learned during the study and suggestions made for further research.

The information displayed in Table 1.1 gives a synopsis of the activities in each phase of the NEP as undertaken in this study, utilising the adjusted FAO (1997) framework (Figure 1.3). Research participants and research tools, the type of research and sample sizes in each phase are indicated.

A conceptual framework for this research project is presented in Figure 1.5 to organise the processes of preparation, formulation, implementation and evaluation of the NEP so as to conduct and report on the empirical research study in this thesis.







**Table 1.2 Framework of the study indicating the different phases, the research participants in each phase, research tools and sample sizes**

Chapters and phases	Research participants	Research tool	Used to identify:	Type of research	Sample size
<b>Chapter 3.</b> <b>Phase: Preparation</b> <b>Situational analysis</b>	Child caregivers (volunteers). Governance structure: Sharpeville Care of the Aged.	Questionnaires to provide information on:			
		▪ Socio-demographic questionnaire	▪ Socio-demographic profile	Quantitative: descriptive	n=52
		▪ Reported health status			n=52
		▪ Existing nutrition knowledge of all FBDGs	▪ Identify FBDGs to be addressed in NEP.		n=52
		▪ Food intake		Quantitative: descriptive	n=43
		o DDQ	▪ Calculate FVS and DDS		
		o 24h-recall	▪ Calculate dietary intake		
		Apply findings of situational analysis to malnutrition model to provide input to development of NEP			
<b>Chapter 4</b> <b>Phase: Formulation</b> <b>a) Testing of existing South African FDBGs (2003) pamphlets of DOH (section 4.4).</b>	Child caregivers: Governance structure: Boipatong Women's' Interdenominational Prayer Group.	▪ Questionnaires	▪ Identify understanding of the content of existing NE material of DOH	Quantitative: descriptive	n=86
		▪ Image elicitation	▪ Understand participants' perception of different types of pictures in existing NE material	Quantitative Qualitative	n=53 of the original sample of 86 caregivers
<b>b) Development and pilot testing of lesson plans of the NEP and draft NE material (section 4.5.)</b>	Pilot group: TUT cleaners but also caregivers with similar socio-demographic characteristics.	Focus group (reliability testing)	▪ Verify understanding of NE material translated to Sesotho	Qualitative	n=6

c) Image elicitation of pictures for new NE material (section 4.5.)	Child caregivers: BIWPG					n=46 of the original sample of 86
	:	▪ Questionnaires	• Identify understanding of illustrations	Quantitative		
d) Designing booklets (Sesotho and English)	.	▪ Image elicitation	• Identify preferred options for NE material:			
	Graphic designers (TUT)	▪ Field notes				
<b>Chapter 5</b>						
Phase: Implementation	<u>(Short term assessment – no control group)</u>					
Designing measuring tools	TUT pilot group	Quantitative questionnaires for each FBDG	Verify participants' understanding of measuring instrument to test nutrition knowledge pre- and post-test (short term).	Quantitative: Pre- and post-test design		n=6
Implementation of NEP intervention	Experimental group child caregivers: B WIPG	NKQs ▪ Short term at each discussion group: Pre- and post-test (x3)	Short-term change in nutrition knowledge.	Quantitative: Pre- and post-test design		n=45 (variety) n=54 (legumes) n=46 (animal protein)



<b>Chapter 6</b> <b>Phase: Evaluation</b> <b>(Medium term)</b>	<b>a) Nutrition knowledge</b>	<u>Experimental group:</u> Child caregivers belonging to the Boipatong WIPG	NKQ: (Jan + Sept 2012) 4 FBDGs; Medium-term	Medium-term knowledge change	Quantitative	n= 56 (before)
			<ul style="list-style-type: none"> <li>Before intervention (questionnaire on 4 SAFBDGs)</li> <li>After intervention</li> </ul>		Compare before- and after- intervention changes in nutrition knowledge	n= 37(after)
		<u>Control group:</u> Caregivers of Soshanguve from ECD crèches	<ul style="list-style-type: none"> <li>Medium term (no intervention) same questionnaire at same times as experimental group's before- and after-interventions (Jan + Sept 2012)</li> </ul>	Change in nutrition knowledge		n=15 (before) n=15 (after)
<b>b) Dietary intake</b>		<u>Experimental group:</u> BIWPG	Food intake: <ul style="list-style-type: none"> <li>24-hr recall</li> </ul>	Detect any changes in <ul style="list-style-type: none"> <li>dietary intake and</li> <li>top 20 foods</li> </ul> from before and after NE intervention in the experimental group	Quantitative	n=38 (before) n=32 (after)
<b>c) Perceptions of NE interventions</b>		Experimental group	Focus groups to determine perceptions of impact of NEP	Getting more in-depth information regarding participants' attitude re importance of nutrition	Qualitative	n=7 n=8

<b>Chapter 7</b>		<b>Article writing/ conference presentations</b>
		Feedback to the community
		Editing and completion of thesis
		Discussion, conclusions and recommendations of the study
<b>Chapter 6</b> <b>Phase 4: Evaluation of NEP</b>		Results and discussion
		Data capturing, analysis & interpretation
		Qualitative data collection: Value added by NEP?
		24hr Recall (Experimental Group)
		Nutrition knowledge after intervention: Quantitative (Experimental and control groups)
<b>Chapter 5</b> <b>Phase 3: Implementation of NEP</b>		Research design: Phase 4
		Finalisation of booklet according to findings (adaptation of translation & pictures)
		Results and discussion
		Quantitative data collection and analysis
		Short-term nutrition knowledge retention: Pre- and post-test data captured & analysed
		Intervention: sessions: South African FDBGs (Experimental group)
		Nutrition knowledge before intervention and dietary intake (Experimental & control groups)
		Development of measuring instruments
<b>Chapter 4</b> <b>Phase 2: Formulation phase of NEP</b>		Research design Phase 3
		4 (d)Layout and design Graphical designers
		Pre-testing of developed NE materials (Pilot)
		4(c ) Development and pilot testing of lesson plans for the NEP
		Translation of NE material (Sesotho)
		4(b)Development of NE material (English version)
		Results and discussion
		Data collection, capturing & analysis
<b>Chapter 3</b> <b>Phase 1: Preparation phase (Situational analysis)</b>		4(a) Testing of existing pamphlets of DOH
		Research design of phase 2
		Conclusions regarding situational analysis
		Results and discussion
<b>Chapter 2</b>		Data collection, capturing & analysis
		Research design: situational analysis
<b>Chapter 1 Problem statement</b>		Literature review
		Framework outline of this study
		Frameworks used
		Set aim and objectives of this study
		Causes and consequences and scope of malnutrition
		Describe importance of this study

**Figure 1.5 Conceptual framework of this study.**

# CHAPTER 2

## LITERATURE REVIEW

### 2.1. INTRODUCTION

This chapter provides an overview of the literature on different nutrition interventions and then examines NE specifically, as a strategy.

### 2.2. NUTRITION INTERVENTIONS TO COMBAT MALNUTRITION

Many nutrition strategies and interventions to decrease malnutrition in adult women living in lower-income urban settings have been implemented with varying degrees of success across the globe. In order to identify the type of intervention that is likely to be effective in this specific situation, it is important to investigate the full range of options available before deciding on the best option.

#### 2.2.1. *Types of nutrition interventions*

Various types of nutrition interventions exist to address malnutrition in adult women to decrease or prevent both under- and overnutrition throughout the lifecycle. As mothers and caregivers they are responsible for their own health, but also for feeding their families.

##### 2.2.1.1. Interventions to combat undernutrition globally

###### ➤ Maternal and child health programmes

Undernutrition may be rooted in maternal attitudes and practices giving way to malpractices in child feeding. Promoting child care is therefore essential for women and includes protection interventions such as promotion of breastfeeding, kangaroo care and appropriate complementary feeding practices. Nutrition interventions aimed at young children include growth monitoring and promotion; immunisation; disease management, including oral rehydration therapy; individual and multi-micronutrient supplementation; protein-energy supplementation; promotion of dietary diversity and complementary feeding; and deworming (Bhutta 2013b:2-9). A combination of improved infant feeding, better household access to food and more accessible health services and sanitation is more effective in combating undernutrition than any of these measures taken alone (Allen & Gillespie 2001:92).

➤ Programmes to address micronutrient deficiency

Micronutrient deficiencies are also sometimes referred to as 'hidden hunger', as the consequences often go unnoticed (Faber & Wenhold 2007:393-4).

*Food fortification*

Fortification has a long record of success, safety and sustainability in developing and industrialised countries. It is administered in a safe and cost-effective way to the majority of the population. Fortification of frequently consumed foods offers an opportunity to reduce or even eliminate the prevalence of vitamin and mineral deficiencies (Oakley & Tulchinski 2010:284-295). A major advantage of food fortification is that it does not require significant changes in eating patterns (Venkatesh & Sankar 2004: 1000). Fortification is a 'one-window solution' to tackling a multitude of micronutrient deficiencies through a single intervention (Das *et al.* 2013:67).

*Biofortification*

Biofortified crops are crops naturally bred or genetically modified to enhance their micronutrient content – an example of the newer strategies to address micronutrient deficiencies by increasing the concentration of micronutrients in staple food crops. The challenge is to get producers and consumers to accept bio-fortified crops and increase their intake of the target nutrients. Advantages include a consistent intake of food staples by all family members, implicitly targeting low-income households, recurrent costs are low, and healthy, improved varieties will continue to be grown and consumed year after year (Nestel *et al.* 2006:1064-67) .

*Food and nutrient supplementation*

According to Darnton-Hill *et al.* (2005) and the World Bank (2006:4-12), food and nutrient supplementation is the addition of nutrient supplements, energy and other vital nutrients not present in adequate amounts in the diet of those people who have special nutritional needs.

Food and nutrient supplementation is the most widely practised intervention, according to Bhuttha *et al.* (2013:8). Nutrients such as vitamins and minerals are best derived from food sources. Nutrient supplements provide nutrients such as

vitamins, minerals, fibre, fatty acids or amino acids that are not consumed in sufficient quantities in a diet (Bhattacharya 2004:03).

➤ School feeding programmes

This type of hunger-alleviation programme is increasingly recognised as a social safety net that can be converted into long-term investment in human capital through improved nutrition and education (Bhutta 2013b:14). Weak evidence exists that it improves school performance (Allen & Gillespie 2001:80).

➤ Food Aid/ Food relief programmes

Worldwide, food aid programmes serve as a safety net for the destitute and vulnerable groups of a population. The pros and cons of these programmes are constantly being debated, particularly around issues of public policy and humanitarian rights and strategies, as well as specific programmatic issues that could increase success (Gentilini & Omamo 2011:329).

➤ Home food gardens

Agriculture and urbanisation are considered to be incompatible activities, competing for the use of limited land. However, the role of urban home food gardens in ensuring an adequate food supply in sub-Saharan Africa is increasing (Alderman *et al.* 2009:19). NE through urban gardens (or school or community gardens) improves the community's knowledge about food and fruit, which could lead to an improvement in their outlook on food and could promote better eating habits (Faber *et al.* 2011).

Faber *et al.* (2011:21) explored home gardens as a feasible intervention to improve food security in rural areas in SA. Diverse vegetable crops are essential, and should include both cold-weather and warm-weather crops to ensure year-round availability that will also provide variety to the diet. However, feasibility studies of such interventions in urban areas are lacking.

The interventions reviewed by Masset *et al.* (2012:334) were successful in promoting the consumption of food rich in protein and micronutrients, but the effect on the overall diet of poor people remains unclear.

#### 2.2.1.2. Interventions to combat overnutrition

Interventions related to the control of overweight and obesity can be grouped into diet, physical activity, childcare programmes, media-based programmes, parental involvement and multi-component interventions (Sreevatsava *et al.* 2013:115). Alarming, few countries are engaged in serious efforts to prevent the severe dietary challenges being faced in overnutrition (Popkin *et al.* 2012:3).

Childhood obesity has been on the rise in recent decades in developing countries and is associated with non-communicable diseases (NCDs) in adulthood (Sreevatsava *et al.* 2013:115). Rapid urbanisation has resulted in changed lifestyles, leading to a nutrition-in-transition stage. The promotion of healthy diets and active living at each stage of life is required to combat this trend (Uay *et al.* 2014:52).

Interventions at the community level are important. Local leaders, traditional healers, religious institutions and community radio could play significant roles and could be important promoters of lifestyle-changing measures to address overweight and NCDs (De-Graft Aikins *et al.* 2010:7). The implementation of proper non-communicable disease policies requires political commitment and appropriate funding (Birk 2012:5).

Furthermore, synergies between food availability, access and utilisation need to be aligned in interventions to address and strengthen food and nutrition security (Faber *et al.* 2011).

A summary of general interventions is presented in Table 2.1. These were compiled from meta-analysis studies, considering cost and benefit.

**Table 2.1 Global interventions to improve malnutrition by platform and type**

Platform	Type of intervention
<b>Local environment/community-based settings</b>	<ul style="list-style-type: none"> <li>• Promotion of breastfeeding to pregnant women /families.<sup>2</sup></li> <li>• Growth monitoring and promotion, including educational information to mothers and caregivers, regarding weaning practices, feeding of young children. <sup>2,3</sup></li> <li>• Supplementation programmes to address PEM and/ or micronutrient deficiencies<sup>2,7</sup></li> <li>• Media and education: Sustained, focused media and educational campaigns, using multiple modes, for increasing consumption of specific healthful foods or reducing consumption of specific less healthful foods or beverages, either alone or as part of multicomponent strategies.<sup>5</sup></li> <li>• On-site supermarket and grocery store educational programmes to support the purchase of healthier foods.<sup>5</sup></li> <li>• Increased availability of supermarkets near homes.<sup>5</sup></li> <li>• Multicomponent interventions utilising governmental, community and religious governance structures to deliver food relief programmes that identify needy families, in the form of cash transfers, soup kitchens, food parcels, meals on wheels.<sup>5</sup></li> <li>• Targeted, culturally appropriate NEPs, methods and messages to promote health and well-being, incorporating healthy traditional cuisine.<sup>2</sup></li> <li>• Small-scale farming programmes to address poverty and food insecurity.<sup>4,7</sup></li> </ul>
<b>School-based programmes</b>	<ul style="list-style-type: none"> <li>• Multicomponent interventions focused on improving diet, including specialised educational curricula, trained teachers, supportive school policies.<sup>5</sup></li> <li>• Provision of healthy food and beverage options in school and crèche feeding programmes, and canteens.<sup>5</sup></li> <li>• Parental/family education/information component.<sup>5</sup></li> <li>• School garden programmes, including nutrition and gardening education and hands-on gardening experiences.<sup>4,5</sup></li> <li>• Restrictions on advertising and marketing of less healthful foods or beverages near schools and public places frequented by youths.<sup>5</sup></li> </ul>
<b>Workplace-based programmes</b>	<ul style="list-style-type: none"> <li>• Comprehensive worksite wellness programmes with targeted NE /information components.<sup>5</sup></li> <li>• Increased availability of healthier food/beverage options and/or strong nutrition standards for foods and beverages and employee meals served, in combination with vending machine prompts, labels, or icons to make healthier choices.<sup>5</sup></li> </ul>

<b>Industry-based programmes</b>	<ul style="list-style-type: none"> <li>• Regulatory policies regarding food fortification to address country-specific micronutrient deficiencies.<sup>3</sup></li> <li>• Regulatory policies regarding the promotion of baby milk and infant feeds<sup>9</sup></li> <li>• Regulatory policies to reduce specific nutrients in foods (e.g. <i>trans</i> fats, salt, certain fats).<sup>5</sup></li> <li>• Labelling and information: Mandated nutrition facts on labels as a means of influencing industry behaviour and product formulations.<sup>5</sup></li> <li>• Agricultural bio-fortification and/or genetic engineering of staple foods to address micronutrient deficiencies.<sup>7,8,4</sup></li> </ul>
<b>Governmental-based policies and programmes</b>	<ul style="list-style-type: none"> <li>• Policies to view malnutrition as a development outcome.<sup>6</sup></li> <li>• National programmes to combat malnutrition.<sup>9</sup></li> <li>• National nutrition surveys for monitoring purposes to guide country-specific policies.<sup>2</sup></li> <li>• Multicomponent interventions, including subsidy strategies, to lower prices of more healthful foods and beverages; tax strategies to increase prices of less healthful foods and beverages.<sup>5</sup></li> </ul> <p>Changes in both agricultural subsidies and other related policies to create an infrastructure that facilitates production, transportation, and marketing of healthier foods.<sup>5</sup></p>

Sources: <sup>1</sup>Doak 2002; <sup>2</sup>Bhutta *et al.* 2008, <sup>3</sup>Fotso *et al.* 2012, <sup>4</sup>Masset *et al.* 2012; <sup>5</sup>Mozaffarian 2012; <sup>6</sup>Bhutta *et al.* 2013a; <sup>7</sup>Bhutta *et al.* 2013b; <sup>8</sup>Miller & Welch 2013. <sup>9</sup>Khan *et al.* 2013



### **2.2.2. Interventions in South Africa**

Nutrition is an outcome indicator of national development. Achieving the objective of good nutritional status in a sustainable manner is crucial for all people throughout the lifecycle and includes all aspects of food and nutrition (Mahan & Escott-Stump 2008:333; Moeng & de Hoop 2008:288).

The main policy and programmes for addressing the interlinked challenges of malnutrition, poverty and food insecurity in SA are the National Policy on Food and Nutrition Security (NPFNS), the Integrated Nutrition Programme (INP), managed by the Department of Health (DOH), the National School Nutrition Programme (NSNP), managed by the Department of Basic Education (DBE), and food relief programmes run by the Department of Social Development (DSD).

#### **2.2.2.1. Food and nutrition security**

Food and nutrition security is founded on the SA Constitutional Bill of Rights, section 27, which states that every citizen has the right to sufficient food and water. The Department of Agriculture, Forestry and Fisheries (DAFF) developed the National Policy on Food and Nutrition Security, in partnership with the DSD, that was approved by the Cabinet in 2013. The Integrated Food and Nutrition Security Programme (IFSNP) provides a common reference for all players in tackling the food and nutrition insecurity problem with the emphasis on cooperation that will minimise duplication and inefficient utilisation of resources amongst stakeholders (DAFF 2013).

The main goal of the IFSNP is to ensure availability, accessibility, utilisation and stability of safe and nutritious food at national and household levels (DAFF 2013). Intersectoral collaboration is essential, as several food security and nutrition-related implementation plans are currently being developed and information systems maintained by various departments and stakeholders, seemingly without proper coordination. There still seems to be a need for alignment from national to provincial level and regional level.

There is a need for trade incentives to engage women in farming activities (Altman *et al.* 2009:345-7). Another way to help these women is to teach them new and efficient

farming methods. The government should cooperate with non-governmental organisations in helping women to become farmers (Hawkes & Ruel *et al.* 2008:5).

The degree to which home gardens can address household food needs is uncertain, as there is little evidence of any impact on maternal or child nutritional status, with the possible exception of vitamin A (Ruel & Alderman 2013:539). Legal restrictions and local government greening policy goals could cause conflicts in urban areas. Economic barriers to gaining access to land and resources (such as reasonably priced water) are among the most common problems confronting urban agriculture (Masset *et al.* 2012:345).

#### 2.2.2.2. The South African Integrated Nutrition Programme (INP)

The Integrated Nutrition Programme (INP), managed by the DOH, was established on the recommendation of the Nutrition Committee appointed by the Minister of Health in 1995 (DOH 2004). It has since been reviewed and the Roadmap for Nutrition in SA 2013-2017 was accepted as a strategic document for the Department in March 2013 to guide the actions and interventions of the INP. It provides a framework to reposition nutrition and nutrition-related issues, with special attention to maternal, neonatal, children's and women's health (MNCWH), prominently in the healthcare system. The DOH is tasked with the responsibility of coordinating nutritional interventions in SA. Although there are elements of NE in the programme, it is not clearly stated as a priority (DOH2013:9-10; UNSCN 2013:30).

The overall vision of the programme is to optimise nutrition for all SA residents. The goals set by the Nutrition Roadmap are:

- “To contribute to increased life expectancy of the entire population by improving the quality, coverage and intensity of specific nutrition interventions that support reduction in mortality rates, especially maternal, neonatal, infant and child mortality;
- To promote optimal growth of children and prevent overweight and obesity later in life, by focusing on optimal infant and young child nutrition;
- To contribute to the prevention, control and treatment of HIV and tuberculosis through targeted nutritional care and support strategies;

- To contribute to the effective functioning of the health sector, by reducing the demand for curative services and improving recovery rate from disease, thus freeing up resources for preventive and promotive services;
- To empower families and communities to make informed nutrition-related decisions, through advocacy regarding household food security, multi-sectorial collaboration and effective NE” (DOH 2013:17).

The Roadmap to Nutrition also lists key nutrition interventions, based on a review of the current evidence-based information on the situation in SA:

- “*Behaviour change interventions*, including promoting exclusive breastfeeding, improved complementary and targeted supplementary feeding, healthy eating for optimal weight management during pregnancy and lactation, and detection of malnutrition during this period, improved hygiene practices, and NE and information on healthy eating and health risks associated with poor diets;
- *Micronutrient and deworming programmes*, including vitamin A supplementation, iron, folate, calcium and therapeutic zinc supplementation, fortification of staples, salt iodisation, situational deworming, treatment of severe, acute and moderate malnutrition in children <5years of age, multiple micronutrient supplements and targeted supplementary feeding to undernourished individuals” (DOH 2013:19-20).

The DOH has a number of existing programmes, including the following:

- The growth monitoring and promotion programme (GMP), the aim of which is the early detection of growth faltering and the promotion of safe infant feeding practices.
- The promotion of breastfeeding in the community but also in hospitals, which are encouraged to register as ‘baby-friendly’ hospitals. This strategy is essentially a nutrition behaviour-change programme that promotes exclusive breastfeeding practices for the first six months of a baby’s life.
- The protein-energy malnutrition scheme, which provides take-home, enriched nutrient supplements by the Nutrition Therapeutic Programme (NTP), including NE and counselling, has been implemented since 2010 (Iverson *et al.* 2012:5932).

- Food fortification: The DOH implemented a national food fortification programme in 2003, making mandatory the fortification of maize meal and wheat flour (white and brown bread) with six vitamins and two minerals to address micronutrient deficiencies (Shisana *et al.* 2013:40). The logo of this intervention is displayed in Figure 2.1.



Logo used on fortification products

**Figure 2.1 The South African logo to be used on fortified products**

**Table 2.2 Contribution of fortified products to RDA for persons 10 years or older**

Micronutrient	% RDA per 200 g raw maize meal	% RDA per 200 g raw wheat flour
Vitamin A	25%	25%
Vitamin B6	25%	25%
Vitamin B1 (Thiamine)	25%	25%
Vitamin B2 (Riboflavin)	17%	20%
Vitamin B3 (Niacin)	25%	25%
Folic acid/Folate	50%	50%
Iron	25%	25%
Zinc	20%	20%

(Source: Moeng & De Hoop 2008:301-307)

The contribution that fortification of maize and wheat may make to the total nutrient intakes, measured as the recommended dietary allowances (RDA) for persons ten years and older, is indicated in Table 2.2 (Moeng & de Hoop 2008:301-302). Teaching the population to eat correctly is accepted as being the best long-term solution to micronutrient deficiencies and malnutrition in general. Food fortification usually differs according to the needs of different countries (Kearney 2006:28; Kruger *et al.* 2008:683). The need for encouraging individual compliance or changes to the customary diet is minimised when the right foods are chosen to act as vehicles for a specific micronutrient in a vulnerable population (Moeng & de Hoop 2008:301). Careful consideration should be given to the food consumption pattern in a particular population and the selection of suitable nutrients to advance the nutrient status of the target groups (Kruger *et al.* 2008:684).

All fortified products in SA must carry the fortification logo on the packaging. Other fortified foods available on the SA market include cereals, powdered milk and infant formulas. Fortifying these specific foods with iron improves iron stores and reduces the prevalence of iron-deficiency anaemia (Moeng & de Hoop 2008:290).

- Salt iodisation, or adding iodine to salt, was legislated in 1995 in terms of the regulations of the Act on Foodstuffs, Cosmetics and Disinfectants, 1972 (Act 54 of 1972) to alleviate iodine deficiency in SA. Iodisation of salt is the most common method used to prevent and control disorders involving iodine deficiency (Moeng & de Hoop 2008:298).
- Prophylactic micronutrient supplementation: Three national surveys (NFCS 1999; SA Dietary Household Survey [SADHS] 2005, and the NFC: Food Fortification Baseline 1 [NFCS-FB-1] 2005) collectively indicated that micronutrient deficiencies were a major problem to be tackled in SA (Labadarios *et al.* 2005; Labadarios *et al.* 2008b 101-128).
  - Vitamin A: The purpose of the administration of supplementation in the form of a high-dose vitamin A capsule to infants 0–11 months, children 12–60 months, pregnant women and all post-partum women, is to reduce child mortality and improve maternal health (Moeng & De Hoop, 2008:307-308).

The 2005 NFCS-FB-1 reconfirmed vitamin A, iron and zinc deficiencies in SA. It found that nationally, one out of five women had

poor Vitamin A status (Labadarios *et al.* 2008b). Almost a third of women (29.7%) were estimated to be anaemic on the basis of haemoglobin concentration.

In comparison with previous national surveys, the SANHANES-1 survey indicated a decrease of 20 percent in the national prevalence of VAD and a 17 percent increase in mean retinol in children under five, which may be related to the successful implementation of the INP programme (Sishana *et al.* 2013:40).

- Iron and folic acid: In SA, all women should receive daily oral supplementation with iron and folic acid during pregnancy and for two months after the birth of the baby (Moeng & De Hoop 2008:301,309-10).

The findings of the SANHANES-1 survey indicate that VAD and iron deficiency present a moderate public health problem in SA (Shisana *et al.* 2013:19).

Despite some worthy accomplishments by the INP in SA, programmes have failed to restore adequate growth rates among underprivileged children. The failures experienced are most likely due to the inadequate implementation and scale of the programmes (Iverson *et al.* 2012:5934). Also, the success of the INP at district level depends on encouraging community participation and involvement and ensuring a buy-in by community leaders, such as traditional leaders, and community members (DOH 2008), which was probably not executed properly because of a nation in transition and acculturation.

The South African FBDGs were developed under the auspices of the DOH in 2003, and updated in 2012. The FBDGs essentially resort under the behavioural change interventions of the SA Roadmap to Nutrition (DOH2013:9-10) as direct nutrition interventions or complementary to other food security programmes and health promotion or health care programmes. Child nutrition can only be improved by addressing the underlying determinants of nutrition: food security, child care and nutrition knowledge.

#### 2.2.2.3. National School Nutrition Programme (NSNP)

The NSNP is run by the Department of Basic Education (DBE) with the aim to provide school feeding to enhance the learning capacity of learners through the

provision of healthy meals at school, to provide NE and to improve sustainable food production.

The programme has been shown to improve punctuality, regular school attendance, concentration and general well-being of scholars where it is implemented. Educators are provided with NE resource materials to support the curriculum. Schools are also encouraged to establish food gardens to supplement the menu in line with the South African-FBDGs (NSNP 2009:4).

#### 2.2.2.4. National Food Relief Programme

Poverty-stricken households are identified and referred to one of the government's food relief and sustainable development programmes run by the Department of Social Development (DSD 2015).

All of the above are nutrition interventions in SA, based to a large extent on tangible and physical products, whether they be food parcels, fortified bread and flour, or supplemental food items, and programmes for weighing and measuring children. Although these are worthy and effective interventions, they all call for considerable funding and extensive organisational systems requiring a large complement of human capital. However, little attention has been given to intangible interventions, such as nutrition information or transfer of knowledge and skills to improve nutritional status in a sustainable way. NE on its own will also not solve the problem of malnutrition in poor communities. However, NE should form part of all interventions to complement those endeavours.

#### 2.2.2.5. Nutrition education in South Africa

Previously, NE was categorised as a part of health promotion and run on an interdepartmental basis by the Directorate of Nutrition and the Directorate of Health Promotion. It was argued that health promotion takes a holistic view of health and is seen as a resource for everyday life. Secondly, it includes the concept of well-being. Thirdly, health promotion acknowledges that the spectrum of factors affecting health status is a broad one (Behr & Ntsie 2008:316-320). In the Roadmap to Nutrition in SA 2013-2017, the importance of NE is emphasised as one of the behavioural change interventions to form part of other ongoing interventions (DOH 2013:19-20).

For the past decade, the South African nutrition and dietetic community, together with the Department of Health, has been propagating the messages of the original

set of FBDGs for South African people older than seven years as a basis for a healthy eating plan (Van Heerden 2013). The guidelines form the core of the government's NE strategy, with a vision of promoting healthy lifestyles among all SA people (DOH 2004). These guidelines will be discussed in more detail under 2.6.2.2 as part of planning NE interventions.

While it is imperative to maintain direct nutrition interventions, success in improving child nutrition can only be attained by addressing the underlying determinants of nutrition: food security, child care and nutrition knowledge. Perhaps NE had been so dispersed that its effectiveness was compromised. The researcher argues that NE should form part of any food and nutrition security intervention to improve food utilisation in better food decision-making, storage, handling and preparation of food. It could especially support women to develop new attitudes to and confidence in making healthy food choices, as well as ways of feeding their families. NE fits into the vision of the Roadmap for Nutrition in SA 2013-2017 with one of the goals stating explicitly "to empower families and communities to make informed nutrition-related decisions, through advocacy regarding household food security, multi-sectorial collaboration and effective NE" (DOH 2013:17).

### **2.3. NUTRITION EDUCATION AS AN INTERVENTION**

NE is a worthwhile strategy for improving the health and nutritional status of the population. NE can be defined as "any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviours conducive to health and well-being" (Nnakwe 2009:294). Contento (2011:14) expands the definition as "... any combination of educational strategies accompanied by environmental support, designed to facilitate voluntary adoption of food choices and other food- and nutrition-related behaviours conducive to health and well-being and delivered through multiple venues, involving activities at individual, institutional, community and policy levels".

Nutrition educators have to have a better understanding of the predictors of human behaviour to help create supportive physical and social environments for making more healthful choices by guiding communities and groups to use the most up-to-date scientific information as a basic human right. The goal of ethical NE is not to



coerce or control. Behaviour change models, informed by empirical evidence, are utilised as the conceptual grounding for designing practical programmes (Lyttle 2005:90).

NE has the ability to reach large numbers of people repeatedly to reinforce key messages and could therefore promote widespread and sustainable changes in food choices. Research on safe food handling practices among low socio-economic status (SES) women suggests that there may be a need to target safe food handling messages to these vulnerable households (Quinlan 2013:3634). New tools for food-based approaches include the development of new or altered recipes to improve the nutrient quality of family meals using low-cost local ingredients, as well as the development of action-orientated messages to improve feeding practices (Lutter *et al.* 2013:101).

The four areas that underlie the main aspects relating knowledge to dietary intake are summed up in the following questions:

- Do people know what the current expert dietary recommendations are?
- Do they know which foods provide the nutrients referred to in the recommendations?
- Can they choose between different foods to identify the healthiest ones?
- Do they know what the health implications are of eating or failing to eat particular foods? (Parmenter *et al.* 1999:301).

NE can be viewed as a basic life skill to provide knowledge and skills that assist people to grow, purchase, process, prepare, and enjoy foods. The nutrition information should provide knowledge of what constitutes a healthy diet and how people can best meet their nutritional needs from the limited resources that they have available (Perez-Rodrigo & Aranceta 2001:131; Contento 2011:1-5).

NEPs should accommodate social and technological changes, as food supply in many countries changes rapidly owing to economic growth and the increased availability of processed foods. These programmes should aim at behaviour change, using appropriate communication channels and media (Higgins & Barkley 2003:365-368). NEPs encourage women to believe in themselves and empower them to make important household decisions regarding what food to buy and how to take care of their children (FAO 2004).

Through investing in people development through NE concomitant with various interventions, the government could assist communities in improving their capability and productivity. This could have a positive effect if medical costs and health care could be reduced through the adoption of better diets and lifestyles. Currently there are uncertainties in the economy, while life expectancy has also increased, with the result that, in many countries, the number of elderly people is rising rapidly. Older people have unique nutritional needs and these needs should be addressed so that older people can be helped to meet their daily requirements (FAO: 2004:4)

Nutrition educators have sometimes had limited success using cognitive approaches to effect behaviour change. Although nutrition is founded in natural science and based on theory, the application of NE lies in the territory of human and behavioural science, where feelings (for example, self-reliance and powerlessness), perceptions (food likes and dislikes) and behaviour (changing eating habits) are important. NE has not always been effective, for the following reasons:

- The advice given to people was not practical or appropriate. This is often because the messages were decided on by nutritionists in government offices instead of involving local nutrition workers and communities.
- Educators usually told people what to do instead of discussing with people what they could do about their nutritional problems and providing guidance on how to solve and overcome those problems.
- NE was not given to men, but to women only, but women are often unable to deal with the causes of nutritional problems without assistance.
- Nutrition educators were poorly trained on the important aspects of nutrition; they knew about nutrition, but not enough about how to help others learn about good nutrition and its benefits.
- NE received very little funding and support from government, local municipalities and communities (King *et al.* 2005:279; Alderman 2009:20-29).

Strategies forming the basis of interventions and programmes to change behaviour need to focus on three sources: theories of behaviour change, evidence for the success and failure of past attempts, and an in-depth understanding of the target audience.

This overview of recent research on health behaviour change in developing countries revealed progress as well as pitfalls (Aboud & Singla 2012:589). Different theories and models regarding NE are discussed below as theory-based NE.

### **2.3.1. Theory-based nutrition education**

#### **➤ Health belief model**

This model has been used to develop many successful health communication interventions. The model maintains that people will be more inspired to change their behaviour toward healthy ways if they believe they are predisposed to a particular negative health outcome. The stronger the degree of fear of the threat, the more likely they will be to change behaviour to avoid that outcome. The individual must perceive that the new behaviour will bring about positive benefits. If barriers to the benefits are too great (for example, too costly or painful) the preventative behaviour will not be adopted. Cues to action, internal and external, are the most underdeveloped and unmeasured elements of the model (Carpenter 2010, 661-2).

#### **➤ Social cognitive theory (SCT)**

This theory was developed by Bandura (2001:1) in 1977 and has become the most widely used theory in NE and health promotion programmes. He states that “the capacity to exercise control over the nature and quality of one’s life is the essence of humanness”. Individuals need the knowledge and cognitive, affective and behavioural skills that will enable them to reach their goals. This will give them a sense of taking charge of their lives in addition to understanding the determinants of their behaviour (Engler 1979:224). People must also believe that they can carry out the action (self-efficacy), even in the face of difficulties (barriers). The environment both influences and is influenced by the person’s behaviours and thus needs to be supportive of the change. Self-efficacy and skills are, therefore, the major facilitators of change (Bandura 2001:5-10).

NE typically presents *cognitive facts* about more healthful diets, buying and preparing food, food security, and food safety (that is, knowledge). SCT also suggests that taking a health-related action requires that people become aware of health risks, believe in the benefits of taking action and set goals to make changes. Food- and nutrition-related knowledge and self-regulation skills to exercise control

over their actions are essential, but self-efficacy is key. Environmental support can contribute to the change (Contento 2011:97-115).

Two central features of the SCT theory are that people will change their behaviour when they believe the change will bring positive outcomes (outcome expectancy) and when they have the confidence to bring about such outcomes (self-efficacy). Effective behaviour change must be realistic. A series of classes is more likely to result in positive change than a single class because multiple sessions increase 'dosage' by reinforcement for instruction and practise in class. Dosage can be further increased by means of homework or written materials. For behaviour change to occur, a programme participant should be physically and emotionally ready to institute a change; and should really believe that he or she is capable of changing. Empathy, validation, praise, and encouragement are necessary at all stages of change, especially when people struggle with ambivalence and doubt their ability to accomplish the change (Pratt 2008).

#### ➤ ***The logic model***

The logic model postulates that, when designing an NEP, the inputs (resources needed in the programme in terms of staff, time and materials), output (theory-based activities the programme will undertake, such as facilitating groups, conducting classes, working with families, community partners and media) and outcomes (benefits that result in the short and medium term) must be planned (Contento 2011:59-60).

#### **2.3.2. Nutrition education and behaviour change**

The goal of NE theories is to understand the predictors of human behaviour so that supportive physical and social environments can be created to enable communities and groups to make more healthful choices by being guided to use the most up-to-date scientific information. The goal of ethical NE is not to coerce or control. NE must be informed by empirical evidence, and utilised as the conceptual grounding for designing practical programmes (Lytle 2005:90-91).

NEPs seek to change health behaviour by changing health-related knowledge, attitudes and/or structural barriers. Key elements of theories include knowledge of health risks, perceived self-efficacy, goals and motivations, and barriers and facilitators. Community-based techniques are used to encourage a change in

behaviour or reduce structural or cultural barriers. There is inconclusive evidence for the effectiveness of interventions such as health/NE, counselling, changes in environment and changes in policy for encouraging pregnant women to eat healthily. Skills are best acquired through interactive or participatory learner-centred programmes (Jepson *et al.* 2010:538).

NE that is based on preventing malnutrition has to include well-defined communication and psychological strategies that deal with cultural norms within a group belonging to a specific socio-economic status (SES). In low-SES communities, food diversity is restricted by low income. In that kind of environment education is aimed at providing sufficient knowledge and skills to assist people to grow, purchase, process, prepare and consume foods according to their knowledge of what constitutes a nutritious diet, and at determining how people can best meet their nutritional needs from the limited and scarce resources at their disposal.

### **2.3.3. Nutrition education and nutrition literacy**

In low-SES environments, literacy levels are often low because of low educational levels. NE in these settings takes place in a triad of cultural, linguistic, and health literacy barriers. This may require modified strategies. Health literacy might be a stronger predictor of health than age, income, employment, education and race. Nutrition literacy can be defined as the individual's capacity to obtain, process and understand basic nutrition information, the method of finding information, and trusting that information (Zoellner *et al.* 2009:a128).

Because participants are mostly adult learners, a participatory approach is the preferred option, as passivity and submissiveness in learners may hamper involvement when self-reliance and empowerment are pursued. Lack of confidence, low self-esteem, and feelings of powerlessness and lack of control may hamper participation (Arnold *et al.* 2001:341).

Contento (2011:1-5) is also of the opinion that community participation is of pivotal importance when designing NEPs to resolve nutritional problems. NE should go beyond teaching people to make better use of available food resources, and should include strategies that address the problem of inadequate food resources. NEPs should be well planned, have target objectives and be well implemented, using appropriate communication channels and media (WHO 2000; Alderman 2009:20-5).

The key features of NEP models include the following:

- Active community involvement in all stages of the NEP process, including monitoring and evaluation, to strengthen community ownership
- Selection of methods appropriate for the target group and settings
- Multimedia strategies, which are preferable to a single medium
- Capacity building, an essential requirement for all implementers
- Commitment of political leaders, policy makers and resource providers
- Active involvement of people from food-insecure households, in view of their right to adequate food and health standards (Behr & Ntsie 2008:324).

Nutrition communication within the context of SA with its 11 official languages signifying ethnic and cultural differences presents a challenge to generic NEPs. NE should strengthen the capacity of local communities to solve their own local food and nutrition problems. It is important to note that NE in isolation cannot solve complex social and economic problems.

#### **2.3.4. Identification of target groups**

- **Primary target groups:** It is advisable to take a lifecycle approach when designing national programmes. Smaller groups with special needs should be identified and targeted, for example, ethnic communities, newly arrived migrants or unemployed and low-SES groups. In this study the primary target group was the caregivers of children (5-15 years of age).
- **Secondary target groups** include those people that may be used to reach the primary target group. Initially, the Sharpeville Care of the Aged (Chapter 1.3.3) served as secondary target group in the preparation phase. During the formation phase the executive committee of the BWIPG fulfilled that role.
- **Tertiary target groups** are groups that can facilitate or support NE initiatives (Smith 1997). This role was assumed by the VUT, Centre for Sustainable Livelihood (CSL).

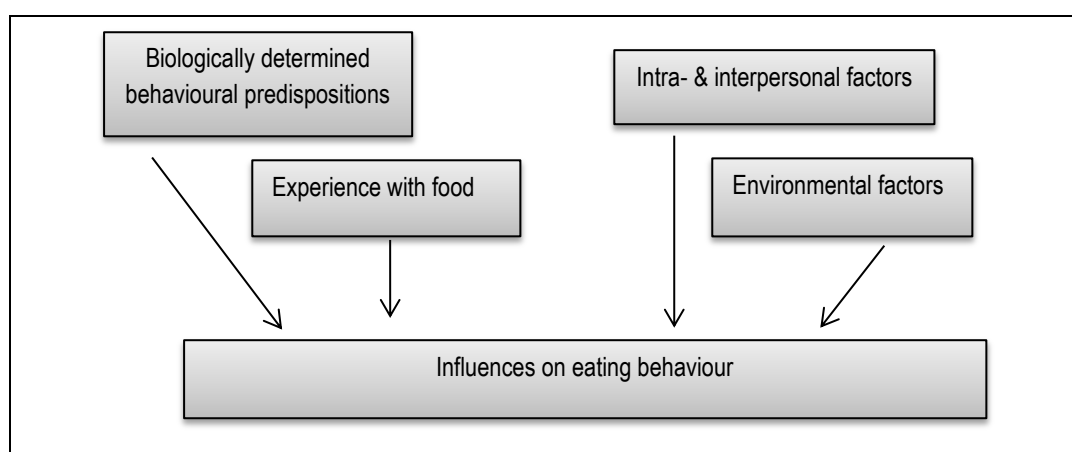
#### **2.3.5. Selection of channels for the planning of an NEP**

Relevant questions include whether NE should be delivered mainly via print materials, face-to-face individual and small-group education, or mass media. Also to be considered is the intensity of NE necessary to make a difference. Repeated

contacts add costs; from the participants' view it requires time and possibly transportation costs. When focusing on subgroups, it is essential to address the question of how targeting criteria should be established (Smith 1997).

### **2.3.6. The role of individual food choices and food preferences in NEPS**

An individual's nutrition knowledge, and his or her application of healthy food choices and dietary practices are of key importance in well-being and the prevention of many health problems. The factors that influence dietary patterns are presented in Figure 2.2. Dietary patterns are dynamic and are influenced by many factors, including taste and food preferences, physiology, weight concerns, convenience, access to and cost of foods, food advertising, perceived product safety, culture and attitudes/beliefs. Dietary patterns, therefore, describe the composition or specific combination of foods in a meal. The word 'meal' refers to both the event (time of day, social interaction) of eating as well as to what is eaten (food combinations, nutrient content) (Meiselman 2008:13).



**Figure 2.2 Factors that influence food choices and dietary behaviour (adapted from Contento 2011:31)**

Dietary patterns also rely on cultural heritage and health. The disappearance of sound cultural diets, devoid of sweetened and fatty westernised foods and loss of fibre, is associated with the erosion of local culture and traditional food systems. A key challenge is to stop this negative trend and allow a renewal and updating of customary prudent dietary patterns (Safdar *et al.* 2013:10).

### **2.3.7. The role of food and culture in NEPs**

The NEP should be culture-sensitive. If it is not adapted to ethical and cultural norms and beliefs, it may present major barriers to the acceptance of nutrition interventions. Indigenous foods play an important role in the lives of people.

The development of food habits clearly indicates that food is more than just nutrition. Viljoen (2010:4) states that, for this reason, it is important that both the nutritional and cultural elements be studied when seeking to understand dietary patterns.

Culture is broadly defined as the values, beliefs, attitudes and practices accepted by members of a group or community. A symbolic function of food is cultural identity. Culture is learned; it is passed on from generation to generation; it defines what flavours are preferred and what is edible or inedible. Cultural membership is defined by ethnicity. Acculturation of food habits occurs when people from one ethnicity move to an area with different cultural norms and begin to adapt to a new society. The food habits of cultural groups are often linked to religious beliefs or ethnic behaviours and regional identity (Kittler *et al.* 2012:3-17).

SA is a mix of cultures where art, music, dance and religion play an important part in each group's life. Cultural foods are closely linked to these traditional ceremonies. Modern children watch TV in the urban environment, but also listen to stories told by their elders; they enjoy the traditional food of their ancestors, but also indulge in fast food (Clark 2009:4-7). This trend was also reported in a study by Viljoen (2010:108) in a study conducted in Matla, Pretoria, as a dynamic movement between the modern and the traditional poles, where traditional food practices were not discarded, but both were embraced and regarded as important, partly because of belief in ancestors and in the importance of keeping the ancestors happy by adhering to traditional customs and practices.

#### **2.3.7.1. The Sesotho culture as predominant culture in the Vaal Region**

Cultural identity is one's feeling of affiliation to a group or culture. SA consists of a diverse socio-economic and multicultural society. The main groups are the Nguni, Sotho, Venda and Tsonga. The Southern Sotho peoples are a diverse group that includes almost two million South Africans. The Sesotho are found predominantly in the Free State and the southern part of Gauteng (Viljoen & Gericke 2001:103).



This research project was done among Sesotho women in Boipatong in the Vaal Region. Therefore, a brief overview of culture and norms and values is presented, as the supportive booklet was developed in Sesotho (South Sotho).

Regarding child care, the saying '*It takes a village to raise a child*' is a well-known and accurate description of African practices. Every village woman is eligible to correct an erring child, to rescue one in difficulty, and to encourage all (South African History Organisation). However, it should be remembered that this extended family network is fading with urbanisation, turning households into separate families, as will be discussed in Chapter 3, in the preparation phase.

The following are some of the ethnic and traditional heritages of the Sesotho:

- Totems, or praise-names taken from animals, distinguish the Sotho-speakers from the Nguni, who are mostly grouped in clans. The Sesotho were historically controlled by a hereditary district chief assisted by community headmen.
- The largest group of Christian churches is the African Independent Churches (AICs), with many denominations. This organisation of over 4 000 churches serves more than ten million black people in urban and rural areas. (Clark 2009:8). The Supreme Being that the Sotho people believe in is most frequently referred to as 'Modimo'.
- In Sotho tradition, the man is considered the head of the household. Women are defined as farmers and bearers of children. Men are primarily responsible for the livestock.
- Although cattle, goats and sheep were kept, these animals were slaughtered only on ceremonial occasions, which centred on the sacrifice of a cow for ancestral worship and cultural rites. Cattle were considered a symbol of wealth and not a food resource (Viljoen 2010:105). A family's honour is dependent on the quality and quantity of food at weddings and funerals – spit-roasted cow and chicken are mandatory.
- In contrast with the traditional two meals per day, studies have shown that modern urban blacks generally enjoy three meals per day. In the traditional setting the first meal was enjoyed in the late morning, between 11:00 and 12:00, while the second meal of the day was served after sunset, from 17:00 to 20:00 (Viljoen 2010:109-111).

- Contemporary eating patterns include traditional maize meal (as porridge), which is served with a relish and is still consumed as a main meal (mostly lunch) on weekdays, together with meat and potatoes and vegetables (three to four times per week). Most ethnic groups prefer maize products as their staple food. Sotho groups in the greater Pretoria area indicated a preference for rice rather than samp, and for mealie rice as their staple food. Vetkoek made with cake or bread flour and baking powder is a deep-fried product consumed regularly. Supper in these groups consisted of meat, fish or chicken, served with rice and vegetables/salads (Viljoen & Gericke 2001:101-2). Pork sausage and ham, Russians, Vienna sausage and polony were indicated as high-preference items. Chicken was liked and regularly consumed. Chicken liver and fried liver and vegetables were high-preference items, with kidneys, frankfurters, and liver patties being neutral-preference items. Fried fish, fish cakes, sardines, pilchards in tomato sauce and haddock were rated as high-preference items. Tuna is not well known. Although cheese was not part of their eating pattern, it has become popular, together with plain yoghurt. Eggs were indicated as being part of their habitual eating plan (Viljoen & Gericke 2001:107-8).
- The preparation methods for meat and vegetables have also changed; because the traditional preparation method of boiling was too time consuming. Most of the participants therefore fried meat in oil or grilled it in the oven (Viljoen 2010:122).
- Convenience food: Particularly notable is the high consumption of bread, a finding also reported in other studies. It was regarded an acceptable alternative to the staple grain porridge that was otherwise served either for breakfast or lunch (MacIntyre *et al.* 2002).

Kearney *et al.* (2000:219) point out that an understanding of the socio-economic predictors of dietary patterns is considered necessary for the development of effective NEPs. Several studies have shown that children of mothers with no formal education or only primary education were more likely to be stunted when compared with children of mothers who had secondary or college education (Hendrix *et al.* 2008). Because of their low SES, the indigenous and traditional food systems of poor communities need to be promoted in the search for solutions to the global problems

of poverty, food insecurity and malnutrition (Faber & Wenhold 2007:395). There is clearly a need to develop NEPs that incorporate risk reduction of NCDs (high intake of saturated fats and sugar) and health enhancement (diet diversity, intake of micronutrients), particularly in situations of rapid social and economic change such as SA's urban societies living in a modern nutrition transition environment.

According to the FAO (2003:1) and the WHO (2010:2), NE is an important factor in improving the capability and self-efficacy of the participant, while providing motivation to consume healthy foods. When women lack sound nutrition knowledge it has major consequences for their families. In an empowerment approach, the goal of NE is to assist and enable individuals to take voluntary control of their own food choices and dietary intake (Contento 2011:7-20). NEPs should also accommodate social and technological changes. Food supply in many countries has changed rapidly owing to economic growth, which has led to the increased availability of often unhealthy convenience and processed foods (WHO 2000; Alderman 2009:20-25).

NE as part of health promotion supports personal and social development through providing information, education for health, and enhancing life skills. This has to happen in school, home, work and community settings (Ottawa Charter 1986).

There is a tendency in NE to want to skip key elements such as formative research, thorough planning, monitoring and evaluation, either because of a lack of capacity or resources or because of an unrealistic time-frame. Formative research is a reiterative process, in that additional research may be needed if the initial design does not result in the desired behaviour changes. At the same time, there is a concern, particularly from donors, that programmes spend too much time on formative research instead of the direct NE activities. Interpreting and applying formative research results seems to be possible only through repeated practice with guidance from someone skilled (McNulty 2013:31-32).

The field of NEPs enables smaller groups to be reached where they live, work and play. Positive links can be formed with other sectors and disciplines to deliver programmes targeted to the perceived needs of groups in these settings. Links can be formed with local schools, day-care services, and church and social organisations. Working in a variety of settings with various organisations requires collaboration and negotiation skills that will foster long-term relationships of mutual

benefit to bring about change (Smith 1997). However, NE should accompany health, school-based and community-based programmes and be included in nutrition-related policies. NE is therefore an intrinsic element of many interventions.

## **2.4. PLANNING NUTRITION EDUCATION INTERVENTIONS**

Promoting healthy eating, social and behavioural change communication is central to any NEP (Lutter *et al.* 2013:101). Enabling women through education is essential for the key roles they play in food choices and utilisation, income generation and, ultimately, the growth and development of children. Educated mothers are more likely to take leadership positions in community structures and influence child care practices in their homes and communities. However, there are multiple educational pathways to influence child nutrition (Del Carmen Casanovas *et al.* 2013:46–47).

The FAO framework (1997) was developed to assist in developing an NEP most suited to a particular community (refer to Figure 1.3). There are four basic components within this framework: preparation, formulation, implementation and evaluation (Smitasiri 1997). The FAO-NEP framework alters the concept of changing individual behaviour through individual counselling to changing group behaviour. It calls for community participation in the development of the NEP. The proposed phases should be seen as *interactive* and the different parts as *interdependent*. Poverty and socio-demographic factors must be taken into account when designing such a programme. The NEP should address health, well-being and disease prevention simultaneously (Smith & Smitasiri 1997).

