

EVALUATING A NUTRITION EDUCATION PROGRAMME FOR FOOD SERVICE ASSISTANTS IN PRE-SCHOOLS IN THE VAAL REGION

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LIST OF ABBREVIATIONS

µg	:	Microgram
ADSA	:	Association for dietetics in South Africa
AI	:	Adequate Intake
BTT	:	Birth-to-Twenty
CALD	:	Cambridge Advanced Learner's Dictionary
COD	:	Concise Oxford Dictionary
CSS	:	Central Statistical Service
DoH	:	Department of Health
DRIs	:	Dietary Reference Intakes
DRV	:	Daily Reference Values
EAR	:	Estimated Average Requirement
EXCO	:	Executive Committee of Convocation
FBDG's	:	Food-based dietary guidelines
FAO	:	Food and Agriculture Organisation of the United Nations
g	:	Gram
HRO	:	Human Resources Development and Operations Policy
HIV	:	Human Immunodeficiency Virus
INP	:	Integrated Nutrition Programme
kg	:	Kilogramme
km	:	kilometre
LBW	:	Low Birth Weight
LSU AG	:	Louisiana State University Agriculture
PFBDG's	:	Paediatric Food-based Dietary Guidelines
mg	:	Milligram
m ²	:	Cubic meter
n	:	Sample Size
NEP	:	Nutrition Education Programme
NCHS	:	National Centre for Health Statistics
NFCS	:	National Food Consumption Survey
NNW	:	National Nutrition Week
RDAs	:	Recommended Dietary Allowances
SA	:	South Africa

SD	:	Standard Deviation
SPSS	:	Statistical Package for Social Sciences
UNICEF	:	United Nations Children’s Fund
US	:	United States
USDA/ARS	:	United States of Agriculture/Agriculture Research Service
VUT	:	Vaal University of Technology
WHO	:	World Health Organisation

LIST OF DEFINITIONS

Caregiver	:	specialised carer (Cambridge Advanced Learner's Dictionary (CALD) 2005:181)
Food service assistant	:	a person who develops menus and prepares meals
Immune system	:	the various cells and tissues in the body which makes it able to protect itself against infection (CALD 2005:637)
Malnutrition	:	physical weakness and bad health caused by lack of the types of food necessary for good health (CALD 2005:769)
Menu	:	a list of items to be served at a meal (Concise Oxford Dictionary (COD) 1990:742)
Nutrition	:	the substances that you take into your body as food and the way that they influence your health (CALD 2005:865)
Paediatric	:	relating to medical care of children (CALD 2005:908)
Pre-school	:	a school for children who are younger than five years old (CALD 2005:995)
Pre-school children	:	young children between the ages of two to five years
Planning	:	a formulated and detailed method by which a thing is to be done; a design or scheme (COD 1990:910)
Sanitation	:	the system for taking dirty water and other waste products away from buildings in order to protect people's health (COD 1990:1124)

ABSTRACT

Malnutrition amongst pre-school children age two-to-five-years is a growing world-wide concern. This is mainly due to poverty, diseases and inadequate dietary intake. Malnourished children are also a problem in South Africa. Pre-schools play an important role in the prevention of malnutrition because most young children consume about two thirds of their food and therefore their daily nutritional intake at the pre-schools. There are various factors that affect a child's nutrition in pre-schools, such as food choices, meal plans, the environment and the nutritional knowledge of the caregivers. Pre-schools can only fulfil this responsibility through the proper nutritional knowledge and training. The nutritional education and knowledge of food service assistants/caregivers are very important, because they compile the meal plans and menus for pre-schools.

The objectives of this study were to evaluate a Nutrition Education Programme (NEP) to address the lack of nutritional knowledge of service assistants/caregivers who plan the menus in pre-schools in terms of existing menu content and food choices required for children between two to five years of age and by using the existing menus and food choices applied to make recommendations for nutritional skills training. Also in terms of basic nutrition, health and safety, to recommend more appropriate alternatives acceptable to children between two to five years of age. Lastly to integrate recommendations for nutritional skill training with regard to the alternative meal plan, eating habits and food choices for the menu through a NEP that would be implemented and evaluated.

The study design was a combination of an exploratory and quantitative-descriptive research design in the form of a survey. A pilot study was used mainly to test the nutrition knowledge questionnaires for content validity. The study population of this research project was randomly selected pre-schools chosen from the Eatonside informal settlement. Procedures for data gathering and the different methods used for data analysis were divided into four phases.

Descriptive statistics were used to determine the percentage of pre-schools who answered the questions correctly for selected nutrition knowledge, portion sizes questions and menu planning, as well as food safety and health. Paired t-tests were carried out to measure the statistically significant difference ($p \leq 0.05$) before and after the implementation of the NEP.

The results of the t-test indicate that only nine of the questions in the post-test questionnaire showed a confidence interval of the difference. There is statistical significance in these questions through either increase or decrease. It can be concluded that the Nutrition Education Programme (NEP) was successful, but that more training is needed due to the limitations experienced.

The menu analysis tested the respondent's menus in terms of the average daily nutrient intake level given to the pre-school children. The data of the pre- and post-test menus were then compared to EAR in order to determine any change in the menus nutritional values after the NEP was completed. The results showed that there were differences in the post-test results that both decreased and increased.

1

CHAPTER 1

PROBLEM AND SETTING

1.1 INTRODUCTION TO THE PROBLEM

Malnutrition is a worldwide crisis and it is on the rise, especially amongst pre-school children (aged between two and five). It is essentially a consequence of poverty, diseases and inadequate dietary intake (UNICEF 1998:2). Malnourished children refers not only to those that do not have enough to eat but also to those children that eat enough to satisfy their immediate hunger but who do not consume enough and/or the correct micronutrients. Malnourished children are more likely to die as a result of a childhood disease than children that are adequately nourished (UNICEF 1998:2). It is therefore essential that the food needs of children are addressed to protect them from illness. Various forms and combinations of malnutrition have been identified such as protein-energy malnutrition, iodine deficiency disorders and deficiencies of iron and vitamin A (Steyn 2000b:2).

The provision of unwholesome food to children in poor communities is firstly the result of the lack of appropriate nutrition education and information concerning micronutrient dense consumption of foods (UNICEF 1998:3), and secondly the lack of proper funding for providing food to the children at the pre-schools (UNICEF 1998:2).

If not resolved, malnutrition will cause a significant increase in the spread of illnesses and diseases amongst pre-school children or even the numbers of child deaths (UNICEF 1998:1). At present, more and more children eat at least one daily meal at the pre-school they attend and if more pre-schools, especially in poor communities could start providing more nutritious meals or nutrient-dense food to children, these children would be less affected by malnutrition (Briley & Roberts-Gray 1999:981). Studies have identified various factors that affect child nutrition in pre-schools, and these include, among others, meal plans and menus, food or ingredient choices, eating habits and safe and hygienic food preparation methods (Nel & Steyn 2000:1-2; Briley & Roberts-Gray 1999:981).

Educating caregivers on nutritional aspects will equip them with sound knowledge for the compilation of proper meal plans and menus and will contribute to their understanding of and

response to a child's hunger cues that are potentially critical for adequate food intake. Teaching basic nutritional principles plays a fundamental role, particularly when caregivers compile menus for a facility, in order to meet the basic dietary requirements of a child (Nel & Steyn 2000:11; Kloka 2003:7-8). It is therefore, imperative to look at the extent of caregivers' knowledge on nutrition principles and at the existing training provided to these individuals, in order to make recommendations regarding training. The analyses of existing menus at pre-schools and conducting knowledge tests may provide the necessary answers.