The UNICEF conceptual framework of malnutrition (see Figure 1.2) was initially developed and used in the context of undernutrition in children in developing countries, but, due to its generic nature, it is also applicable to adults and overnutrition in urban areas (FAO 1997). The UNICEF conceptual framework was applied in the development of the NEP in this study on child caregivers to incorporate the basic and underlying factors that contribute to malnutrition. Reliance merely on food insecurity measures of availability, access and utilisation paints an incomplete picture without taking into consideration the social, cultural and political context of a situational analysis as performed in the preparation phase of the study. Such a study would therefore be referred to as a ‘nutrition-sensitive’ intervention (Hawkes & Ruel 2006; Ruel *et al.* 2013:536; Bezanson and Isenman 2010:178). The

nutrition-sensitivity of programmes can be enhanced by improving targeting, using conditions to stimulate participation, strengthening nutrition goals and actions, and optimising women's nutrition, time, physical and mental health and empowerment (Hawkes & Ruel 2006).

The planning phase requires several key decisions by the planners, many of which flow from the formative research. Key decisions in the following areas should be made based on project goal, context and capacity:

- Setting learning objectives that also measure outcomes of behaviour change, not only acquired knowledge. Programmes are effective only if they achieve behaviour change. People need other motivation, skills and an enabling environment before they can adapt their behaviour.
- Defining the audience to be targeted, including those who make decisions for, or influence, the individual. Most interventions will have more than one audience. The audience should be examined in relation to the stages of change to determine what type of intervention is needed for the stage they are in.
- Selecting messages tailored to the needs of the audience versus using all generic messages on a topic. There is a tendency to overload the audience with messages. Formative research helps to define clearly which behaviour or which determinants to address. Messages and programme actions can then be minimised and focused.
- Assessing capacity and training needs of the educators who will ultimately deliver the messages and community-level activities. Building their capacity must be included in the work plan and budget.
- Matching methods to the audience and content. Factors to consider include gender dynamics, other demands on women's time, dispersion of households, availability of community volunteers and constraints of government workers (time and transport) (McNulty 2013:33).

#### **2.4.1. Recommendations for planning NEPs**

The following recommendations are provided:

- The choice and design of actions to reduce malnutrition in a given country should consider two key features – efficiency and effectiveness (Bryce *et al.* 2013:1049).
- Guided by theory, key messages may include explanations of benefits, reflect barriers to accessing foods, ‘checking’ questions to be sure the participant understands the message, and the use of educational materials illustrating the behaviour change required.
- Messages must permit flexible delivery; where time is short, only one key message with a ‘checking’ (verification) question can be delivered. Through the child caregiver, a culture of lifelong learning must be stimulated. Any NEP should aim at behaviour change, should be well planned, have target objectives and be well implemented, using appropriate communication channels and media (Alderman 2009:20-5).
- Evidence indicates that attention is higher for tailored health communications and provides a potential strategy for improving dietary intakes over the long term (Eyles & Mchurchu 2009:464; Kessels *et al.* 2011:32).
- Emphasis should be placed on the use of locally available foods in order to achieve long-term sustainability and to reduce the risk of dependence on external aid (Lutter *et al.* 2013:103).
- Behavioural theory helps practitioners develop effective programmes by identifying programme objectives that are related to one another and to the health behaviours of interest. Interventions rooted in behavioural theory increase the likelihood of behaviour change (Guillaumie 2011:12). Older people can be empowered to manage their health by being included in the process of formulating recommendations for change (Nyman & Ballinger 2007:7).

In adults, skills are best acquired through learner-centred, participatory programmes. Interactive teaching and learning methods imitate the natural processes by which people learn behaviour. These include observation, exploration, modelling and social interaction. Effective programmes balance these active methods with information and attitudes related to the health issue addressed (WHO 2003). Tailoring is a strategy that can be used effectively to enhance communication messages. Tailoring can be done according to a range of factors: socio-demographic (gender, age,

education), psychological (confidence, attitude), clinical (feedback on health status), ethnicity, language, and cultural values and beliefs and can be delivered in a variety of formats, including in person, in print and online (Nyman & Ballinger 2007:8). Successful programmes have clear and consistent messaging with regard to their targets (Meiro-Lorenzo *et al.* 2011:11).

Printed information is a tool that is used to reinforce the verbal education and has the benefit of referral and reinforcement, should the teachers forget any aspects learned during training (Viteri 2006). Consumer health information conveyed through written leaflets, fact sheets and pamphlets is common in health care settings. This is based largely on the premise that the provision of sound information empowers consumers to make healthier choices (Johns & Patel 2013:5).

The following are guidelines to consider when developing NE material, according to the International Organisation of Consumer Unions (IOCU):

- Accuracy: information must be evidence-based.
- Completeness: the material should contain all relevant information, be unbiased and not deceive or mislead by omission.
- Non-discriminatory: the text and illustrations should be free of any reference to the characteristics or stereotyping of a specific group.
- Non-commercial: promotional material of any organisation should not be presented as educational. There should be no implied or explicit sales message to buy or sell a product.

The capacity to read the information is only one of the dimensions to be considered. Incorporating suitable diagrams and pictures may assist in enhancing recognition and retention of educational information if the target audience is of low literacy. Adult learners engage more fully in education when they have some control over its nature and direction.

Barriers to the use of factsheets by consumers in a diabetic study included the consumer being unable to read or understand the written information or being unable to use it, or receiving an overload of information. Other barriers included not being in the home language of the reader, or culturally inappropriate (Johns & Patel 2013: 18).

Practical suggestions by diabetes educators to enhance existing and new factsheets included the following:

- Use more pictures, colour and engaging activities.
- Rather than individual factsheets, provide bound booklets of a good quality, which would be more likely to be kept by the client in the long term and could be used as a tool to facilitate care, planning and self-management.
- Summarise important complex information pictorially with concise key messages for populations of lower literacy.
- Provide practical plans to overcome barriers and to prevent complications.
- Provide a condensed version of the major long-term complications of diabetes (Johns & Patel 2013:5–14).

Audrey *et al.* (2006) state that there are challenges involved in embedding process evaluations within random control trials. Conducting process evaluation involves additional research activities with the potential to influence outcomes. The researcher should be aware of the fact that participants often respond to special attention from researchers that heightens awareness, also referred to as the Hawthorne effect.

- Evaluation studies, particularly in education and health, have increasingly investigated the quality of programme delivery in an effort to learn about and understand the successes and failures of applied interventions (Coryn *et al.* 2009:23).
- The goal of the implementation evaluation is to assess whether the intervention can be implemented as intended, and to determine what impact such an intervention has on participant eating behaviour. Both qualitative and quantitative methods may be used (Levine *et al.* 2002). When outcomes are evaluated without knowledge of implementation, the results seldom provide a direction or action because the decision-maker lacks information about what produced the observed outcomes (or lack of outcomes).
- A more compelling goal is to create and sustain a desired set of health and personal behaviours, such as physical activity, healthy eating, effective parenting practices, or positive family communication patterns. Actual



behaviour change in these areas is likely to include cognitive, social, psychomotor, and affective/emotional dimensions (Nutbeam 2008:2072).

#### **2.4.2. Food guidance systems used in nutrition education**

The increasingly complex food environment in which we live requires people to be nutritionally literate, especially in urban settings where there is an abundance of food items to choose from in shops. Many governments use food-based dietary guidelines and food guides to influence the public's knowledge and dietary patterns,.

##### **2.4.2.1. Food-based dietary guidelines**

FBDGs are sets of advice-giving statements for the population that offer practical ways to reach the nutritional goals of that population. The design of the food-based dietary guidelines was devised by the World Health Organisation (WHO) and the Food and Agriculture Organisation (FAO) in response to the World Declaration and Plan of Action for Nutrition adopted at the International Conference on Nutrition in 1992. Apart from nutritional, consumer, agricultural and environmental sciences, educational, behavioural and social sciences also have important roles to play in effecting behaviour change to promote adequate dietary intakes (WHO 1998:3-7). Over the past decade, many countries have started developing country-specific food-based dietary guidelines (FBDGs) as an NE strategy to improve the health and well-being of the population and to reduce the risk of diet-related disease by encouraging changes in food consumption patterns (Vorster *et al.* 2013:s5). FBDGs aim to promote general nutritional well-being while preventing and controlling both ends of the spectrum of malnutrition: undernutrition and overnutrition.

Focusing on variety, moderation and proportionality in a diet that meets energy and nutrient requirements rather than targeting specific nutrients or foods can help reduce consumer confusion. Classification of specific foods as good or bad is overly simplistic and can foster unhealthy eating behaviours. Empowering the consumer by means of *practical messages* that highlight a holistic diet approach promotes healthy lifestyles (Freeland-Graves & Nitzke 2013:307; Vorster *et al.* 2001:s4).

In order to improve the current eating behaviours of all South Africans and to create and promote new eating behaviours, specific characteristics for FBDGs have been identified by a working group, based on the FAO and WHO (1998) recommendations. The guidelines should meet the following criteria:

- Each guide should be stated in a simple message. People from diverse cultures and of different levels of literacy should be able to understand the meaning.
- Guidelines should be stated in a simple, positive way to avoid confusion. No negative message using words such as 'avoid', 'decrease', 'limit', 'cut out' or 'eat less' should be used. The FBDGs should not be associated with negative statements about food.
- Guidelines should be in line with the eating patterns of different cultures and the target population or group.
- Guidelines should be based on cost-effective and readily available foods.
- Guidelines should be sustainable at all times.
- Guidelines should encourage and promote environmentally friendly agriculture.
- Guidelines should lead to a wide selection of foods that are usually eaten together in groupings that accord with existing dietary practices.
- Guidelines should help people to select the most suitable and affordable diets and encourage undernourished and over nourished people to select a more adequate diet (Vorster *et al.* 2001:s1-2).

FBDGs should be revised regularly to support a country's health profile. The 'shortfall nutrients' identified in the USA 2010 revision of the FBDGs were vitamin D, calcium, potassium and dietary fibre. Vitamin A, C E and magnesium were possible shortfalls detected. The emphasis was on the growing evidence of obesity and the overconsumption of solid fats and sugars. A challenge was identified in overcoming barriers to compliance among low-income populations and various ethnic groups. Once approved, the FBDGs should be translated into materials and slogans suitable for the public. When developing these materials, relevant stakeholders must be identified and involved. A multimedia strategy for education is encouraged (Rowe *et al.* 2011:28).

To be effective, FBDGs should be communicated to the public through a variety of educational media. A fundamental assumption of the FBDGs is that consumer knowledge will lead to improved food choices.

Educational material and programmes can be developed to support the country-specific FBDGs to further explain and develop the content, applications and implications of the guidelines in people's everyday lives. These materials could be translated into different languages. Relevant discussions about food preparation techniques could be included. Material may include brochures, and posters or 'sound bites' for radio and television. People will learn best if they have the opportunity to practise applying the guidelines. Lesson plans should be included in programmes for groups (WHO 1998:39, 41).

The 2003 FBDGs for South Africans older than five years were revised in 2012, and evidence-based articles have been prepared for publication in a supplementary edition to the South African Journal of Clinical Nutrition (SAJCN). The updated FBDGs for persons five years and older were finalised in June 2012 and launched during National Nutrition Week (2012). Technical support papers were submitted for publication in the SAJCN (Vorster *et al.* 2013a:S5).

A comparison of the 2003 and the 2012 FBDGs is presented in Table 2.3. The ages for these FBDGs were lowered from seven to five years. Changes to most of the FBDGs were minor, except for the addition of a new FBDG regarding milk, 'Have milk, maas or yoghurt every day' and the scrapping of the 2003 FBDG regarding alcohol. Minor changes included a focus on the quality of fats in the fat guideline, and the wording of some of the other guidelines was slightly altered. It was also agreed that the words 'drink sensibly' in the alcohol guideline created confusion. As there are other initiatives in SA that address alcohol abuse, it was decided to remove this message (Vorster *et al.* 2013a:s6).

The FBDGs can be grouped into three clusters, namely those that are generally essential for a healthy lifestyle, those that are necessary to plan healthy mixed meals, and those required for adapting eating patterns to prevent chronic diseases of lifestyle.

**Table 2.3 A comparison of the 2003 and 2012 South African FBDGs**

FBDGs (2003)	FBDGs(2012)	Comments
<b>General guidelines for a healthy lifestyle</b>		
Enjoy a variety of foods	Enjoy a variety of foods	FBDGs 2012 relevant from 5 years of age.
Be active	Be active	
Drink lots of clean, safe water	Drink lots of clean, safe water	
<b>How to plan good mixed meals</b>		
Make starchy foods the basis of most meals	Make starchy foods <i>part</i> of most meals	Changed 'basis' to ' <i>part</i> '
Eat plenty of vegetables and fruit every day	Eat plenty of vegetables and fruit every day	
Eat dry beans, peas, lentils and soya regularly	Eat dry beans, <i>split-peas</i> , lentils and soya regularly	Changed 'peas' to 'split-peas'
Chicken, fish, meat, milk or eggs could be eaten daily	Fish, chicken, lean meat or eggs could be eaten daily	Take <i>milk</i> out of this guideline and add as separate guideline
	Have milk, maas or yoghurt every day	New FBDG, because of evidence of poor consumption of milk, especially by women, coupled with calcium's role in high blood pressure – a health risk in the South African health profile
<b>Dietary changes to address CDL: How to maintain a healthy eating pattern</b>		
Use fats sparingly	Use fat sparingly; <i>choose vegetable oils rather than hard fats</i>	Add ' <i>choose vegetable oils rather than hard fats</i> '
Use salt sparingly	Use salt <i>and foods high in salt</i> sparingly	Add ' <i>and foods high in salt</i> '
Use food and drinks containing sugar sparingly and not between meals	Use sugar and food <i>and drinks high in sugar</i> sparingly	Add ' <i>and drinks high in sugar</i> ' Omit ' <i>and not between meals</i> '
If you drink alcohol, drink it sensibly		Not part of FBDG
(Source: Vorster <i>et al.</i> 2001:3)	(Source: FBDGs for SA2013)	(Source: Vorster <i>et al.</i> 2013a)

For the purpose of this study, the four FBDGs used in the NEP are described in more detail.

1. Enjoy a variety of food

A diverse diet is internationally recommended for a healthy diet. This guideline should be used in conjunction with the other SA-FBDGs (Nel & Ochse 2013:s13). The main aim of the guideline 'Enjoy a variety of foods' is to challenge the problems arising from a monotonous diet by encouraging people to consume a variety of foods in order to avoid micronutrient deficiencies and CDL. Obesity is a major problem in SA and a diet that lacks variety could result in high energy intakes (Maunder *et al.* 2001:s7). This guideline aims to encourage people to enjoy their food and eat a variety of foods, since there is no single food or meal that can provide all the nutrients needed by the body.

2. Eat dry beans, split-peas, lentils and soya regularly

Legumes (dry beans, baked beans, butter beans, and jugo beans) are rich in protein, carbohydrates, soluble and insoluble dietary fibre components and a variety of minerals and vitamins. In addition, they also contain non-nutritive compounds, such as protease inhibitors, phytate, saponins, plant sterols and isoflavones. Legumes should be eaten two to three times per week. It is also important to encourage children to eat legumes and nuts, such as dry beans and peanuts, as they are good sources of protein (Venter *et al.* 2013:s36).

3. Fish, chicken, lean meat or eggs could be eaten daily

Chicken, fish, meat, and eggs are animal-based foods and are all sources of good-quality protein. Fish, meat and eggs provide many important nutrients, particularly protein, long-chain n-3 fatty acids, iron, zinc, selenium, vitamin D and vitamin B12. Meat is a well-recognised source of bioavailable iron and zinc. These nutrients can make a substantial contribution to dietary adequacy. Adding a small amount of these food products to a plant-based diet can yield considerable improvements in health.

Recommending lean portions, i.e. trimming excess visible fat while reducing the addition of fat during preparation and cooking, could reduce the overconsumption of energy and total and saturated fat in these food types. As populations have urbanised, a corresponding increase in consumption of animal products has been

observed. Diets should include two to three fish servings per week, preferably oily fish, such as sardines, pilchards, tuna, anchovies and mackerel (including tinned versions), and approximately four eggs per week. A serving of lean meat, fish or chicken can be eaten daily, but should be limited to 90 g/day. Trim the visible fat from red meat and remove the skin and fat from chicken (Schönfeldt *et al.* 2013: s66-s77).

#### 4. Have milk, maas or yoghurt every day

A national working group recently reached consensus that a guideline message for milk consumption is essential for SA. Available data show that milk and calcium intake in South Africans is low. The guideline refers to milk, maas and yoghurt, and not all dairy products. There is some evidence that the calcium in milk and dairy plays an important role in the regulation of body weight and bone mineral content in children (Vorster *et al.* 2013b:s57).

Identified barriers include perceptions about lactose intolerance, personal preference, price, lack of knowledge of the nutritive value of these products and possibly, cultural taboos. Dairy products such as milk and Maas are good sources of calcium, which is essential for healthy bones and teeth, blood clotting and healing wounds. The most vulnerable groups with regard to calcium intake are women and children, who should enjoy milk every day. The message that milk matters should be disseminated to the South African population (Vorster *et al.* 2013b:s57-65).

#### 2.4.2.2. Food guides

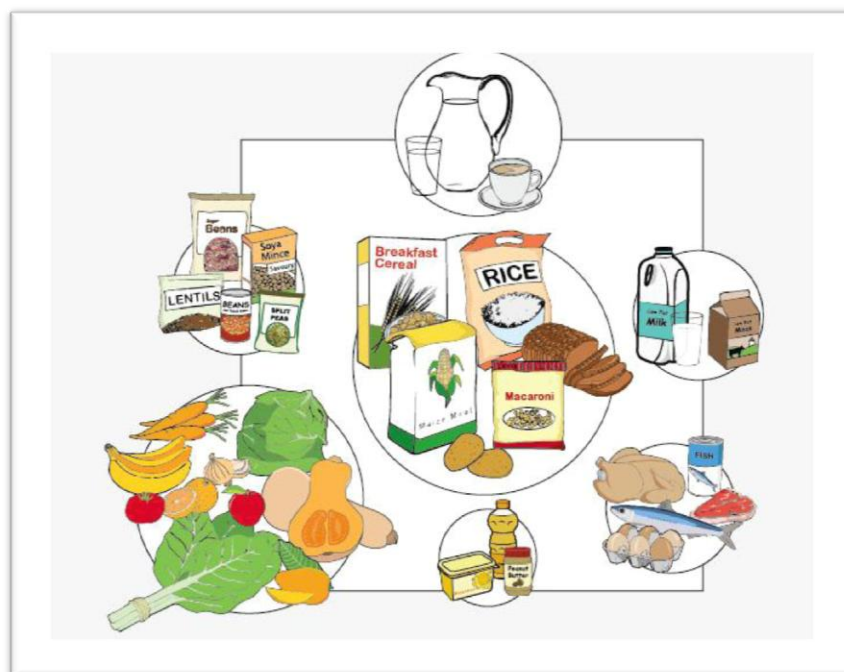
Food guides (FGs) are NE tools that translate dietary standards or guideline recommendations into choices that make up healthy dietary and lifestyle patterns for people with little or no training in nutrition (Bachman *et al.* 2008:804). They emphasise the consumption of a variety of foods, which will ensure that all nutrients required for good health are obtained.

Food guides are educational tools that are pictorial descriptions of food groupings that support a recommended dietary pattern, consistent with the country's FBDGs (Anderson *et al.* 2003). Additional foods contributing negligible amounts of nutrients are left to discretionary intake. It is argued that a single guide can be adapted when necessary for low literacy, ethnicity, or cultural differences. Food guides can be developed in a variety of graphic forms (the food wheel, pyramid, plate, blocks, etc.)

to communicate nutrition information. A single guide achieves consistency through public education programmes in schools, the media and advertising (Smith 1997).

Until 2012, South African nutritionists and health professionals used many different food guides, such as a USA Food Pyramid, a cast-iron tri-pot, or three-legged stool, and various food plates. It became evident that SA needed one uniform food guide which would transmit a unified nutrition message to all South Africans. The food guide that supports the new FBDGs was launched in 2012, after being consumer tested. It consists of seven circles of different sizes with examples of the food/beverage items included in each circle. The different sizes of the circles provide a rough idea of the relative importance of each group in relation to the total diet (DOH 2012; Van Heerden 2013).

The newly approved Food Guide for SA (DOH) was adopted in 2012 and was therefore not available at the start of this research. Figure 2.3 provides an image of the South African Food Guide. The different circles represent different food groups and circles are drawn in proportion to the amounts required.



**Figure 2.3 The South African Food Guide (DOH 2012)**

One of the limitations of the FBDGs and Food Guide (DOH 2012) is the absence of clarity as to the position of cheese in the FBDGs. It is explicitly stated that cheese does not belong to the dairy group (owing to its higher sodium content), yet no mention is made of cheese in the animal protein food group.

## **2.5. REVIEW OF NEPs IN LITERATURE**

A literature search was undertaken to review lessons learned in the type of NEPs presented, the efficacy of the various programmes and the best results obtained.

In Table 2.4 a summary is provided of NEPs found in the literature since 2002, developed for women as caregivers as a primary target group. A search for randomised control trials was undertaken.



**Table 2.4 Summary of different NEPs conducted among women globally and in SA since 2002**

COUNTRY	WHAT WAS DONE	RESULTS	REFERENCES
<b>United States of America</b>	To assess the caregivers' emotional and physical health and behaviours	NE was shown to reduce stress and maintain caregivers' health and well-being	Silver, Wellman. 2002. <i>J. Nutr. Educ.</i> 34:s53-58
<b>United States of America</b>	To assess an intervention on the calcium intake sources and their SES – matched in white women	No significant difference in age, height and daily dietary calcium intake between both groups. Although dairy serving were less for both races.	Mojtahedi <i>et al.</i> 2006: <i>Journal of American Dietetic Association</i> , 106(7):1102-1107.
<b>United States of America</b>	To explore the impact of state-wide NE on WIC family behaviour regarding fruit and vegetables, whole grains and lower-fat milk.	After nutrition intervention women and caregivers reported increased recognition of education messages, increased family consumption of fruits and whole grains, and replacements of whole milk with lower-fat milk.	Ritchie <i>et al.</i> 2010: <i>J. Nutr. Educ. &amp; Behaviour</i> 42:S2-S10.
<b>United States of America</b>	To develop and test nutrition messages and supporting content with low-income mothers of preschool children, addressing fruit and vegetable consumption and child-feeding practices. The study generated 7 tested messages for incorporation into NE interventions targeting mothers.	Messages on role modelling, cooking and eating together were well received. Mothers preferred messages that emphasised their role as teacher. They noted benefits such as their children becoming more independent and learning new skills. Mothers commonly doubted their children's ability to report when 'they are full.'	White <i>et al.</i> 2011. <i>J. Nutr. Educ. and Behaviour</i> . 43(1):19–27
<b>United States of America</b>	To assess reported dietary intake of pre-school children and subsequent associations with caregivers' ethnicity, acculturation and demographic characteristics (Hispanic and non-Hispanic caregivers)	Hispanic caregivers reported fewer intakes of fruit and vegetables by children than those of non-Hispanic caregivers. There were no other significant differences in intakes that could be ascribed to acculturation.	Erinisho <i>et al.</i> 2012: <i>Mother Child Health J.</i> 16: 1844-1853

<b>United States of America</b>	To assess the impact of a short-term nutrition intervention using education on a comprehensive array of nutrition and health topics in low-income women.	Post-intervention increases in nutrition knowledge and favourable nutrition behavioural changes ( $P < .05$ ).	Rustad & Smith 2013: <i>J. Nutr. Educ. &amp; Behaviour</i> 45(6)
<b>Australia</b>	A systematic review to measure outcomes [nutrition-related health behaviours (dietary intake and food purchases) and anthropometric measures] if tailored information was successful to improve the diets of adults over the long term.	In a meta-analysis of 15 trials in all population groups tailored NE was found to be a promising strategy for improving the diets of adults in the longer term >6mnths.	Eyles <i>et al.</i> 2009. <i>Nutr. Reviews</i> 67(8): 464-480.
<b>Belgium</b>	To investigate the dietary habits of Flemish pre-schoolers and associations of these habits with both socio-demographic characteristics and the mother's nutritional knowledge and attitudes.	The associations with the mothers' nutritional knowledge and attitudes support the inclusion of knowledge and attitudes in dietary interventions.	Vereecken & Maes 2010. <i>Appetite</i> 54(1): 44-51.
<b>Indonesia</b>	To examine the effectiveness of two different NE methods: weekly intensive nutrition education (INE) and monthly non-intensive nutrition education (NNE), designed for caregivers of mildly wasted children.	In comparison with NNE, the INE approach was significantly better in bringing about a positive change in the knowledge and practice of caregivers of mildly wasted children.	Inayati <i>et al.</i> 2012, <i>Food &amp; Nutrition Bulletin</i> . 2012, 33 (2):117-127.
<b>Brasilia</b>	To evaluate the association between the consumption of unhealthy foods in children under one year and the education level of the mothers.	The consumption of unhealthy foods by Brazilian children under one year old was high, and associated with the consumption of unhealthy foods that was also higher among mothers with low educational levels.	Saldiva <i>et al.</i> 2014. <i>Bio-Med Central, Nutrition Journal</i> , 13:33.

<b>Iran</b>	To determine influence of socio-demographic factors on health educational interventions.	Food variety intake was lower than recommended intakes and it was influenced by SES.	Salehi <i>et al.</i> 2010: <i>J. of Nutrition</i> , 9(2):1-9
<b>Ghana</b>	To improve complementary feeding practices in caregivers.	About 60% of caregivers showed an improvement in food intakes and 100% on issues of caregiving and breastfeeding practices.	Lartey 2008 <i>Proceedings of Nutr. Society</i> .
<b>Tokyo</b>	To examine the effectiveness of nutrition training for health workers on child feeding practices, including feeding frequency, energy intake, and dietary diversity among children aged six months to two years by counselling caregivers.	Nutrition training for health workers can improve feeding frequency, energy intake and dietary diversity of children aged six months to two years. Scaling up of nutrition training for health workers presents a potential entry point to improve nutrition status among children.	Sunguya <i>et al.</i> 2013, <i>Nutrition Journal, BioMed Central</i> , 12:66
<b>Bangladesh</b>	To determine the effect of nutrition intervention on changing the perception on child caring practices.	Improved knowledge at post intervention and sustainable behaviour changes were observed.	Roy <i>et al.</i> 2005. <i>Food Nutrition Bulletin</i>
<b>SA - KwaZulu-Natal</b>	To determine the caregivers' ability to apply the FBDG appropriately in terms of identifying foods, drinks according to the FBDG food categories.	Caregivers understood the FBGD and their suggested food categories and could construct a typical day's meal using the FBGD, although participants identified a number of barriers to the application of the FBGD.	Love <i>et al.</i> 2001. <i>SAJCN</i> 14: 17-24.
<b>SA - Free State &amp; Northern Cape.</b>	To assess the impact of a NE programme on the nutrition knowledge and dietary practices of lower socio-economic communities.	Knowledge of what to eat daily to remain healthy improved by 10.4% from 42.2% in rural intervention areas. The classification of protective foods, energy foods and building foods was used. The usage of milk improved significantly in households by 14-100%.	Walsh <i>et al.</i> 2003. <i>SAJCN</i> 6(3): 89-95.

<b>SA - Limpopo</b>	FBDG as an NE tool.	It was found that the messages carried by some of the FBDG were interpreted differently by the women. Factors such as household preferences, affordability and availability of foods played a role in the study	Mawila 2004: Online: < <a href="http://www.dspace.nwu.ac.za">http://www.dspace.nwu.ac.za</a> >
<b>SA - Vaal Region</b>	To assess health socio demographic status and quality of diet.	Low literacy level with poor food choices and low food intake was established.	Oldewage-Theron & Kruger 2008:101-133
<b>SA - Vaal region</b>	To test if there was an increase in knowledge in children by means of a specifically designed NE programme.	Initial knowledge of food groups was poor (13.4%), but improved to 64.8% post-intervention. It was concluded that an NEP can improve knowledge of food in preschool children. The efficacy of different tools and aids has to be tested.	Oldewage-Theron & Egal 2009. <i>J. Family Ecol. &amp; Cons. Sciences</i> , 37:45-52.
<b>SA - Vaal region</b>	To develop and test NE tools as part of a NEP for primary school children (Grades 1-3) from low-income households.	The role of NE tools is central to the success of NEPs. They should be simple and cost-effective for children to take home. The NE tools were to be tested in an experimental field test for ease of use, comprehensibility and acquisition of knowledge.	Oldewage-Theron & Napier 2011. <i>Development SA</i> 28 (1):283-292.
<b>SA - Pretoria</b>	An investigation into the capacity of caregivers to provide nutrition-related care to pre-schoolers.	Demographic, anthropometric and NKQs & 24-hour recall were used. Significant improvement in food intakes and improvement in NE were established.	Molotja (2008) <i>MSc. Dissertation, UP</i> .
<b>SA - KwaZulu-Natal &amp; Eastern Cape</b>	To assess the caregivers' knowledge and evaluate community-based growth-monitoring activities.	87% of the caregivers could correctly measure the healthy growth of the child. Training and supervision of the caregivers performing community-based growth-monitoring were also monitored.	Faber <i>et al.</i> 2009: <i>SAJCN</i> 22(4):185-194.

<b>SA - Western Cape</b>	To develop a questionnaire to determine nutrition knowledge based on the FBDGs.	The questionnaire was validated to determine nutrition knowledge based on FBDGs.	Whati <i>et al.</i> 2005: <i>Nutrition</i> , 21: 76-85.
<b>SA - Limpopo</b>	To investigate gaps in public nutrition knowledge in the urban black and white South African population.	Both groups were assessed as having a reasonable knowledge of dietary recommendations and sources of nutrients, but less knowledge regarding the diet-disease relationships. Black women had significantly lower nutrition knowledge than white women.	Peltzer, K. 2004. <i>SAJCN</i> 17(1):24-26
<b>SA - Limpopo</b>	To develop and implement nutrition strategies to improve crèche children's consumption of vitamin A-rich fruit and vegetables. The concept of the food-based dietary guideline 'Eat plenty of vegetables and fruit every day' was introduced.	Access, availability and utilisation of vitamin A-rich fruit and vegetables improved markedly. Flourishing vegetable gardens, planned menus and well prepared meals were concrete evidence. This study confirms that food-based guidelines can be applied as a nutrition strategy	Kwinda <i>et al.</i> 2011  <i>J Family Ecol. &amp; Cons. Sciences</i> , 39: 57-67.

Many articles about NE are available, but most of them focus on breastfeeding mothers, growth-monitoring programmes or schoolchildren, or form part of primary healthcare and health promotion programmes. A number of studies also focus on improving vegetable and fruit intake, with very little attention to other food groups. Very few studies could be found that were tailored to the family members as caregivers, although it is common practice in most ethnic cultures in SA to leave the care of children in the hands of the grandmother. The above-mentioned studies revealed that NE interventions are scattered, with a wide variety of design and methodologies, and that different channels were used, complicating comparisons between success rates.

However, in summary, most studies indicated the value that can be added by means of NE to direct caregivers (mothers) and indirect caregivers (family members). In some studies knowledge contributed reported to changes in breastfeeding and feeding practices as well as improved food intake. There is a definite difference in perceptions, attitude and behaviour between westernised countries and their non-westernised counterparts, and this should be taken into consideration in all NEPs. Socio-demographic differences also have an effect of the approach and design of the programme. Community participation is important from start-up to evaluation.

NE can be done in isolation, but its impact in isolation is much smaller than when it is integrated into other healthcare and agricultural interventions.

## **2.6. CONCLUSION OF THE LITERATURE REVIEW**

Despite the global target for MDG1 to halve the proportion of people who suffer from extreme poverty and hunger being met, the battle against hunger and malnutrition will be continued globally post-2015 in the proposed 17 SDGs that are currently being debated to be reached within the next 15 years. Food insecurity is still apparent in many parts of the world, especially in Asia and sub-Saharan Africa, with over and undernutrition in South Africa often found in the same communities.

From the literature reviewed, it can be concluded that SA is in a stage of nutrition transition, moving to a westernised eating pattern at an increasing

pace, largely influenced by the rapid migration to urban areas. Household food insecurity and poverty are closely linked. Child caregivers other than the mother in the home environment may have a significant impact on child development, particularly in low-SES families.

Malnutrition as reflected in undernutrition is present as underweight and/or micronutrient deficiencies in adults in this country and can be closely linked to poverty. However, often within the same households, obesity is seen, probably due to the nutrition-in-transition situation with a higher saturated fat intake, especially in the urban areas with easy access to food, but also due to time limitations for the preparation of healthy meals, that could give rise to an increase in CDL.

The South African FBDGs are compiled to address the specific nutrition-related health problems, including undernutrition and CDL, experienced in people older than five years in this country. Various nutrition strategies and interventions have been reviewed in this chapter to address over- and undernutrition as well as micronutrient deficiencies. Although the official South African FBDGs have given nutritionists a mandate to promote healthy eating patterns among the population older than five years, these messages have received very little attention as part of NE on a national scale. It is necessary to promote healthy eating to vulnerable low-SES groups, where the highest levels of poverty and malnutrition exist. Individual studies and efforts are scattered.

This study will focus on the development, implementation and evaluation of an NEP as an intervention strategy. Chapter 3 is devoted to a situational analysis of the community in Boipatong in the preparation phase of the NEP (see Figure1.3). Results and findings of the preparation phase are presented in the next chapter.

Devereux *et al.* (2006:14) defines coping strategies as resilience to adverse events or shocks. Kiggundu & Oldewage-Theron (2009:384) talk about 'emotion-focused' and 'problem-focused' coping styles in stressful situations. Two common food coping strategies found by Kruger *et al.* (2008a:3) in SA were to rely on cheaper food (chicken feet, diluted soya-mince soup) or less preferred

food (meat bones) and employing food-seeking strategies (gathering wild foods), consumption of seed stock (maize) and reduced portion sizes (protein foods and side dishes), resulting in starch-based diets of poor variety. Seasonal strategies varied according to the level of food stress experienced. Negative food coping strategies such as these may cause a poor health status. Few studies have been done in urban households over time to understand how households establish themselves and deal with the stress as they move in and out of poverty (Oldewage-Theron & Slabbert 2008:92).

The use of and reliance on strategies for dealing with household food insecurity can be classified as coping strategies, indicating the short-term, temporary responses to declining food availability, and adapting strategies, indicating the long-term, permanent changes in the mix of productive activities (Maxwell *et al.* 2010:92). In addition, environmental and attitudinal barriers need to be identified. Environmental barriers include the lack of certain foods and cooking equipment, while attitudinal barriers could involve a mother's feeling that she lacks control, which derives from her low social status and/or the feeling that she exists to serve her family; this often means that she lacks the confidence to overcome resistance from her child. Also, mothers may feel they lack time to employ new practices (Allen & Gillespie 2001:70-75).

Strategies employed to mitigate food shortages include relying on dietary strategies (eating food less preferred and less expensive; less variety, resorting to staple food), household structure strategies (reducing food intake by up to 50 percent, restricting adult consumption in favour of small children) or rationing strategies (limiting portion size, skipping meals or not eating for an entire day and begging from neighbours or friends), food-seeking strategies (borrowing food, or relying on help from friends or relatives) (Maxwell *et al.* 2010:91-92; Mjonono *et al.* 2009:312).



## **CHAPTER 3**

### **THE PREPARATION PHASE OF THE NEP**

#### **3.1. INTRODUCTION**

This chapter describes the preparation phase of the NEP that informed the next phase of formulation of the NEP (Chapter 4) to be implemented and evaluated (Chapter 5).

The main objective of this phase was to obtain information about the community of Boipatong, their socio-demographic and economic background, self-reported health status, foods frequently consumed, dietary intake and nutrition knowledge. The UNICEF framework of malnutrition (see Figure 1.2) and the preparation phase of the NEP (refer to 1.7) provided a theoretical underpinning to identify both the problem and the causes of the problem.

In this study, a community known to be at nutritional risk (Acham *et al.* 2012:24; Oldewage-Theron *et al.* 2005,24; Oldewage-Theron & Slabbert 2008:93), was the object of descriptive, quantitative data analysis of the situational analysis in the townships of Boipatong. Various socio-demographic risk factors, such as income, employment rate, family and housing conditions and well-being, were identified to prepare a community diagnostic profile (Nnakwe 2009: 246–251).

The situational analysis was conducted in 2007 to determine the socio-economic and health status as well as the nutrition knowledge and dietary diversity of the child caregivers in Boipatong Day Care Centre, as indicated in Chapter 1. This survey comprised a nutrition research project in which socio-demographic and dietary intake variables were used to compile a socio-demographic profile of urban child caregivers in the Vaal Region.

### **NEP Phase 1: Preparation – situational analysis**

- Community engagement
  - Liaising with the organising structure in the community
  - Information session with community members
- Performing a situational analysis
  - Determining the causes of the problem (socio-economic, health and dietary intake)
  - Defining the nutritional problems
- Feedback to the organising structure and community members about:
  - findings of analysis
  - deciding on the way forward

**Figure 3.1 Framework for the preparation phase** (adjusted from FAO 1997)

## **3.2. OBJECTIVES OF THE PREPARATION PHASE OF THE STUDY**

An exploratory situational analysis was conducted to determine the:

- socio-demographic and economic profile of the sample,
- health profile of the women caregivers,
- dietary intake of the caregivers in the sample by means of a 24-hour recall
- dietary quality by means of a dietary diversity questionnaire (DDQ) to determine food group diversity and food variety scores (FGDS and FVS),
- most frequently consumed foods in the area (list of top 20 foods); and
- current nutrition knowledge of the caregivers, based on the South African FBDGs.

## **3.3. RESEARCH DESIGN**

This empirical research was conducted in Boipatong in the Vaal Region. This phase of the study dealt with assessment and analysis. The situational analysis was done within the quantitative paradigm following a positivistic approach to address a real-life problem; an approach which is explained by scholars such as Babbie and Mouton (2001:22-28 & 47-53).

The quantitative paradigm places emphasis on variables when analysing human behaviour (Babbie & Mouton 2001:49). Based on literature on NEP in other studies, the quantitative research paradigm was selected as an appropriate research approach to address the research problem.

The study design was a cross-sectional (Bless & Higson-Smith 1995:60), exploratory survey to assess the socio-demographic and economic profile as well as the dietary intake and food consumption patterns of the caregivers, using descriptive statistics. A participatory approach was followed. Activities included meeting community leaders of the project to ensure project buy-in, and feedback sessions after the situational analysis where problems detected and possible solutions were discussed. Introductory visits were made to the care centre to inform the caregivers about the study and to ensure their cooperation.

Table 3.1 provides an extract to facilitate reading from Table 1.2 on the framework of the study to guide activities in the preparation phase. This exploratory phase provided insight into the Boipatong sample of caregivers and their socio-economic and household conditions, health status, eating habits and dietary intake. The findings of the situational analysis guided and informed the further development of the NEP.

**Table 3.1 Extract from Table 1.1 indicating the activities, research participants, research tools and why they were used, as well as the sample sizes of the preparation phase of the NEP**

Chapter and phase	Research participants	Research tool	Used to identify:	Type of research	Sample size
Chapter 3 Preparation phase: Situational analysis	Child caregivers (volunteers). Governance structure: Sharpeville Care of the Aged. Respondents recruited (n=90).	Questionnaires to provide information on:			
		<ul style="list-style-type: none"><li>▪ Socio-demographic questionnaire</li></ul>	<ul style="list-style-type: none"><li>▪ Socio-demographic profile</li></ul>	Quantitative: descriptive	n=52
		<ul style="list-style-type: none"><li>▪ Reported health status</li><li>▪ Existing nutrition knowledge on all FBDGs</li></ul>	<ul style="list-style-type: none"><li>▪ Identify FBDGs to be addressed in NEP.</li></ul>		n=52 n=52
		<ul style="list-style-type: none"><li>▪ Food intake<ul style="list-style-type: none"><li>○ DDQ</li><li>○ 24-hour recall</li></ul></li></ul>	<ul style="list-style-type: none"><li>▪ Calculate FVS and DDS</li><li>▪ Calculate dietary intake</li></ul>	Quantitative: descriptive	n=43
		Apply findings of situational analysis to malnutrition model to provide input to development of NEP (Figure 3.8)			

### 3.3.1. Sampling strategy

The sample consisted of a convenience sample of caregivers who attended the Boipatong Care Centre on the day that the data collection was to take place. This centre provided a service to children of 200 households at that time. Using a power calculation, based on the size of the population of households, with a confidence level of 95 percent and confidence interval of 10 percent, it was determined that 65 respondents were needed for a sample (Sample Size Calculator). Requests to attend the session were handled by the leaders of the Boipatong Care Centre. Since the situational analysis involved gathering data for the NEP to follow after this study, the use of a convenience sample was not considered to be a restrictive factor, as there was no need to generalise to a bigger population (Pruchno *et al.* 2007:823).

Sample size was calculated based on the following formula:

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

The sample size was calculated on the basis of a confidence level of 95% with the confidence interval of 10 units. From the target population (N=200) of households, a sample of (n=65) persons was needed for this study.

Initially 90 respondents were recruited during the preparation phase when liaising with the community. However at the start-up phase of data collection, only 68 respondents attended the session. Of the total number of respondents (n=65 required) of the population of 200 households, 16 were spoilt or incomplete, leaving 52 complete sets of questionnaires usable for analysis (80%) in the socio-demographic, health, and dietary diversity questionnaires (DDQs). However, when questionnaires were evaluated for completeness and correctness of the data, only 43 questionnaires of the 24h recall were valid. (Data of two participants were removed due to under-reporting dietary energy intake (<500 kJ) that was assumed to also produce underreporting in other nutrients. The failure of seven participants (17% of 52 participants) to complete three 24-hour recalls could be explained by caregivers not being able to attend every time

due to household issues, not being well or not having transport to the centre, which could not be foreseen by the researcher in this cross-sectional study.

This comprehensive survey took several hours per day, and some of the caregivers had to leave early, as children were coming from school. This turned out to be a recurrent problem throughout the study.

Convenience sampling was used as the preparation phase to obtain information on the community, but none of the data would be used as a yardstick for future measurement. The findings were used to guide decisions about the development of the NEP and NE material.

Inclusion criteria were female caregivers of children (5-15 years) belonging to the Sharpeville Care of the Aged. At this exploratory phase of assessment of the Boipatong community, no age restriction was set as a criterion.

### **3.3.2. *Measuring instruments***

The situational analysis is based on what Mouton (2006, 100) describes as measuring instruments of the human sciences: questionnaires, observation schedules, and interviewing schedules. Five data-collection questionnaires were used and considered suitable, with high validity and reliability, for achieving the research objectives as observed in other similar studies (Whati 2005; Oldewage-Theron et al. 2005a; Napier 2006; Kearney 2006). In this study, quantitative pilot-tested questionnaires were used to compile the socio-demographic profile of the respondents to provide a situation analysis of this poverty-stricken area. Ten women 40-60 years of age, not participating in the survey, completed the questionnaires once a week for four weeks (thus four times) to test the individual validity and reproducibility with a Cronbach  $>0.7$ . In addition, health problems, dietary intake and behaviour patterns in the food consumption of child caregivers in Boipatong were assessed. A pre-validated non-quantified DDQ was adapted and used to obtain information about the respondents' usual food consumption patterns and to determine the food variety score (FVS) and dietary diversity score (DDS). (Matla 2008:27; Rathnayake *et al.* 2012:469) as useful indicators of diet quality. A 24-hour recall food-intake questionnaire was used to perform a nutritional analysis in order to compare it to the estimated average intake (EAR).

The following measuring instruments were used:

- Socio-demographic questionnaire (Annexure E)
- Health questionnaire (Annexure F)
- 24-hour recall (Annexure G)
- DDQ, un-quantified (Annexure H) (Matla 2008)
- NKQ (Annexure I), adapted from Whati 2005.

#### 3.3.2.1. Socio-demographic questionnaires (Annexure E)

The validated socio-demographic questionnaires (Oldewage-Theron *et al.* 2005a:313) (Annexure E) used at VUT (CSL) for other related studies was adapted for this study and was completed using the child caregivers in Boipatong Day Care Centre in 2007.

The purpose of the socio-demographic questionnaires was to collect personal data on the caregivers who attended the Boipatong Day Care Centre to inform the researcher about the living conditions and environment of the caregivers. Multiple-choice options were included to make it easier for the respondents and fieldworkers in a one-on-one interview, and to save time in completing the questionnaires. The researcher verified questionnaires for completeness.

Basic socio-economic data were obtained in this study and included accommodation and family composition, work status and income, level of education, home language, household equipment/appliances available in the home, type of fuel used for cooking, sanitation, source of drinking water, and access to services and transport.

#### 3.3.2.2. Health questionnaire (Annexure F)

The validated Gauteng Department of Health screening questionnaire (Annexure F) was used to determine the self-reported health problems experienced by the respondents. The questionnaire was also completed in a one-on-one interview with the assistance of fieldworkers.

#### 3.3.2.3. 24-hour recall questionnaire (Annexure G)

A structured 24-hour recall questionnaire was updated and used to determine food consumed daily and the dietary intake (Oldewage-Theron *et al.* 2005a:

313). The interviews were done by postgraduates as fieldworkers/interviewers, supported by staff members of VUT.

The 24-hour recall was decided on as it is less subject to recall errors than food records, less cumbersome for the respondent and used in many dietary studies to determine actual dietary intake during the situational analysis (Ruel *et al.* 2003; Kennedy *et al.* 2007; Steyn *et al.* 2006a; FAO 2011b). A 24-hour recall is one of the most frequently used methods for collecting food consumption data. This method was chosen as it is quick, easy and inexpensive, and no long-term memory is required. Good reliability existed between trained fieldworkers. Also, respondents are not required to be literate (Walsh & Joubert 2007:294).

Three 24-hour recalls were completed on two weekdays (Tuesday and Wednesday) and one weekend day (completed on Monday). The process of conducting the 24-hour recall as described by Gibson and Ferguson (2008) was followed for data collection. The interviewers assisted the respondents in estimating portion sizes of foods consumed and recalling food and drinks consumed by means of food models to help with the estimation of portion size.

All food items, dishes and beverages consumed in the past 24 hours were recorded by trained interviewers. Supplements were not taken into consideration. Participants were asked for a full description of ingredients in mixed dishes, and amounts eaten were estimated. Standard reference tables (Langenhoven *et al.* 1991) were used to convert household portions to grams for calculation. Dietary intake data was analysed by a registered dietician, using the FoodFinder Version 3 (2009).

A quantitative recall of the women's food consumption during the previous 24 hours made it possible to calculate:

- The nutrient intake
- NAR and MAR

#### 3.3.2.4. Validated dietary diversity questionnaire (DDQ) (Annexure H)

Food variety scores and dietary diversity scores were calculated from frequency analyses for all foods and food groups. Pre-validated but unquantified DDQs used in other studies by the University of Pretoria (Matla 2008) and CSL, VUT (Oldewage-Theron & Kruger, 2008:101) were used to determine the usual food



intake and food choices of the child caregivers. The DDQ consisted of a list of foods according to the nine food groups (Ruel 2003; FAO 2011b; Steyn *et al.* 2006a). An extensive list of foods was adapted to frequently consumed food items in the Vaal area (Oldewage-Theron *et al.* 2005b:13). The DDQ is used to collect data on the variety of foods, which were analysed for FVS and DDS as good indicators of the dietary diversity consumed by the target group. This questionnaire determines whether a food item was consumed over a period of seven days according to food groups. The seven-day period was used in the situational analysis in the formulation phase as a one-day DDS was viewed as insufficient to base dietary diversity on in an assumed deprived poor community where animal protein and dairy (milk or maas) may not be consumed on a daily basis, to avoid under-reporting. The DDQ for this study was formulated during a focus group discussion with ten women caregivers from the Boipatong community in order to identify foods frequently consumed in this community. The pilot 24-hour recall questionnaires were also used as cross reference to verify if all foods recorded in them were included in the DDQ (Oldewage-Theron & Kruger 2008). The DDQ was updated and used (Annexure H). The following indicators were calculated using data obtained from the DDQ:

- A food variety score (FVS) (count of items consumed)
- A dietary diversity score (DDS) of nine food groups

#### 3.3.2.5. Nutrition knowledge questionnaire (NKQ) (Annexure I)

A reliable questionnaire with a high internal consistency and construct validity as developed by Whati (2005:159-167) was used to assess the nutrition knowledge of caregivers in this study. The NKQ was pilot tested for internal validity before use. Ten women 40-60 years of age completed the questionnaire once a week for four weeks (thus four times) to test the individual validity and reproducibility. Results were captured and analysed on SPSS, Version 18, and the results showed that the questionnaire was suitable for use in this group of people (Cronbach alpha >0.7) (Contento 2008).

Most items were phrased in accordance with the South African FBDGs (2003). In the final questionnaire of Whati *et al.* (2005), 60 questions were used to sample the full domain of the original identified concepts of FBDGs, how the FBDGs

relate to lifestyle for the maintenance of good health and weight control, food sources of selected nutrients, food safety issues, and nutrition during pregnancy.

Multiple-choice questions were used because of their suitability for objective measurement of application and analysis, as well as recall and comprehension. True/false, yes/no, open-ended questions and Likert-type scale formats were also used (Whati *et al.* 2005:32).

The questionnaire was adapted for this study and used in the analysis according to Table 3.2. When identifying the most important nutritional concepts for this study in collaboration with an expert panel of nutritionists, the eight questions pertaining to pregnancy and two questions on alcohol were discarded as that was not the focus of the study.

**Table 3.2 Categorisation of items in NKQ (Annexure I) based on the South African FBDGs (2003)**

Guidelines	No. of Items	Item's numbering in questionnaire
1 Enjoy a variety of foods	6	11, 12,27,28,29,40
2 Be active	4	9,16,20,22,
3 Make starchy foods the basis of most meals	5	3,7,34,36,38
4 Eat plenty of vegetables and fruit every day	8	5,10, 15,18,19,30,32,45
5 Eat dry beans, peas, lentils and soya regularly.	6	31,42,43,46,48,49
6 Chicken, fish, meat, milk or eggs can be eaten daily	8	2,13,17,26,35, 39,44,47
7 Eat fats sparingly	3	6,33,37
8 Use salt sparingly	2	14,50
9 Drink lots of clean, safe water	3	4,21,23
10 If you drink alcohol, drink sensibly	2	8,24
11 Eat food and drinks containing sugar sparingly and not between meals.	3	1,25,41
Total number of questions	50	

Adjusted from Whati 2005:169

An assessment score of 0-29 percent was set as very poor, 30-49 percent; poor, 50-74 percent as good and 75 percent as very good.

### **3.3.3. Fieldworkers**

Postgraduate students speaking the local language (Sesotho) from VUT's Department of Hospitality, Tourism and PR Management were recruited and trained as fieldworkers by senior researchers of the CSL. The fieldworkers were given training on how to complete questionnaires with the caregivers, and also

on how to assist respondents with low levels of education in answering the questions, without interviewer bias (Babbie & Mouton 2001: 249). The fieldworkers were also given training in ethical codes of conduct, the importance of the project objectives, and the collection of valid and reliable data. A demonstration was given on the use of food models to demonstrate estimating the correct portion sizes and to assist the respondents in identifying unfamiliar food items. A variety of participatory facilitating methods were used in the training. These included demonstrations, role play and communication skills to enable the fieldworkers to capture the correct data, to familiarise them with the data-collection methods, and to make them confident in using those methods. No student without training was allowed to assist as a fieldworker. The fieldworkers were also trained in how to approach the child caregivers. The fieldworkers chosen were able to speak Sesotho, Tswana, Northern Sotho, isiZulu and isiXhosa in order to overcome the language barriers and to be able to communicate with the women caregivers and explain the procedure of completing the questionnaires. They were also trained in how to complete a 24-hour recall questionnaire with the use of food models to estimate the portion sizes correctly.

The trained fieldworkers administered all the questionnaires, using a face-to-face interview-assisted technique. After the fieldwork had been completed, the researcher thoroughly checked the questionnaires for completeness and accuracy.

#### **3.3.4. Data processing**

The socio-demographic and health data were captured on an Excel spreadsheet. The completed questionnaires were kept safe after the fieldwork had been completed. The data contained in then questionnaires were analysed using the Statistical Package for Social Sciences (SPSS) for Windows program, Version 18.0. Descriptive statistics (frequencies, means, standard deviations (SDs) and confidence intervals) were determined with the assistance of a biostatistician.

Tables were drawn up with the percentages of different variables included on the questionnaires. Data were presented using standardised methods in terms of frequencies and percentages for various categories. With correlations between

variables, probability differences of  $P < 0.05$  were considered significant for all tests.

Where skewness was detected (as in dietary intake) the median and interquartile range (IQR) was used by means of calculating the median and quartile 1 (Q1), 25<sup>th</sup> percentile and quartile 3 (Q3) or 75<sup>th</sup> percentiles. The median and quartiles were used as measure of statistical dispersion to provide an indication of the spread of data (Leys 2013). Full sets (three days) of 24-hour recalls were completed for 43 respondents. Two of the respondents' data were removed in a clean-up of the database, as their energy intake was less than 500 kJ per day, which was considered as under-reporting. The assumption was made that that would also affect the rest of their nutrient intake. The average intakes for the three days were calculated for all the nutrients and divided by three to determine the mean daily intake. To ensure reliability and validity, only one person, namely a registered dietician, did the coding of dietary intake data. The data were captured and analysed by a registered dietitian using the MRC Food Finder®, Version 3, based on the SA Food Composition Tables (Langenhoven *et al.* 1991). Values for fortified bread and maize were used for analysis. The program was developed to analyse the nutrient content of food items consumed and included fortified maize and bread. The nutrient intakes were compared with 100 percent of the EAR for adult women (31-50 years). Where an EAR was not available, the AI was used (NICUS 2007). The top 20 most frequently consumed food items daily were determined from the three 24-hour recalls and were tabulated.

The DDQ was analysed for individual food variety score as an indication of diet quality. An average FVS (mean number of different food items consumed from all possible items eaten) and DDS (mean number of food groups out of nine possible groups) were calculated. Variety of food and food group diversity are useful indicators of diet quality and is reflected in food-based dietary guidelines. These measures can effectively substitute traditional dietary assessment tools as a proxy indicator of nutrient adequacy in communities where people lack nutrition knowledge (Arimond *et al.* 2010:2060S; Oldewage-Theron & Egal 2012:51).

Nutrient adequacy ratios were calculated by utilising the dietary intake data for each of 24 nutrients and comparing it to the EAR (sex- and age-specific for the

respondent). The NAR was calculated by dividing the individual's intake of that nutrient by the EAR.

$$\text{NAR} = \frac{\text{Actual intake of a nutrient (per day) per respondent}}{\text{EAR (sex- and age-specific for the respondent)}}$$

NARs were used as a composite indicator for nutrient adequacy (Rathnayake et al. 2012:471). A NAR of >1 was interpreted as an adequate intake of the nutrient. NAR<1.

The mean adequacy ratio (MAR) was determined from the NAR as the sum of NARs for all evaluated nutrients divided by the number of nutrients evaluated, expressed as a ratio.

$$= \frac{\text{Sum of all NARs (each truncated at one)}}{\text{Number of nutrients}}$$

Pearson correlation coefficients between FVS, DDS and were calculated and also evaluated for sensitivity and specificity, with MAR=1 taken as the ideal standard of adequate intake (Steyn *et al.* 2007:644).

For the FVS, fewer than 30 foods consumed in the seven-day period indicated low food variety, 30-60 foods medium, and more than 60 foods were indicative of a high FVS. For DDS, less than three food groups consumed within the seven days indicated a low score, four to five groups a medium score, while six to nine groups indicated high dietary diversity (Matla 2008).

The NKQ data was captured on Microsoft Excel and statistically analysed on SPSS, Version 18.0, using descriptive statistics and frequencies, with the assistance of a biostatistician of VUT.

### **3.4. RESULTS**

The data on questionnaires were analysed and quantitative results were tabulated. Socio-demographic and economic results are presented based on Ahmed's (2004) framework for the indicators of poverty as discussed in the literature review. The six types of poverty, namely income poverty, asset,

consumption and capability poverty, safety and hygiene and food (nutrient) poverty, will be discussed. Results and findings will be presented per subsection.

**Table 3.3 Home language of the respondents (n=52)**

Variables	Number	Valid Percent (%)
Language spoken:		
SeSotho	30	57.7
Zulu	7	13.5
Xhosa	5	9.6
Other	10	19.1

Child caregivers were predominantly Sesotho speaking (58%), followed by Zulu (13.5%) and Xhosa (9.6%), as shown in Table 3.3 above.

The median age of the sample (n=52) was 44.5 years, (32-62) with a range of 22-78years. The EAR of >31 years or >50 years was used according to the age category of the respondent. All the caregivers were female.

### **3.4.1. Income poverty**

Variables to measure income poverty include income per household, number of people contributing to the income, self-reported shortages of money during a month, expenditure on food, and employment status of the household.

The results of this study are shown in Table 3.4.

**Table 3.4 Income poverty as indicated by monetary and employment status of the child caregivers (n=52)**

Variables	Number	Valid % (%)	Variables	Number	Valid % (%)
	n=52			n=52	
Household Income level:			Employment status		
<R500	14	35.0	caregivers:		
R501 – R1000	16	40.0	Currently unemployed	28	53.8
R1001 – R1500	5	12.5	Retired	16	30.8
Above R1501	5	12.5	Housewife	5	9.6
			Other	3	5.8
Number of people contributing to income:			Partner employment status		
1	7	13.7	Full-time or part-time		
2	30	58.8	Retired	11	21.2
3	8	15.7	Unemployed	3	5.7
>4	6	11.8	No partner	7	13.5
				31	59.6
Reported frequency of money shortage:			Caregivers looking for a job		
Always, often	16	32.0	Yes		
Sometimes	24	48.0	No	16	30.7
Seldom, never	10	20.0		36	69.3

<i>Variables</i>	<i>Number</i> <i>n=52</i>	<i>Valid % (%)</i>	<i>Variables</i>	<i>Number</i> <i>n=52</i>	<i>Valid % (%)</i>
Monthly expenditure on food per household:			Gender of participant completing the forms		
R0 – R50	10	19.2	Female	52	100
R51 – R100	12	23.1			
R101 – R150	6	11.5	Age of participants completing the forms		
R151 – R200	7	13.5	21-30 years	8	15.4
R201 – R300	7	13.5	31-50 years	25	48.1
>R300	2	3.9	51+	19	36.5
Do not know	8	15.3	Mean = 46.8 (SD16.3)		

The results of this study showed that the income status of households was very low, compromising food security in many households. The majority of households (75%) earned less than R1 000 per month (\$142.50 – April 2007), with 80.8 percent of households spending less than R300 per month on food for the household. Eighty percent reported to having (always to sometimes) a shortage of money. Unemployment was high (53.8% of caregivers) although 69.3 percent reported not to be looking for a job. In most households (58.8%), two people contributed towards an income (McIlrath & Slabbert 2003).

On the basis of income, the sample can be classified as falling into the LSM1-3 group. The three segments of lowest status (LSM 1 to 3) cover 17 percent of the SA population, who are perceived as marginalised consumers (SAARF 2011).

### **3.4.2. Asset poverty**

The lack of ownership of shelter and homestead land corroborates poverty or vulnerability to poverty (Ahmed 2004:6), especially in urban areas where proper housing is a scarce resource. Seemingly, most respondents in this study were owners of RDP houses and therefore did not have to pay rent.

The situation regarding the variables used to determine asset poverty is presented in Table 3.5. Most of the respondents had lived in Boipatong (92 percent) for longer than five years (88 percent), signifying established homes, while households consisted largely of four to seven members (74.9%). Yet, 42.3 percent of caregivers in the peri-urban environment were single or divorced (1.9%) or widowed (15.4%).

**Table 3.5 Asset poverty as determined by type of housing and sources of energy and appliances available (n=52)**

Variables			Number	Valid % (%)	
<b>Type of housing</b>					
Brick			36		<b>69.2</b>
Zinc/Shack			16		<b>30.8</b>
<b>Number of rooms in the house:</b>					
< 2			12		<b>23.1</b>
3 – 4			12		<b>23.1</b>
> 4			28		<b>53.8</b>
<b>Source of energy:</b>					
Electricity within the house			41		<b>78.4</b>
Paraffin			6		<b>11.8</b>
Other			5		<b>9.8</b>
<b>Length of stay in the house</b>					
< 5 years			45		<b>87.0</b>
>5 years			7		<b>13.0</b>

Variables	Number	Valid %	Variables	Number	Valid %
	YES	(%)		YES	(%)
<b>Electrical stove</b>	35	<b>67.3</b>	Radio	41	<b>78.8</b>
<b>Electrical kettle</b>	37	<b>71.2</b>	TV	39	<b>75.0</b>
<b>Refrigerator</b>	38	<b>73.1</b>	Bed and mattress	48	<b>92.3</b>
<b>Microwave</b>	25	<b>48.1</b>	Lounge suite	20	<b>38.5</b>
<b>Gas stove</b>	5	<b>9.6</b>	Dining room suite	23	<b>44.2</b>
<b>Primus/paraffin</b>	14	<b>26.9</b>			

Some researchers also classify human capital and children as assets that affect household vulnerability. In this study, human capital will be used to evaluate the capability of households to access health and education and measure perceptions of participants regarding their emotional health and well-being.

Nearly 70 percent of the houses were built from brick and 31 percent were shacks and/or zinc. Most households lived in houses with more than four rooms (53.8 percent).

The main source of energy in the house was electricity (78%) with only 12 percent making use of paraffin and 10 percent of gas. A range of electrical appliances was available, including stoves (67%), kettles (71%) and refrigerators (73%). Radios were owned by 79 percent while 75 percent had televisions. Other equipment and furniture available in the house are indicated in Table 3.4. At the



time of the study, most of the caregivers (87%) had been living in their homes on a permanent basis for longer than five years.

### 3.4.3. Consumption poverty

Indicators and results of consumption poverty are provided in Table 3.6.

**Table 3.6 Consumption poverty influenced by number of people in the household, the caregiver's role in the household, her marital status and food procurement decisions in the household (n=52)**

<i>Variable</i>	<i>Number</i>	<i>Valid % (%)</i>	<i>Variable</i>	<i>Number</i>	<i>Valid % (%)</i>
Number of people in the household:			<b>Frequency of shopping:</b>		
2 - 3	6	11.5	Once a month	36	69.2
4 - 7	39	74.9	Weekly	14	26.9
> 7	7	13.6	Every day	2	3.8
No. of children in the household:			<b>Food is bought at:</b>		
1	6	11.5	Spaza	9	17.3
2	12	23.1	Supermarket	40	76.9
3	11	21.2	Other	3	5.8
≥ 4	23	44.2	<b>Marital status</b>		
No. of children eating at home	47	95.9	Single	22	42.3
Receiving food at school	9	17.3	Married	21	40.4
Caregiver's role in the household:			Widowed	8	15.4
Mother	6	11.5	Divorced	1	1.9
Grandmother or	14	26.9			
Guardian/Family member	32	61.6			
<b>Person responsible for decision-making (n=52)</b>					
	<i>Father</i>	<i>Mother</i>	<i>Grandmother</i>	<i>Grandfather</i>	
<b>Head of the household</b>	12 23.5%	26 51%	11 19.6%	3 5.9%	
<b>Making monetary decisions</b>	4 7.8%	34 66.7%	11 21.6%	3 5.7%	
<b>Making decisions on which food to buy</b>	1 2.0%	38 72.5%	10 19.6%	3 5.9%	

Most of the caregivers were single (42.3%), widowed (15.4%) or divorced (1.9%) while 40.4 percent were married (Table 3.6). Their role in the household varied from mothers (11.5%) to grandmothers (26.9%), and 61.6 percent were guardians or caregivers from the extended family. Despite their single marital status, all the respondents shared the house with other people. Most of them (74.9%) shared the house with four to seven permanent residents. Most households had three or more children (65.4%).

Most households (69.3%) bought food once a month at a supermarket (76.9%) and 17.3 percent at spaza shops. The number of meals enjoyed per day were either two (40%) or three (54%). Meals were mostly enjoyed at home (95.9%) and only 17.3% of children received food at schools.

Table 3.6 also shows that in 51 percent of cases the mother was the head of the home, compared to 23.5 percent of households where the father was the head. In 65.4 percent of households, mothers were responsible for monetary decisions, with 21.2 percent of grandmothers making these decisions. Women were responsible for food procurement decisions in 93 percent of households.

Regarding children, 44.2 percent of households accommodated four or more children (Table 3.6), with 95.9 percent of children enjoying meals at home. In 71 percent of cases either the mother (51%) or grandmother (19.6 %) was the head of the household. Fathers were the head of the household in only 23.5 percent of households. Most households (69.3%) bought food once a month at a supermarket (76.9%) and 17.3 percent purchased food at spaza<sup>1</sup> shops. The percentage of mothers responsible for monetary decisions was 65.4 percent and 21.2 percent of grandmothers were responsible for those decisions. The mother was mostly responsible (72.5%) for making decisions about what food to buy and the grandmother was responsible for those decisions in 19.6 percent of the households.

Of the child caregivers in the household only 11.5 percent were mothers, 26.9 percent were grandmothers, and 61.6 percent regarded themselves as family

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<sup>1</sup>A spaza shop is a small informal shop in a township where only essential food and other household items can be bought ([https://en.wikipedia.org/wiki/Spaza\\_shop](https://en.wikipedia.org/wiki/Spaza_shop)).

members and guardians of children. Food was available at spaza shops and supermarkets, but there was not enough money to procure sufficient food.

#### **3.4.4. Capability poverty/ Well-being poverty**

The incidence of capability poverty as measured by educational level, health status, emotional well-being, and education of caregivers is given in Table 3.7.

**Table 3.7 Capability poverty as indicated by educational level, self-reported general ailments (health status), emotional and social well-being and substance abuse (n=52)**

<b>Education levels of caregivers</b> <i>Variables</i>	<i>n=52</i>	<b>Valid % (%)</b>
None	2	3.8
Primary school education	18	33.3
Secondary school education	28	54.9
College	4	7.8
<b>Self-reported health status as indicated by general ailments</b>		
<b>Variables</b>	<i>n=52</i>	<b>Valid % %</b>
<i>Skeleton problems</i>	26	51.0
▪ Arthritis/painful arm or hip	10	19.2
▪ Dental problems	5	9.8
Suffering from sight or hearing problems	25	49.0
Digestive ailments	12	23.5
<b>Self-reported heart status regarding circulatory problems</b>		
<b>Variables</b>		<b>Valid %</b>
Any ailment of the heart or circulatory system	20	38.5
Reported having high blood pressure	5	25.0

Table 3.7 continued						
Physical, emotional social and functional well-being						
Variables	Number	Valid (%)	Number	Valid %	Number	Valid (%)
	Never/seldom		Sometimes		Often/always	
<i>Physical well-being</i>						
▪ Tiredness	12	37.8	20	44.4	8	17.8
▪ Experiencing pain	9	23.5	25	55.6	8	17.8
▪ Feeling ill	18	57.8	11	24.4	8	17.8
<i>Emotional well-being</i>						
▪ Feeling sad:	20	47.7	15	35.7	7	16.6
<i>Social/ family well-being</i>						
▪ Support from family	12	26.7	9	21.4	27	64.3
▪ Support from friends	20	44.4	7	15.6	26	57.7
<i>Functional well-being</i>						
▪ Enjoying life	8	20.0	5	11.1	20	44.5
▪ Sleeping well	6	14.3	3	7.5	29	72.5
Prevalence of substance abuse						
Variables	Frequency	Valid %	Frequency	Valid %	Frequency	Valid %
	Yes		No		Stopped	
Smoking	8	18.2	32	62.7	0	0.0
Taking snuff	9	20.0	34	75.6	2	4.4
Taking alcohol:	15	33.3	24	53.4	6	13.3
Access to services						
Variables	n=52	Valid (%)	Variables	n=52	Valid (%)	
<b>Water and sanitation</b>						
Tap inside the dwelling	12	23.1	Flush toilets	43	82.7	
Tap outside the dwelling	20	38.5	Pit latrine	5	9.6	
Tap inside and outside the dwelling	16	30.7	Pit latrine/Bucket	3	5.8	
Fetching of water	4	7.7	Pit and flush	1		
<b>Waste removal services</b>			<b>Access</b>			
	39	75.0	Tarred roads (n=12)	12	23.1	
			Gravel roads	40	76.9	

The educational level indicated in this study was that only 3.8 percent of respondents did not attend school at all, while 33.3 percent attended primary schools and 54.9 percent attended secondary school. What is heartening is the fact that 62.7 per cent of caregivers had reached an educational level of secondary school or higher. This compares favourably to the latest SANHANES-1 survey. At a national level, six percent of the sample did not have any schooling and 34 percent completed education at primary school level, while 33 percent completed high school, 20 percent completed matric and eight percent completed tertiary education (Shisana 2012:64). In contrast, in another study in the Vaal Region, on female illiteracy, 23.2 percent of respondents did not have any formal education and 48.5 percent had primary school education only (Oldewage-Theron *et al.* 2006:798). Thus, two adjacent pockets of poverty have their own unique characteristics, which should be taken into consideration when designing appropriate nutrition interventions. This once again stresses the fact that there is no universal solution to poverty and its effects.

When the respondents' physical well-being was investigated, 15.4 percent indicated that they experienced pain, ranging from often to always, while another 23 percent reported often/always feeling ill and 38.5 percent indicated that they were often or always tired. The health questionnaire included questions on emotional well-being and perceptions about social and family life (Table 3.7). The results show that 61.5 percent sometimes or often experienced sadness. This is in contrast with 55.8 percent who reported always enjoying life and 51.9 percent who always slept well. Regarding social well-being, 51.9 percent also reported that they often/always received support from their families, while only 11.5 percent reported support from friends.

Family structures, as a safety net, seem to be strong and supportive, though support from friends seems to be dwindling, as 58.5 percent of the respondents indicated that they never or sometimes received support from friends.

Substance abuse was low in this community, as only 19.2 percent, 30.8 percent and 38.5 percent smoked, took snuff or used alcohol respectively, supporting the relative stable emotional well-being in this community (Table 3.7).

Health depends on the availability of and access to clean, safe and enough water and food, and of protective shelter and safe environmental conditions with clean air and access to sanitation (Oldewage-Theron & Slabbert 2008:92). Hygiene practices are critical for child nutrition and development. Home and health care practices are essential, including diagnosis of illnesses, protection from pests and prevention of accidents (Allen & Gillespie 2001, 69).

These factors were not evaluated in the preparation phase; however, female caregivers' knowledge about improper storing and handling and some food preparation methods were tested later when developing NE material.

The source of energy (Table 3.5) is indicative of an easier life and better sanitary conditions, as most had access to electricity (78.4%), households had water inside (23.1%) or outside the house (38.5%) or both (30%). Only a few households had to fetch water (7.7%). Flush toilets (82.7%) improved hygienic conditions considerably (Table 3.7).

At the time when the situational analysis was performed, waste removal did not seem to be a problem as 75 percent reported having waste removal services on a regular basis. Tarred roads were available in front of the majority of the homes. Children in the small township of Boipatong mostly walked to school (92%), while the rest made use of public transport such as a bus or taxi.

#### ***3.4.5. Food poverty***

The results of the DDQ and 24-hour recalls will be presented and analysed below as part of food poverty.

#### **Food choices of caregivers in the preparation phase**

The results of the 24-hour recall performed during the preparation phase provided a list of the 20 most frequently consumed food items. Before data capturing took place, forms were verified for completeness. Of the 52 forms received, seven were incomplete and therefore not included in the analysis. Another two participants were removed because of their extremely low energy intake reported (below 500 kJ). (The sample for this questionnaire was therefore n=43 or 82.7% of the original sample size). Beer was excluded from the top-twenty list as it was consumed by only one person (2250 g) and would therefore

provide a skewed picture. The top 20 most frequently consumed foods are listed in Table 3.8.

**Table 3.8 Food poverty as indicated by the top 20 foods frequently consumed, as determined from the 24-hour recall (n=43)**

Food item		Total intake(g) n=43	Mean per capita intake (n)	SD	Mean intake per person that consumed the item (g)	Number of people who consumed the item (and %)
1	Maize meal, stiff	7580	176	154	205	37 (86)
2	Bread, brown	3740	87	21	104	36 (84)
3	Tea brewed, Joco/Rooibos	9000	209	73	273	33 (77)
4	Maize meal, soft	4110	96	183	228	18 (42)
5	Milk, fresh full cream	1820	42	106	114	16 (37)
6	Chicken, cooked	1255	29	49	90	14 (33)
7	Rice, white cooked	1720	40	186	130	13 (30)
8	Egg	1432	33	74	172	11 (26)
9	Water	4680	109	557	468	10 (23)
10	Beef, cooked	1289	30	163	161	8 (19)
11	Apple, average, raw	750	18	61	125	6 (14)
12	Cold drink, carbonated	2430	57	430	486	5 (12)
13	Fruit juice	1250	29	177	250	5 (12)
14	Potato chips, French fries	510	12	91	102	5 (12)
15	Bread, white	460	11	33	92	5 (12)
16	Maltabella porridge	1250	30	125	312	4 (9)
17	Sausage: Boerewors	630	15	86	157	4 (9)
18	Liver, fried	550	13	106	137	4 (9)
19	Vetkoek/dumpling	1050	24	234	350	3 (7)
20	Coffee, brewed	500	12	0	250	2 (5)

The results were indicative of food poverty and poor food choices, possibly due to monetary constraints, with 40 percent of households with an income of R501 to R1 000 per month and high unemployment was (53.8%).

The five food items consumed in by the largest number of the respondents were (1) maize meal, stiff (86%), (2) bread, brown (84%) and (3) tea, brewed (77%), (4) maize meal, soft porridge (42%) and (5) milk, fresh (37%). The results showed that the respondents consumed a mainly carbohydrate-rich diet, as eight

of the twenty most frequently consumed food items were carbohydrates such as stiff maize meal porridge, brown bread, soft maize meal porridge, white rice, potato fries, white bread, Maltabella porridge and vetkoek or dumplings. The protein-rich food sources like milk, chicken, egg, beef, beef sausage and liver were consumed by fewer respondents in smaller portions. When looking at the mean per capita intake, the representation is even more distressing. On average, each respondent consumed only 42 ml of milk compared to the 400-500 ml of low fat milk intake recommended in the South African FDBGs (Vorster 2013:58). No plant proteins were included in the top twenty list of food frequently consumed.

In terms of fruit, apple was consumed in small amounts by 14 percent of the respondents and fruit juice appeared 13<sup>th</sup> on the list, (about one cup consumed by five respondents) which in total is unlikely to satisfy the mean of 400 g intake per capita recommended by the WHO (2015).

### **Dietary profile of caregivers**

Food intake that will safeguard long-term health is the end goal of nutritional research. Dietary intake was measured against the EAR (NICUS 2007) as part of a nutrient assessment for adequacy in this sample of the Boipatong population, and shown in Table 3.9. The EAR for women >50 years of age were used as the median age was 44 years, but with the 25<sup>th</sup> percentile 32 years and the 75<sup>th</sup> percentile 62 years, indicating a skewed distribution to the right of the normal distribution (nonparametric distribution), thus including more older caregivers. As the dietary intake data also showed non-normal distributions, the nonparametric statistics were also used.



**Table 3.9 Food poverty as determined by an analysis of the 24-hour recall data of food energy and macro- and micronutrient intake compared with EAR (n=43)**

<i>Nutrient</i>	<i>EAR *women &gt;50 years of age</i>	<i>Median</i>	<i>Q1</i>	<i>Q3</i>	<i>Number of subjects =&gt; 100% EAR and (percentage)</i>
<b>** Energy (kJ)</b>	<b>7855</b>	5323	(3369	7949)	11 (25.5)
<b>*** Total protein (g)</b>	<b>46</b>	47	(32	74)	23 (53.5)
<b>*Total carbohydrates (g)</b>	<b>100</b>	156	(98	244)	31 (72.1)
<b>## Total fat (g)</b>	<b>52</b>	35	(21	59)	16 (37.2)
<b>Dietary fibre (g)</b>	<b>25</b>	12	(7.0	17)	3 (6.9)
<b># Calcium (mg)</b>	<b>1200</b>	165	(94	331)	0 (0.0)
<b>Iron (mg)</b>	<b>5</b>	10	(7	16)	37 (86.2)
<b>Magnesium (mg)</b>	<b>265</b>	189	(143	270)	13 (30.2)
<b>Phosphorous (mg)</b>	<b>580</b>	688	(414	1112)	28 (65.1)
<b>Zinc (mg)</b>	<b>6.8</b>	7.2	(4.8	10.6)	22 (51.2)
<b>Selenium (mcg)</b>	<b>45.0</b>	21.5	(8.5	53.1)	14 (32.6)
<b>Iodine (mcg)</b>	<b>95.0</b>	16.4	(7.5	42.5)	3 (6.9)
<b>Vitamin A (RE) (mcg)</b>	<b>500</b>	355	(180	727)	14 (32.6)
<b>Thiamine (mg)</b>	<b>0.9</b>	0.79	(0.57	1.15)	18 (46.5)
<b>Riboflavin (mg)</b>	<b>0.9</b>	0.78	(0.46	1.17)	18 (41.9)
<b>Niacin (mg)</b>	<b>11.0</b>	13.9	(7.6	24.6)	27 (62.8)
<b>Vitamin B6 (mg)</b>	<b>1.3</b>	0.92	(0.63	1.64)	15 (34.9)
<b>Folate (mcg)</b>	<b>320</b>	244	(167	359)	17 (39.5)
<b>Vitamin B12 (mcg)</b>	<b>2.0</b>	1.82	(0.5	5.1)	19 (44.2)
<b>Pantothenic acid (mg)</b>	<b>5.0</b>	3.6	(1.4	6.7)	16 (37.2)
<b>Biotin (mcg)</b>	<b>30.0</b>	20.2	(10.6	32.9)	12 (27.9)
<b>Vitamin C (mg)</b>	<b>60.0</b>	10	(3.6	22.5)	4 (9.3)
<b># Vitamin D (mcg)</b>	<b>10.0</b>	1.2	(0.3	7.9)	5 (11.6)
<b>Vitamin E (mg)</b>	<b>12.0</b>	4.3	(1.7	10.7)	7 (16.3)

\* EAR for active women >50years of age respectively (Nicus 2007)

\*\*EER for women with a physical active level >50 years

# AL women >50 years where EAR is not available (Nicus 2007)

##AMDR for women >51 years for total fat =25-35% of energy (Nicus 2007).

Therefore total fat:  $7855 \times 25\% = 1963$  kJ from fat / 38 kJ per g = 52 g fat

The median and IQR were used for interpretation purposes when dietary intakes were compared to the EAR. As indicated in Table 3.9, food energy intake was about 70 percent of the EER (median 5323 kJ; IQR 3369-7949). However, it is widely recognised that reported energy intake in dietary surveys underestimates usual energy intake (Nicus 2007:15). Protein intake (median 47 g, IQR 42-74)

per day per respondent was sufficient, but only 53.5 percent of the respondents reached the EAR. Fat intake was low (median 35, IQR 21-59) g per day compared to the 52 g as calculated from the adequate macronutrient distribution range (AMDR), yet only 37.2 percent of respondents reached the EAR. Consumption of carbohydrates (median 156, IQR 98-244) g per day compensated for hunger and energy intake and was consumed by most of the participants (72.1%).

Calcium intake was extremely low (median 165, IQR 94-331) mg per day and none of the participants reached the EAR for this mineral. Selenium (median 21.5, IQR 8.5-53.1) mcg/day and iodine (16.4, IQR 7.5-42.5) mcg was also low and only 32.6 and 6.9 percent of participants reached the EAR.

Most of the vitamins were slightly lower than the EAR, including vitamin A, thiamine, riboflavin, vitamin B6, folate vitamin B12, pantothenic acid and biotin. Vitamin C was very low (median 10, IQR 3.6-22.5) mg, Vitamin D (median 1.2, IQR 0.3-7.9) mg and vitamin E (median 4.3, IQR 1.7-10.7) mg/day. Another concern is that for most of the vitamins less than 50 percent of participants reached the EAR.

➤ **Nutritional adequacy ratio and mean adequacy ratio**

In this cross-sectional study the nutritional adequacy ratio (NAR) for energy, five macronutrients, seven minerals and twelve vitamins and the mean adequacy ratio (MAR) were determined to test dietary quality (n=43). Nutrient adequacy ratios (NAR) were calculated for each individual by means of 24-hour recalls for each nutrient.

Values for the NAR, when bigger than one (100%) per individual, were truncated at one (indicating EAR adequacy) to avoid skewing data of larger portions consumed by a few. The MAR for the total diet was calculated by adding the NARs and dividing the sum by the number of nutrients analysed (24) (Table 3.10).

**Table 3.10 NAR per nutrient and for macronutrients, fibre, minerals and vitamins as well as for the total diet as calculated from the 24h recall of child caregivers (n=43).**

<i>Nutrient adequacy ratio (NAR)</i>	<i>Value Median</i>	<i>Q1</i>	<i>Q3</i>
Energy	0.7	0.4	1.0
Protein	1.0	0.7	1.0
Fat	0.7	0.4	1.0
Carbohydrate	1.0	1.0	1.0
<i>Mean adequacy ratio (MAR) for macronutrients</i>	<i>0.8</i>		
Fibre	0.5	0.3	0.7
Calcium	0.1	0.1	0.3
Iron	1.0	1.0	1.0
Magnesium	0.7	0.5	1.0
Phosphorous	1.0	0.7	1.0
Zinc	1.0	0.7	1.0
Selenium	0.5	0.2	1.0
Iodine	0.2	0.1	0.5
MAR minerals	0.6		
Vitamin A	0.7	0.4	1.0
Vitamin B1	0.9	0.6	1.0
Vitamin B2	0.9	0.5	1.0
Vitamin B3	1.0	0.7	1.0
Vitamin B6	0.7	0.5	1.0
Folate	0.8	0.5	1.0
Vitamin B12	0.9	0.2	1.0
Pantothenate	0.7	0.2	1.0
Biotin	0.7	0.4	1.0
Vitamin C	0.2	0.1	0.4
Vitamin D	0.1	0.0	0.8
Vitamin E	0.4	0.1	0.9
MAR vitamins	0.6		
MAR total diet	0.7	0.4	0.9

An analysis of the 24-hour recall data into NAR for each nutrient and a MAR of 0.7 for the total diet confirmed poor dietary quality for a number of nutrients. Energy intake was low (median 0.7) and this could be a confounding factor in lowering medians for macro- and micronutrients. The NARs of fibre (median 0.5), calcium (median 0.1), iodine (median 0.2) vitamin C (median 0.2) vitamin D (median 0.1) and vitamin E (0.4) were lower than 50 percent of the respective requirements. This confirms the poor dietary intake as indicated in Table 3.9. Although the MAR for macronutrients were 0.8, those of minerals (0.6) and vitamins (0.6) were deficient. The total MAR had a median of 0.7 (IQR 0.4-0.9).

The results of this study are in accord with those of Oldewage-Theron *et al.* (2005b); Napier (2006), Oldewage-Theron *et al.* (2008), and Acham *et al.* (2012b), who found poor dietary intakes in the Vaal Region, supporting the need for intervention and NE to improve food intake.

➤ **Food variety score (FVS) and dietary diversity score (DDS)**

The use of dietary pattern analysis focusing on the whole diet rather than on a single food or nutrient has numerous advantages in linking diet to health outcomes (Safdar *et al.* 2013:1). A non-quantified DDQ was used to measure the FVS. As the DDQ did not include portion sizes, each eating occasion was assumed to include a portion. The total number of food items reported in the DDQ was 89 food items. The questionnaires of 52 of the respondents interviewed were completed adequately.

For the FVS, fewer than 30 foods consumed in the period of seven days indicated low food variety, 30 to 60 foods indicated medium variety, and more than 60 foods, high variety (FVS) (Oldewage-Theron 2013:52). Table (3.11) provides a classification of the risk of respondents for malnutrition.

**Table 3.11 Food poverty: FVS child caregivers categorised according to the number of food items consumed (n=52)**

<i>Food items consumed</i>	<i>Low food variety FVS ≤30</i>	<i>Medium food variety FVS =31-60</i>	<i>High food variety FVS ≥61</i>
Number of respondents	11	29	12
Percentage of respondents	21.2%	55.8%	23.1%

The food items consumed by any participant as reported in the DDQ ranged between 7 and 77 foods. The median FVS was 39 with an interquartile range of (Q1: 31- Q3: 52) food items, indicating a medium food diversity with 21.2 percent of participants with a high risk of food poverty (Table 3.11).

The DDS is defined as the number of food groups consumed over a period of seven days as calculated from the FVS. The diet was classified according to nine food groups, namely (1) cereals, roots and tubers, (2) vitamin-A-rich fruits and vegetables, (3) other fruit, (4) other vegetables, (5) legumes and nuts, (6) meat, poultry and fish, (7) fats and oils, (8) dairy, and (9) eggs. Other remaining items

such as tea, sugar and sweets were not used in the DDS and food variety score (FVS) calculations (Steyn *et al.* 2007:645).

The DDS was calculated by totalling the number of food items in a food group consumed by an individual respondent over a seven-day period. DDS can be used to assess changes in the diet before and after an intervention (FAO 2011). A holistic picture of the food and nutrition security status in a community can be obtained from diversity as a measure of household food access and food consumption that can be verified with other food-related information (Kennedy *et al.* 2007:1).

**Table 3.12 Household diversity: Different food items consumed within nine food groups by respondents**

FOOD GROUPS								
Meat, fish poultry	Eggs	Dairy	Starches & roots	Legumes	Vit A vegetables & fruit	Other fruit	Other vegetables	Total fat
Food items [n=13]	Food items [n=1]	Food items [n=8]	Food items [n=14]	Food items [n=5]	Food items [n=8]	Food items [n=18]	Food items [n=17]	Food items [n=5]
0=0	0=16	0=2	0=1	0=5	0=1	0=2	0=1	0=1
1=2	1=36	1=2	1=0	1=10	1=2	1=4	1=1	1=3
2=2		2=6	2=0	2=11	2=1	2=5	2=7	2=14
3=7		3=8	3=0	3=12	3=6	3=6	3=2	3=24
4=6		4=9	4=4	4=7	4=11	4=5	4=2	4=6
5=5		5=4	5=1	5=7	5=8	5=8	5=7	5=4
6=6		6=12	6=2		6=5	6=2	6=6	
7=5		7=4	7=9		7=8	7=4	7=3	
8=6		8=5	8=9		8=11	8=2	8=8	
9=2			9=7			9=1	9=3	
10=4			10=3			10=1	10=3	
11=4			11=4			11=2	11=3	
12=3			12=2			12=1	12=1	
13=0			13=4			13=2	13=1	
			14=6			14=1	14=0	
						15=3	15=1	
						16=0	16=0	
						17=1	17=3	
						18=2		

As shown in Table 3.12, a large number of respondents had consumed only a few of the foods in a group; for example, five respondents did not consume any legumes, while ten respondents reported having had one item of the legumes in a seven-day period. Most seem to have consumed three to eight items of the animal protein group in the seven-day period and seven to nine items of

starches, and most had three to five items of vitamin A vegetables and fruit. Based on the use of the nine-food-group system, the participants in the preparation phase had a high median DDS of 9 (8-9) (see Table 3.12).

### **3.4.6. Nutrition knowledge of women caregivers**

The questionnaire developed by Whati *et al.* (2005:159) was adapted and used in the preparatory phase of the NEP to determine the nutrition knowledge of women caregivers in Boipatong.

**Table 3.13 Classification of the scores obtained by the caregivers regarding their nutrition knowledge**

Percentage		n=52
<29	Very poor	2
30-49%	Poor	30
50-74%	Good	20
>75%	Very good	0

Nutrition knowledge showed a median of 50 percent (42-54%). The majority of caregivers (30 participants) scored between 30 and 50 percent on the questionnaire that was used to determine their nutrition knowledge (Table 3.13). The minimum score was 22 percent and the maximum 66 percent.

**Table 3.14 Summary of nutrition knowledge of caregivers in the preparation phase based on the 11 South African FBDGs (2003) (n=52)**

<i>Messages</i>	<i>Mean % scored per FBDG</i>	<i>SD</i>	<i>*Confidence interval 95%</i>	<i>Ranking: least knowledge</i>
Enjoy a variety of foods	33.4	4.1	1.1	1
Be active	66.5	3.4	0.9	11
Drink lots of clean, safe water	40.7	3.9	1.1	3
Make starchy foods the basis of most meals	44.8	4.4	1.2	5
Chicken, fish, milk or eggs can be eaten daily	40.3	3.5	1.0	2
Eat plenty of vegetables and fruits daily	52.0	3.4	0.9	6
Eat dry beans, split peas, lentils and soya regularly	54.3	6.7	1.8	8
Eat fats sparingly	44.7	3.6	1.0	4
Use salts sparingly	52.0	4.5	1.2	7
Use food and drinks containing sugar sparingly and not between meals	60.0	8.1	2.2	10
If you drink alcohol, drink sensibly	<u>57.0</u>	4.3	1.2	9
Mean % for the 11 FBDGs	49.6%	3.9	1.1	

\*Source: Confidence Interval Calculator for Means

Table 3.14 indicates that the caregivers exhibited the least knowledge of the following items, based on the South African FBDGs: (1) 'Enjoy a variety of foods' (mean 33.4%; CI 1.1) (2) 'Chicken, fish, meat, eggs and milk could be eaten daily' (mean 40.3%; CI 1.0) and (3) 'Drink lots of clean, safe water' (mean 40.7%; CI 1.1) The mean percentage for all the FBDGs was 49.6 percent (CI 1.1). Surprisingly, the caregivers' knowledge proved to score the highest on questions testing knowledge about activity, with secondly, 'Use food and drinks containing sugar sparingly and not between meals.'

## 3.5. DISCUSSION

### 3.5.1. Income poverty

The *poverty line* is a common index used to determine poverty in terms of household units. A poverty line based on minimum food needs for daily dietary energy requirements, plus essential non-food items, is calculated (Rosalina *et al.* 2007:135). The World Bank's (2012) current international poverty line is \$1.25 for absolute (extreme) poverty, but a more generous poverty line of \$2 per day is

also used. This phase of the NEP assessed the situation of urban households of the sample of child caregivers in the Boipatong Township in order to establish a profile of the caregivers on which to base the next phases of an NE intervention.

Income and food poverty existed amongst the households of the caregivers. The large proportion of households (75%) surviving on an income of R1 000 is proof of income poverty. Income poverty was also indicated in a study by Oldewage-Theron *et al.* (2006) in the same region, where 58.3 percent of respondents had a monthly income of less than R1 000. Depending on the number of household members, the monthly expenditure per member ranged between R42.86 (seven people) and R70 (four people) per person per month; 70.5 percent indicated a frequent shortage of money and spent less than R100 per week (R400 per month) on food. It would therefore seem as if the depth of poverty of households in this study was worse and linked to food poverty. Similar results were found amongst a study of the elderly in Umlazi, with 82.9 percent surviving on an income between R500 and R1 000 per month and reporting frequent food shortages (54 percent) (Mkize *et al.* 2013:3). Jacobs (2009) held that, based on the Rose-Charlton index, on average 26.5 percent of urban households fall below the food security threshold. Food poverty is inversely related to household income.

Disposable income measurement is a meaningful way to assess living standards, while consumption poverty might be a more accurate measure of inequality. Yet, income, occupation and education are frequently used as indicators of class, while socioeconomic status has been associated with healthy food habits and diet quality (Fisher *et al.* 2012). Recent studies show that income inequality has increased over the past three decades (Fisher *et al.* 2012). This is supported in the SANHANES-1 report where the reported source of income by sex showed gender disparity with more men (46%) as opposed to females (32%) receiving salaries and wages and where more females (27%) relied on pensions, grants and UIF than males (15%) (Shisana *et al.* 2012:64-66). It is also reported that the proportion of females living below the \$1 poverty line remained higher (5.3%) compared to that of males (4.8%) in 2006 (RSA Millennium Development Goals Country report 2010:27).



In the SA National Development Plan (NDP), a poverty line of R418 was recommended per capita (in 2009) for SA, that is, an income of R1 672 for a family of four members (NPC 2011:2).

Mahal and Koran (2008) warned against the over-simplification of the assumption that declines in poverty measured in terms of the 'food basket' automatically lead to nutritional gains. Micronutrient deficiencies tend to persist in India, despite economic growth and a steady decline in poverty. In contrast, a study undertaken by Loopstra and Tarasuk (2013) suggests that improvements in income and employment are related to improvements in households' experiences of food security, highlighting the potential for income- and employment-based policy interventions to have a far wider effect; also on nutrition.

Unemployment was much higher (53.8% for caregivers and 59.6% for their partners) than the SA unemployment rate that ranged from 20 to 25 percent over the past five years (SASTATS 2013). However, a study undertaken in the Vaal Region (Oldewage-Theron & Slabbert 2008) found the unemployment rate to be 94.2 percent among respondents, while 64.9 percent of their partners were looking for jobs. Although they lived in the same region in SA, the two samples differed considerably in terms of income and unemployment. This once again highlights the challenge of identifying pockets of poverty in order to design applicable interventions.

In this study, many of the caregivers might be the main source of income in an extended family, as 30.8 percent were retired (therefore above the age of 60 years and thus receiving a pension). Many were single, widowed or divorced but assumed the role of caregiver. Hunger and the need to bring home food leave many people in despair. Therefore, women, many of whom are child caregivers, may end up facing chronic illnesses and difficulties in commuting, purchasing and preparing food (SA-MDG report 2010:28).

Given the results, it can be concluded that income poverty exists with a high level of unemployment in this sample of households, which might have a negative influence on food intake, leading to malnutrition. Khan (2005) talked about the 'culture of poverty', in which there is no urge by the poor to improve their

condition; no ambition and no dreams. This leads to a 'peasant economy' syndrome, centring on short-term survival with little vision for the future. Empowerment, therefore, has become a primary objective in alleviating the plight of the poor. Levels of malnutrition are significantly associated with a matrix of inter-related socio-demographic variables such as household income, expenditure on food, and employment status of respondents (DBSA 2008:15-6).

### **3.5.2. Asset poverty**

Income and asset poverty is undeniably a political issue because it relates to the distribution of scarce resources and about an ongoing debate about what people need to survive; about the relation between have and not having. Identifying what the poor have, rather than what they do not have, focuses on their resources. Assets are slow-changing and discrete (Booyesen *et al.* 2008).

Household asset 'portfolios' are increasingly seen as central in the battle to reduce vulnerability to transient poverty (moving in and out of poverty) and escaping chronic poverty by the acquisition of assets. Asset-based approaches are also proposed by Kent and Dorward (2012:2-3) in the ongoing discussion about defining and measuring assets. Tangible assets such as livestock and food stores can support the household against food insecurity, but also generate an income (Kent & Dorward 2012:7, 13). Martin (2006) states that in Swaziland many poor families subsist by letting rooms in their houses as an additional source of income. It was observed that houses in Boipatong are being extended and this might also serve as an informal coping strategy.

The respondents mostly lived in brick houses (70%) with more than four rooms (48%) with a wide range of electrical equipment and furniture. The large percentage of caregivers living in their houses for longer than five years signified established homes. Electricity, safe water and other services have been delivered by the government. Little evidence of asset poverty was found in this study. The 'new face' of urban poverty was also found in a study amongst elderly in Umlazi, with 84.8 percent living in brick houses, generally with more than four rooms (Mkize *et al.* 2013:3).

This differs from many metropolitan areas worldwide that causes the urban poor to live in deplorable housing conditions with high and/or implicit costs of housing.

Also, in SA large numbers of urban people with a low SES still lack access to infrastructure and social services. High costs of shelter, transport, health and education further prevent the chronically poor from accessing sufficient food (Frayne *et al.* 2014). The state-driven relocations and dispossession of assets in terms of land and livestock during the apartheid era also limited access to markets and infrastructure. It has been a constant priority of the new government to overcome this legacy (Viljoen & Sekhampu 2013:730).

The better than usual living conditions can be explained by the fact that brick houses were built for the poor as part of the Reconstruction and Development Programme (RDP) of the SA Government after 1994 to address challenges of apartheid geography and reshape townships and shack settlements in urban areas to meet basic needs and combat poverty (NPC 2011:233-238).

According to the asset data collected from the sample, the respondents would fit into the LSM 5-7 group. Yet, based on income levels, they fall into the LSM 1-4 group (Martins 2006). It can be concluded that asset poverty has been successfully eradicated in this area. Findings also correspond to the history of Boipatong where pensioners are now living with their children. It can be assumed that, because of the high unemployment rate, they are the main contributors to household income by means of their old-age pensions.

### **3.5.3. Consumption poverty**

Income poverty gives rise to consumption poverty and household food insecurity. Poorer segments of the population are more exposed to unhealthy dietary choices as healthier diets consisting of lean meat and fresh vegetables and fruit cost more (Ralston *et al.* 2012:3).

Households consisted largely of four to seven members (74.9 %). This could be indicative of extended families sharing a house, as 42.3 percent of caregivers were single, divorced or widowed. This figure indicated larger households than the 3.4 persons reported for average household size in SA (SASTATS 2012), but smaller than the 5.3 reported for sub-Saharan Africa (Bongaarts 2001:266). In a similar study in Qwa-Qwa, households consisted of an average of 4.9 (five) persons (Oldewage-Theron 2012:43). In another study in Umlazi (Mkize *et al.* 2013:1, 3), the mean size of the household was four to ten members.

In addition, more than 40 percent of households accommodated four or more children. This supported the findings of the role of the caregiver as part of the extended family, or the grandmother. Sharafkhani *et al.* (2010:385) found a significant relationship between family structure and household food insecurity status. Household with children <5 years had a 1.4 times greater chance of food insecurity with further adverse effects on children's and parents' relationships. Anyanwu (2012:13) also found a correlation between the level of poverty and household size in Nigeria.

Households were mainly female-headed, mostly having to cope on a low household income in this impoverished community. The conclusion is that older caregivers and grandmothers (61.6%) had to take care of children at home or after school, contributing to household income with a pension, while the mother had to work to generate an income. Therefore, coping strategies of buying food once a month (69.2%) had to be followed, as supermarkets were further away, bringing about higher travelling costs by taxi and more time consumed in procuring food.

Females were central to decisions about spending money on food, its procurement and its preparation. Household factors are strong indicators of children's nutritional status. Usually, children in households with higher incomes have a better nutritional status (Das *et al.* 2008). Factors such as poverty, overcrowding and the possible contamination of food have an impact on the health status of children. Poor food quality rather than actual lack of food is the cause of malnutrition in young SA children and can be eradicated by functional nutritional education (Kleynhans 2003).

Household food insecurity is inversely related to household income. A household is defined as living in poverty when the amount of money spent on food alone is inadequate to purchase a basic diet (Oosthuizen *et al.* 2007:6). The results of this study indicate that the average income of households for 87 percent of the sample is below R1 500. On average, there was extremely low monthly food expenditure per household of below R200 per household in 67 percent of households. Jacobs (2009) estimated that in 2005 the cost of the 'average dietary energy food-basket' (8620 kJ) was R262 per month per person and that of the 'below average basket' (6530 kJ) was R189.25 per month per person. In

the average household of four people of this research, this means that R757 had to be spent on food.

The LSM1 spend an average of 70 percent of their household income on food, while the LSM6 group spend 24 percent on food (Martin 2006). Oldewage-Theron and Slabbert (2008) found household expenditure to be <R100 per week in a household of five members; that is, households could spend R2.90 per person per day on food. In another study in the area, the mean monthly income was R612. The average poverty gap was R1 017.21 (poverty gap ratio 56%) (Oldewage-Theron & Slabbert 2010). When the average number of people per household (five people) is taken into consideration, the Boipatong study translates into R50 per person per month (or R1.66 per day). The assumption can thus be made that consumption poverty existed in these Boipatong households, as 51 percent or more of their income was spent on food. Food availability is good, but food accessibility linked to poverty in the area is a cause of concern (Battersby 2012).

Household consumption (housing, water, electricity, gas and other fuels) of overall household expenditure was 32.0 percent while food and non-alcoholic beverages contributed a further 12.8 percent. Combined, these two items formed around fifty percent of the total expenditure (SASTATS:IES 2010/2011)

#### **3.5.4. Capability poverty**

Poverty is not just economic in nature, but also has a psychological dimension. The idea of deprivation is widely accepted, along with non-monetary variables like self-esteem (Maxwell *et al.* 2010:92) and inequality (Ravallion 2012b:2-5; Viljoen & Sekhampu 2013:729). The vulnerable needy often experience a lack of expectations, given their limited resources. They have to be taught to think, to learn to find alternatives, to take decisions and to develop greater self-esteem and a sense that they can take charge of their own destiny (Viljoen & Sekhampu 2013:729). These intangible assets of human capital widen the poverty lens from focusing solely on basic needs such as Maslow's basic needs of food, water, clothing and shelter, to including aspects of maintaining a proper standard of living as essential needs. Empirical studies have shown that an increase in

women's education and an improvement in women's status have significantly contributed to the reduction in the rate of child malnutrition (Dauda 2010: 263).

The results of this study compare favourably to the latest SANHANES-1 survey, where, at national level, six percent of the sample did not have any schooling, 34 percent had attended primary school, while 33 percent had attended high school, 20 percent had completed matric and eight percent had completed tertiary education (Shisana 2012:64). In contrast, in another study on the female illiteracy rate in the Vaal Region, 23.2 percent of the respondents did not have any formal education and 48.5 percent had attended primary school only (Oldewage-Theron *et al.* 2006:798). Thus, two adjacent pockets of poverty each has its own unique characteristics, which should be taken into consideration when designing appropriate nutrition interventions. Empirical studies have shown that improved women's education and improved women's status have significantly contributed to the reduction in the rate of child malnutrition (Dauda 2010: 263). Educated mothers and caregivers are more aware of children's health (Das *et al.* 2008).

No major health problems could be detected from the results. In the SANHANES-1 report, females' self-reported rate for high blood pressure was 20.6 percent (Shisana 2012:72), thus significantly higher than this study (25%). The reporting of constant tiredness experienced by 44 percent of the respondents renders a challenge. This could be linked to the low energy intakes and a lack of good quality diet. This study did not measure psychological distress as such, but the 52.3 percent experiencing sadness might be indicative of psychological distress. Apart from this, the emotional and social well-being of the respondents is good within their family structures, as 73 percent reported that they enjoyed life, despite their circumstances.