The benefits of employing knowledgeable individuals on nutrition could lead to a reduction in malnourished pre-school children, which in turn would lead to a decrease in illnesses as a result of malnutrition, and ultimately to a decline in child deaths resulting from illnesses such as those mentioned in the opening paragraph of this chapter. (UNICEF 1998:1-2). Achieving the recommended standards for providing for the nutritional needs of children and an educational instruction in nutrition in a safe, sanitary and a supportive environment of childcare programmes will promote healthy growth and development in pre-school children (Briley & Roberts-Gray 1999:981). The implementation of high standards in addressing the nutritional needs of children and in nutrition education in childcare settings, will have a major impact on the health of children in the future (UNICEF 1998:4).

Providing proper nutritional knowledge to preschool food service assistants, educators and children would instil good eating habits in children and benefit the communities in surrounding areas. In other words the parents of the pre-school children, pre-school kitchen staff and educators, (who in turn could educate the pre-school children and thus the children themselves would adopt more nutritious eating habits that would be vital later in their lives), would be able to benefit from the nutritional knowledge once they understood how to apply the acquired knowledge (UNICEF 1998:3-4).

The value of the study lies in the fact that more nutritious menus could be planned and used by the pre-schools, after implementation of the training programme. The food being served to the children, as a result of a nutrition education programme (NEP), would better fulfil their micronutrient needs.

1.2 RATIONALE AND MOTIVATION

As indicated in the previous section, malnutrition is a crisis globally. A majority of pre-school children may routinely eat half and in some cases more of their three meals and three snacks outside of their parents' care (Hersheys 2004:13). Even though awareness about the role of nutrition in health and chronic disease prevention has been promoted by nutrition guidance and educational initiatives such as the Food Guide Pyramid for adults and children (Hersheys 2004:14), the Estimated Average Requirement (EAR) and the Daily Recommended Intake (DRI), for the needs for preschool children, very little has been achieved in this regard in South Africa (SA).

Hersheys (2004:13), indicates large unexplored areas on, for example, the effects the feeding practices of childcare providers have on the development of preferences and intake patterns for pre-school children, SA has also developed its own set of food-based dietary guidelines for children (Bourne 2007:228) similar to the American (US) guidelines. Despite these guidelines, poor dietary patterns are still observed amongst parents and children in the US (Hersheys 2004:14) and even more so in SA (Steyn 2000b:2). It is thus crucial that the meals served in pre-schools meet the nutritional needs of children.

Findings of a survey conducted in 1994 determining the nutritional status of pre-school children in SA indicated that 23% of children were stunted, 9% underweight and 33.3% had a marginal vitamin A status. One in five children was found to be anaemic and visible goitre was noted in 1% of children nationally (Steyn 2000b:2). In 1999 a National Food Consumption Survey (NFCS) conducted in SA, among one to nine year old children showed one out of ten children to be overweight and one in five stunted. Children living in rural areas and commercial farms were the most affected. Furthermore, dietary findings indicated that 50% of children consume less than half their daily recommended level of energy as well as a specific quantity of important micronutrients.

Less than 67% of the nutrients of the Recommended Dietary Allowances (RDAS) like energy, calcium, iron, zinc, selenium, vitamin A, vitamin B6, vitamin C, vitamin D, vitamin E, riboflavin and folic acid were consumed (Labadarios, Swart, Maunder, Kruger, Gericke, Kuzwayo, Ntsie, Steyn, Schloss, Dhansay, Jooste, Dannhauser, Nel, Molefe & Kotze 2008:253).

A survey on the nutritional status and food consumption patterns of children in the Vaal Region (Napier 2001:85), indicated no association between nutritional status and eating patterns, thus suggesting other influences causing poor nutritional status (Napier 2001:85) such as factors of the immediate, underlying and basic causes contributing to malnutrition in children (Department of Health 2002:1-2). Environmental and individual factors could also include genetic and non-genetic factors (Napier 2001:84).

1.3 OBJECTIVES

This study aims to evaluate and address the nutritional knowledge of food service assistants/caregivers responsible for planning menus in pre-schools for children between two to five years of age. The main objective and specific objectives are discussed below.

1.3.1 Main objective

The main objective of this investigation was to evaluate a Nutritional Education Programme that addresses the lack of nutritional knowledge amongst food service assistants /caregivers planning menus in pre-schools with reference to existing menu content and food choices required for children between the ages of two and five.

1.3.2 Specific objectives

The first specific objective was to determine the level of knowledge amongst service assistants/caregivers who plan menus in pre-schools by looking at existing menus and food choices that are made in order to make recommendations for nutritional skills training.

The second specific objective was to determine how nutritional knowledge is applied by these service assistants/caregivers in their planning of menus in pre-schools with reference to basic nutrition, health and safety in order to recommend more appropriate alternatives acceptable for children aged between two and five.

The third specific objective was to integrate recommendations for nutritional skills training by means of an alternative meal plan, eating habits and food choices for the menu through an implemented and evaluated NEP.

1.4 RESEARCH METHODOLOGY

1.4.1 Conceptual framework

This study followed a phased approach in order to reach the objectives set out in the previous section.

Phase 1 was the planning of the literature study; proposal writing and project design. Prior to the commencement of the second phase measuring instruments for the study were developed. This study made use of questionnaires (Annexure C) and interviews (Annexure B) to gather the necessary data (as seen in Figure 1.1). Questionnaires used in the pre- and post-tests were evaluated for content validity with a pilot study (Annexure A) using ten schools in the Eatonside area as a sample.

The main study (Figure 1.1) was conducted during **Phase 2** of the study and 16 schools in the Eatonside area were used as the sample.

Phase 3 was the empirical research, and the main study included menu analysis and nutritional intake of two-to-five-year-old children. Menu compilers' knowledge about good nutrition was reviewed through questionnaires and interviews. The pre-test consisted of data collection capturing, analysis and interpretation. The data obtained from this facilitated the development of an NEP. The post-test was conducted following the implementation of an NEP (Figure 1.1).

In **Phase 4** the final data were gathered, through data capturing, analysis and interpretation thereof followed by report writing. Figure 1.1 clearly illustrates the different phases.