As shown in the UNICEF model, care behaviours depend on resources for caregiving to children including a number of the socio-demographic variables investigated, such as education, knowledge and beliefs, physical and mental health and nutritional status. Self-confidence, control of resources, reasonable workload and availability of time, and family and social support are also important variables that enable the caregiver to give effective care and maintain the good health and nutrition of the child. Van de Vathorst *et al.* (2013:47) states that

trans-cultural information is often not taking cultural and religious determined health beliefs, perceptions on illness and expectations of care into consideration.

In this study, substance abuse (cigarette and alcohol) was low, but health was compromised because of high levels of air pollution from local steel and coal-petrol and other chemical plants, similar to a study undertaken by Oldewage-Theron and Slabbert (2008) in neighbouring informal settlements in the Vaal region.

Safe food and water is a consumer's basic right enshrined in the constitution promotes good health through reducing the possibility of food- and water-borne diseases (SASTATS 2001). In this study most of the households had access to clean water (92.3%) and flush toilets (82.7%) and water removal was available on a regular basis. Access in terms of roads was available in the form of tarred or gravel roads. Working women have to balance paid work with domestic responsibilities and increasingly require accessible public transport (Tacoli & Satterthwaite 2014:3).

### **3.5.5. Food poverty**

This study indicates the prevalence of poverty and poor dietary intake that correlates well with a number of studies performed in the Vaal region. Previous surveys in the Vaal region indicated that urban poverty is associated with illiteracy, household food insecurity and poor food choices, with women at greater risk of poor quality diets (Oldewage-Theron *et al.* 2005; Oldewage-Theron & Kruger 2008:102; Acham *et al.* 2012a:24; Mkize 2013).

The top-20 food consumption list indicated that the majority of food items consumed were carbohydrate-based, small portions of animal protein sources and with a lack of plant protein and vegetables and fruit in the list. Similar results were found by a study in the Vaal region in female caregivers with a diet consisting mainly of a carbohydrate-rich diet with the top three foods also corresponded with this study. Mkize *et al.* (2013:4) also found a carbohydrate-rich diet in elderly in Umlazi. Milk was consumed by a large number of respondents, but in inadequate quantities. Reports (Steyn *et al.* 2006 b & c) indicate that starchy foods are the most frequently consumed, contributing 62–71 percent of total energy intake. This type of diet, consisting mainly of carbohydrate

foods, is typical of many of SA poor black adult population (Steyn *et al.* 2006b:229; Vorster 2010:2).

An analysis of the 24h recall dietary intake revealed that the energy intake was low (median 5323kJ) compared to the EAR of 7855kJ per day. Of concern is that only 25 percent of the participants complied with the EAR for energy. Although protein intake (median 47g) exceeded EAR, only 58 percent of the sample reached the EAR. The same was true for carbohydrates with 72 percent of participants reaching the EAR and fat with 37 percent reaching the EAR. In a study by Mkize (2013), also conducted in the Vaal region in elderly women, a mean energy intake of 4745kJ was recorded in a low SES community.

In SA income is still unequally distributed and many people are still exposed to food insecurity resulting from a diet low in energy and essential nutrients. When comparing results of this study to results of a study by Steyn *et al.* (2012:233) of SA and Kenyan women, similarities were detected according to WHO recommendations for energy derived from macro nutrients. Total energy supplied by carbohydrates was lower in this study (49%) while the SA-Kenyan study showed an average energy intake of 7207kJ in SA women with carbohydrate contributing 56-57 percent to energy intake. Fat intake as a percentage of energy was 29.1 percent in urban SA women compared to this study's 24 percent of energy derived from fat, but in line with WHO (2003) recommendations.

Many of the micronutrient intakes were also low despite the fact that compulsory SA food fortification was taken into consideration when calculating the dietary intake. A low intake of milk was confirmed by the analysis of calcium where none of the respondents reached the EAR. The EAR was reached by 30 percent of respondents for magnesium. Vitamin C was very low (median 10mg, 3.6-22.5), Vitamin D (median 12mcg, 0.3-7.9) and vitamin E (median 4.3mg 1.7-10.7). Another concern is that for most of the vitamins less than 50 percent of participants reached the EAR.

These results were consistent with the results of the Top 20 most frequently consumed carbohydrate food items. When comparing the mainly carbohydrate-based diet shown in the top 20 most frequently consumed foods (table 3.8), the insufficiencies regarding minerals and vitamins from the dietary analysis (table



3.9) is evident. For instance, vitamin C intakes were extremely low and this is consistent with the only two fruit items (apple and fruit juice) included in table 3.8. Although it seems that protein intake is sufficient (median 47g per day), only 51.2 percent of the women complied with EAR intake. The same pattern is found for most of the nutrients. Of special concern is calcium where none of the women complied to EAR intake, with a median intake of 165mg Calcium per day.

The high IQR of some of the micronutrients also indicated a further analysis of the quality of the diets. This was done by means of calculating the NAR per nutrient for each respondent. Values for the NAR, when bigger than one (100%), were truncated at one (indicating EAR adequacy) to avoid skewing data of larger portions consumed by a few. The MAR for the total diet was calculated by adding the NARs and dividing the sum by the number of nutrients analysed (Table 3.10).

An analysis of the 24h recall data into NAR for each nutrient and a MAR for the total diet supported poor dietary quality. Although the MAR for macro nutrients were 0.76, that of minerals (0.64) and vitamins (0.65) were low. Vitamins C (median 0.17) and Vitamin D (median 0.13) that is not part of the fortification programme was significantly low. The MAR for the total diet was 0.68 (0.43-0.89).

A diet which is sufficiently diverse, i.e. includes several food groups, reflects nutrient adequacy (FAO 2011b). Yet when taking the FVS into consideration, variety within groups seems to be low (FVS median 39, 31-52 food items) According to a report based on the DDS by Drimi and McLachlan (2010), 40 percent of the SA populations is categorized as deficient (0-3 food groups), 50% as sufficient (4-6 food groups) and only 10 percent as food diverse (7-9 food groups). The DDS in this study, in contrast indicated 98.1 percent as food diverse, yet lacking in many nutrients. When interpreting the DDS it is important to keep in mind that it does not take into account the amount of an item consumed (FAO 2011b). The DDS is often greater in urban areas than in rural areas because food markets are more easily accessible.

The more food groups included in a daily diet the greater the chances of meeting nutrient requirements. Monotonous diets based mainly on starches e.g. maize, bread, have been closely associated with food insecurity (Labadarios et al.

2011:1), nutritional inadequacy and have negative influences on an individual's health and well-being, reducing capacity for physical activity and lowering resistance to infection. Yet in urban areas, access to fast foods and take-away foods leads to higher intakes of energy and fat, resulting in overweight and CDL. One effect of the nutrition transition to urbanisation and Westernisation is that attention is increasingly being focused on nutrition-related non-communicable diseases (Shisana 2012: Vorster 2010).

Dietary patterns are ideal means to assess relations between diet and disease as these patterns reflect habitual intake of food and thus nutrients. This has led to the development of dietary indices for the characterisation of dietary patterns. A healthy pattern is usually associated with more nutrient-dense diets, whole foods (rather than nutrients), their combination and potential synergistic effects. Many older adults may have compromised food intake that puts them at nutritional risk. Inadequate intake of key nutrients increases the risk of morbidity and mortality, and they might be twice as likely to be obese or have low vitamin B12 levels, without clinical evidence of malnutrition. Some of these indices include the (DDS) (Bailey *et al.* 2007; FAO 2011b) or dietary guideline index (DGI) that are associated with SES, health factors, chronic disease risk factors and nutrient intake (McNaughten *et al.* 2008).

It would appear; therefore, that the sample of women caregivers was consuming food from all of the food groups over a period of one week. However, variety within the food groups was relatively low, except for the cereal group. The contradictory results of high dietary diversity in DDS (median 9) versus low dietary diversity (FVS median 39) was also found by Oldewage-Theron and Egal (2014:58) indicating high variety between food groups, but low diversity within food groups, typical of urban low-income communities. In contrast low variety in the meat, fish and chicken; and vegetable groups were found. Similar results were obtained by Acham (2012), who reported a strong relationship between dietary diversity and micronutrients among women in informal settlements in Gauteng, with older women slightly more at risk of inadequate micronutrient intake, notably calcium and vitamins A and C. An above-average DDS score was also found by using nine food groups classifying 89 food items. Other studies conducted to relate DDS, nutrient intake (FVS) and adequacy (measured as

NAR and MAR) include Steyn *et al.* (2006a) Oldewage-Theron & Kruger (2008) and Labadarios *et al.* (2011). Acham (2012) found that FVS is related to NAR and MAR but not to DDS.

In a study by Labadarios *et al.* (2011:4-6) it was found that 32.8 percent of people living in Gauteng and 73.9 percent of the SA population of low living standard measures had a DDS lower than 4. In order to achieve nutrition security individuals need access not only to sufficient, safe, and nutritious food, but also to other essential factors. These include: (i) access to health-care services; (ii) access to safe water, hygiene, and sanitation; and (iii) knowledge about child care, food hygiene and preparation, and a healthy environment – a close correlation with the underlying causes in the UNICEF malnutrition framework for children.

While protein and macronutrient requirements were met, inadequate intakes were reported for vitamin A, C, Niacin, and vitamin B6, folate, calcium, iron and zinc. In order to combat the devastating effects of malnutrition, nutrition interventions should be geared to bring about positive change. The ultimate goal of any nutrition intervention strategy is ultimately to bring about lasting improvements in the dietary intake of people.

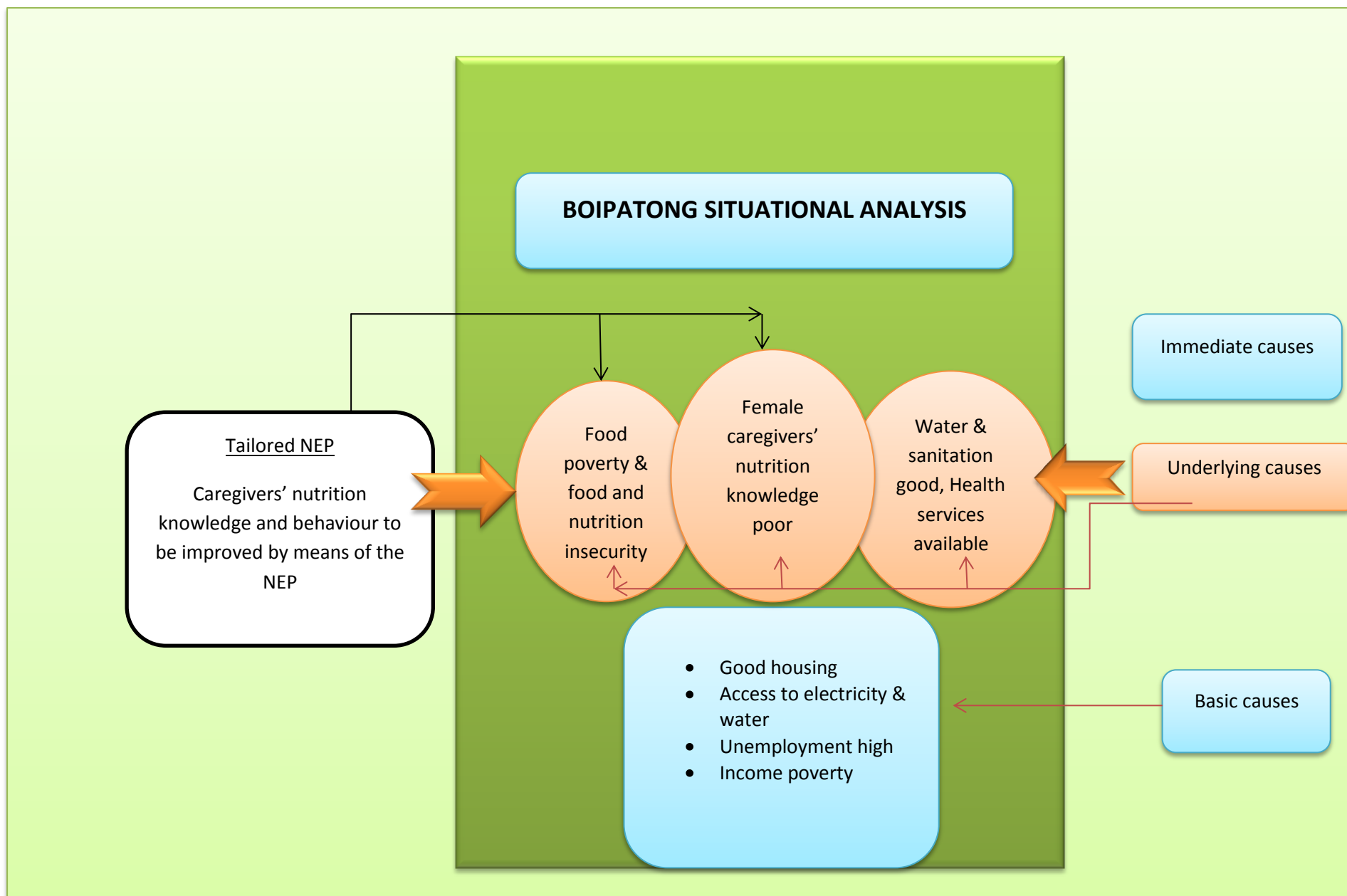
The DDQ reflected a moderate variety of food items consumed over a period of seven days (DDS=9; FVS=39 food items) but the 24-hr recall as well as the top 20 items consumed reflected poor variety. The DDQ is regarded by Steyn *et al.*, (2006a:648) as an efficient means of estimating the nutrient adequacy of the diet. The diets of the caregivers were not consistent when comparing the 24-hr recall and the DDQ. A study completed among an elderly community (Oldewage-Theron & Kruger 2009) showed a DDS improvement from 3.4 to 8.5 after a two-year food-aid programme was implemented. The DDS among the elderly community is very similar to that found in this study although no food-aid programmes were present. The dumping of perishable food items in this community may have been a contributing factor to the high-variety diet of the caregivers.

Poor diet quality results in malnutrition (under and over in the nutrition transition) resulting in higher economic costs. This becomes a double burden and puts

more strain on their quality of life, further impacting on their nutritional status. Undernutrition and infection in childhood has been shown to have consequences in the short term for morbidity, but in the long term for intellectual ability, economic productivity diabetes and cardiovascular diseases (Kirkpatrick *et al.* 2012). Popkin *et al.* (2012) also noted that increases in income may be associated with diets richer in fat content, meat, processed food and sweeteners, with potentially adverse consequences to health, and chronic diseases of lifestyle (CDL). He campaigns for including newer food items and a wider selection of nutrients such as proteins, iron, vitamins, fats, calcium and others. A preferred approach is to use the EAR, indicating the level at which 50 percent of the group meet their nutritional requirements.

The findings of the situational analysis of this situational analysis were applied to the UNICEF framework of malnutrition in figure 3.2. Factors regarded as basic causes of malnutrition (for example housing, access to electricity and water) that are often shown in studies (Pena & Bacallao 2002:242; McFerson 2010:51) to be lacking in poor communities, were shown to be good and available in the sample. Sanitation services were also found to be well provided for at the time. However unemployment led to income poverty. Underlying factors indicated a community experiencing food poverty leading to food and nutrition insecurity in a low SES urban community. The child caregivers' nutrition knowledge was found to be poor. Based on these findings, the tailored nutrition specific intervention was focused on the caregivers' nutrition knowledge and behaviour change of dietary intake.

Findings of the Boipatong situational analysis is applied in the UNICEF framework of malnutrition (1990) in figure 3.3, indicating the current state regarding the basic and underlying causes of malnutrition. Also depicted in the figure are the areas where the rest of the research project was aimed to impact.



**Figure 3.2 Summary of findings in the Boipatong situational analysis as applied to the UNICEF framework of malnutrition and the areas of influence of the planned NEP**

### **3.6. CONCLUSION**

The dynamics of poverty remains one of the greatest challenges confronting humanity. Some of the challenges in this urban township have been overcome such as improved housing and better services, including electricity, water and waste removal. Despite the better than usual urban living conditions of this area under study, households remain poor in terms of income and household food security. Low disposable incomes and unemployment lead to cohabitation and large families in small houses, often dependent on elderly pensioners, resulting in poverty. Although asset poverty, safety and hygiene as well as capability poverty (well-being) have been improved, income poverty (unemployment, low income) and consumption poverty (food and nutrition insecurity) still runs rife.

Classified according to income, the sample of caregivers fit the LSM1 group, but based on assets, educational level and capability; the sample matched the LSM4-6 group. The underlying predictors of malnutrition are household food security, maternal and child care, health, water and sanitation services. Money spent on food by households was insufficient, as was evident from the low intake of energy and of many of the micronutrients by Boipatong dwellers.

Food poverty and food insecurity has been demonstrated in the high intake of carbohydrates for energy, while intake of nutrients, especially calcium, vitamins A, C, D and E, was low. Dietary Diversity Score was high as is to be expected in an urban situation with nutrition in transition, yet with an average food variety within the groups. This may lead to severe undernutrition and reduced productivity in this community.

The transition from rural to urban poverty requires changing from open fires and paraffin stoves to electricity requiring new cooking skills and knowledge to preserve nutrients. New skills in procurement and financial decision-making are required when people are exposed to different brands of foods in shops and spaza shops or when eating at cafeterias or tuck shops, food knowledge is required to make 'value for money' choices.

Thus NE must address optimal value for money in food procurement and utilisation. NE of caregivers can help to clear cultural and tradition-based misconceptions and improve their general nutrition knowledge. The importance of the environment and

the dignity of those living in a low socio-economic situation in which such a programme is delivered must be considered.

The three FBDGs with the lowest score as determined by analysis of the NKQ were selected for the NEP namely:

- 'Enjoy a variety of food'
- 'Chicken, fish, meat and milk could be eaten every day'
- 'Eat fat sparingly'

However it was decided that 'eating fats sparingly' supports the animal protein guideline as saturated fats would also be addressed in the animal protein FBDG and the NEP was to address the FBDGs to compile a mixed meal to promote variety. As the mean nutrition knowledge of the caregivers was low, it was decided to address both animal and plant protein in the NEP as an initial intervention in the Boipatong area. Although the women's nutrition knowledge of plant protein was relatively good, the intake of plant protein was not reflected in the top 20 frequently consumed foods. The situational analysis built a profile of Sesotho-speaking Boipatong child caregivers (5-15 years), thus laying a foundation for the formulation of a suitable NEP. In the next chapter, the formulation phase of the NEP is discussed, including the testing of existing DOH NE material.

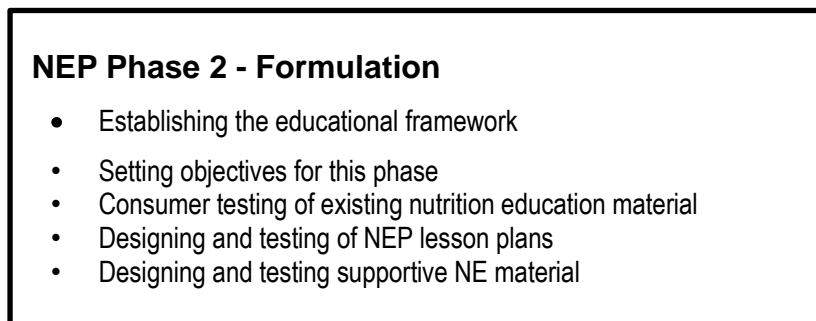
## CHAPTER 4

# THE FORMULATION PHASE OF THE NUTRITION EDUCATION PROGRAMME

### 4.1. INTRODUCTION

Chapter 4 covers Phase 2, the formulation of the NEP. This chapter consists of two parts. In the first part, the findings of field tests of existing NE material of the DOH are presented and discussed (section 4.4). This is followed by the design of the NEP and NE material in English and Sesotho, in support of the intervention and pilot testing of the NEP (section 4.5).

The formulation phase in the framework includes (Figure 4.1) the following objectives: Establishing the educational framework, setting specific objectives for the intervention programme, and choosing media or multimedia. This phase concludes with the design of lesson plans and supportive NE material, including the testing thereof.



**Figure 4.1.** *The formulation phase of the NEP (adjusted from FAO 1997)*

Based on the results of the situational analysis (Chapter 3), it was decided that NE as a strategy would be pursued for the Boipatong nutrition intervention. It was decided that the NEP would be made up of two components:

- Face-to-face communication in lecture format, conducted by the researcher and facilitated by a Sesotho-speaking caregiver from the group (one FBDG per session).



- Supportive written NE material in booklet format, based on the selected FBDGs.

Gaps in nutrition knowledge identified in the situational analysis were used as a starting point for the development of the NEP intervention. They were the three South African FBDGs (2003), 'Enjoy a variety of foods,' 'Eat dry beans, peas, lentils and soya regularly' and 'Chicken, fish, meat, milk or eggs could be eaten daily'.

#### **4.1.1. The study area**

The governance structure had been transferred to the Boipatong Interdenominational Women's Prayer Group (BIWPG) in the formulation phase (see section 1.3.3.) and participants of the sample were thus child caregivers of children (5-15 years), were older than 40 years, and were members of the BIWPG. The participants came from the same geographical area and were from the same group that helped with the feeding on Wednesdays under the auspices of the Sharpeville Care of the Aged in the situational analysis. During the situational analysis there had been no age restriction, but most of the women attending the prayer meetings were older (median 44.5 years). It was thus decided to focus the intervention study specifically on caregivers older than 40 years of age. Attrition delivered a database of 184 caregivers. The age of the new sample changed to median 63 years (52-72) with a range of 40-85 years for the rest of the study. Since the sample belonged to the interdenominational prayer group and consisted of women from twelve different churches, the gatherings were held in the different denominations in the community on a rotational basis. The group had a prayer session only once a month; a given that slowed down the progress in testing DOH material. The average attendance at such a session ranged from 40 to 60 women. The church buildings where the prayer groups assembled provided a comfortable environment for the research gatherings. Lectures presented as informal discussions formed an integral part of the prayer meetings.

The church, and specifically the women's groups of the different churches, played a pivotal role in the social organisation of this community and fulfilled an important social function. Those who belonged to the group were particularly proud of their membership. To identify the church to which they belong, the members of many of these groups wear special 'church clothes', giving a sense of belonging and good

standing, over and above mere group identification and allegiance as a respected member. Viljoen (2010:89) held that the socio-cultural environment presents complex interrelationships of interactions that exist among individuals, their culture, religion and society.

## **4.2. OBJECTIVES OF THE FORMULATION PHASE OF THE STUDY**

- To evaluate the suitability of using the existing NE material (pamphlets and tear sheets) of the DOH based on the South African FBDGs (2003) for people older than seven years, in terms of comprehension and application. (Acceptability, specific interpretations of the information and acceptability by low-SES Sesotho-speaking caregivers had to be put to the test within their cultural setting, as described in this chapter, section 4.4: Consumer testing of existing NE material.)

Supportive objectives were to determine the following:

- The *channel* to be used as preferred by the respondents (most suitable format of the NEP, as well as the format of the NE material to be used in the programme)
- The *preferred language* favoured by the target audience. The design preferences for written material regarding format, type of drawing/picture and size

(This part of the research was completed by Ms FH Holeni in successful fulfilment of an M Tech study, with the researcher as co-supervisor. For this reason we will be referred to as 'the researchers' in this part of the study.)

- To design the content and lesson plans of the NEP and pilot test it in a sample of female cleaners similar to the BIWPG group regarding language, age, SES and literacy level.
- To design and pilot test the new text of NE material translated into Sesotho.
- To test images suitable for meaning and comprehension in the BIWPG group to complement the text of the NE material.

### 4.3. THE EDUCATIONAL FRAMEWORK

The educational framework included the four development criteria for this NEP (Figure 4.2), namely relevance and understanding of information, stressing the importance of behaviour change, barriers, and solutions to change behaviour, utilising the selected South African FBDGs (2012).

FOUR DEVELOPMENT CRITERIA FOR THE NEP	CONTENT OF THE NEP SELECTED SAFBDGS (2012)
Theme 1: Relevance and understanding of information of the message (Knowledge and skills (Contento 2011, 218).	<ul style="list-style-type: none"> <li>• Enjoy a variety of foods</li> </ul>
Theme 2: Why it is important to change behaviour regarding eating habits for each FBDG.	<ul style="list-style-type: none"> <li>• Fish, chicken, lean meat and eggs can be eaten daily.</li> </ul>
Theme 3: Possible barriers to compliance in each FBDG	<ul style="list-style-type: none"> <li>• Eat dry beans, split peas, lentils and soya regularly</li> </ul>
Theme 4: Solutions to healthy eating in each FBDG	<ul style="list-style-type: none"> <li>• Have milk, <i>maas</i> or yoghurt every day</li> </ul>

**Figure 4.2 Educational framework used for the NEP**

The NEP framework is a food-based approach of continuous research and evaluation, grounded in scientific principles (FAO 1997). The decision regarding the selected FBDGs for inclusion is in accordance with the recommendation of the USA 2010 nutrition expert committee that Americans' informed food choices should be made with a shift to more plant-based diets, including cooked dry beans and peas, whole grains, nuts and seeds where poor diet is a major public health concern for the prevention of NCDs (Dietary Guidelines for Americans 2010). Overcoming barriers among low-income populations and various ethnic groups was identified as a challenge. It has also been found that the most successful intervention programmes are those that target very narrow dietary shortcomings and address only one or two barriers per subpopulation (JADA 2011:28). It was thus decided to focus the NEP on those South African FBDGs that address animal and plant protein foods, and to complement them with the importance of diversification of the diet. The lack of nutrition knowledge in these FBDGs was detected during the preparation phase (Chapter 3).

Table 4.1 provides an extract to facilitate reading from Table 1.2 on the framework of the study to guide activities in the formulation phase. The formulation phase was

devoted to planning of the NEP, its lesson plans and supporting NE material. The process of planning the NEP started off with testing the appropriateness of utilising existing NE material available from the DOH at that stage. It was established that the information (text) was suitable, but had to be translated into Sesotho. However, the illustrations did not add meaning to the text.

When developing the NE material, the text of the existing NE material was retained to a large extent, as its validity had been verified by input from nutritionists countrywide and as it had been found to be acceptable by the BIWPG participants. The information was translated into Sesotho and qualitatively pilot tested by the TUT group. The next step was thus to embark on a series of image elicitation sessions within the BIWPG. The text and images were then submitted to graphic designers for designing the NE booklet. The NEP was implemented in Phase 3 (Chapter 5).

Lesson plans were developed and pilot tested in a purposively sampled TUT group of Sesotho-speaking cleaners. Table 4.1 provides an extract from Table 1.2 indicating the activities undertaken in the formulation phase, the research tools used to identify specific information, the type of research conducted and sample sizes.

**Table 4.1 Extract from Table 1.1 indicating the activities, research participants, research tools and why they were used, as well as the sample sizes of the formulation phase of the NEP.**

Chapters and Phases	Research participants	Research Tool	Used to identify:	Type of research	Sample size
<b>Chapter 4</b>					
<b>Formulation of NEP</b>					
<b>a) Testing existing South African FDBGs (2003) pamphlets of DOH (section 4.4)</b>	BIWPG child caregivers	<ul style="list-style-type: none"> <li>Questionnaires</li> <li>Image elicitation</li> </ul>	<ul style="list-style-type: none"> <li>Identify understanding of the content of existing NE material of DOH(2003)</li> <li>Understand participants' perception of different types of pictures of existing NE material</li> </ul>	Quantitative: descriptive  Quantitative Qualitative  Qualitative	n=86  n=53 of the original sample of 86 caregivers  n=6
<b>b) Developing and pilot testing lesson plans of the NEP and draft NE material (section 4.5)</b>	Pilot group: TUT cleaners	Focus group (reliability testing)	<ul style="list-style-type: none"> <li>Verify understanding of information of lessons</li> </ul>		
<b>c) Image elicitation of pictures for new NE material (section 4.5)</b>	BIWPG child caregivers	<ul style="list-style-type: none"> <li>Questionnaires</li> <li>Image elicitation</li> <li>Field notes</li> </ul>	<ul style="list-style-type: none"> <li>Identify understanding of illustrations</li> <li>Identify preferred options for NE material re font, size</li> </ul>	Quantitative	n=46
<b>d) Designing booklets (Sesotho and English)</b>	Graphic designers (TUT)				

#### **4.4. CONSUMER TESTING THE APPROPRIATENESS OF EXISTING NE MATERIAL (SOUTH AFRICAN FBDGs 2003) TO BE USED IN THE NEP**

This part of the research was designed to determine the appropriateness and/or limitations of the contents of the existing South African DOH pamphlets in order to investigate comprehension and acceptance in terms of:

- testing the meaning and comprehension of information by the participants;
- identifying the caregivers' perceptions of design and layout (format, use of colour and images, size and value added to the understanding of the pamphlets);
- testing participants' attitude to and the perceived importance of receiving NE;
- participants' nutrition literacy regarding previous exposure to sources of information about nutrition concepts; and
- testing preferences regarding language for the specific group identified.

The project was cleared with the Director of Nutrition of the DOH, Mrs Moeng, and her team at a meeting on 28 February 2011.

In 2003 twelve different pamphlets had been developed (targeted at LSM 4–6) as NE materials for the Department of Health in the form of pamphlets to be utilised primarily at clinics. The pamphlets were not intended to be used as hand-outs only, but to serve as support material for healthcare workers.

The information collected in this part of the study was to inform the design and development of the NEP and supportive NE material that was to follow.

##### **4.4.1. Research design**

A descriptive, cross-sectional design was used in the quantitative paradigm for testing existing NE pamphlets and performing image elicitation in the illustration selection. Qualitative methods were used in pilot testing newly designed lesson plans. This phase encompassed applied action research where the researchers and the participants were equally involved in the process of solving a nutrition problem, namely the lack of nutrition knowledge leading to poor food choices and, ultimately, malnutrition. The researchers and participants took equal responsibility for the success of the specific aim envisaged for the research endeavour, as suggested by

Neuman (2000:24-25). Evaluation was done in terms of acceptability and understanding by the caregivers to investigate the possibility of including the existing pamphlets in the NEP.

Permission to undertake this project was granted by the Boipatong Interdenominational Ministers' Forum and the executive committee of the Boipatong Women's Interdenominational Prayer Group. The ethics approval obtained for the baseline survey also included the intervention study. The participants who formed part of the BIWPG caregivers signed consent forms for voluntary participation (Annexure C).

#### **4.4.2. Methodology**

The quantitative paradigm places emphasis on variables and on analysing human behaviour (Babbie & Mouton 2001:49). The quantitative research paradigm was thus considered to be an appropriate research approach that could be utilised to investigate the existing NE material and to test perceptions and understanding of newly tailored NE material. New data was collected during the formulation phase of the NEP. The research was cross-sectional in nature which, according to Bless & Higson-Smith (1995:60), is typical of studies where different sets of data are collected simultaneously.

#### **4.4.3. Sampling strategy for testing appropriateness of existing NE material**

Attrition occurred from the sample recruited in the situational analysis. Thus the new sample of BIWPG caregivers represented a purposive sample for this community research project of a database of 184 caregivers. The average attendance at the prayer sessions ranged between 40 and 60 women. The sampling size varied depending on the monthly meeting attendance, which was influenced by where the specific church for that month was located, weather, availability of transport and well-being of the caregivers, as the period during which the research was run included late summer, autumn and winter. The church buildings where the prayer groups assembled provided a comfortable environment for the research gatherings.

Purposive sampling was done as women had to belong to the BWIPG, had to be caregivers of children (5-15 years), older than 40 years and Sesotho-speaking.

Women aged 40–85 years who acted as caregivers (grandmother or family member) of children in the household and attended the prayer gathering were included.

#### ***4.4.4. Sample size for testing appropriateness of existing NE material***

The database obtained from the BIWPG consisted of 184 women who complied with the set criteria of being caregivers of children, aged > 40 years, and living in Boipatong. The sample size was calculated on the basis of a confidence level of 95% with a confidence interval of ten units (the survey system). From the target population (N=184) of households, a sample of 63 persons was needed for this study. A ten percent increase was included to allow for possible drop-outs; the actual sample size required was thus 70 respondents. However, probably based on the increased interest in the project, 86 caregivers who complied with the set criteria turned up at the sessions of consumer-testing existing NE material and were included in the sample.

#### ***4.4.5. Measuring instruments in testing the appropriateness of existing NE material***

Copies of the existing NE material tested are presented in Annexure X1-3. The testing of existing pamphlets was undertaken by an M Tech researcher who developed questionnaires (Annexure J1 and J2). The first (Annexure I) was specifically designed to gain information in a self-assessment questionnaire about the caregivers' own opinions of their nutrition knowledge, their eating habits, their reading skills and their main sources of information regarding nutrition. In addition, to verify their opinion of their nutrition knowledge, twenty questions were asked to gain a more in-depth understanding of the caregivers' knowledge of the foods in each FBDG tested, why they are important, and barriers to the implementation of each of the FBDGs. The questionnaire included questions (true/false) about the purpose and source of foods in the FBDG.

Another questionnaire (Annexure J2) was developed to determine the caregivers' perceptions of the pamphlets to be administered for each of the FBDGs. The questionnaire included multiple-choice questions and also included questions about language preference and design and layout, for example, their perception of the colours used in each pamphlet and their understanding of and preference for certain types of pictures or drawings. A grading scale was used to evaluate their



perceptions. The respondents' interpretation of images used and whether this contributed to their comprehension of the message was also tested.

The questionnaire for each FBDG was used to evaluate the pamphlets with regard to the following:

- Whether the information on the pamphlets was understood
- Whether the images in the pamphlets were recognisable and meaningful
- Respondents' perceptions of the use of colour in the pamphlets
- The language in which the female caregivers preferred the pamphlets to be written
- The format of the NE material

#### ➤ ***Validation of the self-administered questionnaires***

Questionnaires were developed for this part of the study, which was undertaken by an M Tech student. Construct validity was tested by means of input by lecturers from the Department of Hospitality Management and Tourism who reviewed the questions to evaluate whether the questions posed tested participants' knowledge of food and nutrition. The Department of Arts, Graphic Design, assisted with perception testing of the layout and design of pamphlets.

#### ***4.4.6. Fieldworkers and data collection for testing appropriateness of existing NE material***

Postgraduate students from the VUT Department of Hospitality, Tourism and PR Management were recruited and trained as fieldworkers by the Centre for Sustainable Livelihood (CSL) at VUT. No students without training were allowed to assist as fieldworkers. They were also trained on how to approach the female caregivers. The fieldworkers included students who were able to speak Sesotho in order to overcome the language barriers and to be able to communicate with the female caregivers and explain the procedure of completing the questionnaires. The researcher assisted the fieldworkers in practising how to translate the questionnaires into the respective languages before the actual fieldwork took place. This was done in order to address bias and to report answers accurately. The researcher was present and corrected the fieldworkers in cases where they needed help.

Before distributing the questionnaires to the female caregivers, the trained fieldworkers had to explain all the procedures for completing the questionnaires in the caregivers' home language and also in English. Most of the female caregivers completed the questionnaires themselves because they could read and write, but the fieldworkers assisted those few participants who could not and those that had problems with certain questions. The fieldwork took place on 3 and 5 June 2011 at the United Reformed Church in Boipatong

After the fieldwork had been completed, the questionnaires were thoroughly checked for completeness and accuracy. Data were captured on an Excel spreadsheet.

#### ***4.4.7. Data processing***

Descriptive statistics, frequencies, means, standard deviations (SD) and confidence intervals were determined with the assistance of a biostatistician. An Excel spreadsheet was used to capture raw data and an SPSS package was used to obtain information from the data.

#### ***4.4.8. Results of testing appropriateness of existing NE material***

Determining the appropriateness of the existing NE material included determining the respondents' comprehension of the text, their perceptions about the illustrations used, and their general impressions of the layout and design of the pamphlets.

##### ***4.4.8.1 Determining the caregivers' understanding of existing nutrition pamphlets in terms of the content/text***

The existing DOH pamphlet (in English) was provided to the caregivers and they were given the opportunity to read through it. Subsequently, a short questionnaire was administered to test their understanding. The results of their understanding of the information are provided in Table 4.2.

**Table 4.2 Results of the caregivers' understanding of three of the existing South African FDBG pamphlets.**

Description	n=86	%
<b>What does 'Enjoy a variety of foods' mean?</b>		
It means to eat the same food all the time	11	12.8
It means to eat foods that you like the most	31	36.0
It means to eat more than one type of food in a meal	26	30.3
It means to eat lots of food	13	15.1
It means to eat frequently	5	5.8
<b>What does the word 'healthy' mean?</b>		
It means to be well and free from illness	64	74.4
It means to be clean	11	12.8
To protect our bodies from illness	11	12.8
<b>Why is it important to eat dry beans, peas, lentils and soya regularly?</b>		
Good source of protein	38	44.2
Very good for teeth	9	10.5
Very fatty	6	7.0
They make our bowels function properly	22	25.6
Good source of vitamin A	11	12.8
<b>The good thing about eating dry beans, peas, lentils and soya regularly is:</b>		
We can eat them instead of meat and still be healthy	70	81.4
They contain a lot of fat	12	14.0
They are easy to cook	4	7.0
<b>Before cooking dry beans, peas, lentils and soya</b>		
Wash beans and soak them in water overnight	76	88.4
Soak the beans in a solution of water and salt	7	8.1
Fry the beans in cooking oil first	3	3.4
<b>Meat and chicken should be eaten</b>		
Every day	42	74.4
Once a week	25	12.8
Seldom	25	12.8
<b>Why do we have to eat chicken, fish, meat, milk and eggs?</b>		
To build muscles, bones, skin and also necessary for growth	69	80.2
Gives energy	14	16.3
Protects against fever	3	3.5

➤ **Enjoy a variety of foods (Annexure R1)**

The results (Table 4.2) indicated that 30.3 percent of caregivers interpreted the meaning of 'Enjoy a variety of foods' correctly, while 36 percent focused more on the word 'enjoy', as they chose the option 'it means to eat the food that you like most.' In contrast, 15.1 percent focused on more food and 5.8 percent on the frequency of eating. The term 'healthy' was evaluated by 74.4 percent of the caregivers as meaning to be well and free of illness.

➤ ***'Eat dry beans, peas, lentils and soya regularly' (Annexure R2)***

The same procedure as for the previous pamphlet was followed. Many of the respondents knew that it was important to eat dry beans, split peas, lentils and soya regularly because it is a good source of protein (44.4%), but fewer realised that it also is good for digestion (25.6%). A large percentage (81.4%) indicated that one can eat dry beans, peas, lentils and soya instead of meat and still be very healthy; therefore their knowledge seemed to be better in terms of foods than in terms of nutrients. This is in line with one of the objectives of the FBDGs. However, the list of the top 20 foods consumed by the caregivers (Chapter 3, Table 3.8) did not indicate a high consumption of food items by this group. Therefore, it appears that the behaviour of the women does not correspond to their knowledge. Most of the caregivers also knew that it is recommended that dry beans be soaked overnight before the cooking process.

➤ ***'Fish, chicken, lean meat or eggs can be eaten daily' (Annexure R3)<sup>2</sup>***

The reason why chicken, fish, meat, milk and eggs should be eaten was correctly indicated by 80.2 percent of caregivers, while 48.8 percent of them indicated that meat and chicken can be consumed at least once a week and 29.1 percent said it should seldom be eaten. This corresponds to their poverty profile.

#### 4.4.8.2 Selection of type of supportive NE material

Respondents' preference for the type of NE material was as indicated in Table 4.3, using a weighted average where 'excellent' was weighted as (x4), 'good' (x3), 'somewhat' (x2) and 'poor' (x1).

The most popular and preferred options for the channel of communication were (1) videos, (2) pamphlets and (3) lectures. Videos and pamphlets are classified as mass media methods, while a lecture or an oral presentation is a direct form of interpersonal communication. The least preferred options were crossword puzzles, puzzles and card games.

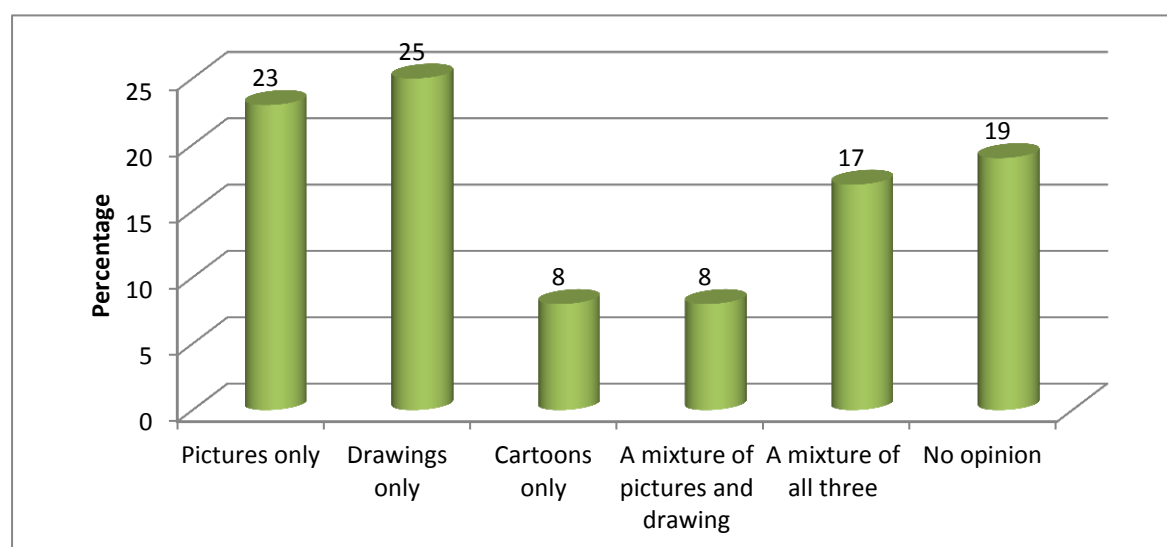
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<sup>2</sup> The wording of the animal protein guideline changed in 2012 to 'can be' from the 2003 version 'could be'

**Table 4.3 Preference for type of NE materials by caregivers (n=86)**

Type of NE material preferred	Card games	Calendars	Role play	Magnets	Comics	Videos	Lectures	Pamphlets	Puzzles	Crosswords	Other
<b>Weighted Results</b>											
Excellent (4)	20	24	24	24	16	52	36	48	20	8	0
Good (3)	27	51	30	33	33	60	54	51	30	30	0
Somewhat (2)	6	0	12	4	14	0	2	0	4	4	0
Poor (1)	11	6	6	8	7	3	2	3	8	13	0
Total	64	81	72	69	70	115	94	102	62	55	0
<b>MOST POPULAR</b>						<b>1</b>	<b>3</b>	<b>2</b>			

The caregivers were also asked to report on where they currently obtained most of their information regarding nutrition and if they would value being exposed to further nutrition information (table 4.5).



**Figure 4.3 Caregivers' preference for images to be used in NE material (n=86)**

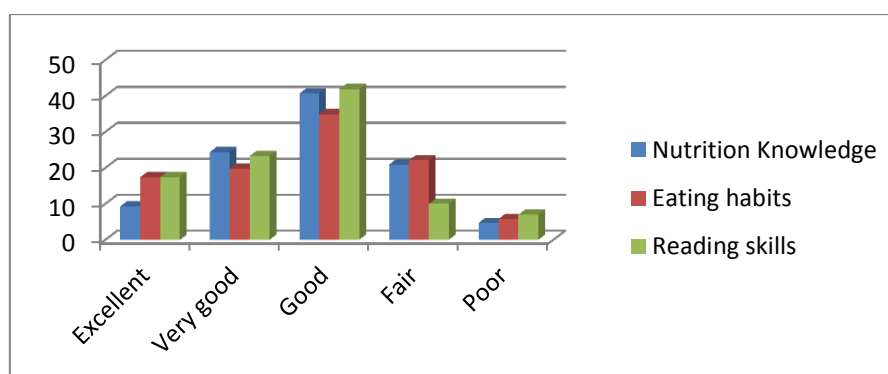
There was little difference between the options of pictures only (23%) to be utilised and drawings only (25%), while eight percent did not have a preference. Cartoons seemed to be less popular (8%) while 19 percent did not express any opinion. It was therefore decided to use a mix of pictures and drawings, depending on the best fit for the specific illustration.

**Table 4.4 Caregivers' self-reported current sources of nutrition information**

Description	n=86	%
TV programmes	21	24
Magazines	26	31
Family members	15	17
Clinics and health care workers	24	28

The largest number (31%) obtained nutrition information from magazines, while 28 percent received their information from clinics in their community and 24 percent from TV programmes (Table 4.4).

Caregivers were also asked to assess their own reading skills, current nutrition knowledge and whether they considered their present eating habits to be healthy.



**Figure 4.4 Caregivers' self-reported nutrition knowledge, quality of eating habits and reading skills (n=86)**

Figure 4.4 indicates that most of the women caregivers thought they had 'good' to 'very good' nutrition knowledge, while 9.3 percent believed theirs was excellent. About 25 percent acknowledged that their knowledge was not good. Only six percent rated their eating habits as poor. Less than 20 percent of caregivers thought they had poor reading skills.

#### 4.4.8.3. Preferred language for communication and selection of channels

A large percentage preferred the NE material to be in Sesotho (55.8%), but 22.1 percent indicated the preferred option as English (Table 4.5).

In this study it was decided to utilise face-to-face group discussions, supported by print materials to reinforce messages and support the transfer of information to the

rest of the family. The motivation behind the choice of caregivers as the unit of analysis was to benefit the households and children within the community in the longer term. Caregivers were constantly reminded during the group discussions that they should share the information with the rest of the family. Printed material was to be developed to include activities and/or games to involve children and the family.

Relevant questions included whether NE should be delivered mainly via print materials, face-to-face individual education, small-group education or mass media. Also debated was the intensity of NE necessary to make a difference. Repeated contacts add costs; from the participants' view it requires time and possibly transportation costs. With regard to subgroups, an important area to address is how targeting criteria should be established (Smith 1997).

The FAO promotes a food-based approach that can be adapted to specific cultural backgrounds, emphasising the nutritional value of food and the multiple benefits obtained from enjoying a variety of foods. An empowerment approach promotes ownership and dignity and restores the confidence of participants. Smith (1997) recommends the development of dietary goals and guidelines as a possibly valuable tool for the direction of dietary change in a specific country.

#### 4.4.8.5. Evaluation of the caregivers' perceptions regarding the design and layout of the existing DOH pamphlets

The results of the evaluation of the designs of the three FBDG pamphlets are combined and discussed in general.

**Table 4.5 Results of preferences of caregivers for design of pamphlets (n=86)**

Description	n=86	%	Description	n=86	%
<b>Which best describes the pamphlets:</b>					
<b>Messages on the pamphlets are</b>			<b>Are the images on the pamphlets</b>		
Too many	3	3.5	Attractive	27	31.4
Too few	4	4.7	Colourful	29	33.7
<b>Difficult to understand</b>	9	10.5	Dull	9	10.5
Easy to understand	52	60.5	Clearly understood	13	15.1
Confusing	18	20.9	Too many	8	9.3
<b>Does the pamphlet look</b>			<b>The recipes on the pamphlets are</b>		
Very colourful			25		
Very dull	3	29.1	Easy to follow	45	52.3
Too many colours	45	3.5	Too difficult to follow	8	9.3
Confusing	12	52.3	Have too much information	13	15.1
Other, specify	1	14.0	Have too little information	1	1.2

Table 4.5 indicates that 60.5 percent of the caregivers found the messages in the pamphlets easy to understand. The caregivers evaluated the colours used for the pamphlet as being too many and confusing (52.3% and 14% respectively). They were not aware of the use of colour coding for easy identification. With regard to the images on the pamphlets, 31.4 percent and 33.7 percent of the caregivers indicated that they found them attractive or colourful, respectively. Recipes on the pamphlets were evaluated as easy to follow by 52.3 percent of the respondents.

It should be reported that, as the M Tech study progressed to testing the remainder of the FBDGs (2003), the case for having NE material translated into Sesotho grew stronger.

#### **4.4.9. Discussion**

The main objective of this part of the study was to evaluate the existing pamphlets of the Department of Health's Food-based Dietary Guidelines for 'Enjoy a variety of food,' 'Chicken, fish, meat, milk or egg could be eaten daily' and 'Eat dry beans, peas, lentils and soya regularly' in terms of comprehension and acceptability in order to apply these results in the design of the NE materials and the subsequent development of the NEP.



#### 4.4.9.1. Caregivers' understanding of the information in existing nutrition pamphlets

The three pamphlets tested delivered different results regarding comprehension of information and the contribution of images to transfer or communicate the meaning of the message. It is important that messages and nutrition material be pre-tested before the development of NE material starts. Love *et al.* (2001:9–19) also identified some areas of confusion regarding some of the terminology or concepts such as 'legumes', 'food from animals', and 'healthier snacks', which were changed to 'dry beans, peas, lentils and soya'. 'Foods from animals' was changed to refer more specifically to 'chicken, fish, meat, milk and eggs'.

#### ➤ **'Enjoy a variety of foods' was tested (Annexure R1)**

The results indicate that only a small percentage of the child caregivers had an understanding of the guideline 'Enjoy a variety of foods'. However, when discussing this guideline, it is vital to keep in mind the SES of the Boipatong community, who still lives in poverty. Nutrition educators should be able to come up with effective ways of explaining this important guideline in order for the caregivers to understand the importance of dietary diversity (Maunder *et al.* 2001:s7) and how to incorporate variety into their eating pattern, including culturally acceptable foods that fit their food budget.

Furthermore, these results are consistent with the top 20 most commonly consumed food items in this community as reported in the baseline survey, since a mainly carbohydrate-based diet was consumed. This finding is supported by Shisana *et al.* (2013) and Vorster and Bourne (2008), who also reported that urban Africans pursue either a traditional urban diet or a typical westernised South African diet, consuming more sugar, meat and fruit than their rural counterparts.

When dealing with this guideline it is important to stress cheaper, nutritious foods in order to achieve better results in reaching the desired outcome of changes in attitude and behaviour. The diversity of food intake and its role in the further development of the NEP for the women caregivers is very important. Topics for family caregivers could include eating a balanced diet, managing impaired appetite, the need for adequate protein and other nutrients to maintain strength, quick and easy menu items to prepare, understanding dietary guidelines, and interpreting food labels and

nutrition messages in the media. Simply offering handouts on the topics discussed is not likely to result in dietary change. To be successful, nutrition educators should use or modify methods and strategies that have proved to be effective in other adult populations. Programmes for older adults use expectancy value models, such as the health belief model or social learning theory. These theories that link health-related behaviour to an individual's knowledge that he/she is vulnerable are able to change behaviour and raise awareness that compliance decreases risk. It is likely that they will not only feel motivated to change their own behaviour, but will also influence the household by making them active participants in dietary behaviour change. The educator might find not merely a needy audience, but a receptive one (Silver & Wellman 2010).

➤ **'Eat dry beans, peas, lentils and soya regularly' (Annexure R2)**

This FBDG was included to address both undernutrition and overnutrition in SA, as legumes are sources of economical protein of good quality, complex carbohydrates and dietary fibre. Efforts should be made to maintain the place of legumes as a traditional food (Venter *et al.* 2013:s36). The women caregivers showed a good understanding of the guideline 'Eat dry beans, peas, lentils and soya regularly'. They indicated that it is important to eat dry beans, peas, lentils and soya regularly because it is a good source of protein, while. 81.4 percent indicated that the good thing about dry beans, peas, lentils and soya is that one can eat them instead of meat and still be very healthy. Therefore their knowledge regarding these foods was good, but does not match their behaviour when one examines the top 20 food list. Most (88.4%) indicated that it is recommended to soak dry beans overnight in clean water to soften them before the cooking process. The understanding of this guideline might have been influenced by the clarity of the images used to identify the guideline and because these items are readily available and affordable (Mawila 2004:45-46).

Dry beans, peas, lentils and soya are vital foods for boosting dietary fibre. It is highly recommended that one should include legumes in one's diet. Legumes are rich in nutrient content, including starch, vegetable protein, dietary fibre and minerals (Venter & Eyssen 2001:s32). Dry beans, peas, lentils and soya are very low in fat content. Legumes have a moderate amount of oil that is unsaturated. Dry beans and soya foods play a role in the prevention of diabetes and the clinical management of

established diabetes. Legumes decrease the high risk of developing diabetes because of their high-fibre, low-fat content and low glycaemic indices (Venter & Eyssen 2001:s37).

➤ ***‘Chicken, fish, meat, milk or eggs could be eaten daily’ (Annexure R3)***

Food from this SA-FBDG adds variety and essential nutrients to the diet, making a considerable contribution to the adequacy of a mixed diet. Animal sources are often associated with saturated fat and cholesterol. However, there is no scientific evidence that a moderate intake of fish, chicken, lean meat and eggs have a negative effect on health (Schönfeldt *et al.* 2013:s66). At the stage of testing the existing DOH pamphlets, this guideline still included milk and yoghurt. However, during the development stage of the booklet (2012), the revised FBDGs came into effect and the booklet was designed based on the two FBDGs of an animal-source FBDG and a milk-source FBDG.

The new message was formulated as: ‘Have milk, maas or yoghurt every day.’ The guideline refers to milk, maas and yoghurt, and not all dairy products. Milk (fresh and powdered as well as yoghurt and traditional fermented maas) is relatively low in sodium and high in potassium, and also contains bioactive peptides which may guard against the development of chronic diseases of lifestyle (CDL). Milk and dairy may play an important role in the regulation of body weight and bone health. Available data show that milk and calcium intakes in South Africans are low (Vorster *et al.* 2013:s57). The findings of this study support the importance of this new FBDG, as none of the caregivers had a sufficient intake of calcium. Alvarez-Leon (2006:s96) concluded that there is an inverse relationship between dairy intake, colorectal cancer, hypertension and stroke, but a high intake of milk might be associated with an increased risk of prostate cancer.

The women caregivers had a good understanding of why chicken, fish, meat, milk and eggs could be eaten. Almost half (48.8%) of the caregivers indicated that meat and chicken can be consumed at least once a week, though 29.1 percent said these foods should seldom be eaten. The understanding might have been influenced by their particular eating patterns and economic barriers. The results of the top 20 list of foods (Chapter 3, Table 3.8) indicated that eggs, chicken, liver and beef were consumed by a small number of caregivers and in small amounts. These are known

as animal-based foods and are excellent sources of protein, which is required for the maintenance and restoration of body tissues. Dairy products are a good source of calcium, which is needed for healthy bones, teeth, blood clotting and healing of wounds (Scholtz *et al.* 2001:S39).

According to the results of this study, the majority of the caregivers found the messages in all pamphlets to be easy to understand (60.5%), yet 20.9 percent reported that they found them confusing (Table 4.9). Regarding the layout and design of the three existing nutrition pamphlets, only 31.4 percent of the caregivers indicated that the pamphlets were attractive. The recipes on the pamphlets were considered easy to follow by 52.3 percent of the women, although 19.8 percent indicated that the recipes were confusing. Layout and design did not contribute to comprehension and too many colours were found to be confusing (52%).

Before funds are spent on production, NE messages should be pre-tested in order to be certain that they convey the intended message (Behr *et al.* 2008:336). In addition, in order to accomplish the required results using the FBDGs, the cultural background of the target group for which they are proposed should be considered (Mawila 2004:14).

Just over half (51.2%) of the caregivers mentioned that the information on the pamphlets was sufficient, while 60.5 percent indicated that the information was easy to understand, although 50 percent of the caregivers found the pamphlets confusing.

#### 4.4.9.2. Recommendation for the design of NE material for this NEP

Although a video was the preferred option of most caregivers, it was decided to focus this study on the second choice owing to the major cost implications of a video and the high level of expertise required to produce it. The caregivers indicated that they would prefer pamphlets or booklets in order to learn about nutrition, followed by television advertisements or programmes.

The results of this study indicated that 98.8 percent of the caregivers were eager to learn more about nutrition. Almost half of the women caregivers indicated that they would prefer the pamphlets to be written in English. However, as time passed, with testing on different days, it seems that their preference for information in their home language became stronger. In the last test of the M Tech study that covered testing

the remainder of the FBDGs, which were not relevant to this study, the preference for Sesotho was 98 percent.

When the results of the pamphlets tested in this study were assessed, the following recommendations were provided:

- The caregivers expressed a definite need for further NE. *The caregivers were in favour of a booklet in their home language, South Sotho.*
- *Develop and draw up a suitable new booklet in A4 format to address problems found in this study on the three FBDGs originally identified.*
- *Adapt the original objective to develop NE material for three FBDGs to four FBDGs to fit the new 2012 South African FBDGs.*
- The text/information content of the pamphlets was acceptable and valid. Although there were no negatively phrased messages, the meaning was often incorrectly interpreted. This might be for many reasons, including low literacy levels, limited eyesight in some of the elderly caregivers, and limited time allowed for reading the pamphlets. *Develop an English A4 booklet for low-literacy adults and translate it into Sesotho. The text must be written in the commonly understood Sesotho language of the caregivers.*
- Based on the results obtained from testing of the existing pamphlets, it can be stated that the caregivers understood the information on the pamphlets well, but their understanding of the images was poor. The use of colours in the pamphlets was confusing and the images did not contribute positively to the meaning of the FBDG. *Redesign the pamphlets in respect of layout, use of colours and images. All images to be used must be tested extensively for acceptance and comprehension. Colours are to be used sparingly and frames should be avoided.*
- The guidelines did not address the Sesotho culture and eating patterns of the target population in the Boipatong community. *Traditional food items of the Sesotho must be included in the FBDGs used.*

Originally, the draft text of the DOH pamphlets was subjected by voluntary nutrition experts countrywide to two rounds of stringent critical reviews for validity and scientific correctness of information and messages. Draft concepts of the pamphlets were also consumer-tested in Gauteng health clinics for consumer comprehension of

information. However, it was developed in English only, and information was generic in nature – not adapted to a specific cultural group.

#### **4.5. DESIGNING AND PILOT TESTING LESSON PLANS AND SUPPORTIVE NE MATERIAL FOR THE NEP INTERVENTION**

Despite a choice of many types of nutrition intervention, knowledge about healthy food choices remains an important mediating factor for the adoption of food choices. Health messages can elicit positive emotions; often fear (as used in the health belief model) can distort information and/or change our responses to it. Personal biases can also distort the messages (Brown 2010:19). Several studies support NE as a strategy to provide knowledge that increase awareness about healthy/unhealthy food choices, increase awareness of health benefits of specific FBDGs through knowledge of the diet-disease relationship, and increase awareness of the relative low cost associated with meeting the national guidelines through healthy food choices (Robinson 2008:403; James 2004:364).

A summary of the characteristics of the Boipatong caregivers was formulated for the development of the NEP and NE material obtained from the situational analysis and is presented in Table 4.6. As most of the caregivers were older than 40 years, an additional criterion was set for the development of the NEP to be older than 40 years and being a caregiver of children (5-15 years). The study was aimed at low-SES Sesotho-speaking females with low literacy skills.

**Table 4.6 Characteristics of the study population for whom the NEP had to be developed.**

<b>Intervention community characteristics</b>	<b>Primary target group</b>	<b>Secondary target group</b>
<b>Urban, good housing conditions and infrastructure</b> <b>Culturally homogenous</b> <b>Socio-economic disadvantaged households with income and capacity poverty (low SES)</b>	Female caregivers (>40years) of children, low literacy level Sesotho	Households of caregivers Children 5-15 years Sesotho

The wording of the messages of the FBDGs (2003) was not tested by the research team as this had been done by Love (2002) and the messages were accepted as national South African guidelines.

After tests of existing NE material were completed, the design of the NEP and supportive NE material could start. This process was informed by the literature review (Chapter 2) and the findings of both the situation analysis (Chapter 3) and the results of testing existing NE material (section 4.4).

As stated by the FAO (1997), the process of NEP development is not linear, but rather non-sequential. Community participation is widely regarded as the key approach to designing NE interventions (Weiss 1998). When the NEP was developed, different needs of different stakeholders (governance structures and caregivers) were taken into consideration in the design process.

Four criteria set for each guideline (Figure 4.2) were applied in every session. As the DOH NE material testing indicated that the text /information of the pamphlets were easy to understand, this information was tailored in the development of lectures and NE material.

For NE to be effective in producing behaviour change, the message has to be culturally meaningful, and the recipient should have sufficient self-efficacy and desire to alter practices. NE should also address the physical and social environment (Contento 2008:331). The process of NEP and NE material development was an iterative process requiring several levels of input, review and revision. The use of a systematic process was crucial in ensuring continuous feedback.

The aim of pilot testing the NEP material was twofold:

- To establish whether participants considered the information and NE material useful, easy to understand, relevant and acceptable.
- To determine what improvements could be made to the lesson plans and NE booklet to make them more suitable, useful and acceptable for the intended audience.

Formative research is used to test concepts or message design and to pre-test materials with the target audience. Complementary assistance uses mixed methods to integrate the strengths of each, as one method can enhance the other and allows for greater creativity and adaptability in studies in real-world conditions. According to Morgan (1998:362), complementary methods are a likely strategy for health researchers because the strengths of different methods help address the complexity of health research topics.

#### ***4.5.1. Research design of formulating the NEP***

This part of development of the study was an exploratory design. Since this section included the development of the lesson plans and the NE booklet, the process included qualitative and quantitative formative research to tailor lesson plans and NE material to the unique characteristics as presented in Table 4.11. Kreuter and Skinner (2000:4) defined tailoring as “any combination of information or change strategies intended to reach one specific person, based on characteristics that are unique to that person, related to the outcome of interest, and that have been derived from individual assessment”.

Following a systematic process to develop the NEP lesson plans, informed by the findings from the process of testing the existing DOH FBDG pamphlets as described in 4.4, the Sesotho text was first tested in a pilot setting. Discussions centred on the four themes presented in Table 3.19.

#### ***4.5.2. Sampling strategy for pilot testing of the NEP***

The NE material was evaluated by a pilot sample of cleaners at TUT who were matched to the BIWPG sample for language, age, literacy skills. Participation was voluntary and each participant signed the ethical clearance used in the situational analysis (Annexure B). Permission was also obtained from their supervisor for one hour per week in order to assist in the focus group. Non-probability, purposive sampling was used to obtain the purposive sample of cleaners. The pilot sample was closer to the researcher in terms of location and convenience. An observer (lecturer) attended each session to note observations.

Convenience sampling was used in the image elicitation (n=46) in the BIWPG sample that attended the prayer session in June 2012. Pictures and illustrations to be used in the booklet were tested through image elicitation. The Department of Arts, Graphic Design, at VUT assisted with the perception testing of illustrations.

#### ***4.5.3. Methodology for developing and pilot testing the NEP and NE material***

Participants of the BIWPG could not be used for testing lesson plans and the information to be presented in the draft NE material, as this would have influenced NEP impact measurements during the implementation phase (Chapter 6). Therefore the sample of TUT cleaners were selected to be utilised for pilot testing. These focus



groups provided the platform to evaluate the effectiveness of the lesson plans and information of the newly designed NE material.

Researcher-generated image elicitation was done (using photos or hand-drawn illustrations) by means of quantitative methods in a questionnaire using a Likert scale to evaluate understanding in two focus groups. The Department of Visual Arts and Design (Prof RJ Gaede) played a central role in training fieldworkers in these testing events.

Testing images in an interview situation means that the fieldworker communicates with the respondent using both verbal and visual communication, collecting richer data. It was also reported that this is less tiring than standard interviewing (Gaede & Surujlal 2011:347-8). Perceptions regarding illustrations were tested for suitability and understanding for inclusion in the Sesotho pamphlets in a quantitative manner, using a Likert scale to evaluate understanding. Two qualitative focus groups were also used to test perceptions of the caregivers regarding NE materials after the intervention.

#### ***4.5.4. Sample size for the pilot tests***

a) TUT sample: A sample size of six to eight participants was preferred, enabling the researcher to have direct interaction with the participants in the focus group for pilot testing the lesson plans. The group was kept small to provide close contact with the researcher in order to gain in-depth information about the participants' perception of and attitude to the elements subjected to pilot testing. Eight members were recruited, but only six participated as active members.

b) BIWPG sample: With image elicitation in the BIWPG the caregivers attending the specific meeting was n=46. The sample of BIWPG was used in image elicitation as this would not influence their nutrition knowledge in the interim period. In addition, it served to maintain interest in the project while the NEP was being developed.

#### ***4.5.5. Measuring instruments used in pilot testing the NEP***

a) TUT sample: Qualitative research in the form of group discussions was used in pilot testing the newly developed lesson plans and NE material to obtain in-depth responses about the participants' thoughts and feelings in order to gain insight into the perceived benefits of the NEP. Focus group discussions were used to gain in-

depth understanding of the Sesotho-speaking TUT cleaners' comprehension of the lesson plan presented and the translated text of the NE material in four weekly sessions lasting 90 minutes each. The first session was used to familiarise participants with the NEP and to build a working relationship with them. Specific attention was paid to NE material to determine if Sesotho word choices were understandable at the low literacy level of the participants. The text was piloted for clarity (face validity) and readability (reliability) with lower-SES adults.

Qualitative data was obtained and recorded by the researcher and observer in a structured format. Formative research was used to test concepts and the effectiveness of lesson plans with participants. The objective was to test the text first before paying attention to illustrations. Following review and revision, the materials were re-tested in one-on-one counselling sessions with two of the participants at the TUT site. Final minor adjustments were made to the wording, organisation and formatting, resulting in the final text draft used in the implementation phase.

b) BIWPG sample: Quantitative data, using specifically designed questionnaires, were used for preferences of image elicitation (Annexure N1 and N2). These data were captured on an Excel spreadsheet and analysed using descriptive statistics.

#### ***4.5.6. Fieldworkers and data collection in pilot testing the NEP***

The researcher and an observer recorded observations in the focus group discussions with the TUT cleaners. After each session the findings were discussed and recorded by the researcher and observer. The quantitative data of the questionnaires were captured on Excel spreadsheets and analysed using descriptive data.

#### ***4.5.7. Data processing***

The results of the qualitative data guided the design and development of the intervention materials which were then utilised in the implementation phase. Observer notes were assessed and lesson plans and NE material text adapted accordingly. A summary of the findings of the qualitative data is presented in table format.

#### **4.5.8. Results of pilot testing the NEP lesson plans and NE material**

Following a systematic process to develop the lesson plans and supportive NE material, the NEP was first tested in a pilot setting. Pilot testing of the understanding of the content of the lesson plans and NE text of the material included:

- Readability (visual and language aspects and the meaning attributed to phrases in the text)
- Comprehensibility (assessing the interaction of the reader with sentence structure, text and the way the reader reads the text for understanding)
- Communication effectiveness (as a function of the reader's understanding).

##### **4.5.8.1. Selection of channels of communication**

According to the FAO framework (Smith & Smitasiri 1997), the selection of the media should be based on the understanding of the background of the target group. For this study, the decision was based on the results of the situational analysis. The NEP was to be presented as lectures (oral presentations) (section 4.4.8.4. and table 4.4) that were to be supported by newly designed and tailored NE material and activities to enhance participation of caregivers. Based on the preference of the sample for printed NE material (table 4.5 & table 4.6) it was decided to develop a supportive written A4 booklet in English and Sesotho.

##### **4.5.8.2 Development and pilot testing of Lesson plans (Annexure S1-4) and supportive NE material text.**

According to Contento (2011:256-9), instruction can be seen as “the deliberate arrangement of events in the individual's environment to make learning happen and to make it effective” to support the internal processes of learning. This then leads to a lesson or education plan. The following steps were followed in this research (Annexures Q1-4):

- a) Gain attention by planning activities to stimulate interest
- b) Present new information, using the mediators as discussed in Chapter 2 by offering benefits of desired action, discussing barriers and presenting alternatives. Tailor messages to fit the audience's prior knowledge and values.

- c) Provide for hands-on activities and role models to demonstrate action to gain mastery of skills and self-efficacy.
- d) Apply and close: Summarise, wrap up and conclude the session.

The pilot sample (focus group) explored participants' understanding and thoughts on the relevance and usefulness of the information (Eyles *et al.* 2009).

It was more difficult than expected to adapt the NEP to the Sesotho cultural group. Very little literature could be found on their specific eating patterns, traditional foods and preparation methods. Di Noia *et al.* (2013:224) reported that despite consensus that nutrition intervention programmes should be culturally sensitive, relatively little is known about methods to develop culturally sensitive interventions.

Understanding and using information requires effort from the participants and is dependent on each individual's ability and motivation (Brown 2010:6-7). Therefore lectures were run as oral presentations, combined with informal discussion groups, asking for participants' understanding of concepts, ideas and experience in daily life, which were recorded as notes to each session.

As there is no simple way to analyse the readability of Sesotho materials, the pilot discussion group was used to check the readability of the intervention materials as well as to confirm that the Sesotho word choices were understandable at the low literacy level of the people commonly living in the area.

The draft NE material developed was verified for validity by nutritionists from VUT and altered, pilot tested and modified for clarity (easier understanding by a low-educational level reader) before being sent to a professional language service to be translated into Sesotho. When the translated material was received back, it was verified by a Sesotho-speaking B Tech student at TUT who translated the material back to English (see section 4). The process of developing and testing the material and testing of images/pictures is shown in Table 4.11. The process was often not linear, but one activity informed the other for adaptation and upgrading.

The results of pilot testing the lesson plans and draft NE material translated into Sesotho are presented below.

➤ ***Pilot testing of lesson plan and NE material text for ‘Enjoy a variety of food’***

The lesson plan (Annexure S1) was presented. The Sesotho text was provided. Observations from the discussion are presented in Table 4.7, adapted from an observation format suggested by Garner *et al.* (2012:283). Observations and thematic information regarding the lesson are provided in Table 4.8.

**Table 4.7 Observations from discussions regarding content of lesson plan for ‘Enjoy a variety of food’ in pilot test focus group (n=6)**

Theme	Some remarks	Observer's notes	Readability of NE material	Comprehension of information	Communication effectiveness
<b>1: What is included in the group?</b>	‘Understand different foods’ ‘ja, we do eat together mantsiboa’	Participants were very enthusiastic and amazed to see something in a home language. They were highly attentive throughout session.	Participants did not understand ‘variety’ well, as they did not know food groups. They did not have a problem with understanding other words.	Well understood. Sesotho-speaking facilitator contributed to trust and building relations.  Hearing and reading information in home language contributed meaningfully to comprehension.	Participants were initially shy to participate in discussions (were only used to participate in song and sometimes prayer).  Ideas for solutions had to be solicited from participants, but were well accepted once explained.  Only a few participated in discussions
<b>2: Why is it important?</b>	‘so that your family may be well’	Information well understood.			
<b>3: Barriers to implementation</b>	‘Do not like milk’ ‘drink tea & coffee black’ ‘gives runny tummy’ ‘money little’ ‘must buy food for house’ ‘expensive to have children at school – little money for food’ ‘transport expensive’ ‘Eskom expensive’	A stepwise approach might be beneficial to aim for one cup a day of milk.			
<b>4: Solutions to barriers</b>	‘can cook differently – but frying is quicker’ ‘do not eat the same food’				
<b>Activity</b>	Different food items were placed on the table at random and the group was requested to sort the items into foods belonging to the same group or message.	The concept of food groups was still foreign to them. The following groups were formed: Legumes: Included were soya, tinned beans, dried beans, but also tinned green beans and tinned vegetables. Starches: correctly identified as samp, rice and bread. Meat: correctly identified as lamb chop, boerewors, chicken and fish. Milk group: milk, yoghurt cheese, custard,			

		<p>but also eggs.</p> <p>Vegetables and fruit: Apple, butternut, spinach.</p> <p>Fats and oils: Margarine and sunflower oil.</p> <p>After grouping item into food groups, participants were asked why they included green beans and tinned vegetables under the legumes and they were able to correct themselves. The same happened when asked why eggs were part of the milk group.</p>			
<b>Refreshment</b>	Peanut butter and jam sandwiches				

In Table 4.9 it is shown that participants were amazed at seeing nutrition information in their own language. This was accepted enthusiastically and demonstrated the importance of tailoring messages to the participants' specific culture. The biggest hurdle experienced in this session was the concept of 'variety', as the idea of sorting food into different groups was still foreign to them. Once explained and accepted, the activity became easier to participants. The lesson had to be adapted to explain 'variety' in more detail. They found the term 'eat different kinds of food' to be more descriptive. The text in the NE material was found to be clear and well explained. This once again highlighted the importance of NE material not be treated as hand-outs only, but to discuss its content thereof with the people concerned.

➤ ***Pilot testing of lesson plan and NE material text for 'Eat dry beans, peas, lentils and soya regularly'***

The lesson plan (Annexure S2) was presented. Sesotho text was provided to each participant. Observations from the discussion are presented in Table 4.8.

Participants found the use of a hay box very interesting and debated its uses. The lesson plan was accepted well and found interesting in general, although the participants admitted that they did not regularly use dry beans and peas. The text was easy to read in font size 12 and they preferred the A4 page size.



**Table 4.8 Observations from discussions regarding content of lesson plan for ‘Eat dry beans, peas, lentils and soya regularly’ in pilot test focus group (n=6)**

Theme	Some remarks	Observers notes	Readability of NE material	Comprehension of information	Communication effectiveness
<b>1: What is included in the group?</b>	'like baked beans' 'do not eat every week' 'must have piece of meat'	Participants admitted that although they knew about dry beans and soya, they did not use them weekly.	Participants found text easy to read. They preferred the A4 format, as previously established.	Information well understood. The text was evaluated as clear and simple to follow. Reader stopped after each sentence, interpreting what she read. Information 'enough' – not too little or too much.	Increased trust and acceptance was visible. This contributed to more questions being asked by more participants.
<b>2: Why is it important?</b>					
<b>3: Barriers to implementation</b>	'takes long to cook after work'				
<b>4: Solutions to barriers</b>	'will try hay box' 'can use it at church meetings to keep food warm'				
<b>Activity</b>	Group had to select legumes from a variety of food items. How to assemble a hay box was demonstrated and the assembled box was used for keeping soup hot.	The group selected tinned green beans as part of the legumes, but did not identify chick peas.			
<b>Refreshment</b>	'soup very nice'	Bean soup was served and recipe card given to respondents. Participants found the use of a hay box very interesting and a lengthy discussion ensued on the bags currently available in a retail shop.			

➤ ***Pilot testing lesson plan and NE material text for ‘Chicken, fish, meat milk and eggs can be eaten daily’***

The lesson plans (Annexure S3) was presented. Sesotho text was provided to each participant.

Observations from the discussion are presented in Table 4.9. Although the content was accepted and understood, some refinements were done to tailor the content and words to the cultural group of caregivers. For example, some participants were not confident about the term ‘offal’ but preferred terms such as ‘ox tripe’, which is a cultural favourite. Sheep head and ox stomach were also added as favourite and cheaper items. In this low-SES sample, price was given as a barrier to the regular consumption of meat, chicken and fish.

The fat content of meat, fish and chicken was debated and it was clear that the participants’ knowledge about this topic was lacking.

**Table 4.9 Observations from discussions regarding content of lesson plan for ‘Chicken, fish, meat milk and eggs can be eaten daily’ in pilot test focus group (n=6)**

Theme	Some remarks	Observer's notes	Readability of NE material	Comprehension of information	Communication effectiveness
<b>1: What is included in the group?</b>	Include more familiar items such as chicken feet, heads, and mala	Offal; term not understood, use sheep head which is cooked, or ox stomach cut into strips (traditional)	Information understood. Explaining of terms perceived as important.	All the respondents indicated at the end of the session that they would like to get more nutrition information as these sessions were enjoyed and they were learning about nutrition.	Good
<b>2: Why is it important?</b>	‘important for health’ ‘make stomach full’ ‘children need meat to grow’				
<b>3: Barriers to implementation</b>		All love meat, but price is a barrier			
<b>4: Solutions to barriers</b>	Use of cheaper cuts or ‘use pilchards or eggs’ ‘Family love chicken.’ ‘Use sheep head which is cooked, or ox stomach cut into strips’				
<b>Activity</b>	Identification of fatty meat from selection of photos.			Respondents discussed amongst themselves and they were unsure about a number of items, e.g. polony, could not distinguish between fried and boiled chicken. They also classified liver as a non-fat animal protein	.
<b>Refreshment</b>	Savoury baked rice.	Recipe cards were handed out.			

The observations, key themes derived from the discussion groups and performance results of the quantitative questionnaires were used to guide the modification of the four draft NE resources. Resources were checked and health tips and messages were changed to ensure that they were framed positively. Foods were checked to ensure that they were relevant and familiar to the cultural group. Recipes were chosen that were simple, quick to prepare, used familiar ingredients, and included healthy versions of traditional food. However, due to the financial implications of translations, it was decided to adapt the text only after implementation with the Boipatong experimental group and after their input had been incorporated.

Following review and revision, the materials were retested in one-on-one counselling sessions with two of the participants at the TUT site. Final minor adjustments were made to the wording, organisation and formatting, resulting in the final draft used in the implementation phase. Johns & Patel (2013:10) highlighted the importance of consumer (participant) consultation in the development of written educational material and guidelines in order to ensure that they are user-friendly and relevant.

#### 4.5.8.3. Pilot testing of appropriateness of images to be used in the booklet with the experimental BIWPG caregivers.

In this study, images served to convey understanding of specific concepts. Two separate sessions were devoted to image-elicitation in the BIWPG group during the implementation phase at a prayer meeting (n=46).

Image elicitation is a research tool in visual sociology to gather data about images, be it photos, drawings or other types of illustrations. Studies have shown that employing these techniques stimulate richer data, using both visual and verbal communication (Gaede & Surujlal 2008:348). Images are part of communication strategies used to tell or inform. Images provoke deeper components of human perception than words. There are a number of common visual research strategies that are generally associated with qualitative research. (Harper 2002:13-14).

Recent reviews suggest that simple images without distracting, irrelevant details and with easy-to-read captions heighten comprehension, especially for people with low reading skills (Houts *et al.* 2006).

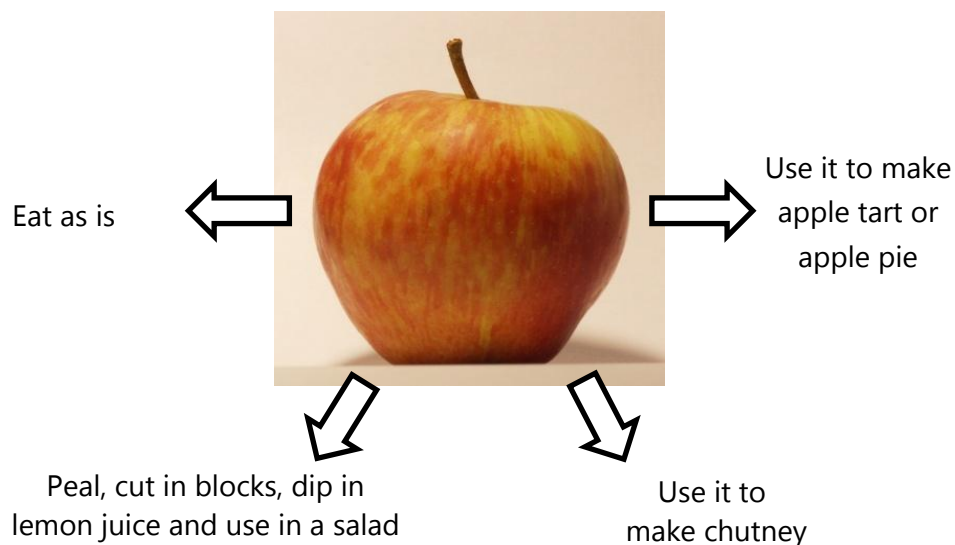
Written materials can be effective in increasing healthy behaviours, and are likely to obtain better adherence rates if group discussions are kept short. Issues previously

experienced when running discussion groups with older people include low attendance, difficulty in answering questions because of sensory or memory impairments, and difficulty in remaining focused because of waning energy and attention.

➤ ***Examples of images accepted by caregivers for inclusion in NE material***

Some of the examples tested are provided to show participants' preferences. Quantitative methods were used (see Annexure N1 and N2)

**Think of all the things that you can do with an apple...**



Can you think of more uses for an apple?

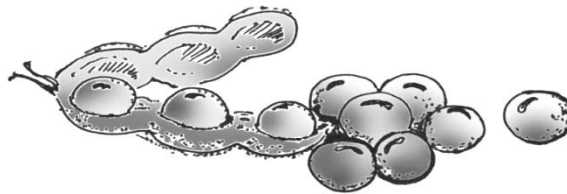
***Figure 4.5 Image of an apple with labels that give meaning as accepted by caregivers.***

It would seem as if the caregivers favoured coloured images by a small margin (54% to 46%). The image of an apple in Figure 4.5, indicating various ways to incorporate it into the diet, was well accepted by caregivers, giving meaning to the picture.



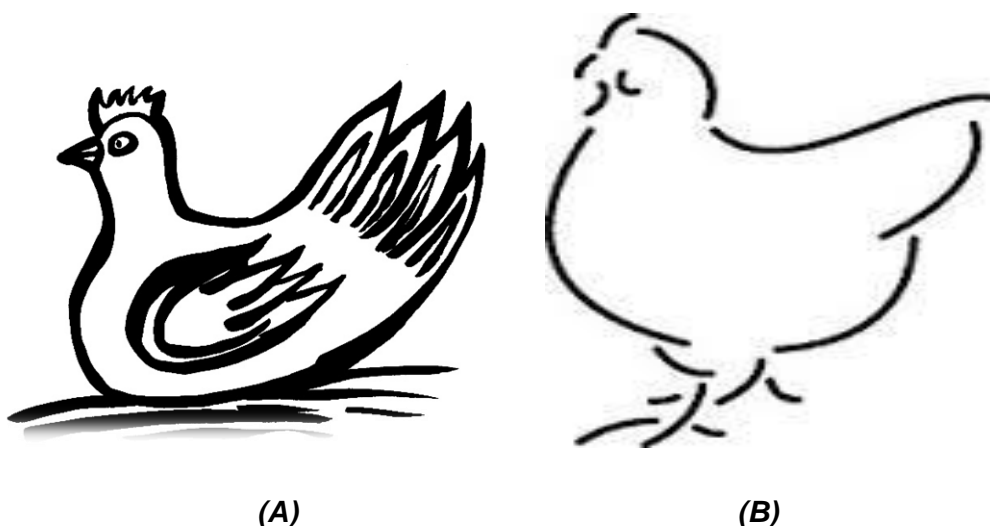
**Figure 4.6 Images of different plant proteins with labels accepted by caregivers**

Images with labels were the preferred option for caregivers to provide them with information on what is portrayed and what the food product looks like, to enable them to identify the product (Figure 4.6).



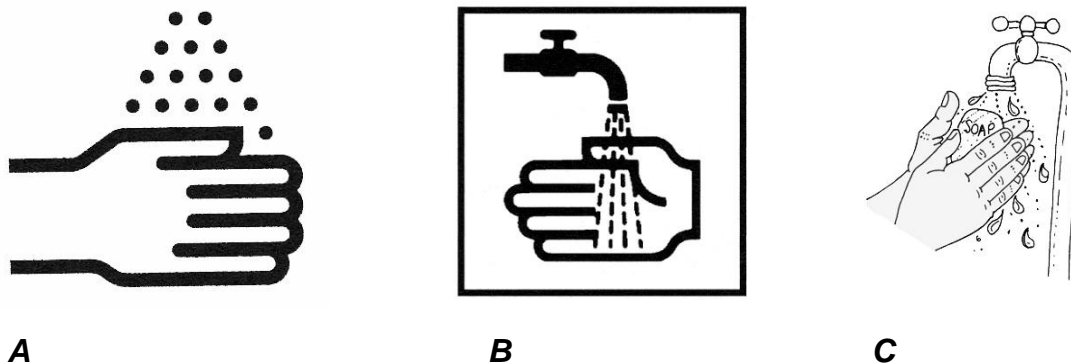
**Figure 4.7 Image of a soya bean that caregivers found difficult to identify**

The option of soya (Figure 4.7) showing seeds inside was not accepted as an option and discarded for the picture in Figure 4.6. Some identified the soya picture as peas, eggs, potatoes, or even a snake. Only ten percent identified the illustration correctly as soya. Cultural relevance of images affects comprehension; images of people who are similar to the viewer have a greater effect on behaviour than images of unfamiliar, different people (Dowse *et al.* 2006).



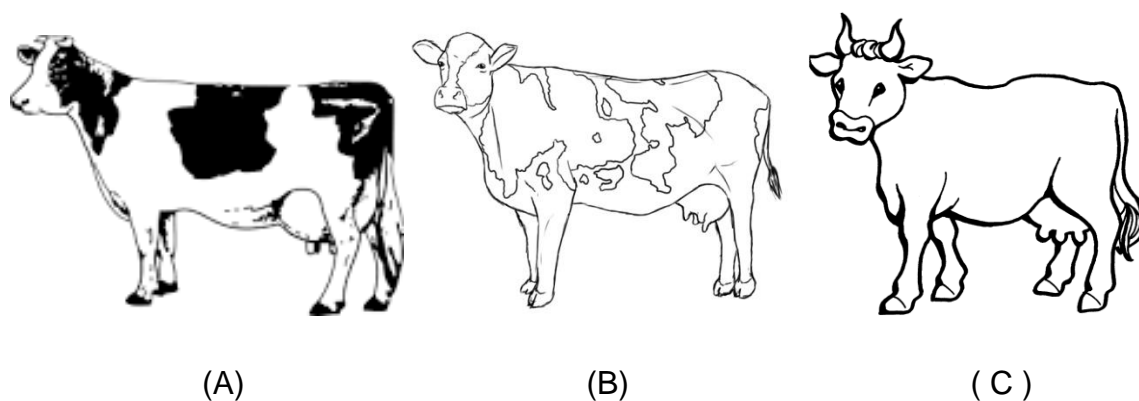
**Figure 4.8** *Examples of images evaluated by caregivers for the booklet to be used as an activity to colour*

Images in Figure 4.8 were tested to be included in the NE material as activities that the caregivers can use at home for the children to colour. These were acceptable to them. However, the picture in (B) now tended to be too simplistic (35%), with some saying that it looked like a bird and that they favoured (A) (65%).



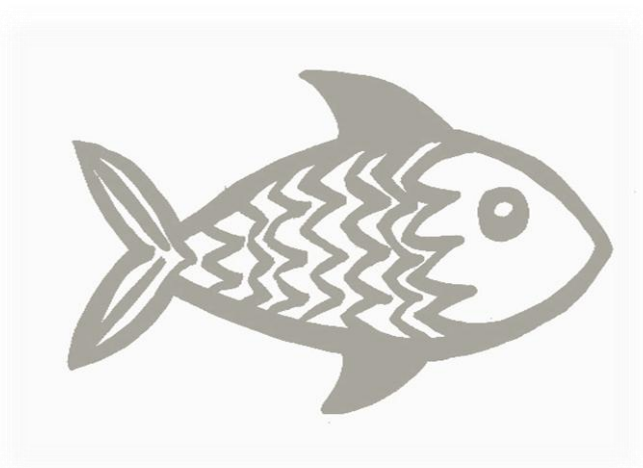
**Figure 4.9** *Testing images for hand hygiene*

The caregivers identified the illustration of a tap with hands being washed showing a bar of soap the easiest (81%) 'as the proper way of washing hands' (Figure 4.9). The splashing water in the illustration made little sense to them (Annexure N2).



**Figure 4.10 Testing of images of a cow to serve as an activity to complete with children by means of numbers and line**

All images in figure 4.10 were identified as cows. However when the lines in the sketch were replaced with numbers to link, the darker colours in picture (A) was confusing (15%). Picture (B) was too complex for the participants (25%). The one with less detail (C) was favoured (60%) and was the easiest to link lines by means of numbers.



**Figure 4.11 Testing fish images to be used as a colouring activity for children**

Most caregivers identified the illustration of a fish correctly (62%). Interestingly, some linked it as health, for example, 'fish for people with heart disease,' 'shows food that has less fat' or even 'fish is a body builder.' The other participants (38%) were not able to identify the picture.





**Figure 4.12 Testing images of meal servings**

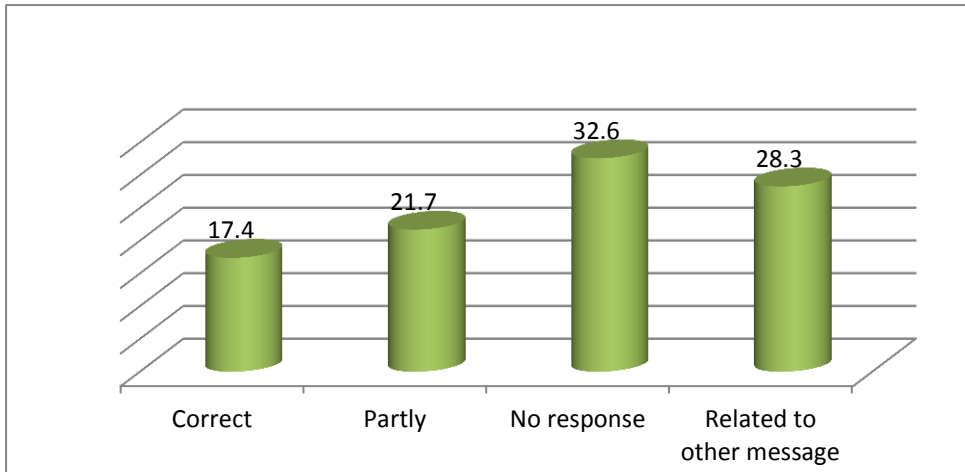
Results of testing cultural preferences of serving a meal (figure 4.12) revealed that a bowl shaped plate was preferred (87%). The starch dish was dished up first and filled most of the plate. A small portion of meat was then added, accompanied by a small portion of vegetables.

Simultaneously with testing the above images, a photo testing the caregivers' perception of 'Enjoy a variety of food' was put to the test.



**Figure 4.13 Image of a composite picture of a variety of foods**

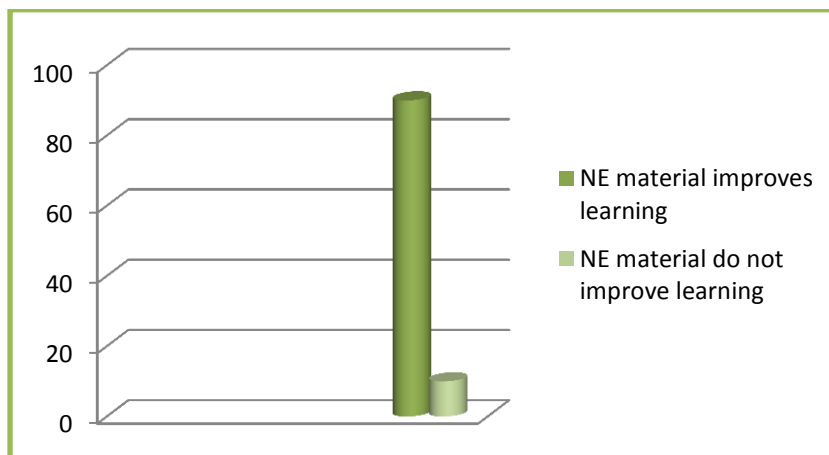
It appears that the picture (Figure 4.13) was too complex, as only 17.4 percent of respondents identified the variety of food correctly. As indicated in Figure 4.13, a further 21.7 percent identified it partly correctly, for example, 'must balance your food' or 'to protect my body', while 28.3 percent related it to some of the other FBDGs, for example, 'when cooking chicken remove the fat, or 'lentils are good for me'. A large percentage, 32.6 percent, had no response and only saw different foods (n=46).



**Figure 4.14 Results of evaluating the image of 'Enjoy a variety of foods'**

In summary, difficulty was always experienced when a compound picture was provided to participants, and the meaning had first to be explained to stimulate comprehension.

The value that the NE material added to the NEP was assessed quantitatively in a single question in May 2012 on completion of the implementation of the lesson plans. The result of this was that 90 percent agreed that the printed material improved learning, while 10 percent did not perceive it as adding value (Figure 4.15).



**Figure 4.15 Preliminary testing of the perception of caregivers regarding the value of booklet (n=46).**

Of the 46 participants (Figure 4.15) who participated in this session, 90 percent regarded the NE to be valuable, while 10 percent did not believe the written material would improve learning more than the oral presentations and discussions.

**Table 4.10 Summary of final testing of preferences obtained from the caregivers regarding written NE material (n=46)**

Element elicited	Options and percentages of preferences			
Font size of text	Small (10 font)	Medium (12-14 font)	Large (16 font)	
Language to be used	English 9%	Sesotho 74%	English & Sesotho 11%	Zulu 6%
Illustrations	Black and white 54%	Colour 46%	Look nice 12%	Must give meaning 88%
Format of written NE material	One-page pamphlet 19%	A5 booklet 28%	A4 booklet 51%	

In a final evaluation of the format of the booklet, preferences chosen by the caregivers (n=46) regarding written NE material is provided in Table 4.10. The majority of caregivers preferred the text of the booklet to be in their home language, Sesotho, using medium font size (12-14), which is more easily readable by the older sample of caregivers. Caregivers favoured coloured illustrations by a small margin, but illustrations had to contribute meaning to the text. The overwhelming majority preferred a booklet (28+51%) rather than loose pamphlets. A larger booklet was the preferred option.

In Table 4.11 a summary is provided of the process followed in the development of the booklet. Although the pilot-tested lesson plans were based on the FBDGs (2003), the FBDG on animal protein and milk protein was split into two, based on the FBDG (2012) version. The booklet consisted of four sections. Each section was devoted to one of the four FBDGs. Messages were tailored to the target audience and information on indigenous foods was incorporated into the design of the booklet in order to improve the caregivers' nutritional practices and knowledge about these culturally accepted foods. On the finalisation of draft texts, they were sent to a professional language service for translation into Sesotho. The objective was first to finalise the text before paying attention to illustrations. This text was pilot tested in an independent TUT group of cleaners by means of focus groups. Illustrations that were tested to be best understood by caregivers were selected from the results of image elicitation. Draft copies of text and illustrations were submitted to TUT's professional graphic designers for layout and design.

**Table 4.11 Summary of the development process of the tailored NE material**

Activity	Output	Source of information	Data collection method & technique
<b>Drafting nutrition education material</b>	Draft text FBDG pamphlets (x4)	Protocol, lesson plan, existing DOH pamphlets	Content analysis
<b>Translating draft NE material into Sesotho</b>	Translated Sesotho pamphlets (x4)	Professional translation service	Pilot testing with TUT cleaners in focus groups
<b>Caregivers' discussion sessions. One FBDG per session. Once monthly (x3).</b>		Lesson plan, draft NE material	Evaluating knowledge improvement before and after each FBDG discussion. Questionnaire, before and after tests. Personal observations and evaluation (critique)
<b>Adjusted NE material to finalise booklet</b>	Adjusted English text	Information gathered in previous step	Personal evaluation (critique)
<b>Updating in Sesotho</b>	Finalised text in Sesotho booklet	Professional translation service	N/A
<b>Testing visual meaning of pictures</b>	Images to be tested	Graphic designer (VUT)	Tested quantitatively in pilot and experimental group
<b>Design and layout</b>	Booklet, English & Sesotho	Design protocol, layout done by graphic designer (TUT)	N/A
<b>Translation of Sesotho back into English</b>	Layman's translated English version	B Tech student	Verification of Sesotho text from English version.
<b>Testing of finalised booklet</b>	Booklet, English and Sesotho	Experimental sample Boipatong	Qualitatively in focus groups (refer to results in Chapter 6)
<b>Finalisation of booklet</b>	Corrections and minor adaptations done.	Graphic designer	

#### **4.5.9. Discussion**

Although results of testing the NEP lesson plans, NE text material and illustrations were given separately, the process was iterative. The discussions focused on the three main elements of the NEP developed, namely the channel of communication, the lesson plans, and the written NE material.

NEPs should be developed both to prevent undernutrition and NCDs and to promote health. When developing NEPs, several factors should be taken into account, including availability of foods, access to food, culture and eating patterns, nutrition literacy and the availability and accessibility of information to targeted populations (Contento 2011:1-5; Shahar *et al.* 2012:12). In line with the thinking of FBDGs around the globe, the NEP and NE material had to focus on foods and not on nutrients.

Vital and meaningful information had to be provided in the pamphlets to enable informed decisions on food choices.

Understanding the local socio-cultural context is critical to the design of an appropriate intervention (Atun *et al.* 2010:10). The NEP was therefore specifically aimed at the socio-cultural factors as determined in the situational analysis (Chapter 3). While NEPs are often developed for middle-income populations who usually have high literacy levels, fewer interventions are being developed for specific ethnic audiences with low literacy skills. Tailoring health education brings personalised health messages to members of an ethnic group (Strolla *et al.* 2005:466). Messages closely responding to the needs of the caregivers and based on the earlier assessment of their lifestyle (Chapter 3), were used to introduce participants to recommended food choices. Tailoring is associated with stronger behaviour change effects than generic health education, especially in NE interventions, while threat information seems to result in a loss of message attention (Kessler *et al.* 2011:32).

##### **4.5.9.1 Channel of communication**

In consultation with the participants, face-to-face discussion groups were selected as the channel of communication for the NEP developed for this study. Learning methods that were used when giving nutrition information to a group of people included oral presentations, facilitated by a Sesotho-speaking member of the

executive committee, group discussions, demonstrations and active participatory methods (FAO, 1997b). The challenge was to develop an intervention that would be short, easy to understand, accurate and practical for the caregivers (Karim et al. 2008:53) to ensure that the messages reach the target group.

The discussion groups were supported by written NE material to reinforce messages after the face-to-face sessions. The information (text) of the booklet that was developed was tailored to the specific ethnic target audience of Sesotho-speaking caregivers of children. However, it was pilot tested in the TUT group of cleaners, and matched to the BIWPG group for language, age, and literacy skills.

The combination of face-to-face communication and written material was believed to have strengthened the impact of the NEP. Printed materials are less expensive and accessible to readers, but require literacy skills, and if used as a single channel, written material may be impersonal and less engaging, and can be confusing, boring, misunderstood and discarded. However, the combination of channels has the advantage of personal engagement with a backup of written material (Brown 2010:9). Simply handing out written materials to provide nutrition knowledge is not likely to change behaviour. Therefore educators have to modify educational strategies that have been proved to be effective in free-living adult populations, such as the health belief model or social learning theories (Silver & Wellman 2002:s53-4). Taking these factors into consideration, a combined strategy using both face-to-face interaction (lectures) and written material (booklet) was decided upon in the design of this NEP. Achtenberg concluded, from a study done in 1994 (1810S), “that print brochures are insufficient interventions to achieve substantial change” but that large-scale community-based interventions will require print materials at some point. Therefore, throughout the process, qualitative methods were used in tandem with quantitative methods as mixed-method research to minimize weaknesses inherent to the quantitative and qualitative paradigms respectively (Venkatesh *et al.* 2013). Dietary guidelines may be more or less universal, but the actual educational process and materials need to be tailored to specific target groups. The same principles were applied in this study.

#### 4.5.9.2 Development and pilot testing of lesson plans

The planning of the lessons was founded on SCT (section 2.3.1) to provide knowledge and self-efficacy to the participants. For decisions and actions to be maintained in the long term, a supportive physical and social environment is required, and was provided by churches in the community. The religious environment also addressed overlapping spheres of influence with home environments in which healthful foods could be consumed to reinforce the messages delivered (Contento 2008:53). The Sesotho culture is one of social cohesion with common values fostered by religion and their regular meetings, as well as their shared joy (good living conditions, being part of a family, emotional well-being) and shared hardships (poverty, physical handicaps, unemployment).

Active participatory methods in this study included prayer and scripture, songs and swaying/dancing at every session, asking participants' opinions and experiences, building a simple puzzle, sorting food items or pictures of food items, and a demonstration of ideas to utilise disposable milk bottles. Refreshments were adapted to specific food items included in the respective FBDGs.

Qualitative research, used in pilot testing the newly developed lesson plans in the form of group discussions, was used to obtain in-depth responses about the study participants' thoughts and feelings so as to gain insight into the perceived benefits of the programme (Gaede & Surujlal 2011). These results guided the design and development of the intervention materials, which were then confirmed and tested with additional qualitative research.

#### 4.5.9.3 Written NE material

The aim of pilot testing the NE material was twofold, namely:

- To establish if participants considered the draft material useful, easy to understand, relevant and acceptable; and
- To determine what improvements could be made to the material to make it more suitable, useful and acceptable to the intended audience.

The findings and recommendations of existing DOH NE material (section 4.4.9) were applied in the development of newly designed material. The two main elements of written material are discussed, namely the information or text provided and suitable illustrations to complement text and provide meaning.

While written NE material is often developed for middle-income populations that usually have high literacy levels, fewer interventions are developed for specific ethnic audiences with low literacy skills. Tailoring health education brings personalised health messages to members of an ethnic group (Strolla *et al.* 2005:466). Messages closely responding to the needs of the caregivers and based on the earlier assessment of their way of living (Chapter 3), were used to introduce participants to recommended food choices. Tailoring is associated with stronger behaviour change effects than generic health education, especially in NE interventions, while threat information seems to result in a loss in attention to the message (Kessels *et al.* 2011:32).

➤ **Text**

Certain elements as presented by Garner *et al.* (2012:283) were considered essential when developing written materials for this NEP:

- Readability (includes visual and language aspects and the meaning attributed to phrases in text)
- Comprehensibility (includes assessing the interaction of the reader with sentence structure, text, and the way the reader reads the text for understanding)
- Communication effectiveness (a function of the reader's expectations, understanding, and often intentions and behaviour, such as concern, relief).

The tailored NE material (Sesotho) was piloted for clarity (face validity) and readability (reliability) with lower-SES and low-literacy skills adult caregivers in Boipatong. Readability as measured by language aspects in the text and words used at the specific low literacy level of participants were observed during pilot-tested focus group discussions (see Tables 4.8; 4.9 & 4.10). Only minor changes were made to the draft translated text versions. Comprehensibility was also found to be good, as sentences were short and easy to read and comprehend. It was noticed that when a reader was requested to read the text aloud, she stopped after each sentence, giving herself time to comprehend what she read. Very little could be deduced from observations of communication effectiveness as intentions or concerns or relief. The caregivers were generally satisfied with the content of each lecture, indicating that they did not feel overloaded or received too little information.



### ➤ Illustrations

Realistic colour pictures were also the preferred option by a small margin for low-literate participants in this study, as was also found in an EFNEP study (Shilts *et al.* 2015:394). In contrast, participants in this study indicated little differences in their preference between pictures and drawings. Foods commonly consumed by the group as determined by the 24-hour recall and top 20 food lists were used in the situational analysis and tested with the target audience to be included in the educational material. A preference for the serving of meals was found to be in slightly 'bowled' plates with the starchy food forming the basis of the plate, with a little animal protein and vegetables stashed piled on top of the starch. Tested images were used to reinforce the messages of each FBDG.