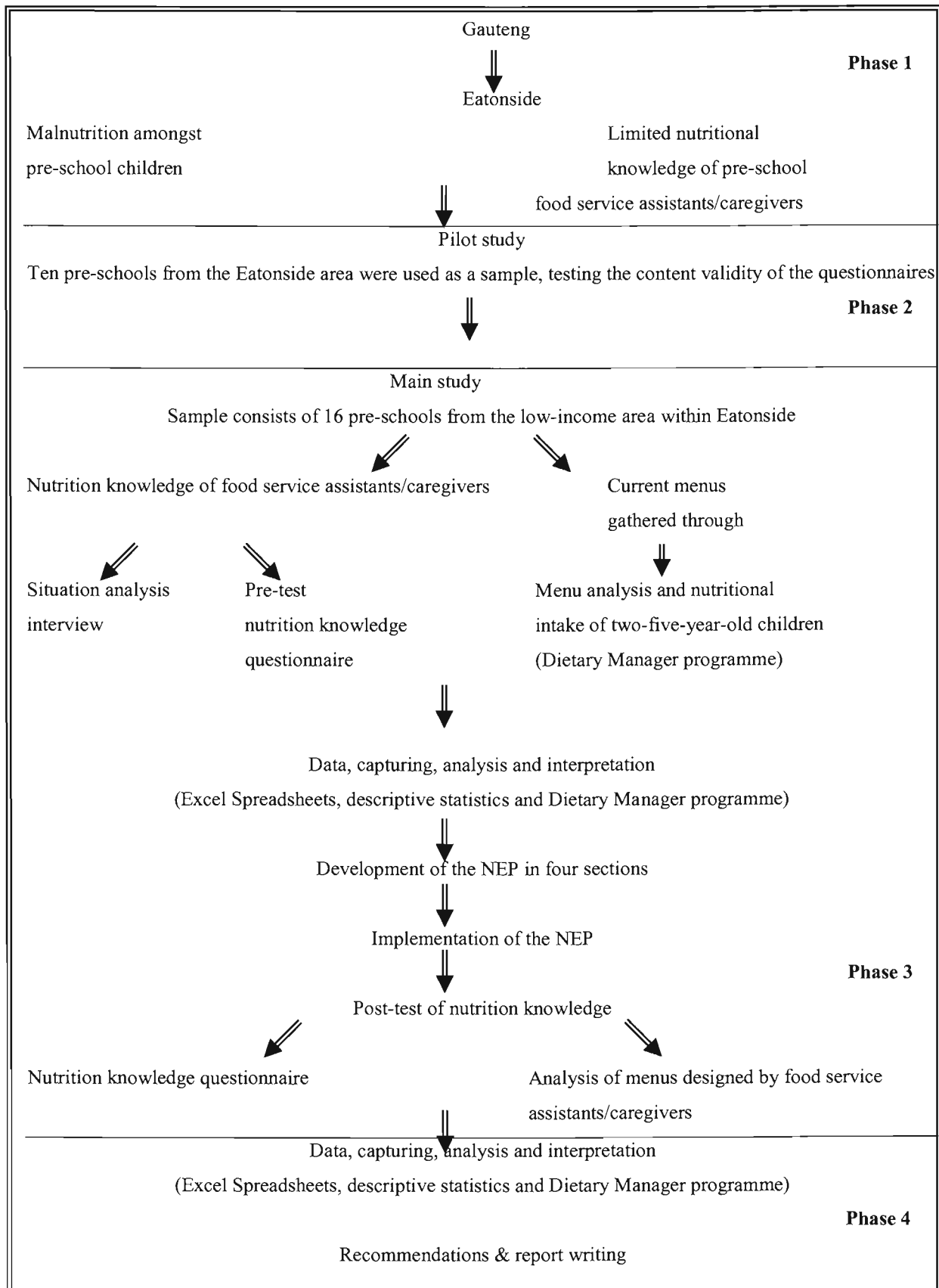


Figure 1.1 Phases of the project: a conceptual framework

1.5 GENERAL OUTLINE OF THE STUDY

Chapter 1: Introduction and problem statement

This chapter includes a short discussion covering the study motivation, the problem and setting, the research objectives and methodology.

Chapter 2: Literature review

The literature review focuses mainly on child malnutrition, South African pre-schools health and safety standards, menu planning, nutrition education and nutrition and dietary recommendations for children aged two to five years.

Chapter 3: Methodology

This chapter focuses on the purpose of the study, ethical considerations, the study design, the study population, measuring instruments, procedures for data gathering and the different methods used for data analysis.

Chapter 4: Results and discussion

This chapter starts with a discussion about the Pilot study results and then the nutrition knowledge questionnaire and its different sections. Secondly the menu analysis is given and compared with the EAR, RDA and American Food Guide Pyramid.

Chapter 5: Recommendations and conclusions

Recommendations and conclusions are made about the results of the effect that the NEP had on the pre-school's food service assistants/caregivers nutritional knowledge.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Nutrition plays an essential role in the prevention of malnutrition particularly in the diets of children. There is various factors that have an effect on the nutritional intake of a child, one being the food children consume at pre-schools. The busy lifestyle of today forces parents to leave their children at pre-school and because of the long hours children spend at these schools (Steyn 2000a:12) they receive at least one or more of the daily meals at the pre-school (Waterlow 1994:3-6, Briley & Roberts-Gray 1999:981).

2.2 MALNUTRITION

Malnutrition causes an impairment of an individual's health because of a shortage, excess, or disparity of nutrient intake or body consumption and includes **over nutrition**, such as a surplus of carbohydrates, energy or vitamin A toxicity (Mueller, Robinson & Weigley 1997:5). In 1994, 9 % of children between the ages of three and six, a representative sample of African children in Cape Town, were reported to be overweight and the condition was prevalently higher in urban formal areas (Bourne, Bowley, Marino & Pentz-Kluyts 2007a:235). Malnutrition also includes **under-nutrition**, resulting from a deficiency of energy and/or some other nutrient or nutrients (Mueller *et al.* 1997:5). In 1995, it was estimated that 2.3 to 2.5 million SA citizens were undernourished; most children aged nil-to-fifteen-years. The prevalence of under-nutrition was the highest in rural areas, particularly on commercial farms and informal settlements compared to urban areas (Bourne *et al.* 2007a:235).

Mueller *et al.* (1997:5) describe the primary cause of malnutrition as some imperfection in the diet, such as a shortage in food intake, as a cause of poverty and ignorance (Figure 2.1). Secondary causes include, among others, an error in metabolism or some interaction between nutrients and medication. A normal or balanced nutritional intake is achieved when the ingestion of calories and nutrients is neither deficient nor excessive. Moderation and a variety of food choices are key elements in achieving this balance (Mueller *et al.* 1997:6; Faber 2010:110).