Participants found it more difficult to interpret composite images and to deduce their meaning. Labels were accepted if they contributed to the understanding of the image, as in the case of the apple. Guidelines were compiled for the design and layout of the booklets and provided to the designer, where the individual pamphlets were adapted and compiled in an A4 booklet. The text was finalised before paying attention to images and layout. Images, drawings and pictures were pilot tested for each FBDG and subjected to evaluation by the experimental group during the formulation phase before being incorporated into the final booklet. The layout was done by the graphic designers at TUT's printers. The final products were printed in English and Sesotho (Annexure W1 and W2).

## 4.6. CONCLUSIONS

A definite need was identified for culturally acceptable NE in the caregivers' home language. This NEP supports the importance of NE to address food insecurity in low-income households to educate caregivers about food. Nutrition knowledge is a prerequisite to favourable behaviour change.

Constructed on the information obtained from the situational analysis and the testing of existing NE material, it was decided to use face-to-face communication as the channel of communication. The researcher presented lectures as oral presentations in English and a trained Sesotho-speaking caregiver translated the information into

Sesotho, to enable easier discussions. Lessons were guided by the written Sesotho NE material. Active participation in discussions and activities was encouraged.

New tailored lesson plans and NE materials were developed and tested for acceptability, relevance and meaning. The intervention package has the potential to increase the nutrition knowledge of caregivers and to motivate them to adopt healthy eating and a healthy lifestyle, thus reducing the risk of nutrition-related illnesses and healthcare costs, as well as influencing the household and the children of whom they are caregivers to follow them as role models.

The testing of existing NE material revealed several shortcomings in terms of layout and design. Although the information/text was readily accepted, images were often not understood and did not contribute to a comprehension of the FBDG. Therefore, the new booklets were designed and tested in English and translated into Sesotho.

The preparation and formative phase was used to shape the NEP to ensure the successful implementation of the NEP in Boipatong in the next phase. Chapter 5 focuses on the implementation of the NEP and the results obtained regarding short-term memory retention of nutrition knowledge in a pre and post-test design.

## **CHAPTER 5**

### **THE IMPLEMENTATION PHASE OF THE NEP**

#### **5.1. INTRODUCTION**

The implementation phase refers to activities that are part of delivering a programme or intervention (Youzafsai & Aboud 2014:33). One of the strategies for addressing the global pandemic of the co-existence of over- and undernutrition is a tailored NEP (Pekka *et al.* 2002; Gans *et al.* 2009). The wellness of a community could be improved by making them more aware of and sensitising them to good nutrition, health and hygiene practices through proper NE (Oldewage-Theron & Egal 2012:481).

In the formulation phase, the NEP was culturally adapted for four of the evidence-based South African FBDGs (2012). The NEP had as its objectives to increase knowledge and influence behaviour towards improved (a) dietary diversity, (b) animal, and (c) plant protein intake with (d) special emphasis on the importance of milk in the diet of caregivers, and to indirectly address the quality and type of fat intake.

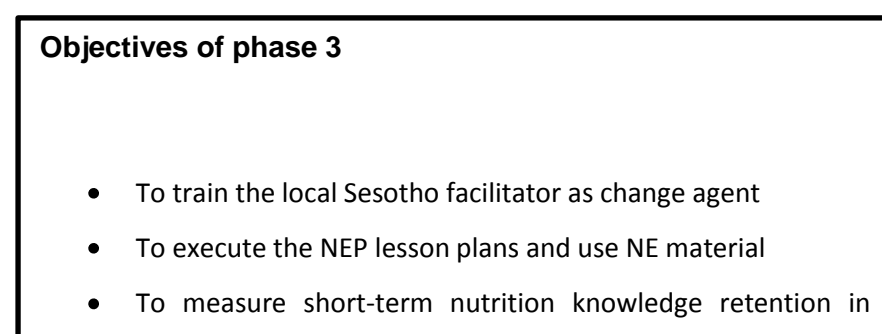
During the implementation phase, the NEP and NE material that had been developed and tested in Chapter 4 was applied. The goal of this section was to explore whether the developed and implemented NEP would be effective in improving the experimental group of caregivers' knowledge about nutrition in the short term. A goal of ten percent improvement in nutrition knowledge (change) was set for the short-term measurement in each independent session.

This chapter complies with the study objective 'to develop and implement an NEP based on the needs of child caregivers in the Boipatong District in the Vaal Region'. Lesson plans were designed and tailored (Chapter 4) to provide the NEP intervention based on four of the evidence-based South African FBDGs (2012). The NE material developed (Sesotho booklet) provided the core content of the lectures and was provided as a hand-out to reinforce messages afterwards. The results regarding short-term knowledge retention are presented as measure of performance by the NEP.

Social cognitive theory (SCT) provided the educational foundation for a better understanding of the multiple levels, factors and barriers that impact dietary behaviours in this study. Different levels of influences are conceptualised by the SCT: intrapersonal level (taste preferences, habits, and nutritional knowledge and skills); interpersonal level/social environment (processes whereby culture and traditions impact eating practices and patterns within peer groups, friends and family); and physical environment (environmental factors that affect food access and availability) to take charge of their lives in the face of barriers (Robinson 2008:398).

### **5.1.1. Framework and objectives for the implementation phase**

The short-term results of the effect of the intervention were measured by means of a pre- and post-test completed by the BIWPG caregivers at each session. Figure 5.1 shows the objectives set for this phase.



**Figure 5.1 NEP framework for the implementation phase (FAO 1997)**

This research project intervention included a combined strategy of interpersonal communication by means of face-to-face adult discussion groups, facilitated by lectures, within the social structures of church communities. SCT (Bandura 200:5-10) provides a theoretical explanation for the shaping of reciprocal patterns between personal and environmental factors. Facilitating face-to-face discussion groups is a type of personal communication that is adaptive, engaging, correctable, more effective than print materials, but expensive, with limited access and extremely tight time constraints. Hearing and speaking problems in elderly people can impair communication. In this project, these barriers were overcome by providing supportive written NE materials, translated into Sesotho.

### **5.1.2. Protocol of the NEP**

The protocol of the NEP was established for the purpose of this study as:

- Utilising the four South African FBDGs (2012) to improve nutrition knowledge and influence change in behaviour in terms of eating patterns to improve diet quality by making healthy food choices.
- In line with the thinking of FBDGs around the globe, the NEP had to focus on foods and not on nutrients.
- Utilising the newly developed supportive NE material (booklet) for low- literate, low-SES Sesotho caregivers to reinforce messages (Chapter 4.5.3).
- The development of the NEP would be based on SCT and the logic model as described by Contento (2011:59-60) to guide the process.

## **5.2. RESEARCH DESIGN**

Experimental epidemiology usually involves the study of a preventative intervention (Ehrlich & Joubert 2014:91). A non-randomised control trial (NRCT) was undertaken in the implementation and evaluation phases. During the implementation phase, a change in only one variable, nutrition knowledge, was measured in the short term. Because of the involvement of the BIWPG in the development of the NEP, this study was viewed as a pilot towards testing its effectiveness, and randomisation was therefore difficult. Quantitative methods to test short-term knowledge retention in a pre-post-test design was used in the experimental group by means of descriptive statistics and paired t-tests.

In complex, naturally occurring healthcare situations, it is often difficult, for practical reasons, to meet the requirements of control needed in true and ideal group experiments (UNICEF 2014; Johnston *et al.* 1995:383-4). A control group from the BIWPG was not practical, as participants could not be deterred from attending the prayer meetings since discussions formed an integral part of the prayer meeting. Construct validity was restricted to a change in nutrition knowledge alone in a paired t-test situation. Internal validity is thus restricted to the specific group without generisability (UNICEF 2014). Non-randomised controlled trails are often used in community settings where it is difficult to assign specific groups to the intervention or control. Examples include Kain *et al.* (2004), in preventing and reducing obesity in

low SES schools, de Meij *et al.* (2011) in physical activity education and exercise sessions, and Herrick *et al.* (2012) in six schools in a low-income population to increase physical activity.

In the longer term a control sample, consisting of caregivers employed in ECD crèches in Soshanguve was recruited for comparison purposes. Participants were matched for age, language, low SES and low literacy skills to control confounding factors or variables not intentionally being studied.. No measurements were done in the control group in the short-term evaluation, as they were not subjected to any intervention (Ehrlich & Joubert 2014:91).

The longer-term evaluation where a before-intervention testing of nutrition knowledge and dietary intake was done and repeated three months after completion of the intervention (after intervention) will be reported in Chapter 6. In this instance a control group closely matching the caregiver participants was used for evaluating changes in nutrition knowledge. Both the intervention and control group were followed up through time and the outcome in each compared to determine efficacy. It is advisable to have a control group even if there is no intervention (Ehrlich & Joubert 2014:20, 96).

Table 5.1 provides an overview of activities undertaken in the implementation phase, research tools and why they were used, the type of research and sample sizes. Before embarking on the intervention, baseline data was obtained from the BIWPG experimental group regarding nutrition knowledge, covering the complete programme, as well as dietary intake. In the control group, only their current nutrition knowledge was measured by means of the same NKQ used for the experimental group.

**Table 5.1 Extract from Table 1.1 indicating the activities, research participants, research tools and why they were used, as well as the sample sizes of the implementation phase of the NEP**

Activities	Research participants	Research Tool	Used to identify:	Type of research	Sample size
<b>Chapter 5 Implementation phase</b>					
<b>Obtain data (baseline) for longer-term evaluation</b>	Experimental group (January 2012) BIWPG caregivers + Control group Caregivers of Soshanguve from ECD crèches	Longer-term NKQ (Addendum M): 50 questions;	Provide baseline data to compare with after-intervention data (Chapter 6)	Quantitative	Experimental n= 47 control n= 23
			Provide baseline data to compare with after-intervention data	Quantitative	
<b>Implementation of NEP</b>	Experimental group (January 2012)	Food intake ○ 24-h recall x3	Measure change in nutrition knowledge about the specific FBDG at each session		n=38
	Experimental group (March-June 2012)	Implementation of lesson plans and NE material  NKQs: • Variety: Annexure L1 (22 questions) • Plant protein: Annexure L2 (15 questions) • Animal protein: Annexure L3 (33 questions)	Time series: short-term change in nutrition knowledge per FBDG implemented and tested at the one- day-a-month prayer meetings	Quantitative: Pre- and post-test design	n=45 (variety)  n=54 (plant protein) n=46 (animal protein)
	Researcher, facilitator and fieldworker		Observations on reaction of caregivers	Qualitative	
		Field notes			

### 5.2.1. Study design

The study design of the implementation phase was of a quantitative nature to measure changes in nutrition knowledge before and after each discussion session in the experimental group. A summary of the different intervention sessions is provided in Table 5.2, indicating dropout rate, and number of questions posed in each NKQ

**Table 5.2 Summary of NEP intervention sessions, number of caregivers attending the prayer meeting, dropout rate and number of questions of each NKQ**

Variable	Sessions	Number of trainees attending	Number completing pre- & post-test	Dropout	Number of questions posed
Number of implementation sessions	3 x 1.5hrs				
<b><u>Formal training sessions</u></b>					
▪ Enjoy a variety of food		52	45	7(13.5%)	22 Annexure L1
▪ Eat dry beans, peas lentils and soya regularly		54	54	0 (0.0%)	15 Annexure L2
▪ Chicken, fish, meat, milk and eggs could be eaten every day		51	46	5(9.8%)	33 AnnexureL3

### 5.2.2. Study area

Before the implementation of the NEP, the researcher organised a feedback meeting with the executive committee of the BIWPG to thank them for their cooperation thus far. The continuation of the project was also discussed. A formal request was also forwarded to seek permission from the pastors, priests and reverends of the Interdenominational Church Group to implement the NEP at the BIWPG monthly meetings. The same database (184 participants from the BIWPG) was applied as was applied for the testing of existing NE material in Chapter 4.

### 5.2.3. Sampling strategy

Purposive sampling with a quantitative approach was used with the same criteria as those set in the formulation phase, namely that a participant had to be a member of the BIWPG, a female child caregiver, older than 40 years, had to be from a low-SES household, and had to have low literacy skills.



Prayer groups were held on a rotational basis at the different churches. Irregular attendance by the caregivers was mainly due to transport problems or walking distance from a specific church, and weather conditions.

#### **5.2.4. Sample size**

During the implementation phase the sample size varied between 40 and 60 women attending the BIWPG from the same database of 184 caregivers that was used in Chapter 4 for evaluating the existing NE material. As the study population had already been restricted to the 184 database and the usual attendance of prayer meeting was between 40 and 60 participants, there was no need for sampling (Ehrlich and Joubert 2014:107).

In order to verify a sample size required, a sample calculator for before and after intervention studies delivered a required sample size of 49 (where Alpha was 0.05, the standard normal deviate for  $\alpha = Z\alpha = 1.96$ ; the standard normal deviate for  $\beta = Z\beta = 1.645$  with Beta=0.02, size effect=0.8 and change in SD=2.) (Gibson 2006:6; Rosner 1995; Sample size study paired t-test calculator). The size of the actual samples at each NE session is indicated in Table 5.1.

#### **5.2.5. Methodology**

A pre-post methodology was followed to measure the short-term impact on the nutrition knowledge of the participants at each meeting. A quantitative NKQ, based on the specific FBDG discussed, was used to evaluate knowledge retention (Annexures L1, L2 and L3). The quantitative paradigm places emphasis on variables and on analysing human behaviour (Babbie & Mouton, 2001:49).

In the longer term, an NKQ (Annexure M) that covered the content of the four FBDGs included in the NEP was administered before and after the intervention to the experimental and the control group during the same week in January 2012 and September 2012 (Annexure M). Also, 24-hour recalls were undertaken with the experimental group in January and September 2012. These results are presented in Chapter 6 as part of the longer-term evaluation of the NEP.

A number of studies used a pre-post-test methodology. In a study of 13 countries consisting of two curricula, 'Eat smart, stay well' and 'Eating well on a budget'

delivered to limited-resource older adults, each curriculum consisted of sessions once a week for five weeks in a pre-post-test design study (McClelland *et al.*, 2013:2). Hendrix (2008) also used a pre-post design convenience sample, testing the effect of an NEP (eight sessions) to increase fruit and vegetable consumption at senior centres in Georgia. Panter-Brick *et al.* (2006) reported an intervention on all villagers, (intervention only, with no control group) in two villages with an immediate pre-post-test and a one-month follow-up. All of these studies focused on a significant improvement in health outcome, including knowledge.

In this NEP, each session was started with a brief scripture reading, song and prayer, and closed with song and prayer. The basic structure of the lesson plans was to start with an introduction to gain attention (5 minutes), followed by a feedback of the previous sessions and completion of the pre-test questionnaire (15 minutes). The main part was dedicated to a 20-minute discussion/translation. A question-and-answer session followed each of the topics (5 minutes). This was followed by participatory activity (10 minutes) and a post-test and closure (15 minutes). Refreshments reinforcing the FBDG message were provided after the prayer gathering (see Lesson Plans: Annexures S1-4).

Records were also kept as qualitative data of observations during each discussion session to gain a deeper insight into the attitudes and behaviours of participants (see Annexure V for an example).

#### **5.2.6. Measuring instruments**

A trend to utilise short questionnaires is reported by Spillman *et al.* (2011:617). This study utilised three short quantitative questionnaires; one based on each of the FBDGs respectively in the pre-post-test design (Annexures L1-3). These quantitative measurement instruments were extracted from the comprehensive questionnaire designed and validated and showing high internal reliability by Whati *et al.* (2005), as used in this study's baseline survey.

##### **5.2.6.1. Quantitative measuring instruments**

Questions applicable to the three FBDGs in this NEP were used as in the validated questionnaire (Whati) that was used in the situational analysis (Annexure I). Multiple-choice questions were simplified, as the caregivers found them difficult to answer. A

pre- and post-test NKQ was compiled of the applicable questions (Annexure M) for the longer term evaluation of the NEP, and consisted of 50 questions. This NKQ was administered before delivery of the NEP sessions started (January 2012) to both the experimental and control groups. The same questionnaire (Annexure M) was re-administered three months after delivery (September 2012) to both groups. The results will be reported in Chapter 6 as part of the longer-term evaluation phase.

The questions in Annexure M were sorted into three NKQs for the short-term evaluation to be used in the implementation phase. These three NKQs are presented in Annexure L1 (22 questions), L2 (15 questions) and L3 (33 questions). As detected in the pilot studies, multiple-choice questions posed challenges to caregivers with low literacy skills. The format of the questionnaires was therefore changed to individual questions with true and false options. The questionnaires were validated by ten VUT students completing the questionnaires over a period of three weeks.

Most of the participants preferred to complete the questionnaires themselves, as most could read and write. Those who experienced difficulties were assisted by the fieldworker, who explained what was expected of them.

#### **5.2.6.2. Qualitative instruments**

*Observation Checklist:* An observation checklist was used in the implementation phase. Records were kept as qualitative data of observations during discussion sessions to gain a deeper insight into the attitudes and behaviours of the participants. Also, perceptions regarding illustrations were tested for suitability and understanding for inclusion in the NE booklet in a quantitative manner to evaluate understanding and interpretation by Sesotho caregivers. The Department of Visual Arts and Design at VUT (Prof RJ Gaede) played a central role in training fieldworkers in these testing events.

#### **5.2.7. *Training of fieldworkers***

Postgraduate students from VUT's Department of Hospitality, Tourism and PR Management were recruited and trained as fieldworkers by senior researchers of the VUT(CSL). The same procedure as the procedure for the training of fieldworkers was used in the situational analysis (chapter 3). The fieldworkers were given a course on how to complete questionnaires with the caregivers and how to assist

caregivers with low levels of education and nutrition literacy in answering the questions.

The same fieldworkers were also trained to collect data for the testing of illustrations to be used in the booklet by the Department of Arts and Visual Design (Prof RJ Gaede). A guideline (Annexure P) was provided to each fieldworker.

#### ***5.2.8. Training the Sesotho-speaking discussion session facilitator***

The facilitator for the discussion sessions was recruited from the participants and was one of the Executive Committee members, with considerable influence in the group and who enjoyed their respect. She was a former teacher with a post-matric qualification. She was also the liaison person with the ministers. A week before the session was to take place, she was provided with the pamphlet and the lesson plan. The researcher had a 30-minute telephonic discussion about the content of the next lesson with her, because of the distance between the researcher and the facilitator. The facilitator translated the content into Sotho sentence by sentence as the researcher explained the FBDG and the pamphlet.

Two fieldworkers, Sesotho-speaking B Tech students, were recruited and trained to assist the researcher during each session.

#### ***5.2.9. Data processing***

Only the small number of participants could not read and write well enough to complete the questionnaires were helped. Descriptive statistics were calculated for all variables. Data was captured on Excel spreadsheets. The Statistical Package for Social Sciences (SPSS) Version 21 was used to analyse the data. Frequencies were used to determine the number of questions answered correctly in each session and paired t-tests were performed to test statistical significance. Descriptive statistics were also calculated to determine mean percentages scored in pre- and post-tests to measure the degree of change (UNICEF 2014). To analyse the short-term pre- and post-tests in the experimental BIWPG group, paired t-tests were used.

### **5.3. RESULTS**

Quantitative data on the pre- and post-test delivered the performance results shown in Table 5.3 of short-term knowledge retention in the Boipatong caregivers. As the

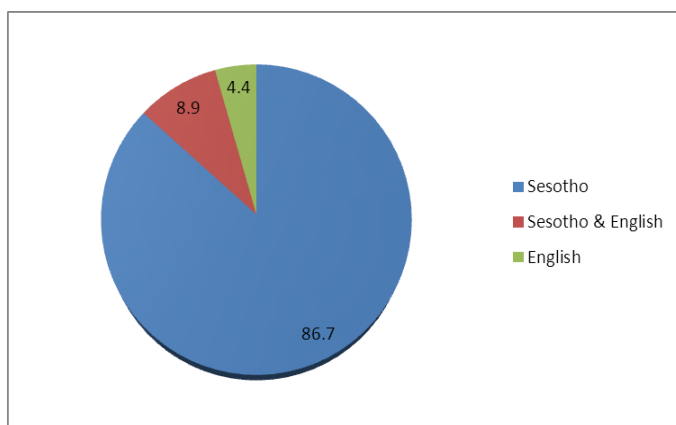
distributions on nutrition knowledge were tested and found to be normal, data were analysed for means and standard deviations (SDs).

**Table 5.3 Short-term results of change in nutrition knowledge between pre- and post-tests in each of the FBDGs by the experimental sample of Boipatong caregivers**

FBDG	Number of questions	Pre-test: Mean number of questions correct [A]	SD Pre-test	Post-test : Mean number of questions correct [B]	SD Post-test	Significance: Paired t-tests	Change [C] = A-B	Percentage change [D] = C/A*100
Variety (n=45)	22	10.8	1.9	12.6	1.5	p<0.001	1.8	16.6%
Plant protein (n=54)	15	8.8	1.1	11.5	1.9	p<0.001	2.7	30.6%
Animal protein (n=46)	33	17.5	3.2	20.4	3.7	p<0.001	2.8	16.0%

There was a significant difference between the pre- and post-test at every session ( $p<0.001$ ), indicating a successful performance (Table 5.3). The goal of ten percent change (increase) in nutrition knowledge was reached for each of the FBDGs. The percentage change in knowledge increase for plant protein was the largest, namely 30.6 percent, followed by variety (16.6%) and animal protein (16.0%).

During the first discussion session of the implementation phase an additional question was asked to verify how Sesotho caregivers experienced the opportunity to read NE information in their home language. The findings obtained on the same day as 'Enjoy a variety of foods' indicated that the majority of women were in favour of Sesotho NE material (86.7%), while 8.9 percent indicated that the booklet should be in Sesotho as well as in English. Only two percent preferred it to be in English only. The majority was very appreciative of the fact that they could read nutrition facts in their home language, and indicated that they understood the message much better. This was supported by the increase in knowledge that showed an overall trend of improved knowledge in the post-test compared to the pre-test.



**Figure 5.2 Caregivers' choice of preferred language of NE material**

Formative research should determine whether the intended audience understands the messages, whether the lesson design is sequentially logic and interesting to the audience, and whether it can be delivered within the allotted time (Contento 2011:322). Formative evaluation in the NEP was continually used to develop or improve ongoing educational sessions.

### **5.3.1. Intervention: 'Enjoy a variety of foods'**

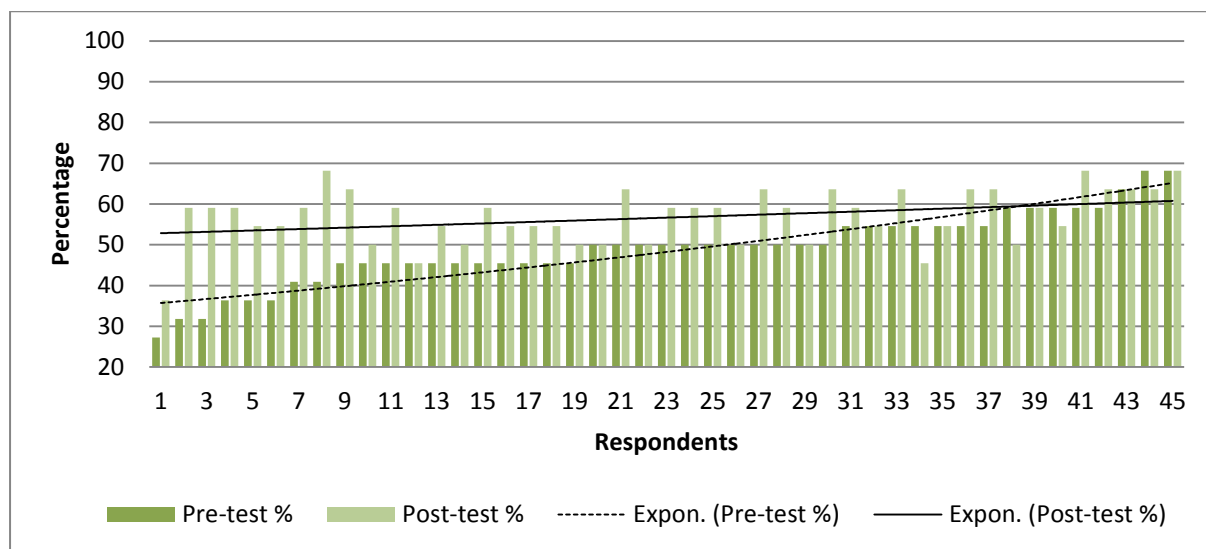
Lesson plans were executed as planned. The prayer meeting was opened with scripture, song and prayer. Before the oral presentation was presented the caregivers were requested to complete the pre-test for this session (Annexure L1) Fifty-two caregivers attended the meeting, but only 45 participants completed both the pre- and post-tests that could be utilised for paired t-tests in the data analysis. The reason for the drop-out (13.5%) was that four caregivers had to leave earlier to fetch children from school and three answer sheets were spoilt. The total number of 22 questions answered correctly in the NKQ before and after the discussion was recorded.

After the attention-gaining exercise had been performed, the lesson (Annexure S1) on the meaning of 'Enjoy a variety of food' was taught, and barriers, as well as how to overcome barriers, were discussed. Refreshments were served.

The number of questions that were answered correctly in the NKQ on variety (Annexure L1) before the discussion session (pre-test) was compared to the number of questions answered correctly after the session (post-test) by using a paired samples t-test Table 5.3). The t-test revealed a significant difference between the

mean number of correctly answered questions pre- and post-discussions ( $p < .001$ ). On average, the respondents tended towards being able to answer more questions correctly after having been exposed to the information (mean=12.6, SD=1.5) than before (mean=10.8, SD=1.9).

Figure 5.3 demonstrates that there was a difference in the knowledge patterns of Boipatong caregivers before and after the group decisions. Most participants tended to having more questions correct after the discussion, which is supported by the relatively low SDs of 1.5 in the pre-test and 1.9 in the post-test. The median in the pre-test (50%; IQR 44-55%) increased to median 59 percent (IQR 50-60%) in the post-test.



**Figure 5.3 Short-term performance per respondent: Number of questions answered correctly in the pre and post-test for food variety (n=45)**

The participants could answer more questions correctly after they had attended the discussion session, as the post-test results are mostly higher than the pre-test results for each participant, indicating a relatively consistent trend. This finding is confirmed by the trend line of the post-test above that of the pre-test. Fong & Lam (2010) stated that inconsistent responses occur when respondents complete a questionnaire without comprehending the items, typically in self-reported questionnaires or when the participants are unmotivated or the questions sensitive. It therefore also appears as if the questions were understood well.

Interactive activity: Trainees were grouped into five smaller groups after the discussion session. Each group was provided with a 'plate puzzle' of food groups, developed by CSL at VUT. The basis (plate) consisted of a tray indicating the different food groups in different colours. Puzzle pieces containing different foods for each food group were to be fitted into the tray. Figure 5.4 shows one of the groups' completed plates, while Figure 5.5 shows a group busy fitting the plate.



***Figure 5.4 Example of a plate puzzle fitted by one group***

All groups were able to complete the plate puzzle within five minutes. Each participant was given a fridge magnet (Annexure T) to remind them at home of the project and to create interest in the other members of the household.



***Figure 5.5 One group of trainees busy fitting the pieces into the puzzle***

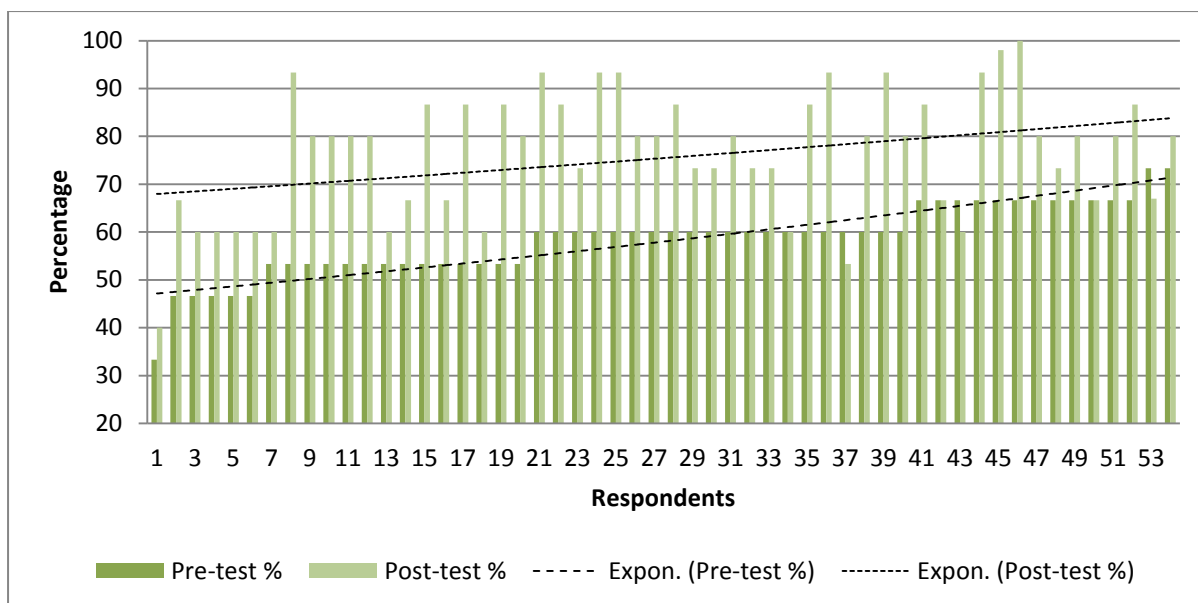


### **5.3.2. Intervention ‘Eat dry beans, peas, lentils and soya regularly’**

Interest in the project increased as 61 trainees attended this session. However, four arrived too late to complete the pre-test and three caregivers had to leave earlier. A drop-out of seven caregivers (11.5%) was thus experienced. Fifty-four participants answered the same 15 questions in the NKQ (Annexure L2) in the pre and post-tests. The number of questions answered correctly by each participant was recorded. After the scripture, song and prayer the lesson plan (Annexure S2) was executed. Participants were shown different examples of foods belonging to this group. After the discussions bean soup that had been kept hot in a hay box was served. The trainees were each given recipe cards for making the soup at home (Annexure U). The trainees showed great interest in how to assemble a hay box and realised that it was a practical idea that they could use to keep food hot at church events.

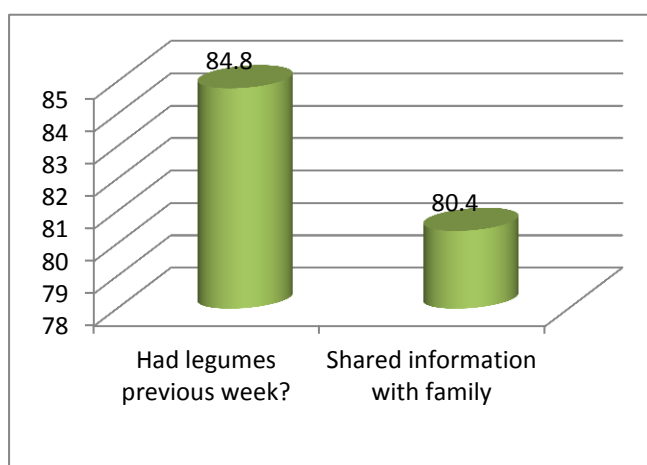
The number of questions that were answered correctly in the pre-test was compared to the number of questions answered correctly in the post-test by using a paired samples t-test (Table 5.3). The paired t-test revealed a significant difference ( $p < 0.001$ ) between the mean numbers of questions answered correctly before and after the group session, indicating an increase in nutrition knowledge about legumes. On average, the participants tended towards being able to answer more questions correctly after having been exposed to the NEP session with a mean=11.5 (SD=1.9) than before the discussion session with a mean=8.8 (SD=1.1). The results indicated that there was an increase in the mean pre- and post-test of 30.6 percentage points.

It is clear that the respondents, with a few exceptions, could answer more questions correctly after the discussion session (Figure 5.6). The median percentage for the pre-test was 61 percent (IQR 53-66%) and the median for the post-test increased to 80 percent (IQR 67-87%)



**Figure 5.6 Short-term performance per respondent: Number of questions answered correctly in the pre and post-test for plant protein (n=54)**

Two questions were added to the questionnaire in the following sessions to explore whether the intervention had effected short-term lifestyle changes regarding plant protein (legume) intake (Figure 5.7). It was heartening to learn that the consumption of legumes had been high (84.8%) in the previous week, which could perhaps indicate a step in the right direction. It was just as positive that most of the respondents (80.4%) had shared the information from the NEP with family members. However, this was too soon to indicate sustainable changes.



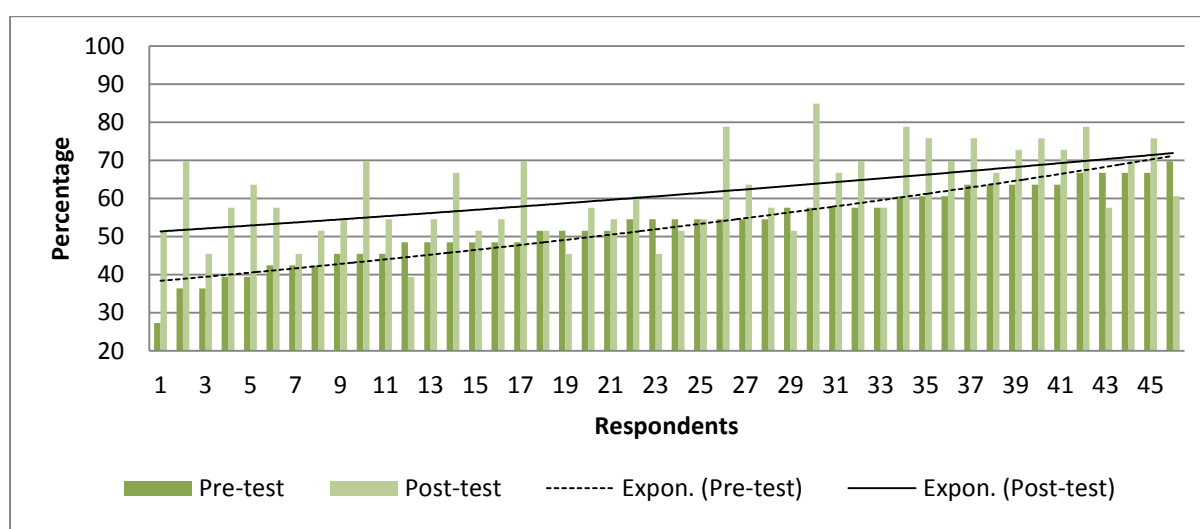
**Figure 5.7 Self-reported behaviours by caregivers regarding the intake of plant protein**

### 5.3.3. Intervention ‘Fish, chicken, lean meat eggs and milk can be eaten daily’

In this session, participants learned about the value of animal proteins and what food products are included. A discussion followed on barriers and how to overcome them (Annexure S3 and S4). The total number of caregivers attending the session on a cold day in May 2012 decreased to 49 caregivers, three (6%) of whom dropped out, either arriving late or having to leave earlier. Forty-six participants completed the 33 pre- and post-test questions of the NKQ (Annexure L3).

The number of questions that were answered correctly in the pre-test was compared to the number of questions answered correctly after the session (post-test) by using a paired samples t-test (Table 5.3). The t-test revealed a significant difference between the mean number of questions answered correctly before and after the discussion ( $p < 0.001$ ). On average, the participants tended towards being able to answer more questions correctly in the post-test (mean=20.4, SD=3.7) than in the pre-test (mean=17.5, SD=3.2).

There was a difference between the knowledge patterns in the pre- and post-test as depicted in Figure 5.8. The general trend was that most of the respondents could answer more questions correctly after the discussion. Improved nutrition knowledge is portrayed by the trend line for the post-test that lies above that of the pre-test. The median for the pre-test was 55 percent (IQR 48-61%) and the post-test median was 60 percent (IQR 55-70%).

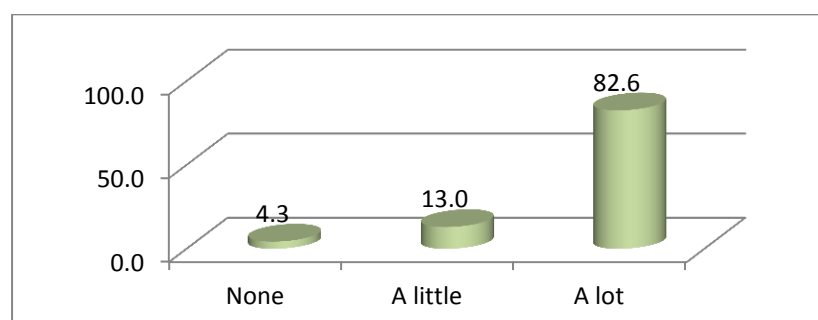


**Figure 5.8 Short-term performance per respondent: Number of questions answered correctly in the pre and post-test for animal protein (n=46)**

The activity at this session required groups of participants to sort pictures of plant and animal fat separately to sensitise them about saturated (unhealthy fats) and unsaturated fats (healthy fats) contained in food items, as well as in preparation methods. It was observed that caregivers' comprehension of different kinds of fats was insufficient, as was evident from vigorous debates within the groups. This activity took longer than expected to complete. A baked chicken and rice dish was served as refreshment, and the recipe was handed out on recipe cards (Annexure U).

Although the animal protein included milk products in one FBDG at the time of the implementation, the importance of milk, maas and yoghurt was pointed out to the caregivers. The booklet was adapted and split into two FBDGs as soon as the DOH accepted the 2012 version as the new FBDGs for SA.

At the last session of the intervention phase, the caregivers were asked if they were of the opinion that they had benefitted from the NEP. Their answers are indicated in Figure 5.9.



***Figure 5.9 Results of perceptions of caregivers about how much they learned from the discussions***

Most of the caregivers (83%) stated that they learned 'a lot' from the group discussions, followed by 13 percent who were of the opinion that they learned a little about nutrition, and four percent who stated that they learned nothing.

## **5.4. DISCUSSION**

This short-term study supports NE as a strategy to increase the nutrition knowledge of caregivers by using lectures (oral discussions) combined with supportive written NE material. The results of the NEP showed significantly positive results with an

overall improvement on the mean of 21.1 percent increase in nutrition knowledge in the experimental Boipatong caregivers group. There was a significant improvement ( $p < 0.001$ ) in pre- and post-test nutrition knowledge in each of the discussion sessions, providing evidence that the strategy to mix face-to-face communication and written NE material in the participants' home language in this low-SES community was successful. Questions in the short-term NKQs were formulated to include current eating habits, moving from traditional cultural eating habits to a westernised dietary pattern (Steyn *et al.*, 2006:200-206), as noticed in the situational analysis (Chapter 3). Contento (2008:331) also recognised the importance of NE interventions that focused on social and community-related practices and used appropriate theory and research evidence for designing interventions.

It is also noteworthy to emphasise that the implementation of this intervention could not be diverted from the participatory process of assessing the situation in the preparation and formulation phase (Chapters 3 and 4), as one phase informed the other. The implementation process refers to activities carried out as part of delivering a programme or evidence-based intervention (Yousafzai & Aboud 2014:33). The NEP was designed and tailored to the Sesotho culture of the Boipatong District to specifically address the underlying challenge of inadequate nutrition knowledge of caregivers (UNICEF model), with the aim to combat malnutrition.

The South African FBDGs could therefore be used successfully in the NEP in the short term to improve knowledge, as indicated by the results obtained in the present study. Messages were flexible enough to allow for tailoring to fit the profile of the low socio-economic Sesotho-speaking Boipatong caregivers belonging to the BIWPG.

NE lesson plans and NE material were tailored for the Boipatong project. The messages and illustrations contained in the lesson plans were fitted to the life context of the target audience and to address their needs and interests. In a systematic review of studies to summarise the effectiveness of tailoring messages for adults, NE was found to be a well-suited method for improving dietary intakes (Eyles & Mhurchu 2009:464). In addition, a supportive environment must be provided that persuades individuals and communities to make positive health behaviour changes (Briscoe & Aboud 2012:612).

An evaluation of the implementation process could contribute to providing guidelines for programme developers and scaling up future programmes in order to enhance their effectiveness (Yousafzai & Aboud 2014:34). A comparison with techniques identified by Briscoe & Aboud (2012:615) as being effective in promoting health behaviour change deliver the elements stated below, which were included in this research project. *Informational techniques* ('what and why') in each lesson plan included some information about the foods involved and sources of health problem rather than consequences; *performance-based techniques* ('how') and *material* included tasting dishes (dry bean soup in the legume lesson plan and chicken and fish in the animal protein one) supported by recipe hand-outs. The making and use of a hay-box was also demonstrated. *Problem-solving techniques* included discussions about barriers and solutions in each lesson plan and building a puzzle where they had to manipulate materials to demonstrate their understanding of variety. *Social and emotional support* was provided by peer members of the BIWPG. *Authority support* of the executive committee and the facilitator provided weight to the message as being accepted by influential people. *Media or channel of communication* occurred by means of group discussions to provide companionship and brought caregivers together to repeat messages in different forms with more personal and cultural meaning. Therefore, the use of multiple techniques contributed to active learning and recall in the short term. SCT was accepted for this theory-based NE intervention. These techniques underscore SCT, as individuals need the knowledge and cognitive, affective and behavioural skills that will enable them to reach their goals (self-efficacy and outcome expectancy) (Engler 1979:224; Bandura 2001:5-10).

When evaluating programme intensity in group sessions, Yousafzai & Aboud (2014:34) reported frequency to vary between six sessions in six weeks to monthly sessions over 33 months. The duration per session was usually one to two hours. This NEP consisted of three monthly sessions of one and a half hour, excluding the initial contact session and surveys for evaluating the longer-term knowledge retention before and after programme implementation (see Chapter 6). The monthly sessions were the most suitable for the caregivers, as they coincided with their regular prayer meetings. When sessions lasted longer than the one and a half hours, drop-out figures rose because caregivers had other responsibilities, such as fetching

children from school, as happened in the variety FBDG session. It lasted for two hours and a drop-out rate of 13.5 percent was experienced. This is in comparison to the 11.5 percent drop-out at the legumes FBDG session caused by late arrivals and caregivers who had to leave earlier. The drop-out decreased to six percent in the animal protein discussion session as the caregivers adjusted to the situation. Both the latter sessions were completed within one and a half hours.

The self-reported evaluation of caregivers indicated that they enjoyed the group sessions, as 82.5 percent indicated that they 'learned a lot' about nutrition, as indicated in Figure 5.9. Initially the caregivers were shy, and barriers such as race, level of literacy skill and socio-economic status had to be overcome. The adult learners were afraid of asking questions and scared of being embarrassed, which resulted in only a few of them participating in discussions at the start of the programme. Also, at the first meeting, participants were divided into smaller groups and each group was provided with a tray of different foods. They were asked to group similar items together. Caregivers grappled with this request as they had no idea about foods belonging to a group, for example, the vegetable and fruit group, or animal protein group. It took patience and the assistance of the research team (researcher, facilitator and fieldworkers) before this concept was grasped. Trust had to be built by giving attention to small cues such as a gesture, individual attitudes, encouraging questions and giving attention to every remark or comment to make information personally relevant. The Sesotho-speaking facilitator played a major role in this. Once this fear was overcome, participants contributed freely and made suggestions about the content and wording of the text from a cultural perspective that was incorporated into the final revision of the NE material.

Printed NE material serves the purpose of reinforcing the oral education and has the benefit of reinforcement during the lecture and referral afterwards (Viteri 2006). The caregivers valued the booklet, as was determined in the quantitative survey (Figure 5.2) in a preliminary short-term survey. In summary, after testing language preference and format and illustration elicitation, the booklet was finalised in an A4 format, in an English (Annexure Y) and a Sesotho version (Annexure Z). Accepted colour pictures and black-and-white illustrations were utilised and the booklets were used as supporting NE material in the lesson plans (Annexure S1-4), as determined in Chapter 4.

Although the NEP implemented was a short-term intervention concentrating on four FBDGs only, many NEPs are of a short duration. One example is a NEP consisting of two curricula and delivered in 13 countries to limited-resource older adults. Each curriculum consisted of once-a-week sessions for five weeks with a pre-post-test design (McClelland *et al.*, 2013:2). Hendrix (2008) also used a pre-post design convenience sample, testing the effect of an NEP (eight sessions) to increase fruit and vegetable consumption at senior centres in Georgia, with a 21 percent increase in intake behaviour. Similarly, a short-term NEP consisting of seven lessons delivered to children (9-11 years old) on healthy eating and food safety in a six to eight week intervention was reported by Townsend *et al.* (2006).

Programme implementation often does not fully match the intended or planned programme for a variety of reasons. For example, the complete programme may not be delivered fully, or the reach of the programme may be more limited than intended (Yosafzai & Aboud 2014:33). In this study, fewer people than anticipated attended the different prayer meetings. This can mainly be ascribed to walking distance, individual physical conditions, transport problems, or weather conditions.

Ahe community's continuous participation is essential in the development of an NEP (Strolla *et al.* 2005:474). It was critical to the acceptance and success of the programme to ask the support of the women's' prayer group community to participate in defining problems and helping to develop corresponding solutions

## **5.5. CONCLUSION**

The preparation and formative phases of the NEP were ongoing, providing input to the implementation phase, while implementation gave feedback to the preparation and formative phases of the NE programme for revision of lesson plans and NE material to permit improvements to the programme while the activities were in progress. The activities of the implementation and evaluation phases were also interwoven, validating the complex nature of designing, implementing and evaluating an NEP, as it is not always a linear process.

After caregivers had been exposed to the NEP information, cognitive knowledge was gained in the short term in the present study, as was demonstrated by the statistically significant ( $p < 0.001$ ) results obtained in the individual initial pre- and



post-tests of this phase of the NEP. Changes in attitude and behaviour were not measured, as they are more difficult and take longer to effect. Psychosocial beliefs about health and food intake (influenced by personal preferences and cultural and social beliefs) takes longer for an individual or household to adjust to and become integrated as lifestyle changes when swayed by knowledge.

The booklet developed as NE material to support the NEP was tested during the intervention and finalised thereafter, based on the results and findings in this chapter.

The final step in the development process of the NEP is the evaluation of its impact in terms of nutrition knowledge and dietary intake in the medium term (three months after the intervention). The next chapter will present results and findings of the impact of the NEP at Boipatong in the longer term.

# CHAPTER 6

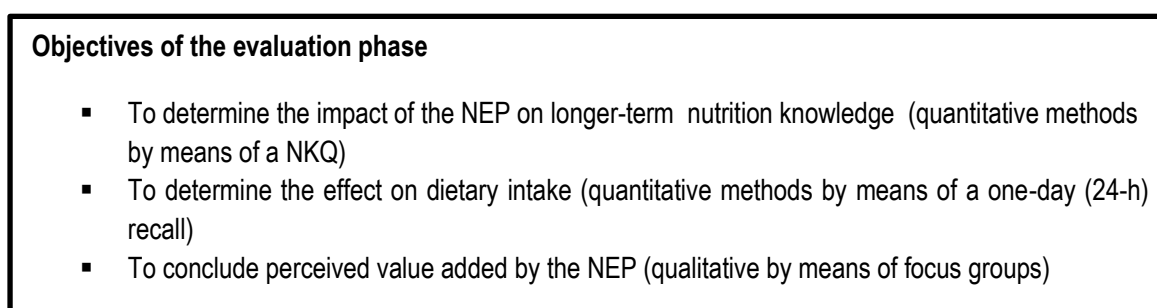
## A LONGER-TERM EVALUATION OF THE IMPACT OF THE NEP

### 6.1. INTRODUCTION

A summative evaluation of the impact of the NEP was performed in this phase in the Boipatong experimental group as well as in the Soshanguve control group with regard to nutrition knowledge in the longer term. Contento (2011:320) states that evaluation is a central component of an NEP in order to measure the value of the programme. Evaluation is a valuable tool for both research and programme purposes. In the research process, evaluation investigates the impact or effect of the programme. Such insight can inform evidence-based theory to further improve the effectiveness of the NE. The goal of this study was to detect a difference between pre- and post-test scores of ten percentage points with a five percent level of significance, and to compare the results with those of a delayed control group.

#### ***6.1.1. Framework and objectives for the evaluation phase***

The goal of the implementation evaluation was to assess whether the intervention could be implemented as intended, to determine what impact the intervention had on participant nutrition knowledge of the four FBDGs, and to determine if there was any change in dietary intake. Figure 6.1 provides a framework for activities planned and executed in the evaluation process. These activities include the longer-term change in nutrition knowledge of the caregivers, and changes in the behaviour and perceptions of participants regarding the value of the NEP.



***Figure 6.1 NEP Framework for the evaluation phase (FAO 1997)***

### **6.1.2. Objectives of the evaluation phase**

Evaluation in this setting was focused on whether the intervention achieved its stated goals, namely:

- to measure if the NEP and NE material led to a change in nutrition knowledge and content in the experimental group, compared to the control group as measured by means of an NKQ applied before and after the intervention (Annexure M);
- to measure any changes in the nutrition knowledge of the control group for purposes of comparison by means of an NKQ applied in January and September; the control group was not subjected to the intervention (Annexure M);
- to measure the change in the dietary intake of the caregivers in the experimental group by means of a 24-hour recall before and after the intervention (Annexure G), as reflected in the nutrient analysis and top 20 foods consumed; and
- to summarise the lessons learned.

## **6.2. RESEARCH DESIGN**

This phase of the study dealt with assessment and analysis. The evaluation phase, similar to the implementation phase, was marked by a mixed-method experimental design, using quantitative methods to test longer-term knowledge retention in a before-intervention and an after-intervention setting in both the experimental group (Boipatong caregivers) and the Soshanguve control group with no intervention. Qualitative methods were used to evaluate caregivers' perceptions about the NEP and NE material. Both qualitative and quantitative methods may be used to perform an evaluation (Levine *et al.* 2002), as was done in this study.

An extract from Table 1.2 (Chapter 1) regarding the longer-term evaluation sessions (before and after intervention), showing research participants, research tools and what each tool was used to identify, the type of research and sample sizes, is presented in Table 6.1.

**Table 6.1 Extract from Table 1.2 indicating the activities, research participants, research tools and why they were used, as well as the sample sizes of the longer-term impact evaluation phase of the NEP**

Chapters and Phases	Research participants	Research Tool	Used to identify	Type of research	Sample size
<b>Chapter 6</b> <b>Phase: Evaluation</b>					
<b>a) Nutrition knowledge</b>	<u>Experimental group:</u> Child caregivers belonging to the Boipatong WIPG	NKQ: (September 2012) (Annexure M) 50 questions repeated. Same as used in Chapter 5, before intervention	Results of NKQ (Annexure M) before intervention compared to results after intervention in order to determine the longer-term change in nutrition knowledge	Quantitative	n= 37(after)
	<u>Control group:</u> Caregivers of Soshanguve from ECD crèches	NKQ: (September 2012) (Annexure M) 50 questions repeated. Same as used in Chapter 5, before intervention.	Results of NKQ (Annexure M) before intervention compared to results after intervention in order to determine the longer-term change in nutrition knowledge	Quantitative	n=15 (after)
<b>b) Dietary intake</b>	<u>Experimental group:</u> BIWPG	Food intake ○ 24-hour recall	Quantitative: Results of dietary intake before intervention (Chapter 5) compared to results of after intervention and compared as a measure of change of dietary intake	Qualitative	n=35 (after)
<b>c) Perceptions of NE interventions</b>	Experimental group	Focus groups to determine perceptions re impact of NEP	Getting more in-depth information regarding participants' perceptions re impact of NEP and NE material	Qualitative	n=7 n=8

### **6.2.1. Study area**

The same caregivers belonging to the BIWPG took part in the evaluation phase (as in Chapter 4; 184 women from 12 different churches who attended prayer sessions regularly). A control group could not be established in the same church-going community. This would lead to errors if information exchange about the NEP between members of the experimental and control groups took place. It was also more convenient for the researcher to access a convenience sample as a control group from Shoshanguve ECD crèches who also showed interest in participating in the NEP. As already described (refer to section 5.2.1 and 5.2.2 for study design), the longer-term evaluation phase had to be effected before the initiation of the intervention.

### **6.2.2. Sampling strategy**

Both the experimental and control groups consisted of a purposive sample. An additional criterion for participation in the experimental group in this phase was that respondents had to have attended at least two discussion sessions to qualify for completing the after-intervention medium-term NKQ, which led to natural attrition of participants, causing smaller sample sizes. The same criterion was relevant for participating in the focus-group discussions in Boipatong.

### **6.2.3. Sample size**

The sample size of the before-intervention in the experimental group was 47 respondents, and after the intervention 37 respondents who complied with the stated criteria completed the NKQ (Annexure M) and the three 24-hour recalls (one completed on Monday for Sunday; and two completed for weekdays on Wednesday and Thursday. Only 23 respondents in the control group completed the before-intervention NKQ and 15 completed the same after-intervention NKQ. Two after-intervention focus groups consisted of Boipatong caregivers of seven and eight participants respectively.

### **6.2.4. Methodology**

The longer-term evaluations in this study that (a) compare before- and after-intervention data in the experimental group and (b) use a non-randomised control

group that are considered acceptable for field-based nutrition projects were utilised (Levinson 1999:63). Furthermore, a randomised control group was not possible, but a comparable group of individuals from the Soshanguve area where the project had not yet begun, was used as a nonrandomised control group. Before- and after-intervention measurements were administered in both experimental and comparison groups with regard to nutrition knowledge. Levinson *et al.* (1999:91) proposed that a control group be added to the experimental group to strengthen the design of the research.

Prior to any face-to-face discussion of the intervention, participants in the experimental and control groups completed the questionnaire consisting of 50 questions that covered the three FBDGs included in the NEP as a before-intervention test (Annexure M). A pre-condition for participating in the after-intervention session was that only caregivers of the BIWPG who had attended at least two sessions during the implementation phase were allowed to attend the after-evaluation session and to take part in the qualitative focus group discussions.

In the experimental group a 24-hour recall was recorded before the intervention (January 2012) and repeated after the intervention (September 2012). Food intake was recorded and a nutrient analysis performed on the data. The nutrient analysis was compared to the EAR of the sample. No dietary intake was recorded in the control group as they were not subjected to any intervention, and changes could therefore not be attributed to a specific variable or intervention.

After an initial meeting with the Soshanguve ECD Executive Committee, 45 women volunteered for the control group. Twenty-three of them who met language, age, income and educational criteria, similar to those of the Boipatong caregiver group, formed a purposive sample. Each participant signed an ethical clearance consent form. These women subsequently completed the same NKQ as the experimental group, which covered the three FBDGs included in the NEP (Annexure M). In the control group, participants who had not completed the before-intervention NKQ were disqualified, as paired-t-tests were used to assess changes in knowledge. They were not subjected to any NEP activities. Only 15 of the 23 initial members of the control group who participated in the pre-test completed this post-evaluation to detect changes in terms of nutrition knowledge. The NE booklet was provided to the 15 respondents on completion of the after-intervention questionnaire. This was

supported by a lecture, covering dietary diversity and feedback on results, two weeks later in the control group.

#### 6.2.4.1 Quantitative evaluation of the nutrition intervention in the longer term

To reach the objectives stated in 6.1.2, nutrition knowledge was assessed in the longer-term evaluation in the before- and after-intervention period in both the experimental and control groups. Dietary intake was assessed by means of before- and after-intervention 24-hour recalls in the experimental group.

##### a) **Nutrition knowledge**

Knowledge retention was assessed three months after the completion of the NEP (September 2012). This was considered to be a long enough period to assess changes in the longer-term memory in both the experimental group and the control group. This questionnaire consisted of 50 questions that were extracted from the questionnaires used in the situational analysis (Annexure M), but only those questions specifically aimed at the three FBDGs of the NEP. The questions were adapted to a simpler format of true and false answers. This questionnaire was also validated by ten VUT B.Tech students who completed the questionnaire weekly for three weeks.

##### b) **Changes in dietary intake**

The purpose of dietary assessment methods is to evaluate the intake of foods or nutrients to describe total intake of various nutrients. The 24 hr recall before and after the NEP was used as a proxy of dietary intake (Shim *et al.* 2014:2; Carroll *et al.* 2012:3, 6). Data was analysed and compared to the EAR. The NAR of each nutrient and the MAR was determined to examine dietary adequacy. Dietary intakes were measured before the start of the project (before-intervention in January 2012) and repeated three months after completion of the NEP (after-intervention in September 2012). Normality of distributions was also tested for. When skewness was detected the median and interquartile range were used for evaluation of results.

#### 6.2.4.2 Qualitative evaluation of the perception of value added by the NEP

The mixed-method research was particularly useful with this defined group, as the qualitative results of the focus groups in the experimental BIWPG group subjected to

the NEP intervention helped give meaning to the quantitative results. This satisfied satisfy objective 1.3.1.7, namely to test the participants' perceptions of the value of the NEP and NE material. Qualitative studies allow for probing deeper for insight into the problems of human beings. Achterberg (1994:s1808) states that, ideally, qualitative and quantitative methods should be combined so that the flaws of one paradigm can be compensated for by the strengths of the other.

Two focus groups were run in the second period to obtain deeper insight into the worth of the NEP in the minds of those that attended at least two of the sessions. The moderator was steered to lead the focus group, using a moderator's guide (Annexure P).

#### **6.2.5. Measuring instruments**

A structured NKQ (Annexure M) was used, consisting of 50 questions, summative from questions asked during the individual sessions (Annexures L1-3) and based on applicable questions used in the situational analysis (Annexure I). This NKQ was used to collect data on participants' knowledge before and after the NEP intervention in the medium term. The same procedures for data collection and analysis were used as described in Chapters 3 and 5.

In a review study of evaluation measures commonly used in NEPs, Contento *et al.* (2002:2, 20) found that 24-hour food recalls or records and quantitative DDQs were mainly used to measure dietary intake (or behaviour changes) in many studies. It was decided that a 24-hour recall would deliver the best results in this study.

One weekday 24-hour recall was captured by trained fieldworkers to determine dietary intake according to a structured format (Annexure G) in the before-intervention and after-intervention periods. The same procedure for data collection and analysis was used as described in the situational analysis, Chapter 3 (section 3.3.3).

#### **6.2.6. Fieldworkers**

The same fieldworkers who had been used in the intervention phase (Chapter 5; section 5.2.7) were used. They were given a refresher course on how to complete questionnaires with the caregivers. They were given additional training in taking



down a 24-hour recall from the caregivers and in assisting caregivers in completing the structured NKQs if and when necessary.

#### **6.2.7. Focus group moderator**

The research team consisted of a Sesotho-speaking doctoral candidate from VUT as moderator, the researcher, and research support staff to organise the process. The focus group sessions were conducted by using a moderator's guide compiled by the researcher, consisting of questions and probes (Annexure P).

During the session, the moderator had to promote debate and discussions by asking open-ended questions to tease out people's perceptions and meanings about the topic. The moderator also had to ensure that everybody participated, and had to ensure that conversations did not deviate from the topic and guidelines provided (Annexure P). Focus groups need to be run consistently, calling for good preparation (Gibbs 1997:2).

#### **6.2.8. Data processing**

Basic measures of central tendency and dispersion were determined using Excel spreadsheets. The Statistical Package for Social Sciences (SPSS) Version 21.0 was used to analyse the data. Frequencies were used to determine the number of questions answered correctly before and after the intervention for nutrition knowledge. Statistical significance ( $P < 0.05$ ) was tested by conducting independent t-tests for changes in nutrition knowledge in the experimental group (as questionnaires could not be paired in the prolonged time period between the before- and after-intervention collection of data). Paired t-tests were used for the control group. Although 23 volunteers from the control group completed the questionnaire, only 15 completed the after-intervention questionnaire. Therefore only the 15 pairs were used in this sample to provide a paired t-test analysis. Descriptive statistics were also calculated to determine mean percentages scored in the before- and after-NEP intervention to measure the degree of change (Oldewage-Theron & Egal 2009:47). The Wilcoxon signed rank test was used for the possibility of nonparametric related samples (as it does not assume that the data follow a normal distribution) in the before and after-intervention tests. The sample sizes were also small and thus better presented by nonparametric tests to accommodate skewness.

Dietary data were analysed using FoodFinder, a software product developed by the MRC of SA, to analyse the 24-hour recall datasheets. The analysis was undertaken by the Durban University of Technology (DUT). Data from the before- and after-intervention dietary intake were compared to the EAR and analysed for changes between the two data sets. Data were tested for distribution and skewness. As distributions were not normal for most nutrients, non-parametric tests were used in the evaluation process and results were provided as medians and interquartile ranges (IQR) (Leys et al. 2013:764; Joubert 2014: Chapter 10).

NAR and MAR were also determined to get a measure for adequacy of the diet. The results of the before- and after-intervention were compared and subjected to independent t-tests for statistical significance. NAR was calculated as the ratio of the intake of a nutrient divided by the recommended intake of that nutrient. The mean adequacy ratio (MAR) was calculated as the measure of adequacy of the overall diet. A MAR of 1 would indicate a perfect diet with the exact requirements met for each nutrient and <1 could indicate a risk of a nutrient deficiency (Steyn *et al.* 2006:645).

### **6.3. RESULTS**

The results of the longer-term impact evaluation of the NEP were assessed in terms of changes in nutrition knowledge as measured by the pre-post-test design in the BIWPG experimental and control groups. Changes in dietary intake in the BIWPG experimental group were also measured before and after the intervention.

#### **6.3.1. Nutrition knowledge**

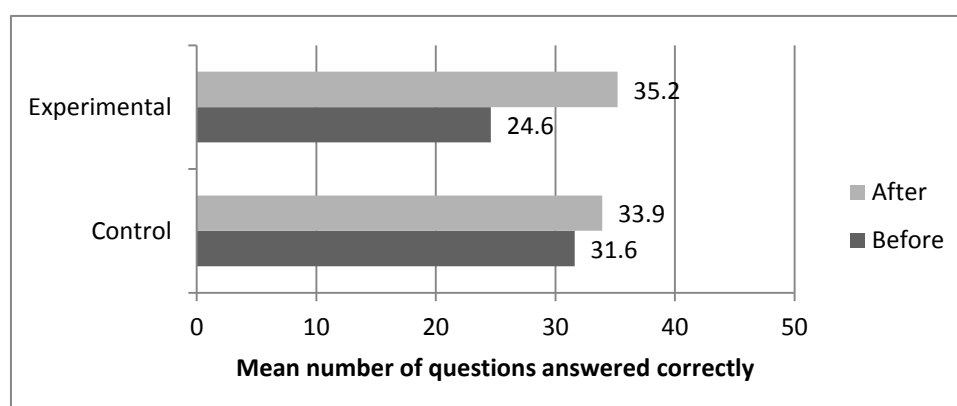
Nutrition knowledge was measured in the same time periods before and after intervention in the experimental and control groups. Before the intervention the experimental group was (n=47), while after the intervention the sample was (n=37), (Table 6.2). The decrease in number of participants was caused by participants not having attended all the discussion sessions and therefore not complying to criteria for inclusion. Fifty questions were answered before and after the intervention (Annexure M). The total number of questions answered correctly by each participant before and after the intervention (January and September 2012) was recorded.

**Table 6.2 Results of medium-term nutrition knowledge retention before and after the NEP for the experimental and control groups**

	Experimental group					Control group				
Intervention	n=	Minimum	Maximum	Mean	SD	n=	Minimum	Maximum	Mean	SD
Before	47	11	32	24.6	4.8	15	22	37	31.6	4.4
After	37	25	40	35.2	3.6	15	29	37	33.9	3.0
Significance of change	Independent t-test			p<0.001		Paired t-test			P<0.001	

The minimum number of questions (11) answered correctly by any respondent of the experimental group before intervention is less than the minimum number of questions answered correctly in the after-intervention assessment (25). The same is true for the maximum (32 and 40 questions correctly answered respectively). In the control group (n=15) the minimum number of questions answered correctly by any respondent in the before test is less (22 questions) than the minimum number of questions answered correctly in the after-NEP assessment (29 questions). The maximum number of questions answered correctly before and after the intervention remained the same (37 questions).

On average, the respondents tended towards being able to answer more questions correctly after having been exposed to the intervention (mean=35.2; SD=3.6) than before (mean=24.6, SD=4.8) for the normal distribution. In the control group the increase was much smaller (mean: 31.6 to 33.9 questions answered correctly out of the 50 questions posed). The Levene's Test of Equality of Variance revealed that the variances of the two groups can be assumed to be equal.



**Figure 6.2 Results of the mean number of questions answered correctly by the experimental and control groups before and after the intervention**

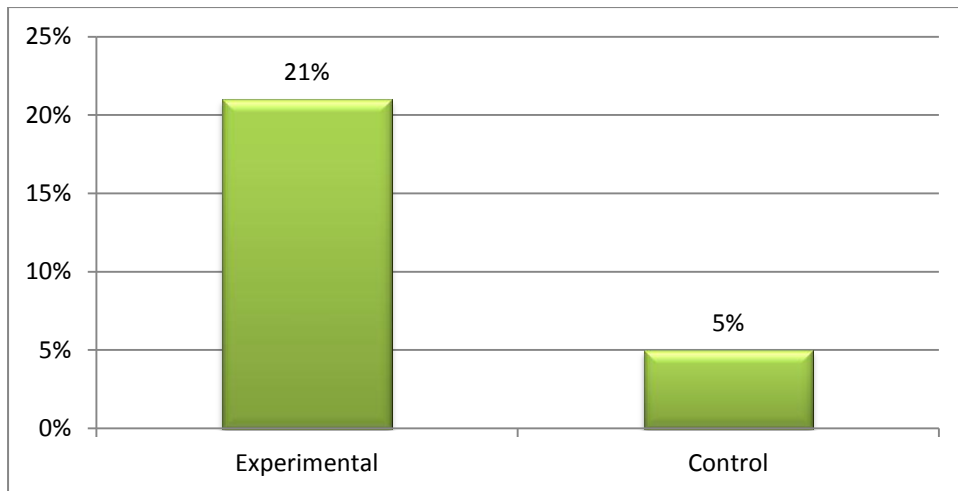
The results of the mean number of questions answered correctly by the respective groups are displayed in Figure 6.2. Positive differences in the knowledge patterns before and after the NEP for both groups were registered. Using an independent sample t-test, the results for the experimental group revealed a significant difference between the mean number of questions correctly answered before and after the intervention ( $p < 0.001$ ). The design of the study focused on changes in nutrition knowledge as a group and not on changes of nutrition knowledge of individuals. Pairing was also more difficult, as the study design required respondents to attend various sessions on different dates, while transport and other household factors further complicated pairing.

In the control group there also was a small increase in nutrition knowledge (the mean changing from 31.6 to 33.9 questions answered correctly), but the pattern was more dispersed. Paired t-tests revealed that there was no significant difference between the mean number of questions answered correctly before and after the NEP ( $p > 0.05$ ). Pairing was easier in the control groups, as attendance was required only twice and arrangements were facilitated by heads of the different ECDs. The initial higher nutrition knowledge compared to the sample of experimental caregivers in the before test and small increase in after intervention knowledge could perhaps be ascribed to individual interest of ECD employees in nutrition.

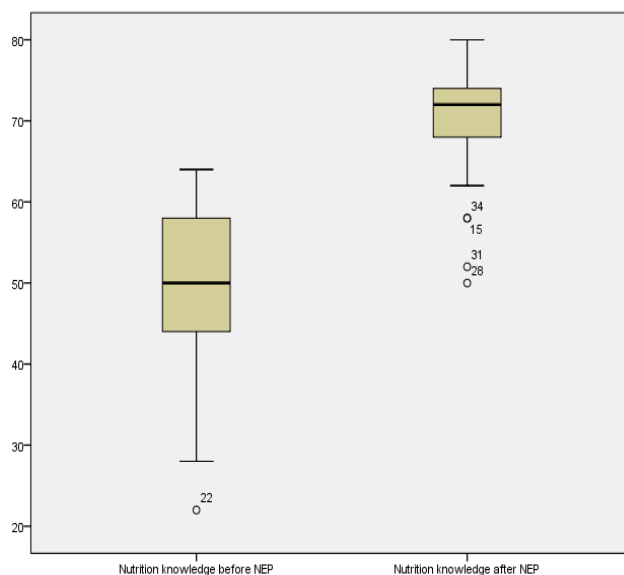
**Table 6.3 Percentage gain in nutrition knowledge in the experimental and control groups in the medium term**

	Before NEP (n=47)		After NEP (n=37)		Change in nutrition knowledge
	Mean number of questions correct	%	Mean number of questions correct	%	%
<b>Experimental group</b>	24.6	49	35.2	70	21
<b>Control group</b>	31.6	63	33.9	68	5

When viewing the results of changes in nutrition knowledge in terms of median percentage change, the experimental and control groups showed a 21 percent and five percent change respectively, as indicated in Table 6.3 and Figure 6.3.



**Figure 6.3 Difference in percentage change in nutrition knowledge between the experimental and control group**



**Figure 6.4 Percentage change in nutrition knowledge of the experimental group before and after the intervention**

According to Figure 6.4 it is clear that nutrition knowledge was higher in the after intervention (median after-intervention 70 percent (IQR 68-73%) versus median before-intervention of 49 percent (IQR 46-57%). Thus the degree of change in nutrition knowledge was 21 percent in the experimental group. The larger and significant mean change in nutrition knowledge of the experimental group is viewed as the effect brought about by the NEP.

### **6.3.2. Dietary intake**

The dietary intake of the experimental group was recorded during Phase 3, before implementation of the NEP intervention (January 2012). After the NEP had been delivered, the dietary intake of the experimental group was recorded again (September 2012) by means of a 24-hour recall. The before-intervention sample consisted of 38 participants and the after-intervention sample consisted of 35 participants in the experimental group.

Table 6.4 reflects the top 20 items mostly consumed as derived from the 24-hour recalls. Data was of the before-intervention and after-intervention in the experimental group (January and September 2012) were tabulated and evaluated.

**Table 6.4 Comparison of the top 20 foods consumed before and after the NEP intervention**

Before intervention (Boipatong n=38) Food item		Total intake(g) (a)	Per capita consumed (g) (a/n)	Consumed by number of participants (b) (n=38)	Percentage consuming the item	Actual consumption (g) (a/b)	After intervention (Boipatong n=35) Food item		Total (g) (a)	Per capita consumed (g) (a/n)	Consumed by number of participants (b) (n=35)	Percentage consuming the item	Actual consumption (g) (a/b)
1	Tea/ Rooibos, brewed	8200	216	33	87	248	1	Tea/ Rooibos, brewed	8540	244	30	86	285
2	Maize meal, stiff	7750	204	33	87	235	2	Maize meal, stiff	5250	150	30	86	175
3	Bread/rolls, brown	1240	33	20	53	62	3	Milk, UHT	3710	106	27	77	137
4	Maize, soft	3740	98	17	45	220	4	Bread/rolls, brown	2490	71	26	74	96
5	Milk, UHT	1720	45	15	39	115	5	Chicken, meat and skin, boiled	1135	32	13	37	87
6	Egg, boiled/poached	1300	34	13	34	100	6	Apple, raw	950	27	8	23	119
7	Chicken, meat and skin, boiled	1289	34	12	32	107	7	Rice, white, cooked	790	23	8	23	99
8	Beef, cooked	1255	33	11	29	114	8	Spinach (Swiss chard), boiled	415	12	7	20	59
9	Rice, white, cooked	1750	46	8	21	219	9	Cold drink, carbonated	1150	33	6	17	192
10	Cold drink, squash, diluted	1350	36	8	21	169	10	Cold drink, squash, diluted	830	24	6	17	138
11	Cold drink, carbonated	1350	36	6	16	225	11	Potato, boiled without skin	340	10	6	17	57
12	Sausage: boerewors	580	15	6	16	97	12	Fruit juice	625	18	5	14	125
13	Maize/samp, cooked	850	22	5	13	170	13	Chicken, meat and skin, roasted	450	13	5	14	90
14	Tomato	220	6	5	13	44	14	Egg, whole, boiled/poached	385	11	5	14	77
15	Liver, chicken, cooked (simmered)	570	15	4	11	143	15	Maize/samp, cooked	550	16	4	11	138
16	Potato chips, French fries	510	13	4	11	128	16	Maas/Sour milk	420	12	4	11	105
17	Mageu	500	13	4	11	125	17	Banana, raw (peeled)	480	14	3	9	160
18	Vetkoek/dumpling	610	16	3	8	203	18	Liver, chicken, cooked (simmered)	450	13	3	9	150
19	Coffee	350	9	3	8	117	19	Oats, rolled or oatmeal, cooked	450	13	3	9	150
20	Maltabella/ Sorghum, cooked	210	6	2	5	105	20	Maltabella/ Sorghum, cooked	400	11	3	9	133

In an analysis of the food group diversity represented, it was found that there were eight items of carbohydrate in the before-NEP list and seven items in the after-intervention list. Five food items for protein appeared in the before-intervention list and four in the after-intervention list for protein. However, there were no fruit and only one vegetable in the before-intervention list; whereas there were three fruit and one vegetable in the after-intervention list. Although this was not the focus of the study, it was supported the FBDG 'variety.' Stiff porridge remained popular, but smaller portions were consumed (before NEP= 204g portions, versus after intervention=150g per capita). Carbonated cool drink and squash remained on the list before and after intervention, despite the community being identified as a low-income community. Milk was consumed by more people (39 vs 77 percent before and after intervention respectively) and in larger portions per capita (45 vs 106 ml). Maas/sour milk was a new item in the 15<sup>th</sup> position after intervention.

A nutrient analysis of the 24-hour recall was done and compared for two periods, before and after the NEP intervention. A summary of the results is presented in Table 6.5. Because the data was tested and found to be skewed, non-parametric tests were used to evaluate the data. Using the median also excludes outliers from the interquartile range.



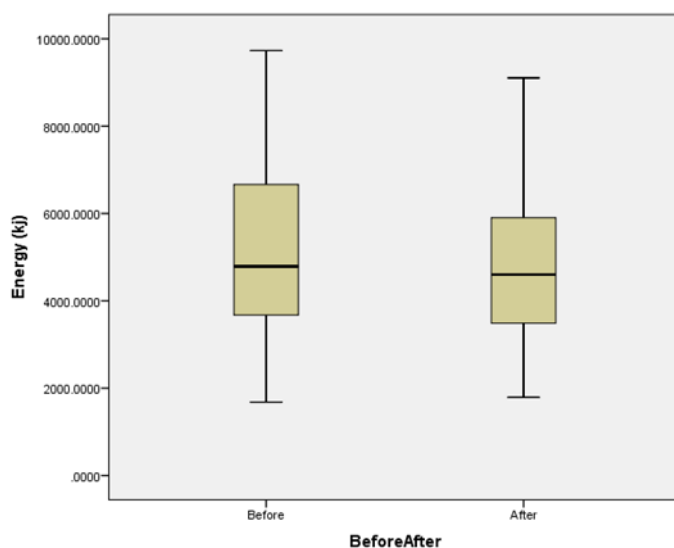
**Table 6.5 Dietary analysis of the 24-hour recall data reported by caregivers before and after the implementation of the NEP intervention (January and September 2012)**

		Before intervention n=38				After intervention n=35				
Nutrient	EAR Women >51\$	Median	Q1	Q3	Number of participants complying with EAR and (percentage)	Median	Q1	Q3	Number of participants complying with EAR and (percentage)	Significance 2-tailed
Energy (kJ)*	7355	4788	3415	6596	5 (13.1)	4651	3369	6664	2 (5.7)	0.483
Protein (g)	46	48	33	68	20 (52.6)	47	32	67	19 (54.3)	0.279
Fat (g)	52	34	23	59	13 (34.2)	36	22	58	5 (14.3)	0.635
Carbohydrate (g)	100	137	98	188	27 (71.1)	132	108	172	28 (80.0)	0.965
Total dietary fibre (g)	25	11	8	15	3 (7.9)	11	8	15	0 (0.0)	0.877
Ca (mg)#	1200	166	98	265	0 (0.0)	296	154	464	0 (0.0)	0.006
Fe (mg)	5	9	5	10	27 (71.1)	5	4	7.2	23 (65.7)	0.004
Mg (mg)	265	186	152	247	8 (21.1)	174	144	235	5 (14.3)	0.348
P (mg)	580	688	461	1021	25 (65.8)	665	500	824	23 (65.7)	0.604
Zn (mg)	6.8	7.3	4.9	9.8	20 (52.6)	5.3	3.6	6.8	9 (25.7)	0.027
Se (mcg)	45	23	8	49	13 (34.2)	22	8	34	8 (22.8)	0.757
I (mcg)	95	23	13	59	3 (7.9)	56	25	77	5 (14.3)	0.015
Vitamin A (RE) (mcg)	500	346	168	632	11 (28.9)	201	109	545	9 (25.7)	0.105
Thiamine (mg)	0.9	0.8	0.6	1.2	18 (47.4)	0.6	0.4	0.8	7 (20.0)	0.009
Riboflavin (mg)	0.9	0.9	0.5	1.5	15 (34.9)	0.7	0.4	0.9	7 (20.0)	0.716
Niacin (mg)	11.0	13.8	10	23	26 (68.4)	11.2	7	17	19 (54.3)	0.671
Vitamin B6 (mg)	1.3	1.0	0.8	1.6	12 (31.5)	0.6	0.4	0.8	4 (11.4)	0.000
Folate (mcg)	320	242	169	354	14 (36.8)	119	87	153	2 (5.7)	0.000
Vitamin B12 (mcg)	2.0	1.8	0.5	3.9	17 (44.7)	1.7	0.8	2.9	15 (42.8)	0.969
Pantothenate (mg)	5.0	4	1.9	7.2	16 (42.1)	3.8	1.6	7.1	16 (45.8)	0.782
Biotin (mcg)	30	18	13	29	9 (23.6)	19	11.2	31.3	9 (25.7)	0.895
Vitamin C (mg)	60	11	5	32	5 (13.1)	18	12	71	10 (28.5)	0.042
Vitamin D (mcg)#	10	1.6	0.4	8.0	4 (11.5)	1.0	0.3	4.7	2 (5.7)	0.377
Vitamin E (mg)	12	4.4	1.9	10	5 (13.1)	4	2.2	7.9	4 (11.4)	0.795

\$ EAR for active women >50 years of age; \* EER for women with a normal physical active level and >50 years; # AL women >50 years where EAR is not available (Nicus 2007)

To determine whether there was a significant change in the dietary intake from before the intervention to after the intervention, each of the nutrient variables was subjected to an independent samples t-test in the experimental group of Boipatong caregivers. The dietary intake was done as an indication of any changes in food intake that may be ascribed to the nutrition intervention. This was not done in the control group, as changes could not be related to any specific variable or intervention. Although low in comparison to the EAR, the median energy intake was 4788 kJ/day (3145-6595) before the intervention, compared to the after intervention of 4651 kJ/day (3369-6664), showing a stable energy intake over the period under investigation. The same pattern in comparison is shown for all the macronutrients.

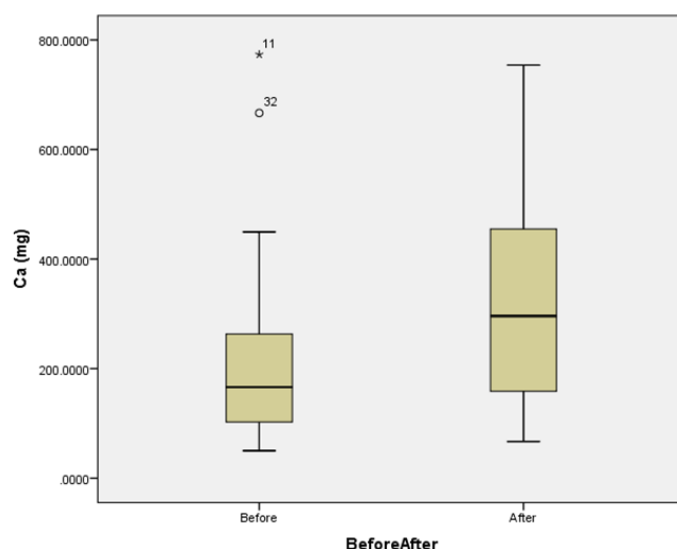
Statistical tests for normality were performed and then supplemented by tests for skewness as a measure of the asymmetry of the probability distribution. Quite a number of the distributions deviated significantly from normal and homogeneity of variance did not seem to hold, as is evident from the boxplots below. Means and medians differed in most instances. Therefore, the median and interquartile range was used primarily as measure of distribution for dietary intake. The non-parametric Mann-Whitney test revealed positive significance differences between the before- and after-NEP intervention values for calcium, iodine and vitamin C. A significant decrease for Fe, Zn, thiamine, vitamin B6 and folate was noticed.



**Figure 6.5 Results of energy intake of caregivers participating in the NEP before and after the intervention**

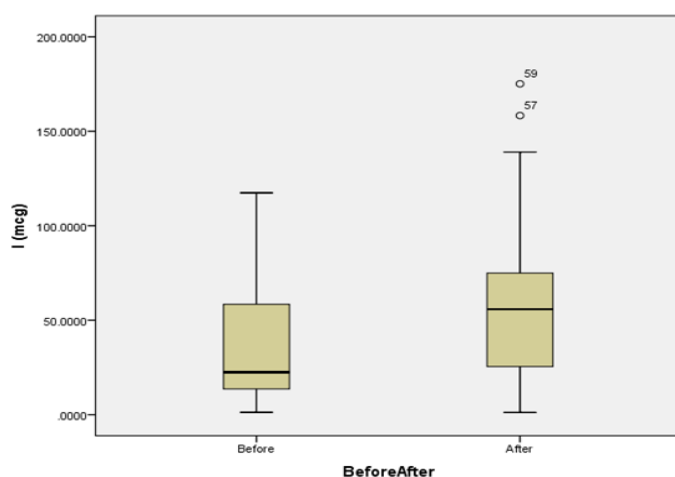
As the energy deviated from normal (Figure 6.5), it can be expected that this will also influence other nutrients. The energy intake before intervention was (median 4788 kJ, 3415-6596) compared to the after intervention (median 4651, 3369-6664). The percentage of caregivers that complied with the EER was 11 percent and six percent in the before and after intervention respectively.

Calcium dietary intake showed a significant improvement from a median of 166 mg/day (98-265) before the intervention to 296 mg/day (154-464) after the intervention, although none of the participants still reached the EAR. Iodine and vitamin C intake also improved significantly. However, zinc dietary intake was significantly reduced. Thiamine, vitamin B6 and folate dietary intake also decreased significantly. This is a concern.



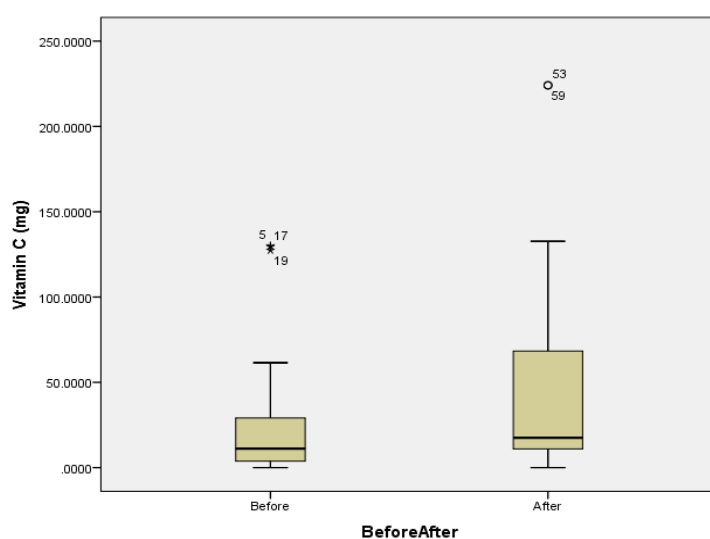
**Figure 6.6 Results of calcium intake of caregivers participating in the NEP before and after the intervention**

Calcium (Figure 6.6) is of specific importance, especially in the group of senior female adult caregivers. Although the respondents in the after group consumed significantly more calcium than the before group, none of the respondents still reached the EAR of 1200 mg per day.



**Figure 6.7 Results of iodine intake of caregivers participating in the NEP before and after the intervention**

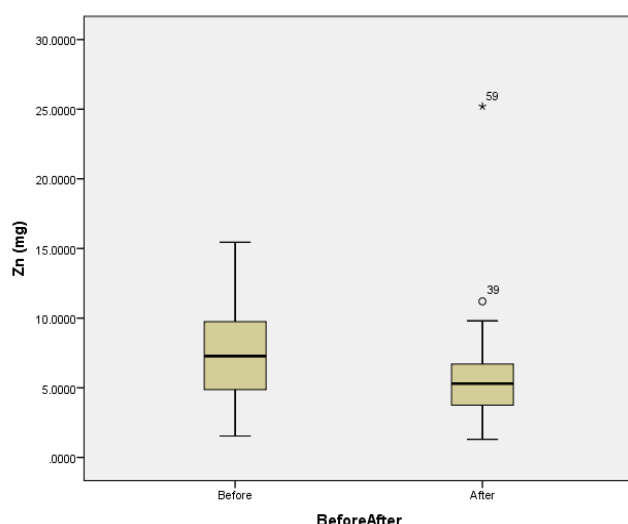
Median Iodine increased significantly. Before the intervention only eight percent of participants complied with EAR while after the intervention 14 percent complied with the EAR (Figure 6.7).



**Figure 6.8 Results of vitamin C intake of caregivers participating in the NEP before and after the intervention**

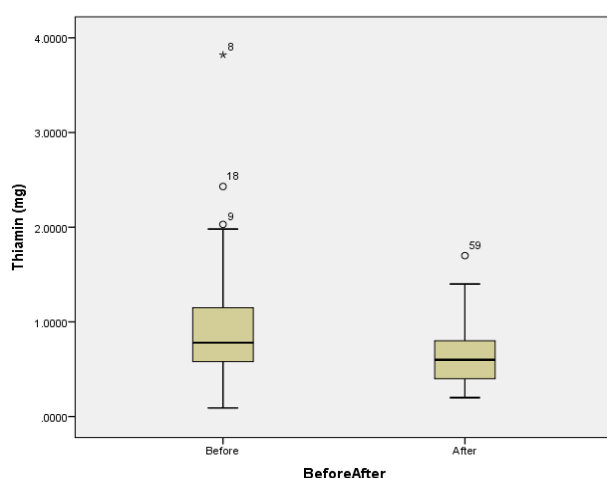
Likewise, vitamin C dietary intake (Figure 6.8) increased significantly from the before- to the after- intervention and the number of participants complying with EAR also increased from eight to 26 percent. The median intake before the intervention was 11 mg per day (IQR 5-32 mg) in comparison with the median intake of 18 mg per day (IQR 12-71).

On the downside, iron, zinc, thiamin, vitamin B6 and folate dietary intake decreased significantly from before to after the NEP intervention. Fortified maize meal was used in both nutrient analyses. The average consumption of carbohydrate in the top 20 food items slightly dropped in the after intervention, which could explain the decrease.



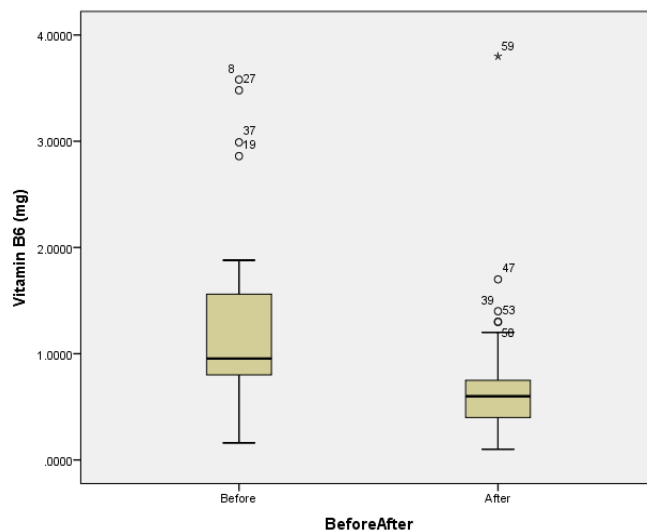
**Figure 6.9 Results of zinc intake of caregivers participating in the NEP before and after the intervention**

Similarly to iron, zinc intake dropped significantly between the before and after interventions. The median for zinc was 7.3 mg per day (IQR 4.9-9.8) and 5.3 mg (IQR 3.6-6.8) before and after intervention respectively. Before the intervention 50 percent of caregivers complied with the EAR, whereas only 26 percent complied after the intervention (Figure 6.9).



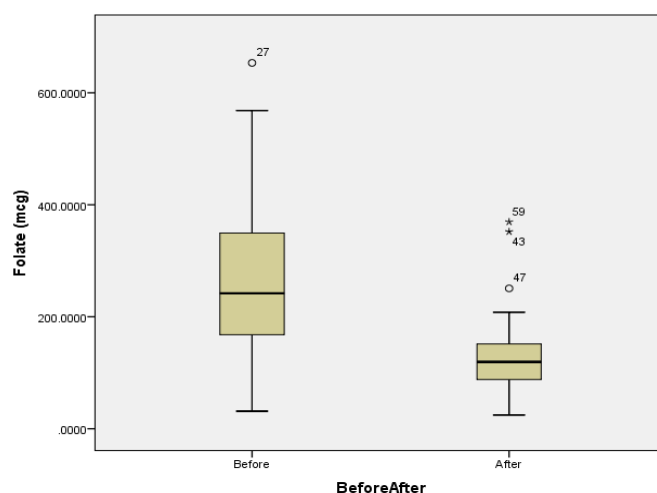
**Figure 6.10 Results of thiamine intake of caregivers participating in the NEP before and after the intervention**

The median (0.8 mg/day intake, IQR 0.6-1.2) of thiamine declined significantly to the after- intervention dietary intake (median 0.6 mg/day, IQR 0.4-0.8). Before the intervention, 39 percent of caregivers complied with the EAR, compared to the eight percent after the NEP (Figure 6.10).



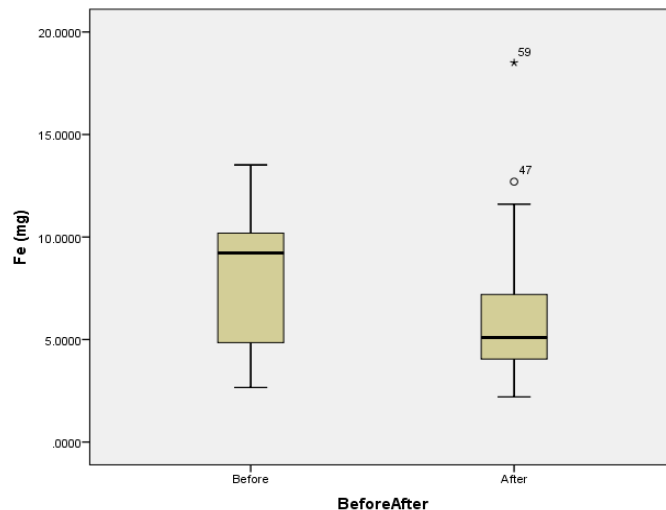
**Figure 6.11 Results of vitamin B6 intake of caregivers participating in the NEP before and after the intervention**

Vitamin B6 decreased significantly (Figure 6.11) from before the intervention (median 1 mg/day, IQR 0.8-1.6) to after the intervention (median 0.6 mg, IQR 0.4-0.8). The percentage of caregivers complying with the EAR before the intervention was 34 percent, compared to 17 percent after the intervention.



**Figure 6.12 Results of folate intake of caregivers participating in the NEP before and after the intervention**

Similarly, folate decreased significantly from before the intervention (median 242 mcg/day, IQR 169-354) to after intervention dietary intake with (median 119 mcg/day, IQR 87-153) and the percentage of participants complying with the EAR dropped from 37 to 14 percent (Figure 6.12).



**Figure 6.13 Results of iron intake of caregivers participating in the NEP before and after the intervention**

Although not significant, in Figure 6.13 the difference between the dietary intake of iron is depicted in the before- and after-intervention analysis. A median of 9 mg/day (IQR 5-10) was recorded before the intervention and a median of 5 mg (IQR 4-7.2) Fe after the intervention. A concern is that 92 percent of participants complied with the EAR before the intervention, whereas 74 percent complied after the intervention.

**Table 6.6 Mean NAR per nutrient of caregivers before and after the intervention**

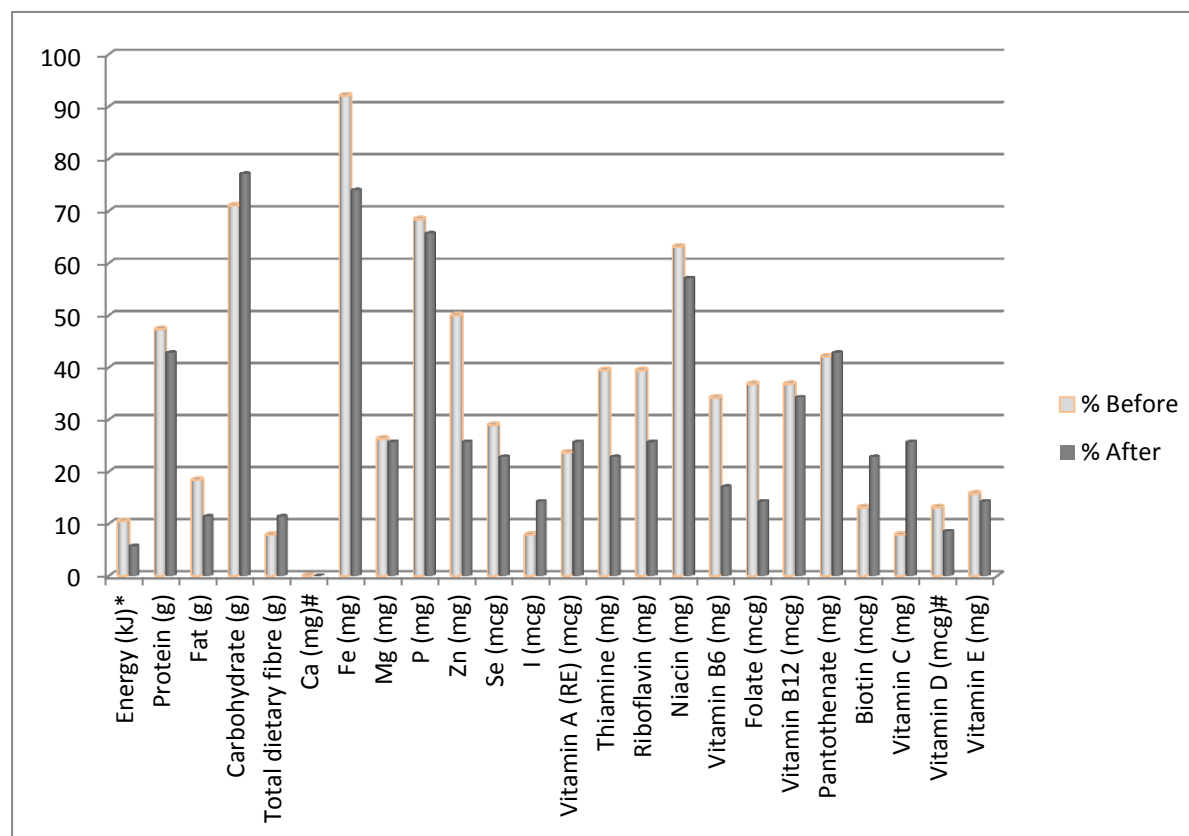
Nutrient	EAR women >51\$	Median NAR before intervention (n=38)	Median NAR after intervention (n=35)	Nutrient	EAR women >51\$	Median NAR before intervention (n=38)	Median NAR after intervention (n=35)
Energy (kJ)*	7355	0.6	0.6	Vitamin A (RE) (mcg)	500	0.7	0.4
Protein (g)	46	1.0	1.0	Thiamine (mg)	0.9	0.9	0.6
Fat (g)	52	0.6	0.7	Riboflavin (mg)	0.9	0.9	0.7
Carbohydrate (g)	100	1.0	1.0	Niacin (mg)	11.0	1.0	1.0
Total dietary fibre (g)	25	0.4	0.4	Vitamin B6 (mg)	1.3	0.7	0.6
Ca (mg)#	1200	0.1	0.3	Folate (mcg)	320	0.7	0.4
Fe (mg)	5	1.0	1.0	Vitamin B12 (mcg)	2.0	0.9	0.8
Mg (mg)	265	0.7	0.7	Pantothenate (mg)	5.0	0.7	0.8
P (mg)	580	1.0	1.0	Biotin (mcg)	30	0.6	0.6
Zn (mg)	6.8	1.0	0.8	Vitamin C (mg)	60	0.2	0.3
Se (mcg)	45	0.5	0.5	Vitamin D (mcg)#	10	0.1	0.1
I (mcg)	95	0.2	0.6	Vitamin E (mg)	12	0.4	0.3

Table 6.6 shows the median NAR of each nutrient before the NEP compared to after the NEP, which confirms the data reflected in Figure 6.4. Macronutrients did not show a marked change from before to after the intervention.

Of importance is the improved intake of calcium (changed significantly from 0.1 to 0.3), iodine (0.2 to 0.6) and vitamin C (0.2 to 0.3) to confirm the findings of the dietary analysis. The NAR provides a refinement in the analysis of dietary intake as the influence of participants obtained from the 24-hour recall is cleaned from an over consumption of food with regard to specific nutrients, thereby influencing the mean of the group and skewing the graph towards a higher intake. This may be regarded as a stepwise improvement in dietary intake over the nine-month period (January to September). On the downside is the decrease in zinc (1.0-0.8), vitamin A (0.7-0.4), thiamine (0.9-0.6), riboflavin (0.9-0.7), vitamin B6 (0.7-0.6) and folate (0.7-0.4), despite the SA food fortification programme. In both analyses the fortified figures were used for maize meal and bread. The change in seasons and availability of food items or price increases could have been contributing factors.



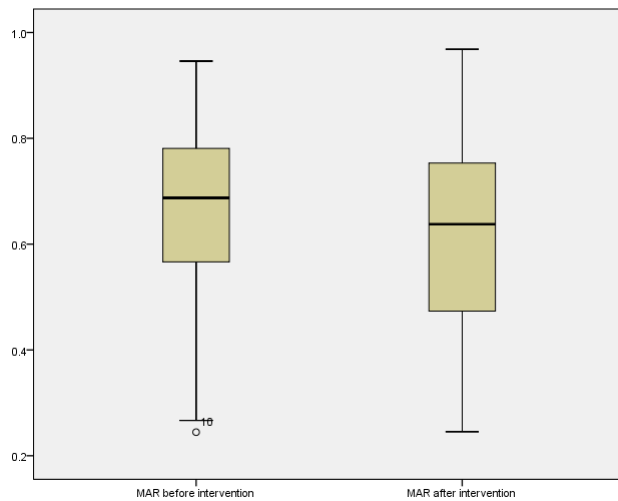
In contrast to the dietary analysis for iron, the NAR does not show any change and indicates that iron intake was sufficient. The median for the diet before the intervention was 0.7 compared to that of after the intervention of 0.6, which, according to Steyn *et al.* (2006b), indicates a mild risk of malnutrition.



**Figure 6.14 Percentage of participants complying with EAR per nutrient before and after the NEP intervention**

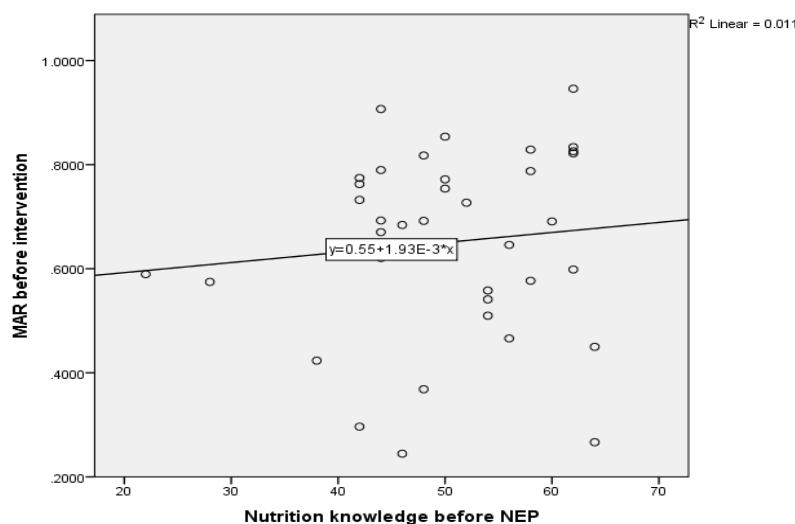
Figure 6.14 provides a visual presentation of the percentage of participants complying with nutrient requirements before and after the intervention. The graph shows that the trend seems to be that the number of participants complying with the EAR for specific nutrients remains poor. Only for carbohydrates did about 70 percent of participants reach the EAR, while the percentage of participants complying with iron requirements was relatively good. Vitamin C intake correlates with the top 20 foods as the number of participants complying with the EAR increased from eight to 26 percent. Calcium intake remains a major concern because both before and after the interventions none of the participants complied with the EAR, despite the fact that there was a significant increase in calcium intake from before to after the NEP intervention.

The MAR for before the NEP was 0.7 (IQR 0.6-0.7) and for after the NEP the MAR was 0.6 (IQR 0.6-0.7). Thus, the difference was negligible.



**Figure 6.15 Results of the MAR of caregivers participating in the NEP before and after the intervention**

Figure 6.15 shows a non-parametric distribution of the MAR in the before- and after-intervention. A slight decrease in the MAR is visible, although more participants were included in the after-intervention MAR within the interquartile range. The question was then asked if there was any correlation between the MAR and nutrition knowledge.



**Figure 6.16 Relationship between nutrition knowledge and diet adequacy as represented by the MAR**

Both the Pearson's and Spearman's correlation coefficients indicated that there is no correlation between nutrition knowledge and dietary adequacy as shown in Figure 6.16. Thus it cannot be deduced that improved nutrition knowledge led to a change in dietary intake.

### ***6.3.3. Perceptions of caregivers regarding the value of the NE material after the NEP intervention was implemented***

Based on the qualitative analysis of the focus groups held in September 2012, assisted by Prof RJ Gaede of the VUT Department of Visual Arts and Design, (Addendum P), it is clear that the NE material played a very important role in the NEP and that the benefits of health education are well recognised. These data were collated three months after the completion of the NEP intervention, and the results are thus viewed as longer-term results.

The qualitative analysis occurred in two phases. The first phase involved a top-down approach where a list of codes was compiled and the primary documents were scanned for quotations that link with the items on the list (code-by-list codes). The second phase comprised a bottom-up approach where quotations in the primary document were linked to additional codes (in vivo codes).

Both types of codes were then linked to themes. The code-by-list codes were based on the moderator's schedule (Annexures Q1 & Q2).