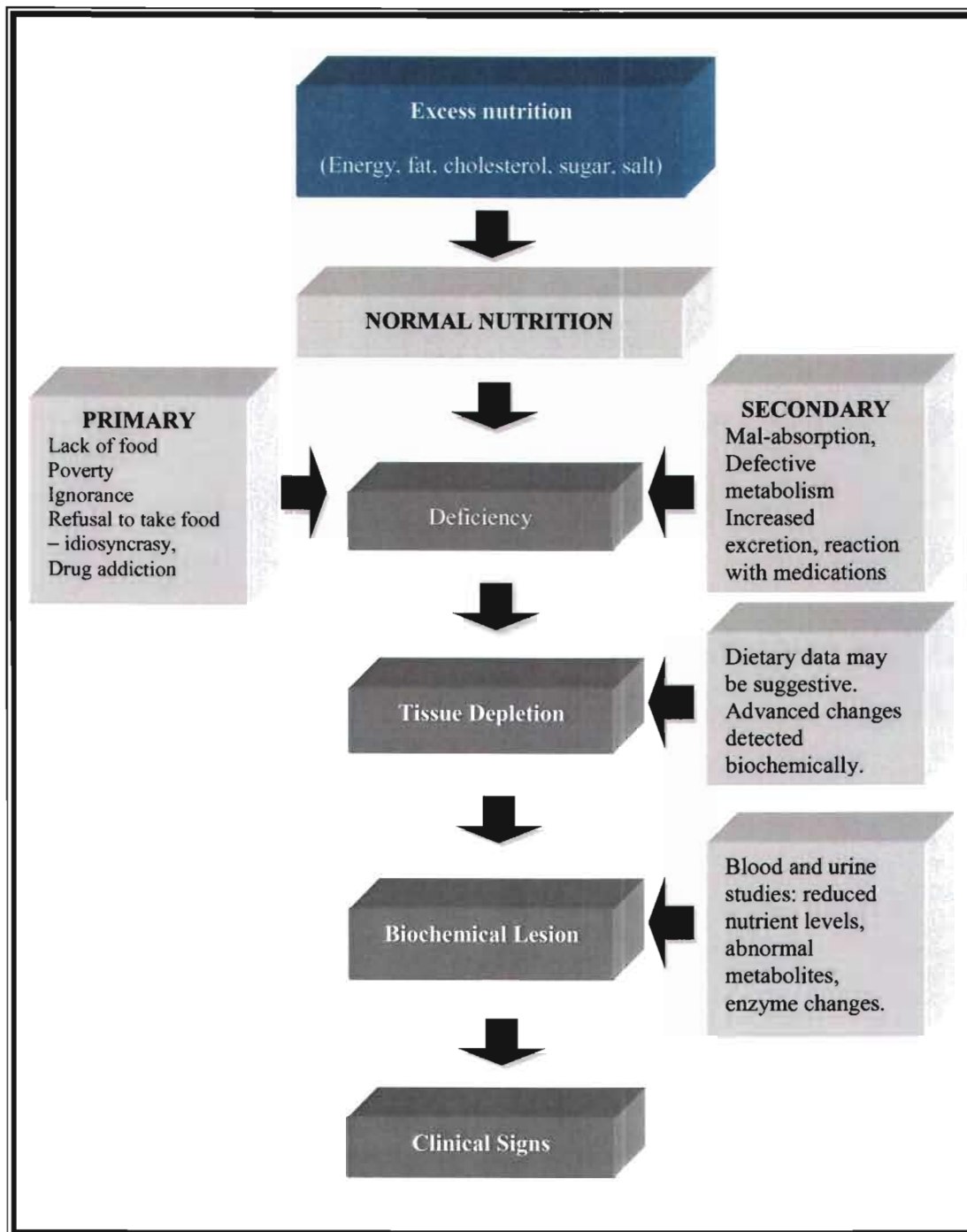


Figure 2.1 Effects of normal nutrition (Mueller *et al.* 1997:6)

In sharp contrast to the depiction of Mueller *et al.* (1997:5), UNICEF (1998:1) labels malnutrition as a large, silent, and invisible emergency, which causes little public alarm. Malnutrition not only refers to inadequate dietary intake, although this is one of the immediate causes of malnutrition, but it also refers to inadequate access to food, water,

sanitation, and access to the basic health services that are linked to the underlying causes of malnutrition (Mueller *et al.* 1997:5-6). In 1999 a second national representative study was conducted in SA amongst children called the National Food Consumption Survey (NFCS) and indicated that most children in rural areas had a very constricted range of food choices. The micronutrient density of available foods proved to be low, with variable energy levels (Bourne, Hendricks, Marais & Eley 2007a:233).

Figure 2.2 illustrates the interactive relationship between malnutrition, pre-schools and menu planning as understood by the researcher. Many pre-school children, particularly in rural areas, are malnourished as a result of a lack of micronutrient-dense food (Bourne *et al.* 2007a:231). If service assistants/caregivers planning menus in pre-schools were educated on aspects like basic nutrition, food choices, menu planning and basic health and safety, it is believed that the food prepared for the pre-school children, will be more nutritious.

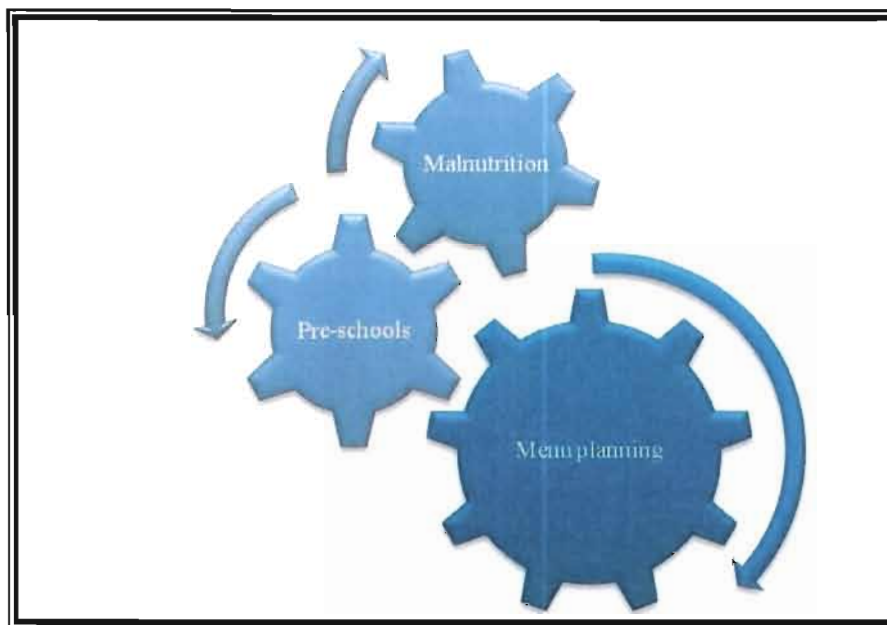


Figure 2.2 The interactive relationships between malnutrition, pre-schools and menu planning, as seen by the researcher

With the aim of replacing the fragmented and mainly food-based approaches of the past, an Integrated Nutrition Programme (INP) for SA was developed in 1995. Because proper nutrition is viewed as a basic human right, the INP facilitates a coordinated inter-sectoral approach in elucidating nutrition problems in SA (Department of Health 2002:1). The

conceptual framework of the INP (Figure 2.3) facilitates the analysis of causes of malnutrition and death in any community.

The theoretical framework indicates the interrelationships between the various contributory factors causing malnutrition. The immediate causes of malnutrition are associated with food intake, stress, trauma and diseases which are influenced by the underlying causes of malnutrition as seen in Figure 2.3. This is linked to the levels of household food security, maternal and childcare, education and information as well as basic health services and the environment (Department of Health 2002:2). In turn, the underlying causes of malnutrition are influenced by the basic causes of malnutrition like the availability and control of resources such as food prices, as well as political, social, ideological, economic and cultural factors that affect the availability and control of resources (Department of Health 2002:2).

One of the basic causes of malnutrition is the number of people within the household, having to share one income for the basic needs of the family (Department of Health 2002:2). A recent study in the Vaal Region where children's nutritional status and eating habits were tested shows that most children (aged between two and five) in informal settlements are undernourished (Napier 2001:73). The study indicates that the parents of these children were neither eager to admit that they were living in an informal settlement, nor willing to acknowledge their true living conditions (Napier 2001:72). The study also showed an inconsistency in nutritional intake, that most of the food was high in carbohydrates resulting in a low nutritional dietary intake (Napier 2001:74).

In many families the income is very small, resulting in a diet that is low in nutrients. In poor communities there are two basic reasons for unwholesome food that are provided to the children, the first being a lack of appropriate nutrition education and information concerning nutritional consumption of meals and secondly the lack of adequate financial resources to provide food for children at pre-schools (UNICEF 1998:1-3).