The list covered:

- ♦ Role of pictures – positive aspects
- ♦ Role of pictures – negative aspects
- ♦ Language issues
- ♦ Booklet design issues
- ♦ Role of the booklet – positive aspects
- ♦ Role of the booklet – negative aspects

The quotations and codes contain the following core themes (see above):

- I. Benefits of health education (for example, changes in attitude)
- II. Purchasing behaviour (for example, saving money and knowing what to buy)

### III. Guidelines for the design of the educational material (pictures, language issues, layout, etc.)

The fact that the booklet is valued by the caregivers is evident from a few quotations from the core themes of the benefit of health education:

'Honestly, I'm happy, because this book is going to help us to be real mothers, we'll be mother able to raise kids, we truly appreciate it. We could see but we did not understand, now we understand clearly ... Now we understood clearly how we should treat the matter of health in regard to our bodies and families'

'I think this book is helpful because it equips us with knowledge of what kind of food we should eat, what kind of food we should cook, and the kind of food we should choose. It increases our knowledge.'

'It was written very well, because even we grannies who are not educated, we're able to read it.'

'One of the things we did not know, we thought it's food for the poor people, it's soya mince, and we did not like it.'

According to the participants, the design of the educational material should provide information that helps them to know *what to buy and how to save money*, and these aspects should be prominent in the final version of the health education materials. The pictures should also help with knowing what to buy. Some of the quotations of the participants are given below to demonstrate this statement.

'So, we're happy to see these pictures. They will help us a lot to know what we should buy. They also show us how to save money.'

'We grannies who are given the government grant, we could not spend a month with that money, since you came and taught us how to buy inexpensive food, we're able to spend the whole month with the grant we get. We no longer buy expensive things.'

'I also like it because it says, you don't have to buy high protein foods only.'

Other guidelines for the design of the educational material, including pictures, language issues and layout, consist of the following:

*Language:* The home language of participants should be used, namely Sesotho, and perhaps Zulu as well.

'I think the translation of this book is a good one, because honestly we are able to follow step by step with the book.'

'Madam, I'm happy because it was written in a language that anyone can understand. Normally when it's in a foreign language, I mean English or Afrikaans ... more especially since we grannies are not educated, and not all grannies went to school.'

*Illustrations:* The pictures should be in colour

'I think these pictures ... if you don't know which ones are lentils, you can identify that type.'

The captions and pictures must match closely, and the pictures must primarily help the members of the community to understand the text, rather than to beautify, or raise the visual appeal, of the educational material.

'These pictures are helpful, they make it easy to understand the book. They help us to see the light.'

*Layout:* A book with hard cover or solid binding is preferred; not pamphlets.

'How are you going to bind this book? Will it be on hard cover? You see kids can take the book, play with it and then destroy it. So I think it's safe on hard cover than when it's like this.'

'Yes, a complete book, not pamphlets. It should be published, and be complete book.'

*Font size:* A large font should be used throughout (a minimum of 12-14 pt. throughout) (Gaede 2012). When developing written materials for older persons, concise text, large font, and pictures are advisable. Communicating in a way that is sensitive to cultural and gender norms may also facilitate adherence (Nyman & Ballinger 2007:9).

## 6.4. DISCUSSION

The role of NE was divided into components, which included the following:

- Nutrition knowledge and awareness

Nutrition knowledge and awareness can be achieved by providing valid information about the relationship between diet and health and also about the nutritional needs of the individual. However, knowledge does not automatically lead to better dietary intake.

- Promoting sound dietary intake

Although this can be achieved by providing reliable information on the nutritional value of foods, other factors play a critical role, like individual food preferences, purchasing and economic decisions, and hygienic food storage and food preparation.

Both nutrition knowledge and dietary intake were measured in this summative evaluation phase of the NEP to provide retrospective information about the performance of the participants exposed to the NEP (Nnakwe 2009). In this study, longer-term memory retention was tested three months after the caregivers had been exposed to the NEP, and compared to their nutrition knowledge before the intervention.

The role that nutrition knowledge plays in dietary intake remains indefinite. In an NEP study targeting low literacy obese and overweight mothers, increased nutrition knowledge appeared to enable these individuals to improve their dietary intake with regard to specific nutrients targeted in the NEP (Klohe-Lehman *et al.* 2006:65). However, dietary intake is not only based on nutrition knowledge. Aspects such as time constraints, family traditions, environmental cues and personal food preferences are factors that present barriers to change (Dickson-Spillmann 2011:617).

### **6.4.1. The effect of the NEP on nutrition knowledge**

The programme's messages and content led to an increase in knowledge in the experimental group, compared to the control group. The results regarding nutrition knowledge of the experimental group (Boipatong caregivers) improved considerably in the longer term, as measured by the number of questions correct (median 48%) to a median of 72 percent in the after-intervention test, which was significant

( $p < 0.001$ ). The questionnaire consisted of 50 questions covering the South African FBDGs (2012) included in the NEP. In the control group there also seemed to be an improvement, but with no significance ( $p > 0.05$ ). The static control group was not exposed to any discussion in order to determine the effect of personal contact of the NEP (McClelland 2013:4). The questionnaires were completed by both groups in January and September 2012. The results of the control group were more dispersed. Despite this, there was a slight increase in nutrition knowledge (63 to 68%) that could perhaps be ascribed to a heightened interest in nutrition or the subject's knowledge that she is participating in an experiment.

The lower initial nutrition knowledge in the experimental group (mean 24.6/50 questions correct) compared to that of the control group (31.6/50) may be due to the control group be working in crèches in the (ECD) environment. However, the main issue is the *change* in nutrition knowledge, which was much greater and significant in the experimental group. The percentage change in the experimental group was 21 percent compared to the control group of five percent. In the after-NEP results, the experimental group's means nutrition knowledge was higher (70%) versus control group (68%).

The face-to-face communication strategy supported by NE material to reinforce messages was suitable for increasing their nutrition knowledge of the experimental group of low-SES, low-literacy skills caregivers. The NE material was especially appreciated by the older caregivers who had some loss of hearing. It served as a reminder at home. Because memory loss is a concern for older adults (Parker *et al.* 2011:8), the NEP used written NE material to prompt memory for implementation and behaviour change. The Sesotho booklets were intended to be read by household members as well. Other NE materials given to the experimental group were FBDG fridge magnets (Annexure T) and recipe cards (bean soup, chicken and rice baked dish (Annexure U).

Not many data exist on the nutrition knowledge of poor communities in developing countries such as SA. In addition to limited resources, low literacy and a lack of knowledge of sound budgeting, food purchasing and food preparation methods can compromise household food security. However, Walsh *et al.* (2003: 89) found that a community-based NEP can contribute to knowledge of balanced economical meals

and dietary practices in low-income communities. Nevertheless, the task of promoting change is rarely a matter of simple persuasion; rather it is an ongoing job to create conditions for change and to keep hope alive. Studies show that change is stepwise and gradual, particularly in adults. Success requires years of learning (Blackburn 2005:219S).

The success of this NEP is supported by Walsh *et al.* (2003:89), who found that a community-based NE intervention contributed to knowledge of balanced economical meals and dietary practices in low-income communities in the Free State and Northern Cape. Oldewage-Theron and Eagle (2009:49) found a positive change in knowledge of 18 percent in schools in the Vaal Region after a NEP intervention. Also, the attitude to healthy eating and the use of different information sources were weakly but significantly related to the level of nutrition knowledge (Grunert *et al.* 2012:166). However, in dietary intake, change takes place slowly and often stepwise. Yet programmes and interventions can always be improved incrementally (Weiss, 1998). Changes in dietary intake of populations take place in a complex and dynamic socio-economic milieu, making data alone inadequate evidence of the effectiveness of programme evaluation. It is ambitious to attempt developing a simple outcome measure to result in a valid and reliable measure (Guthrie *et al.* 2006). When communities accept new ideas, services or products as fulfilling their own aspirations and well-being, they will accept them easier. This is the foundation of communications for behavioural change (CBC). CBC follows a disciplined series of programme development and implementation phases, with steps designed to learn from the community itself: conducting formative research to formulate and test the programme's strategy; designing, testing, and improving messages; producing communication materials; monitoring progress and making necessary revisions in programme strategies to better address people who have not tried new behaviour or who have stopped desired behaviours (Allen & Gillespie 2001:76). Therefore CBC closely resembles the FAO framework in terms of their respective processes.

#### **6.4.2. The effect of the NEP on dietary intake**

In SA, almost 35 percent of poor households' purchases of food fall into the carbohydrate-rich bread and cereals category, with maize meal being the most common purchase. The opposite is true for protein; poor households spend just over



22 percent on meat and fish, with poultry being the most common purchase, accounting for almost half of that expenditure. Potatoes are the most common purchase in poor households in the vegetable category (SA Stats 03 Apr 2014). Monotonous diets may be a contributing factor to malnutrition. (Kennedy *et al.* 2007). For this reason, most countries include a dietary guideline to stress the importance of eating different foods in their set of FBDGs.

A slight improvement was detected in the top 20 foods consumed in the before- and after-NEP results, especially regarding the consumption of milk. An increased portion size per capita (45 to 106 ml) was observed, as well as an increase in number of participants consuming milk (39% before to 77% after NEP), as presented in Table 6.4. This was corroborated by a significant increase in calcium intake measured by means of a 24-hour recall. Maas/sour milk was added as a new item to the top 20 after-intervention list.

Dietary intake was measured in the longer term to detect any behaviour changes that might be ascribed to the NEP. However, the findings of the present study confirm that dietary intake was poor in both the before-intervention and the after - intervention nutrient analysis (Table 6.5), typical of a low-SES community. A median kJ intake of 4788 (IQR 3415-6596) per day (before) and 4651 kJ (IQR 3369-6664) per day (after NEP) was registered and compared to the EAR of 8814 kJ for women >51years. This study confirmed the findings of Oldewage-Theron *et al.* (2006:799) where energy intake in caregivers in the Vaal Region was also found to be low, namely 4550 kJ/day (SD 1993). In urban SA, energy intakes were found to be 7270 kJ (1731 Cal) by Steyn *et al.* (2013:233-5). It is challenging to measure dietary intake in human populations accurately. A growing body of literature has demonstrated that subjects tend to underreport energy and nutrient intakes, and this underreporting occurs more frequently in certain subgroups, such as women and overweight subjects (Nowicki *et al.* 2011).

The significant reduction in iron intake could perhaps be ascribed to red meat being substituted by chicken in the top 20 list (after-intervention). In the before-NEP list participants consumed boerewors (16%) and beef (29%). The nutrient analysis also showed a significant decrease in the intake of zinc. In the before-NEP nutrient analysis of dietary intake, 50 percent of participants complied with the EAR, whereas after the NEP only 26 percent complied with the requirement. Significant decreases

were also found in thiamine, vitamin B6 and folate. This could partly be explained by a slightly lower intake of fortified maize meal and bread as indicated in the after-intervention of top 20 foods frequently consumed indicated. It should be remembered that there was a time lapse of nine months between the two dietary analyses (January before and September after the NEP). This could bring about seasonal variations in food intake and price fluctuations in food that influenced food choices. Such changes are difficult to control in pre-post-test designs and are recognised by the researcher as a threat to internal validity.

The NAR and MAR were used to measure dietary diversity. In this study NAR for energy was low (0.7 before NEP) and 0.6 (after NEP) with only 14 percent and 5.7 percent of participants reaching the EER respectively before and after NEP. The NAR for protein remained constant at 0.8 before and after the intervention. In comparison, Steyn *et al.* (2013:233-5) found NARs for energy to be close to 0.8 while NAR for protein appeared to be adequate. Similar to this study, the NARs for calcium folate and vitamin D were low also low. Despite positive and significant changes in calcium, the actual intake of calcium remains very low (after NEP 0.3) and further efforts should be undertaken to increase milk, Maas and yoghurt intake. The NAR for vitamins E (after NEP 0.5) and C (after NEP 0.4) were also low in this study, despite a significant increase in vitamin C.

The MAR in this study (0.6) was similar to that of 0.63 found by Steyn *et al.* (2013) for urban areas. No correlation was found between the MAR and nutrition knowledge and thus no conclusion can be made that improved nutrition knowledge leads to improved dietary intake.

#### **6.4.3. Perceptions of the BIWPG caregivers on the effectiveness of the NE materials.**

The mixed-method research was particularly useful with this defined group, as the qualitative results of the focus groups in the experimental BIWPG group subjected to the NEP intervention helped give meaning and understanding to the quantitative results. Qualitative studies allowed for probing deeper for insight into the research problem (Achterberg 1994:s1808). The qualitative analysis identified core themes regarding the benefits of health education, purchasing behaviour on what to buy and how to save money, and guidelines for the layout and design of the Sesotho booklet

to serve as NE material. Illustrations used in the booklet should contribute meaning to the text. A booklet with solid binding was the preferred option. A font of 12-14 would enhance reading of the text. The text was well understood and added value to the NEP.

#### **6.4.4. The process**

The successful implementation of NEPs is hampered by the lack of a systematic evaluation of research of what works and what does not. Evidence of efficacy (doing the right things) and effectiveness (doing things right) is therefore needed to address nutrition problems in a cost-effective way to improve nutrition programming by funding organisations and budgets of governments in developing countries. Yet Allen and Gillespie (2001:75) state that there is an extraordinary shortage of well-designed evaluations of community-based nutrition interventions. Cost-benefit analysis could be very valuable.

### **6.5. CONCLUSION**

Nutrition programmes seldom follow logical planning, implementation and evaluation processes to bring about positive change (Lutter *et al.* 2013). Continuous adaptation and re-planning had to be performed based on information gained in this research project.

The NEP and NE materials were effective to bring about an increase in nutrition knowledge in the experimental BIWPG sample of child caregivers. The degree of change in nutrition knowledge was compared to the change measured in the control group and found to be much higher in the experimental group.

Dietary intake was measured in the longer term in the BIWPG experimental group to detect any changes that might be ascribed to the improved nutrition knowledge acquired from the NEP. However, the findings of the present study confirm that dietary intake is poor both in the before-intervention and the after-intervention nutrient analysis, typical of a low-SES community. Few changes were observed after the NEP intervention. Therefore, although the NEP was effective in increasing nutrition knowledge, it did not increase dietary intake. The sample was too small to

generalise findings to a larger population. However, valuable lessons were learnt that will contribute to the body of knowledge on NE in the South African context.

Although improving nutrition knowledge might be classified as a short-term strategy, changing dietary behaviour takes time and persistence as it is a step-by-step process. Enabling communities about healthy eating is important, especially on a low budget. This means not only involving communities in the design of NE, but also mobilising communities through well-planned communication programmes and giving them a role in designing, monitoring, and managing nutrition services.

Stunting in children cannot be reversed, and this also applies to many of the chronic diseases of lifestyle, which result in conditions that are not readily reversible. Thus malnutrition may result from excessive and/ or insufficient intake of certain nutrients as an underlying cause of ill-health. The World Bank has stated (2006:55) that the conclusion, confirmed by many studies, is that factors such as nutrition knowledge, caring practices for young children, access to health services, and water and sanitation, have important roles to play in child nutrition and malnutrition as depicted in the UNICEF framework of malnutrition. Tailored NEPs are important for the health of the women themselves and for that of their children and grandchildren.

The final chapter (Chapter 7) will provide the concluding summary, limitations and recommendations of this study, as well as recommendations for further research.

# **CHAPTER 7**

## **CONCLUSIONS AND RECOMMENDATIONS**

### **7.1. INTRODUCTION**

In this chapter conclusions are drawn about the study are drawn, contributions with regard to NE are discussed, and recommendations for further research are made. Limitations are acknowledged and methods to combat error in the study are highlighted. Reflections are presented on the process of development and implementation of the NEP. Four of the South African FBDGs were employed to address the lack of nutrition knowledge, as indicated in a situational analysis in the Boipatong community in an effort to improve dietary intake, aimed at caregivers of children (5-15 years) in a tailored NEP in Boipatong in the Vaal Region. The NEP promotes sound nutrition at a low-literacy and socio-economic level. Knowledge of nutrition plays an important role in the multitude of factors involved in eradicating malnutrition (Walsh *et al.* 2003:89), as indicated in the UNICEF (2004) framework of malnutrition. The NEP was developed, implemented and evaluated, founded on the four phases of the FAO framework for NEPs (1997). The NEP was based on SCT to favour behaviour change in terms of dietary intake (Bandura, 2001). The NEP is part of capacity building in older caregivers, contributing to better food choices to bring about lasting solutions that can impact the lives of the children and household that the caregivers belong to.

The NEP, developed, tailored and implemented as an intervention strategy to address identified needs of caregivers, was effective in improving nutrition knowledge. The purpose of the research was tested empirically and found to be successful by significantly increasing nutrition knowledge of the South African FBDGs (2012) included in the NEP. Although only small traces of dietary changes could be detected, dietary intake change takes longer, and, according to the literature, it is a stepwise process, especially in areas with income poverty.

**7.1.1. *The role of the researcher in this project encompassed the following:***

- Proposal writing and conducting a literature study about poverty and malnutrition, possible nutrition interventions, particularly focusing on NE
- Designed the research in each phase
- Involved in the planning and fieldwork of situational analysis and interpreting data
- Providing assistance to the M Tech student
- Involved in training fieldworkers for data collection and responsible for training the of facilitator of each discussion group during the implementation of the NEP
- The development of NKQs to test the impact of the NEP in the short and medium term
- The implementation of the reliability testing of questionnaires
- Testing illustrations and drafting the content of the booklet
- Developed and performed the pilot testing of the lesson plans of the NEP and booklet
- Organised and obtained data from the control group
- Compiled the text of the NE material in English, had the text translated into Sesotho by a professional language service and then verified the script with the English version with the help of Sesotho-speaking B Tech students
- Drew up guidelines for the design of the booklet and assisted with the layout
- Prepared and presented the NEP to the caregivers with the help of the facilitator at each discussion session
- Organised data and assisted the statistician with questions to be answered
- Wrote the dissertation and had it edited
- Compiled material for the poster sessions and presentations, and co-authored the two articles as part of the expert group for FBDG revision as provided under research outputs (section 7.7.2).

The study used a participatory process to engage the caregivers and governing structures during the preparation, formulation, implementation and evaluation phases through regular meetings and feedback sessions.

## 7.2. STUDY OBJECTIVES AND MAIN FINDINGS

The study objectives achieved and the main findings on each will be discussed according to the different phases where they were reached.

### 7.2.1. *Preparation phase*

The following study objectives were addressed in the preparation phase:

- 1.3.1.1. Determine a socio-demographic profile and the perceived health status of caregivers of children (5-15 years) in a situational analysis in the preparation phase (Chapter 3).
- 1.3.1.2. Assess the existing nutrition knowledge, food consumption patterns and dietary intake of the child caregivers as part of the situational analysis (Chapter 3).

In the preparation phase, a situational analysis revealed a picture of urban poverty in caregivers of children (5-15 years) in the Boipatong community. The children received feeding support three times a week at a Boipatong centre managed by the Sharpeville Care of the Aged, who was concerned about the children's being hungry. The median age of the caregivers was 44 years (IQR 32-62).

The socio-economic data reflected a low SES in households. Income and consumption poverty was confirmed by 80.5 percent of households spending R300 or less on food, with 75 percent of households having between four and seven people in the dwelling. However, asset poverty was low with a range of electrical appliances commonly available in brick houses with electricity and water supply. The educational level of caregivers was acceptable, with 54.9 percent having a secondary school education. The self-reported health status of caregivers showed that 91.1 percent reported often or always experiencing tiredness and only 57.7 percent reported support from family as a safety net, which compromised their ability to care for children.

Dietary results as measured by a DDQ and 24-hour recall were indicative of food poverty and poor food choices, possibly due to monetary constraints. Respondents consumed a mainly carbohydrate-rich diet, as eight of the twenty most frequently consumed food items were carbohydrates. Animal-protein-rich sources were consumed by fewer people and in small portions. Milk was of special concern. Legumes were absent from the list of foods frequently consumed. Despite these findings, median protein intake complied with EAR for women 31-50 years of age. However, when cancelling the effect of greater consumption than required by some of the participants, dietary protein intake (NAR 0.8) was evaluated as good.

Food poverty was further confirmed by 55.8 percent of respondents that could be categorised as exposed to a mild risk of low food diversity (30-60 different food items consumed), although the DDS was high (8.4), probably due to availability of food in the urban setting. Food diversity was thus high between food groups but low within the different groups. Micronutrient deficiencies also seemed to be present, with a MAR of 0.5 for minerals and 0.6 for vitamins (100% adequate diet =1). The low energy intake (median 5323 kJ /day; IQR 3369-7949), was recognised as only 13.9 percent reached the EER of 10093 kJ per day. The overall MAR of the diet was 0.7. Under reporting in the 24-hour recall could have contributed to the low energy intake, yet taken together with the low-income households, the low energy intake remains plausible.

Regarding the caregivers' nutrition knowledge, the lowest scores were obtained in the categories of the FBDG 'enjoy a variety of food' (mean 33.4% (SD4.1); (95%CI 1.1)) followed by the FBDG on animal protein (mean 40.3% (SD 3.5), (95%CI 1.0)), linked to the small intake by only a few respondents of animal protein. It was thus decided that coupled with the information gained by the dietary intake, these two FBDGs should form part of the NEP to be developed. The absence of legumes in the top 20 most frequently consumed foods led to the decision to include the FBDG on plant protein in the NEP, although caregivers' nutrition knowledge was determined as mean 54.3 percent (SD 6.7) (95% CI 1.8). The channels of communication favoured by caregivers were as first choice videos and secondly pamphlets, followed by lectures. The research team decided that videos would be too expensive and a lack of skills in producing a video would hamper development. The best option in this specific scenario would be a combination of the lectures (as face-to-face



communication) and written nutrition material to reinforce messages delivered, using the South African FBDGs as guidelines. These findings would form the basis of the NEP and NE material to be developed, implemented and evaluated.

### **7.2.2. Formulation phase**

The sample of Boipatong Interdenominational Women's Prayer Group (BIWPG) of caregivers, as a subsample of the caregivers in the situational analysis, was used in the formulation, implementation and evaluation phases of the NEP as the NGO Sharpeville Care of the Aged became non-functional. The median age of this group was 63 years (IQR 52-78). The following objectives achieved in the formulation phase are presented.

1.3.1.3. Determine the acceptability and understanding of the child caregivers of the existing South African FBDGs (2003) pamphlets produced by the SA DOH (Chapter 4).

1.3.1.4. Develop (Chapter 4) a community-based, culturally tailored NE intervention based on the South African FBDGs, to improve nutrition knowledge in the sample of child caregivers.

1.3.1.5. Develop and tailor NE material for Sesotho-speaking child caregivers to support the NEP (Chapter 4).

The acceptability and understanding of the existing pamphlets produced by the South African DOH on the FBDGs as national NE material for low-LSM individuals (Chapter 4) were investigated in the formulation phase of the NEP. Existing written NE materials of the DOH were assessed by the caregivers and found to have a number of shortcomings. Pamphlets were evaluated to be confusing (52.3%). The main findings included acceptability of comprehension and understanding of the messages (60.5%). Image elicitation revealed that little distinction was made between pictures (23%) and drawings (25%) as the preferred option for illustrations. Compound pictures were especially confusing.

It was clear that the NE material had to be re-designed for inclusion in the NEP. New tailored NE materials were developed to address shortcomings identified in the existing DOH pamphlets. A definite need was identified for culturally acceptable NE material in the caregivers' home language Sesotho (74%), written in a medium font (12-14), and bound in an A4 format booklet (51%). Various illustrations were tested for inclusion in the booklet. In order to support the strategy of NE chosen based on findings in the preparation and formulation phases, a booklet in was developed in English and translated into Sesotho, pilot tested, implemented and evaluated in the intervention. The supportive NE booklet addressed the four South African FBDGs (2012) regarding food variety and animal and plant protein, and included the FBDG on milk, maas and yoghurt that was split from the animal protein group as per South African FBDGs (2003) while the current study was being conducted. This change enhanced the outcome of the study, as calcium presented a very low intake in both the situational analysis (median Ca 165 mg IQR 94-331) as well as the evaluation phase (median Ca 166mg; IQR 98-265) before-intervention dietary intake analysis. In the after-intervention dietary analysis calcium intake (median Ca 296 mg; IQR 154-464), showed a significant increase in although it was still very low compared to the EAR of 1200mg per day. The NE booklet was finalised and implemented as part of the NEP (Annexures Y and Z). The booklet is available to be used in other NEPs to promulgate the FBDGs it contains.

A theory-based NE intervention to address nutrition knowledge and promote good dietary intake in child caregivers in the Boipatong District in the Vaal Region (Chapter 4) was developed. Lesson plans were developed and pilot tested for comprehension, readability and acceptability of Sesotho text and information.

### **7.2.3. Implementation phase**

The following objective was reached in the implementation phase:

1.3.1.6. Implement the NEP (Chapter 5) and measure short-term change in nutrition knowledge of the child caregivers at each session of the NEP (Chapter 5).

A nutrition-specific intervention (NEP) based on the needs of child caregivers in the Boipatong District in the Vaal Region (Chapter 5) was implemented. The short-term impact of the NEP with regard to nutrition knowledge was evaluated in a pre-post-test design and analysed by means of t-tests. A significant change in nutrition knowledge was found in every FBDG session in terms of the mean number of questions correctly answered in short quantitative questionnaires in the group of caregivers. Findings included, for the FBDG 'variety' 22 questions (pre-test 10.8 (SD1.9); post-test 12.6 (SD 1.5)  $p<0.001$ ); FBDG 'plant protein' 15 questions (pre-test 8.8 (SD 1.1); post-test 11.5 (SD 1.9)  $p<0.001$ ); and FBDG 'animal protein' 33 questions (pre-test 17.5 (SD 3.2); post-test 20.4 (SD 3.7)  $p<0.001$ ) respectively. Cognitive knowledge gained in the group was thus significant in the short term. The lesson plans were also adapted to four FBDGs, similar to the booklet.

When viewing the change in nutrition knowledge as a percentage, the FBDG 'variety' changed from a median of 50 percent (IQR 44-55%) obtained in the pre-test to median of 59 percent (IQR 50-60%); the FBDG 'plant protein' changed from median pre-test 61 percent (IQR 53-66%) to post-test median 80 percent (IQR 67-87); and the FBDG 'animal protein' from a pre-test median of 55 percent (IQR 48-61%) to post-test 60 percent (IQR 55-70%).

#### **7.2.4. Evaluation phase**

The following objective was achieved in the evaluation phase:

1.3.1.7. Evaluate the medium-term impact of the NEP on the caregivers of children (5-15 years) in terms of nutrition knowledge, dietary intake and perceptions regarding the impact of the NEP and NE material (Chapter 6).

The impact of the NEP was measured in the Boipatong experimental group and compared to a control group in the medium term (three months after completion of the intervention in the experimental group) Both groups were assessed before the intervention for nutrition knowledge in the groups (Chapter 6). Dietary intake was also assessed in the experimental group before and after the intervention by means of 24-hour recalls to evaluate any changes in dietary intake that might be ascribed to the NEP.

One of the main findings of the impact of this study is that nutrition knowledge improved significantly in the medium term and this can be ascribed to the nutrition education intervention. Another finding is that nutrition knowledge is a necessary but not defining factor for significant changes in dietary intake in the caregivers in the medium term, especially when the means to access healthy food are lacking.

Nutrition knowledge, tested by means of a questionnaire with 50 questions covering the FBDGs of the NEP, was significantly ( $p < 0.001$ ) improved in the experimental group. The mean number of questions answered correctly before the intervention was 24.5 (SD 4.8) compared to after the intervention (mean 35.2; SD 3.6). In the control group there were no significant changes in knowledge, as answers were more dispersed. The mean before the intervention was 31.7 (SD 4.4) and after intervention it was 33.9 (SD 3.0) in this group. Although the before-intervention of the control group was higher (mean 31.7; SD 4.1) compared to the experimental group (24.6; SD 4.8), the degree of change was higher in the experimental group (10.6 more questions answered correctly between the before- and after-intervention) compared to the control group (2.2 more questions answered correctly) in the NKQ of 50 questions. The better nutrition knowledge of the control group before the intervention might be due to the fact that they were more exposed to an awareness of the importance of food in the ECD environment.

There was a change in nutrition knowledge in the experimental group of 21 percent compared to that of the control group of five percent. The median before the intervention in the experimental group was 49 percent (IQR 46-57%) and after the intervention, the median increased to 70 percent (IQR 68-73%).

The Boipatong experimental group evaluated the value added by the NEP and NE material favourably in two focus groups held after completion of the NEP. The qualitative analysis highlighted their perception of the importance of health education and the knowledge of what foods to buy to save money. They were very appreciative of the NE booklet in their home language. They could comprehend the script easily and the illustrations contributed meaning to their understanding of the information.

Dietary intakes before and after the intervention were measured and compared. Both the before and after dietary analysis presented a low energy intake (median before 4788 kJ; IQR 3415-6596) and median after-intervention 4654 kJ; (IQR 3369-6664)

compared to an EER of 7355 kJ for women >51 years of age. Carbohydrate intake was a main source of energy supply in both the before and after interventions (median before 137g (IQR 98-188) versus median after (132 g; IQR 108-172) confirmed by the eight and seven carbohydrate-rich items in the 20 most frequently consumed food in the before and after interventions dietary intakes respectively. Calcium, iodine and vitamin C also significantly increased in the after-intervention, compared to the before-intervention dietary intake analyses. On the downside, Zn, thiamine, vitamin B6, folate and vitamin B12 significantly decreased in the after-intervention dietary analysis. No direct reason for this could be found. It is assumed that seasonality could have played a role, as the before intervention was done in January and the after-intervention dietary intake was measured in September of the same year. In the after-intervention dietary intake, red meat (beef) disappeared from the top 20 most frequently consumed list, replaced by more chicken. That could be linked to price increases in red meat in the post-winter season.

### **7.3. LIMITATIONS**

The value and applicability of the results of this study are dependent on the validity and reliability of the respective data-collection methods. This research study therefore aimed to provide data that are valid and reliable.

#### ***7.3.1. External validity***

As the situational analysis was a convenience sample and no random selection was done, concepts cannot be generalised from the sample to a population. The main objective was to compile a profile of the sample to base further developments on the profile. The NEP was implemented and evaluated in a small sample of child caregivers in Boipatong in the Vaal Region only. It would have been more valuable if the study had covered other areas in the Vaal Region as well, in order to generalise the results to the Sesotho group.

#### ***7.3.2. Reliability of data***

Reliability was more difficult to control in terms of varying sample sizes. The situational analysis was undertaken in a sample of child caregivers in a feeding centre in Boipatong under the auspices of Sharpeville Care of the Aged (a NGO in

the region). The child caregivers in the rest of the study were governed by the BIWPG, a religious organisation. However, they were mostly the same individuals also belonging to the Sharpeville Care of the Aged. When the NGO ceased to be functional, the population of the study was the women attending the prayer meetings from whom the sample was recruited. Sample sizes of the various prayer meetings changed, but the same respondents were tested at every session in the pre- and post-test in the short term for nutrition knowledge. The median age of the women in the situational analysis was 44 years (IQR 32-62 years), while that of the experimental group was 63 years (IQR 52-78), an age difference of 19 years. However, the information from the situational analysis was only used to inform the development of the NEP and not for measurement purposes. No comparison between the situational analysis and the experimental group was made.

In the experimental group t-tests were used to measure the degree of change in mean nutrition knowledge in the pre- and post-tests in the short term. However, in the longer term the independent t-tests were used and the Wilcoxon rank sign tests were used to allow for nonparametric data (skewness) in the before- and after-intervention samples. It was not possible to obtain exactly the same individuals to measure the data by dependent t-tests. However, exposure to the NEP was controlled in the after-intervention sample. This was easier in the control group, as they only attended a session in January and September and were easier to get together in a single venue through the crèches on the same dates.

The researcher acknowledges that the results of the formative research may be limited by several factors. The participants in the discussion group were a small sample and may not be fully representative of the entire target population in terms of age, acculturation, literacy levels and other demographic variables. Inference to a larger population can therefore not be made. Despite the limitations, many lessons were learned from the discussion group. However, this study included the testing of developed NE material and therefore delivered valuable information to obtain essential insight.

### **7.3.3. The South African FBDGs**

The 2003 version was revised and changed in 2012 towards the end of the implementation and evaluation phases, which complicated lesson plans and the testing of the draft NE booklet, and added a new FBDG for inclusion.

### **7.3.4. Voluntary dropouts**

The testing of existing NE material started with a large number of participants (n=86), but the intervention study groups were of smaller sample sizes (n=43-55) due to the number of attendants of the prayer groups. However, some of the sessions of the intervention study had to be undertaken despite bad weather and a cold winter (elderly participants walked to the churches, sometimes a considerable distance from their homes).

### **7.3.5. Availability of participants**

A further limitation was that the child caregivers were available on a monthly basis at prayer meetings only. No activities could be done on other days, which hampered progress. The time allowed had to be optimised, leaving no room for error.

### **7.3.6. Sustainability**

The short intervention period is seen as a challenge for establishing lasting dietary changes that allow caregivers and households to continue on a sustainable basis. Thus, lasting effects of the impact of this research at household level is not assured to ensure sustainability. Continued motivation and encouragement of caregivers could be advantageous.

### **7.3.7. Questionnaire**

None of the questionnaires testing nutrition knowledge were translated into Sesotho, while the discussions and booklet were in Sesotho. This could perhaps have influenced the results negatively. According to the literature, inconsistent responses occur when respondents complete a questionnaire without comprehending the items, and especially so in the case of self-reported questionnaires (Fong & Lam 2010). However, few such inconsistencies could be found in this study.

## 7.4. CONTRIBUTION OF THE STUDY

The study contributed to improved nutrition knowledge of 21 percent in the sample of BIWPG caregivers. Caregivers were empowered with nutrition knowledge that can lead to healthier food choices and dietary intake in their households.

The study also led to a better understanding of food patterns of the Sesotho community in Boipatong and of the nutrient inadequacies observed in the sample of caregivers. Although small samples were used, the empirical results contribute to the growing body of knowledge about urban poverty, malnutrition and nutrition transition in SA.

The child caregivers benefited from the study in different ways. Enriching discussion groups were held where elderly caregivers of children could participate and gain more knowledge about nutrition that could influence eating habits in households favourably.

The developed booklet can be incorporated into other studies as it has proved to be successful in improving the nutrition knowledge of the elderly caregivers and it can be used in other NEPs and by health professionals.

The training of fieldworkers and the caregivers provided an opportunity for capacity building. It also contributed to women's empowerment and status.

## 7.5. RECOMMENDATIONS FOR FUTURE ACTIVITIES

Following the results of the research project, areas needing further development are provided regarding the community in which this research was done, recommendations are made to the local provincial and national government tiers, and gaps for future research are identified.

### ***7.5.1. Further activities that could be implemented by the Boipatong community as part of capacity building***

- In order to take this NEP further, the group of educated and enabled caregivers is well positioned to socially mobilise and lobby for better food choices in schools, crèches, canteens, spazas and street sellers to provide and promote healthier food in Boipatong through the vehicle of the Interdenominational Women's Prayer Groups.



- Future interventions with food-insecure households should include NE as well as efforts to increase access and availability to healthier foods nearer to the township. Spazas have to a large extent disappeared from the area, due to alleged robbery and crime, and were replaced by street vendors
- Churches or community organisations could also arrange for NE to provide women in the Boipatong community with personal skills in food safety, good food storage and preparation skills to optimise availability and preserve nutrients, as these were identified shortcomings in the knowledge and skills during the implementation of the NEP. Being situated in an urban area where electric stoves, fridges and freezers are readily available, the skills required to utilise this modern equipment differ largely from cooking over open fires and reaping crops according to need on a daily basis. It was not possible to cover all these aspects during the short NEP intervention. NE may also include money-saving shopping strategies and facilitate menu planning to enable participants to acquire variety in their diet.
- Schools could increase parents' awareness of ways to make healthful foods more accessible to children and households. Schools and churches could host events that provide only healthy food choices. Food gardens could be established at schools.
- Partnerships between communities and healthcare professionals are critical for collaborative decision-making in order to improve community health.

### ***7.5.2. Further activities that could be implemented by policy makers***

All tiers of government are important decision makers that have an impact on the lives of the ordinary civilian. The findings will help guide policy and programmes to improve nutritional health.

#### **7.5.2.1 Local Government**

Environmentalists' slogan to think globally but to act locally applies equally well to reform in nutrition interventions at this third tier of government. Local government as key sector provides the greatest access to the nutritional vulnerable populations. They have the potential to open doors to long-term support for sustainable NEPs in the interest and well-being of the communities. Institutions such as crèches, schools,

churches and NGOs as partners in their region, serve as vehicles to support nutrition interventions. Primary amongst those at risk of malnutrition are women in poor communities and the youth at large.

Since supermarkets are some distance from the neighbourhood, supermarket chains could be lobbied to establish stores in Boipatong to decrease transport costs in a poor community with many elderly people. That would increase food accessibility and lead to better household food security. Increase visibility of healthy food in stores or put wholesome foods on promotion. Local government can play a large role in this. Since the women in this community were closely involved in the struggle against apartheid, the favour can be returned for these now elderly, but still vulnerable, women.

#### 7.5.2.2. Provincial and National Government

The South African government has done well since 1994 in delivering RDP houses and structural facilities and services. The challenge remains to empower especially women, as the main decision-makers, in the procurement and preparation of food and feeding the family with nutrition knowledge and skills to address food poverty in urban areas. Poverty that leads malnutrition is an indirect risk factor for CDL. It is vital to create jobs to improve the situation regarding income poverty, to alleviate the plight of the poor in SA.

NEPs should be implemented, taking into consideration socio-demographic influences on the target customer. Government should consider policies that deliver NE to the population, such as:

- Strengthening and capacitating the public and government servants with NE knowledge is required in various departments. The agriculture and health sectors in particular could make significant contributions to improved nutrition, as they are mainly responsible for implementing the agricultural, food security and nutrition programmes in the communities. They need to include and empower the elderly with nutrition knowledge to help them to be healthy.
- Making provision for NE through a tax levy on food advertising that promotes healthy eating (media, restaurants and food outlets). For example, consumers may be nudged into making healthier choices by the specific placement of certain products in retail grocery stores and cafeterias accompanied by nutrition

information. The maximum impact would be obtained by employing similar measures across a variety of sectors, and industries.

- Implementation of social marketing of FBDGs in mass media and government worksites to provide a model for other sectors. Involve the food industry, including restaurant and food services as well as consumers through consumer organisations.
- Launch advocacy projects to policy and decision-makers about the significance of NEPs and FBDGs and the impact of good nutrition on national development and the economy in SA. Long-term investments in lifestyle and behaviour change could result in sustainable improvement in nutritional status, resulting in higher productivity and economic growth.
- The FBDGs should also be communicated through various channels so that all South Africans become familiar with good eating practices and well-being.
- Adequate nutrition should be treated as a human right; as should the *knowledge* of what constitutes adequate nutrition. Poverty and malnutrition are pivotal to the 2015 MDGs and the global striving to eradicate them should remain a central theme in the way forward at all levels of government.
- Despite the extensive rhetoric about inter-sectoral cooperation, little documentation exists to guide nutritionists in how the cooperation across departments is to be managed. Because there are multiple stakeholders, nutrition often falls between the cracks. Inter-sectoral collaboration is not easy to manage in such a way that meaningful nutritional changes are brought about. Despite some favourable structures and policies at the national level, there is little evidence of coordination in nutrition between the agricultural and health sectors. In SA the IFSNP falls under the mandate of the Department of Agriculture. Yet this department might lose focus of malnutrition within its multiple functions if there is not a specific unit dedicated to food and nutrition security similar to the Expanded Food and Nutrition Education Programme (EFNEP) in the USA, but with a dedicated NE unit lodged within the EFNEP. Food security is often seen only as the food supply for the nation. To further complicate matters, NE falls under the Health Promotion Directorate in the Department of Health and is not directly part of the INP (Chapter 2, section 2.3.3). In 2010 Crush and Frayne wrote “At present, the evidence (on food security of the Southern African urban

poor) is so fragmentary and inadequate that it can only lead to misguided or ill-considered interventions at the municipal and national level.”

### **7.5.3. Future research**

Research is an important aspect of any NE programme, as it contributes to creating a scientific foundation that contributes to science-based evidence.

- The direction of research and evaluation in this field should move to how to implement effectively to scale, sustain the impacts over time, and ensure equitable outcomes of interventions. In future studies, the NEP could be replicated and scaled up to be tested in a larger sample size, as this initial evaluation of the NEP package could be viewed as a pilot study towards testing in a larger random controlled study. Further research is needed to explore the objectives of this study over a longer period and to focus specifically on behaviour change and impact on nutritional intake.
- The results of this study show that an NEP is a viable option and that there is a clear need for more experimental studies on the effectiveness and cost-effectiveness of such interventions. Methodologies need to be standardised to make comparisons and analysis easier.
- The questionnaires on nutrition knowledge could be translated into Sesotho to bring them in line with the discussions and the booklet.
- NEPs should be based on an assessment of the nutritional status and social health indicators of other population subgroups, as the cultural eating habits and values and norms of this rainbow nation differ. Very little scientific information is available on the eating habits and cultures, traditional recipes and rituals of the various population subgroups.
- Further qualitative and quantitative research is needed on the relationship between diet and nutrition insecurity in low-SES communities in urban areas in the South African situation with nutrition in transition. Optimising diets, sensitive to cost and social norms, should be investigated as coping strategies.
- Targeting health behaviour practices that are closely related to nutrition, such as washing hands before preparing food and before feeding young children,

would ensure a better impact on behaviour change that could also improve nutritional status, especially that of children

- Future investigations need to consider the barriers preventing males from engaging in food and dietary modification strategies to determine effective approaches to awaken males' interest in health and nutrition.
- Child nutrition research should engage whole families, not only young mothers, to improve nutrition outcomes. Food and nutrition are important parental responsibilities.
- A longitudinal study could be undertaken on the children of the caregivers who have received NE to track the impact of this education on the secondary target group
- Little information was found on how to run discussion and intervention groups with older people, and so further research could explore the factors that facilitate effective group and participatory activities and older people's adherence to them, for example, cooking demonstrations.
- In general, not much available literature could be identified that documents the implementation of the FBDs in campaigns or other studies.

## **7.6. CONCLUSIONS**

The NEP developed as part of this study consisted of efforts to educate a group of caregivers to improve food choices based on four FBDGs within households in Boipatong. This is a poor community who suffers from household food insecurity and below average nutrition knowledge, resulting in poor nutritional status. The NEP aimed to improve Sesotho-speaking caregivers' nutrition knowledge about animal and plant protein while promoting variety in the diet. The NEP was successful, as it resulted in improved nutrition knowledge. However, no dietary intake behaviour changes were observed. This may have been due to financial constraints and the relatively short time over which behaviour changes were measured. Behaviour change models state that behaviour change takes time and takes place stepwise. NE interventions are considered to be part of the longer route in the malnutrition framework. Therefore, ongoing NEPs should be emphasised in poor communities, as should income-generating practices or strategies such as home vegetable

gardening to address household food insecurity. Improved nutrition knowledge alone is not enough.

Since poverty, food insecurity and malnutrition are typically interrelated, many experts and politicians see the solution in an integrated, horizontal, cross-sector approach. However, the 'how' and lessons learned of successful projects based on such an approach need to be documented. Ways to improve NE to effect better food choices as well as coping strategies towards dietary diversity in the urban poor need to be explored.

## **7.7. OUTCOME AND SELF-EVALUATION OF THE STUDY**

Self-reflection is not purely an internal process. It means 'to take stock,' is action orientated (and thus 'meta-thinking') and historically embedded to serve human interests – it is an essential process to take consideration of situations as agents of history (Boud *et al.* 2005:33) for professional development and an essential part of the learning process (Lieberman 1995:67).

### **7.7.1. Self-evaluation**

During the course of the research, a steep learning curve led to a process of personal growth, where the researcher gained new scientific knowledge and insight:

- Returning to grassroots level and working with participants where they live play and pray filled the researcher with benevolence for their warm generosity and open-heartedness.
- The researcher experienced renewed compassion for people who live in poverty on a daily basis and yet still survive their circumstances. The researcher was honoured to be invited to tea in the home of 'Mrs President' of the Executive Committee and was impressed by the elegance of the small but neat home.
- The normal cycle of conflict build-up within a project was experienced in the Executive Committee of the Boipatong women's prayer group, which was inevitable amongst individuals with strong personalities, and it had to be managed to avoid major damage to the project.
- Risks paid off, such as dependence on turn-out at each prayer meeting or discussion group to provide an adequate convenience sample size, as well as

developing a booklet in one of the official languages that was foreign to the researcher.

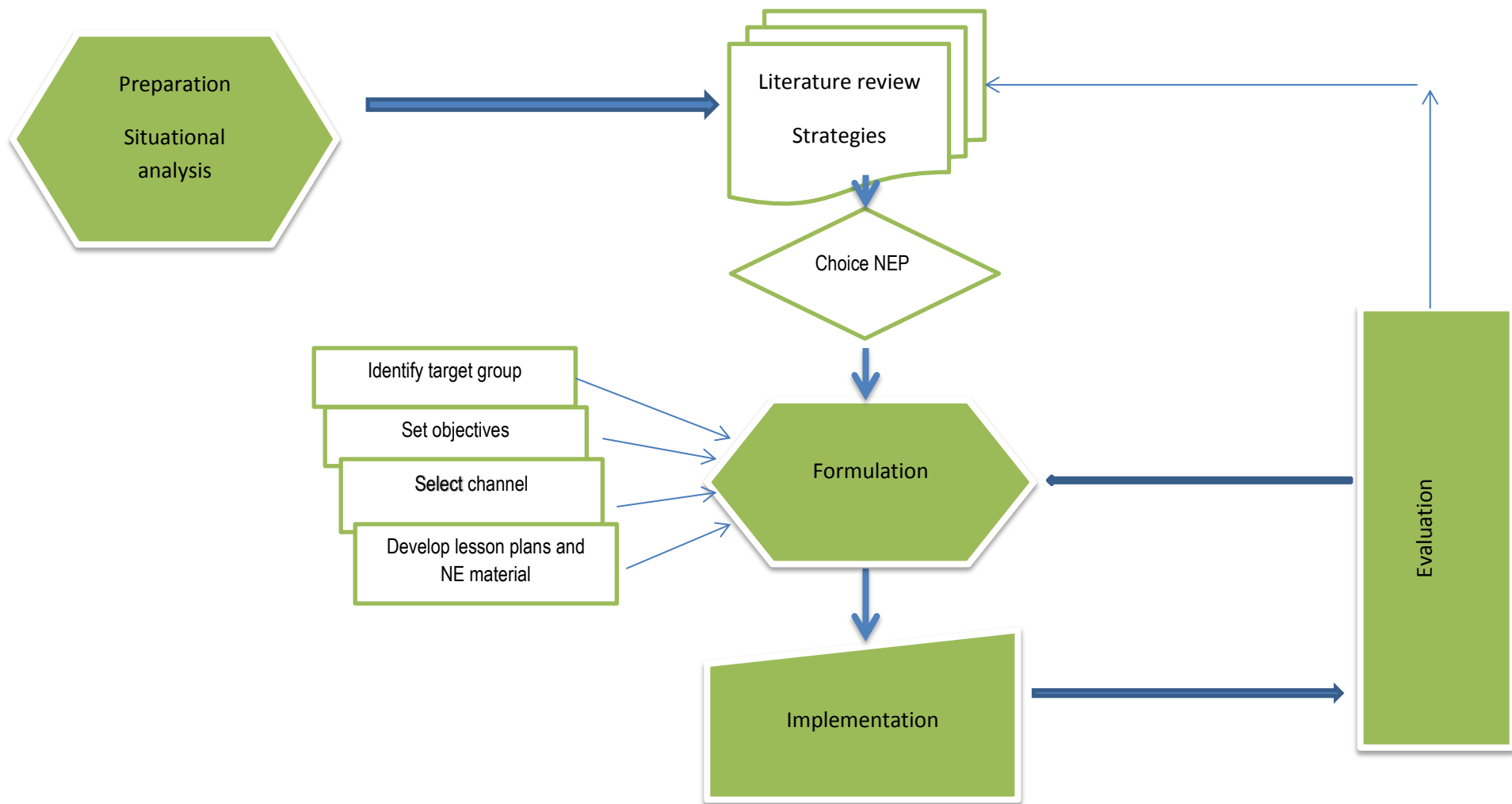
- The financial implications of this study were greater than originally anticipated. The audio-taped Sesotho focus group, for example, turned out to be very expensive as 2 x 30 minutes had to be transcribed, and then translated into English, before any analysis could be performed. Yet the results provided valuable insight.
- If an M Tech study forms part of the bigger study, the D Tech researcher should register nearer to completion of the M Tech to accommodate timelines.
- Methods for both process and outcome evaluation should be included in the planning phase.

The process that was followed is depicted in Figure 7.1. The situational analysis revealed, through a socio-demographic and nutritional analysis, a profile of a poor community where many individuals were at nutritional risk. In this sample of caregivers, income poverty with resultant consumption poverty and capacity poverty were identified as challenges to be addressed. The identified poverty led to household food insecurity and from the literature it was evident that child care is also affected in such situations.

Strategies for nutrition interventions were investigated. Since very little could be done about income poverty, the other route was chosen, namely capacity building in the form of NE to caregivers as primary target audience with children as a 'spin-off' secondary target group.

An NEP was developed and implemented as knowledge transfer in capacity building and empowerment. The outcome of the research project was a significant change in knowledge on the four selected FBDGs.

The NEP framework of the FAO (1997) guided investigations, development and evaluation throughout the study process. The thesis was also written according to the phases of the framework. The UNICEF framework of malnutrition guided the study on the influence of variables regarding the micro- and macro-environment on the various levels of basic, underlying and immediate causes of malnutrition.



**Figure 7.1** The applied process followed during the project, guided by the UNICEF framework of malnutrition and the FAO framework for an NEP



### **7.7.2. Research outputs of this study**

#### **Poster presentation:**

OCHSE, R. & THERON, M. 2004. Development of nutrition education material for the Department of Health. 8<sup>th</sup> Biennial Congress of the Association for Dietetics in South Africa, Goudini-Spa Holiday Resort, 23-27 August, Worcester.

#### **Poster presentation:**

HOLENI, V.F., OLDEWAGE-THERON, W.H. & OCHSE, R. 2009: Nutrition needs of female caregivers in Boipatong for the ISL/SANPAD nutrition education symposium that was held on 4 November 2009 at Quest Conference centre in Vanderbijlpark, Gauteng Province, South Africa).

#### **Presentation:**

OCHSE, R., OLDEWAGE-THERON, W.H. & KLEYNHANS, C.I. 2011. The changing face of urban poverty amongst female caregivers in Boipatong, Vaal Region, Ref no: SAAFECS052. (Presented at the South African Association of Family Ecology and Consumer Science Congress SAAFECS, Pretoria). Unpublished

#### **Presentation:**

OCHSE, R., OLDEWAGE-THERON, W.H. & KLEYNHANS, C.I. 2014. Communicating healthy eating to Sesotho-speaking child caregivers in Boipatong. (Presented at the Community Engagement Symposium, North West University, Vanderbijlpark). Unpublished.

#### **Presentation:**

OCHSE, R., OLDEWAGE-THERON, W.H. & KLEYNHANS, C.I. 2015. Results of a study to determine the success of a tailored nutrition education programme developed and implemented in Boipatong in the Vaal Region. Faculty of Agriculture Research Day, UNISA. (Unpublished).

**Articles: Published**

1. VENTER, C.S., OCHSE, R. & SWART, R. 2013. Eat dry beans, split peas, lentils and soya regularly: a food-based dietary guideline. *South African Journal of Clinical Nutrition*, 26(3): s36-s45.
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## ANNEXURES