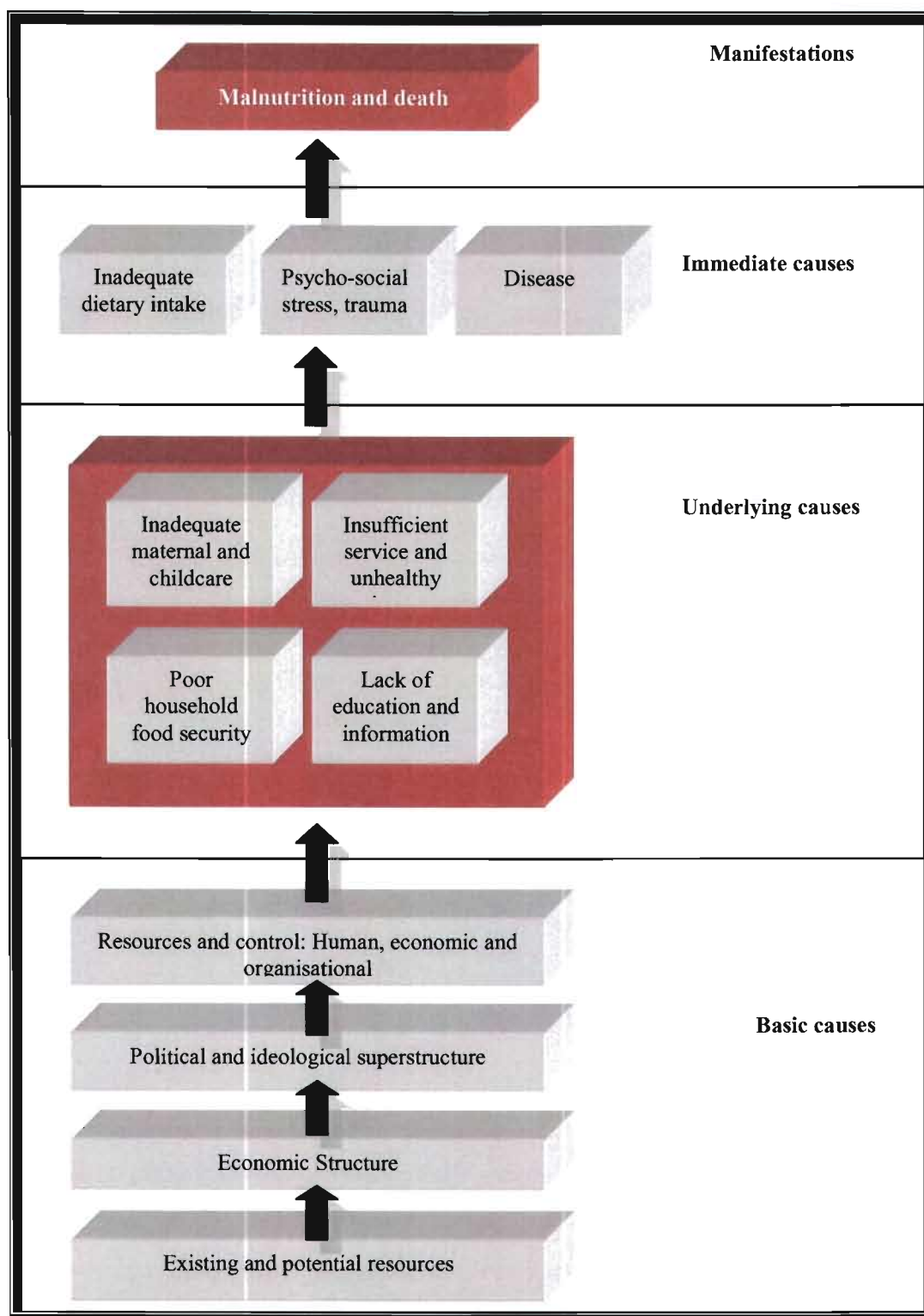


Figure 2.3 Conceptual Framework of Malnutrition (UNICEF 2008:45)

2.2.1 Immediate causes

The most important immediate causes of malnutrition are inadequate dietary intake, and illnesses caused by malnutrition (Steyn 2000a:G11). Inadequate dietary intake normally

results in malnourishment. Children are often at a higher risk of malnourishment, because of the high energy and nutrient requirements of a child's body size compared to that of adults (FAO 1996:14). Micronutrient deficiency is often called "silent/hidden" malnutrition because it is not easily visible until the deficiency is severe. It is critical to control, prevent and reduce dietary deficiencies of vitamins and minerals. Through direct micronutrient supplementation to the vulnerable population groups such as children, the elderly and people with ill health, their health can be improved. This can be done through dietary diversification and fortification of commonly consumed foods to increase the micronutrient consumption. Focusing on the three main vitamin or mineral nutritional deficiencies of public health, namely vitamin A, iron, anaemia and iodine deficiency disorders can reduce malnutrition (UNICEF 1998:2-3; Health Ezimpilo Kwazulu-Natal 2003:11-12; Faber 2010:111-112).

Proper care and feeding is essential for normal growth and development of children. Children should therefore be encouraged to eat a variety of food that provides enough energy and contains protein-rich products as well as a variety of fruit and vegetables for body maintenance and growth (Bourne *et al.* 2007b:241). Some families with a low income will make starchy foods the basis of a child's main meal, seeing as cereals represent the less expensive source of energy (Briend 2007:225).

In 2003 the regulations for the mandatory fortification of all maize meal and bread flour with vitamins A, thiamine, niacin riboflavin, pyridoxine, iron, folate and zinc, came into effect. Since 1995, salt has been fortified with iodine to address the problem of iodine deficiency (Department of Health 2004a:23). Table 2.1, indicates the fortification mix for wheat flour (used in white and brown bread).

Food service assistants/caregivers can be very helpful in alleviating malnutrition, because pre-schools have a real impact on the nutritional intake and quality of the children's diets and can significantly influence the development of eating habits (Steyn *et al.* 2008:23).

Table 2.1 Fortification mix for wheat flour (white and brown flour) (Steyn *et al.* 2008:23).

Fortificants and diluent	Micronutrient requirements (per 1kg flour)	Fortificant requirements (per 1kg flour)	Fortification mix (g/kg)
Vitamin A palmitate (Activity: 75 000 µgRE/g)	1786 µgRE	23.8095 mg	119.0475 g
Thiamine mononitrate (Activity: 78% min)	1.9444 mg	2.4929 mg	12.4644 g
Riboflavin	1.7778 mg	1.7778 mg	8.8889 g
Nicotinamide/niacinamide	23.6842 mg	23.6842 mg	118.4210 g
Pyridoxine HCl (Activity: 81% min)	2.6316 mg	3.2489 mg	16.2443 g
Folic acid (Activity: 90.5% min)	1.4286 mg	1.5786 mg	7.8927 g
Electrolytic iron (Activity: 98% min)	35.00 mg	35.7143 mg	178.5714 g
Zinc oxide (Activity: 80% min)	15.00 mg	18.7500 mg	93.7500 g
Diluent	-	To complete 200 mg	To complete 1000 g

Table 2.2, shows the fortification mix for maize meal (used for making porridge) as stipulated by the South African government regulations (Steyn, Nel & Labadarios 2008:23).

In very poor communities, food is scarce and pre-school meals could be the only meals provided to children and food service assistants/caregivers of pre-schools in these communities act as role models that make mealtime and snack time a positive fun-filled learning experience (United States of Agriculture/Agriculture Research Service 2003:1).

Illness could potentially cause malnutrition in any child, because eating difficulties are experienced when children are sick. Vomiting, nausea, fatigue, poor appetite, treatment and disease pains, drowsiness from the medication, fear and anxiety are many of the causes that

lead to eating difficulties. Frequent infections such as diarrhoea, acute respiratory infections and measles can also cause vitamin deficiencies (Department of Health 1998:12).

Table 2.2 Fortification mix for maize meal (super, special, sifted, unsifted) (Steyn *et al.* 2008:23).

Fortificants and diluent	Micronutrient requirements (per 1kg meal)	Fortificant requirements (per 1kg meal)	Fortification mix (g/kg)
Vitamin A palmitate (Activity: 75 000 µgRE/g)	2085 µgRE	27.8000 mg	139.0000 g
Thiamine mononitrate (Activity: 78% min)	2.1875 mg	2.8045 mg	14.0224 g
Riboflavin	1.6875 mg	1.6875 mg	8.4375 g
Nicotinamide/niacinamide	25.000 mg	25.0000 mg	125.0000 g
Pyridoxine HCl (Activity: 81% min)	3.1250 mg	3.8580 mg	19.2901 g
Folic acid (Activity: 90.5% min)	2.0000 mg	2.2099 mg	11.0497 g
Electrolytic iron (Activity: 98% min)	35.0000 mg	35.7143 mg	178.6714 g
Zinc oxide (Activity: 80% min)	15.00 mg	18.7500 mg	93.7500 g
Diluent	-	To complete 200 mg	To complete 1000 g

In Table 2.3 chemically analysed fortified samples of cooked maize meal porridge and bread are given values of the fortified micronutrients per 100g. These are products currently available on the market (Steyn *et al.* 2008:23). If food service assistants/caregivers were using some of these products with the fortified micronutrients, pre-school children's nutritional intake would improve.

Table 2.3 Values of the fortified micronutrients per 100g in cooked maize meal porridge and bread (Steyn *et al.* 2008:24).

Nutrients	Maize: unfortified	Maize: fortified	White bread: unfortified	White bread: fortified	Brown bread: unfortified	Brown bread: fortified
Iron (mg)	0.2	1.3	1.2	3.6	1.5	3.8
Zinc (mg)	0.22	0.63	1.0	1.7	1.4	2.2
Vitamin A (µg)	0	34	0	83.4	0	73.4
Thiamine (mg)	0.08	0.13	0.15	0.28	0.16	0.28
Riboflavin (mg)	0.01	0.05	0.04	0.16	0.06	0.15
Niacin (mg)	0.2	1.2	1.2	3.1	2.6	4.6
Vitamin B6 (mg)	0.01	0.12	0.07	0.24	0.14	0.30
Folic acid (µg)	3.0	46.0	97.0	81.7	42.0	82.0

2.2.2 Underlying causes

Inadequate dietary intake is the outcome of underlying causes of malnutrition that are closely interlinked, to poor household food security and inadequate maternal and childcare provision (Steyn 2000a:G11). There are many underlying causes of malnutrition, but the most significant are: insufficient household food and water security, inadequate maternal and childcare provision, lack of sanitation, inadequate nutritional information and access to the basic health services (Steyn 2000a:G11). Some of these underlying causes are shown in Figure 2.4.

Inadequate household food security means insufficient access to nutritious food. People of all ages need sufficient nutrients to maintain a healthy life. Household food security is reflected in a family's standard of living, and for the majority of South Africans, food security is primarily linked to income security (Kloka 2003:9). For South African households, food

security can directly be related to the burdens placed upon women. Due to the large number of men moving to urban areas in search for work, female-headed households became the norm especially in non-urban areas (Steyn 2000a:G11-G12). Additional responsibilities placed on women resulted in a lack of time for childcare and the consequent neglect of proper and frequent feedings of infants and pre-school children, which in turn results in poor nutrition (Steyn 2000a:G11). In middle-income households, most small children are poorly fed, due to an unequal power relationship at the household level (Kloka 2003:9). In Eatonside 40% of the households have three or more children, and the money available in these low-income households is used for clothing, school fees and food. This increases the risk of malnutrition and low food security (Napier 2001:75; Faber 2010:113-114).

Nutritional information and access to basic health services should be available to all communities. Sound nutrition is a basic human right guaranteed in South Africa's Constitution, through the Bill of Rights (Kloka 2003:5). Sound nutrition involves more than just the availability of food or consumption of a certain amount of nutrients per day (Kloka 2003:5). Figure 2.4 shows the factors determining adequate dietary intake in children based on the UNICEF framework, and modified to take account of the South African context (Steyn 2000a:G12).

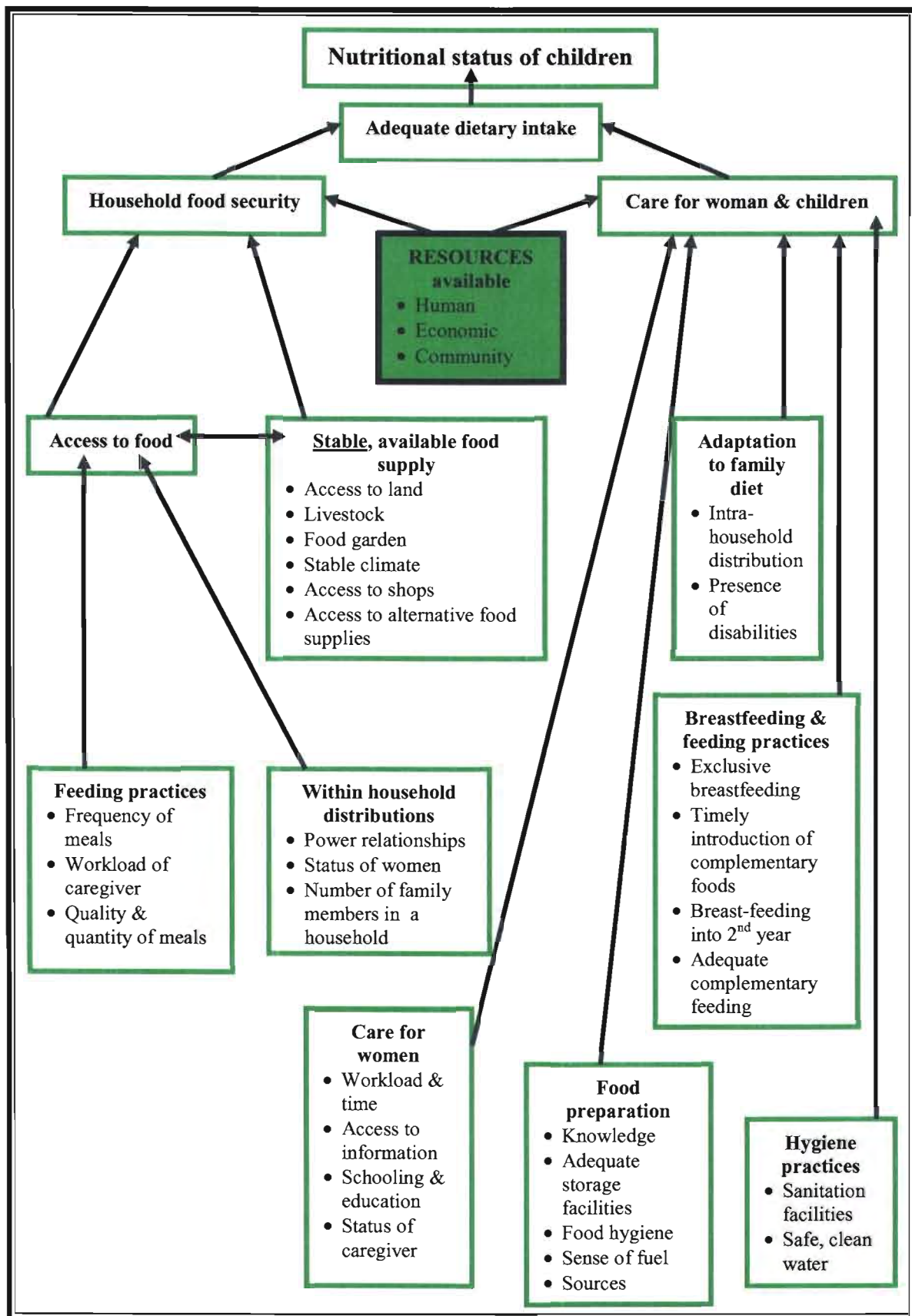


Figure 2.4 Factors determining adequate dietary intake in children based on the UNICEF framework and modified to the South African context (Steyn 2000a:G12)

2.2.2.1 Water intake

Not only is water essential to life because all metabolic processes occur in a watery medium, but it is a major constituent of the body and plays a number of vital functions, such as the transport of nutrients to cells, wastes from cells, and substances, such as enzymes, hormones, blood platelets and blood cells. Water facilitates cellular metabolism and proper cellular chemical functioning (Grandjean & Cambell 2004:1). Water security is as important as food security. When water that is not safe for human consumption is used, the results could be devastating and lead to serious illnesses or infections such as cholera, dehydration and diarrhoea which may lead to death (Bourne, Harmse & Tempel 2007c:306). Young children are especially at high risk of dehydration. Parents and caregivers must be aware of the signs and symptoms of dehydration in children and know when to seek medical help. Physically active children in hot environments have great fluid needs (Grandjean & Cambell 2004:27). Table 2.4 shows the recommended water intake for children.

Table 2.4 Recommended water intake for children (Grandjean & Cambell 2004:29)

Recommended Water Intakes for Children		
Life Stage Group	Total Daily AI	Assumptions
1 to 3 years	0.9 ℓ	Approximately 0.9ℓ (4 cups) as total beverage, including drinking water.
4 to 8 years	1.2 ℓ	Approximately 1.2ℓ (5 cups) as total beverage, including drinking water.

Early childhood care is critical for optimal neural development in a child, which affects physical, mental and cognitive development. Neural development depends on the good nutrition and loving stimulation the child receives during the first months and years of life (UNICEF 2000:8). Care in this context also refers to the practices of caregivers, which translate food security and health care resources into a child's growth and development. The practices include care for women, breast-feeding and complementary feeding, and adaptation to family diets, food preparation and hygiene practises (Steyn 2000a:G11). Inadequate maternal and childcare provision normally results from insufficient sanitation knowledge, a lack of nutritional information and poor access to the basic health services. Childcare in this context refers to food security and health care resources that translate to a child's growth and development.

This includes:

- the care of pregnant and breast-feeding women;
- complimentary feeding;
- family diet adaptation;
- food preparation; and
- hygiene practices (Steyn 2000a:G11-G12).

2.2.2.2 Sanitation

Lack of sanitation, could have critical consequences such as the growth of food-borne pathogens that cause food poisoning, (see Table 2.5, 2.6 and 2.7 for the most common food poisoning bacteria). The basic purpose of sanitation is to protect people from food items that may be deleterious, that are unclean or decomposed or that have been exposed to unsanitary conditions that may contaminate the food item with filth or render it injurious to health (Bennion 1995:69). In short, sanitary means: free of disease causing organisms and other contaminants. Sanitation is critical for any surface that comes in contact with food this includes all dishes, utensils, pots, and pans (Spears 2007:543). The most common food poisoning bacteria are Salmonella, Staphylococcus aureus and Clostridium perfringens (Gordon-Davis 2006:15-16). They all need specific conditions to multiply (Gordon-Davis 2006:10-12).

2.2.2.3 Food poisoning

Common food poisoning bacteria:

- all bacteria need is food, moisture, the right temperature and time;
- bacteria can spread through cross-contamination, this is when bacteria is transferred from a contaminated area to food or a clean surface. For example using the same chopping board for cutting the day's meat, vegetables and bread. After the cutting of each food item the chopping board must be washed with soap and hot water, rinsed and dried before using it again; and
- bacteria cannot live or multiply in temperatures that are higher than 60°C or temperatures lower than 1-4°C (Gordon-Davis 2006:10-12).

Table 2.5 Salmonella food poisoning bacteria (Gordon-Davis 2006:15)

Salmonella	Infective food poisoning
Source	Raw foods, especially meat, poultry, milk and eggs, human carriers, pets, rodents, birds, flies and sewage.
Onset Period	12-48 hours
Symptoms	Headache, fever, abdominal pains, vomiting and diarrhoea which last up to seven days.
Mode of spread to high risk food	Through cross-contamination, undercooked food and by keeping food too long in the danger zone (10°C - 59 °C).
Control	Good personal hygiene, hygienically clean kitchen, utensils and equipment, cooking food properly and excluding pests.
Destruction	Easily destroyed by heat.

Salmonella is one of the food-borne pathogens that causes food poisoning (see Table 2.5). The symptoms may result in headache, fever, abdominal pains, vomiting and diarrhoea which could last up to seven days (Gordon-Davis 2006:15).

Table 2.6 Staphylococcus aureus food poisoning bacteria (Gordon-Davis 2006:15-16)

Staphylococcus aureus	Toxic food poisoning
Source	Human nose, mouth, skin boils and cuts, and unpasteurised milk.
Onset Period	1-7 hours
Symptoms	Vomiting, diarrhoea, sometimes abdominal pains lasting up to six to twenty four hours.
Mode of spread to high risk food	Usually via your hands by touching/scratching your nose, mouth, skin boils and cuts and then touching cooked food.
Control	Good personal hygiene, washing your hands with soap regularly and using waterproof dressings for wounds.
Destruction	Easily destroyed by heat.

Staphylococcus aureus is another food-borne pathogen that also causes food poisoning (see Table 2.6). The symptoms may result in vomiting, diarrhoea, sometimes abdominal pains that could last up to six to twenty four hours (Gordon-Davis 2006:15-16). In Table 2.7

Clostridium perfringens the food poisoning bacteria can be seen, with symptoms of diarrhoea, abdominal pains and sometimes vomiting lasting up to 12 to 48 hours (Gordon-Davis 2006:16).

Table 2.7 *Clostridium perfringens* food poisoning bacteria (Gordon-Davis 2006:16)

<i>Clostridium perfringens</i>	Both toxic and infective food poisoning
Source	Animal and human excreta, soil (on vegetables), dust, raw meat and poultry, flies and cockroaches.
Onset Period	8-22 hours
Symptoms	Diarrhoea, abdominal pains, sometimes vomiting, lasting up to 12 to 48 hours.
Mode of spread to high risk food	Direct contact with contaminated raw meat or vegetables, though a contaminated surface and by not cooking food properly and cooling it too slowly.
Control	Good personal hygiene and good hygiene practices in the kitchen, keeping raw and cooked foods separate and temperature control.
Destruction	Can be destroyed by heat, but spores can withstand four hours of boiling.

2.2.3 Basic causes

2.2.3.1 Poverty

The basic causes of malnutrition start in the households. One of the biggest problems that lead to malnutrition is poverty. Low family income, unemployment, urbanisation and social structures are all direct results of poverty (UNICEF 2000:3). The number of people living in poverty grows as globalisation proceeds along its inherently asymmetrical course (UNICEF 2000:3). The expanding of markets across national boundaries and increasing the incomes of only a few are strangling the lives of those without the resources to be investors or without the capabilities to benefit from the global culture (UNICEF 2000:3). People, mainly woman and children, are affected by poverty and malnutrition. People who were poor before are now even poorer. The struggle between a two-tiered world economy widens the gaps between rich and poor countries and between rich and poor people (UNICEF 2000:3), especially in South Africa.

The basic causes of malnutrition include:

- the number of people within the household;
- family income;
- the occupation of the parents;
- the levels of education of the parents/ caregivers;
- household characteristics;
- politics;
- religion;
- beliefs and ideological factors;
- ethnicity; and
- the money a family spends on food per month (Kloka 2003:5).

In turn the household characteristic factors affect the individual family set-ups such as:

- single parent families;
- both parents are unemployed, leading to little or no food;
- crowded families living together in cramped living conditions;
- many children to feed with a low income can lead to insufficient food security; and
- female-headed households (Central Statistical Service 1995:17).

All these factors of the different household characteristics, mentioned above, have an enormous influence on each individual family due to insufficient funding being available (CSS 1995:13-17).

2.2.3.2 Urbanisation

Urbanisation is one of many environmental factors that affect a child's mental and physical development. The environmental factors act together to result in malnutrition, for example poor health due to inadequate sanitation services. Poverty can be reduced when the poor have the means and the opportunity to be healthy and well nourished, as well as educated and skilled enough, to fully participate in the decisions that affect their lives. Access to basic health care, education, family planning, water and sanitation services is what makes sustained and stable economic progress possible. This will help people achieve greater productivity and will form a critical buffer for woman and children in difficult times (UNICEF 2000:6).

2.2.4 The malnutrition situation in South Africa

Malnutrition in South Africa has two major components. The first is under-nutrition, which manifests itself in young children, infants, pregnant and lactating women. This causes high numbers (16%) of low-birth-weight (LBW) babies. The second is chronic diseases of lifestyle, which manifests typically in adulthood as obesity-related diseases such as ischemic heart disease, hypertension, diabetes and certain cancers (Department of Health 1997:52, Gorden Davis 2002:159).

In South Africa 23% of children are stunted and 9 % are underweight. In practical terms this means that approximately 660 000 pre-school children in South Africa are underweight and that 1 520 000 are stunted owing to chronic malnutrition (Steyn 2000b:3). In 1994 the South African Vitamin A Consultative Group conducted a survey that found that one in three children had marginal vitamin A deficiency status. One in five children had iron deficiency anaemia. One in four children were stunted and one in ten were underweight for their age (Department of Health 1997:52). In Eatonside previous research results indicate that the pre-school children are malnourished, 8 % of the children were underweight and 39% of the children were stunted, both results with a two Standard deviation (SD) of the National Centre for Health Statistics (NCHS) median. This indicates a chronic food shortage (Napier 2001:78). Main findings were that 10% of children were overweight and that 4% were obese (Labadarios *et al.* 2008:255). Children living in rural areas and commercial farms were the most affected. Dietary findings indicated that 50% of these children consume less than half their recommended level of energy as well as a number of important micronutrients. Less than 67% nutrients of the Recommended Dietary Allowances (RDAs) like energy, calcium, iron, zinc, selenium, vitamin A, vitamin B6, vitamin C, vitamin D, vitamin E, riboflavin and folic acid were consumed (Labadarios *et al.* 2008:253). Findings also indicated that sufficient access, kinds and amounts of food enables individuals to live healthy lives. Food insecurity and hunger was found to be 51.6% at national level. This is one in two households on the hunger scale and approximately one out of three was at risk of hunger. Only one in five households appeared to have food security (Labadarios *et al.* 2008:259).

Children need a well-balanced and nutritious diet to avoid infections and to promote growth. This can optimally be obtained through an intake of foods with a high nutrient content. The South African Government has started to address the problem through nutritional surveys

held, such as the NFCS, the health and nutrition education programmes such as INP, and the awareness campaigns such as World Food Day and Nutrition Week. These programmes assist communities, households, health facilities and institutions, care facilities and institutions, schools, and pre-schools who are all in desperate need of proper nutritional educational knowledge (Kloka 2003:6-9).

2.2.5 The malnutrition situation world-wide

Malnutrition is one of the most devastating problems affecting humanity world-wide, such as the poor, the needy and the sick are the people mostly affected by malnutrition (UNICEF 1998:1). Some of the horrific results of malnutrition are disability, both mental and physical development, death and retarded socio-economical development. World-wide, malnutrition results in nearly half of all child deaths or 49 % of ten million deaths among under-five year old children and twelve million child deaths of children under the age of five every year (UNICEF 1998:1). In the United States thirteen million children live in homes with limited access to sufficient food supply (Louisiana State University Agriculture Centre 2005).

One of the Millennium Development Goals is to eradicate extreme poverty and hunger. The target for 2015 is to halve the proportion of people living on (\$2.50) R6.95 per day and those who suffer from hunger. More than a billion people still live on less than this a day such as in sub-Saharan Africa, Latin America and the Caribbean, and parts of Europe and Central Asia are falling short of the poverty target (WHO 1990:2, Statistics South Africa 2010:23).

Since 1990 it appears that the world is on track to halving income-poverty by 2015. Unfortunately, the reality is more complicated and less satisfactory. If China is excluded, the progress has been less than half the rate needed. The number of income-poor in sub-Saharan Africa, South Asia and Latin America combined, has increased by 10 million each year since 1990. Dozens of countries experienced absolute declines in average living standards in the past two decades. At present, an estimated 1.2 billion people have to struggle every day to survive on less than R7.29 per day - about the same number as a decade ago (WHO 1990:4).

2.2.6 Malnutrition affecting child development and growth

Malnutrition and poor health in early school-aged children are linked to child development and growth (Human Resources Development and Operations Policy dissemination notes 1993, LSU AG centre 2005). Exposure to certain nutritional and health problems at a young age,

the enduring impact of prenatal, early childhood malnutrition and social deprivation affects a child's learning capabilities. Children with an iodine deficiency will perform worse on intelligence and other tests of learning capacity than iodine-replete children. Iodine deficiency leads to impaired hearing in children (HRO dissemination notes 1993). Iron deficiency anaemia in children also reduces some aspects of their ability to learn. These children are also less alert, less attentive, and less motivated than their iron-replete peers. Night blindness is caused by a vitamin A deficiency (HRO dissemination notes 1993).

A child's ability to attend to tasks due to an attention deficit can be caused by a protein-energy malnutrition experienced at a young age (HRO dissemination notes 1993). Temporary hunger, commonly a condition of children not being fed before going to school, interferes with concentration abilities, especially when the child is malnourished. Hungry children are more likely to develop frequent illnesses and infections like sore throats, headaches, colds, stomach aches, and iron deficiency anaemia (LSU AG centre 2005).

Some nutrients and food additives can cause allergies or intolerances in children. This may lead to hyperactivity and learning difficulties in children. These allergies and intolerances may cause behavioural problems and influence a child's ability to learn (Vayda 2007:137-149). Even though a child may be very intelligent, he or she may appear to be a slow learner. However, it seems that many allergies and intolerances happen due to a combination of factors. Feingold recommended a diet for hyperactive children, eliminating all foods that are coloured, preserved, tinned, instant or known to contain chemical additives as well as all foods containing natural salicylates. This included almonds, apples, apricots, blackberries, cloves, cucumbers, pickles, currants, gooseberries, raisins, mint flavours, nectarines, oranges, peaches plums, prunes, raspberries, and strawberries, teas of any kind, tomatoes and oil of wintergreen. Ways to lessen the possibility of children acquiring food allergies or intolerances is to practice preventive medicines and taking precautions during pregnancy as well as early childhood (Vayda 2007:137-149).

2.3 MENU PLANNING FOR PRE-SCHOOLS

In short menu planning would involve the proposed list of items to be served at a meal. It is important to have a set of standards to ensure that meals and snacks in a childcare facility meet children's nutritional needs. Menu plans will provide pre-schools with excellent models of healthful dietary meals (Briley & Roberts-Gray 1999:982). A menu or meal plan forms the

basis for the development of a well balanced nutritionally sound menu (Department of Health 1983:5)

According to the Concise Oxford Dictionary (1990:742) a menu is “a list of items to be served at a meal.” Planning is “a formulated and detailed method by which a thing is to be done; a design or scheme.” A plan can also be “an intention or proposed proceeding” according to the COD (1990:910).

Appropriate nutritional intake in young children is vital in order to support continued growth and development. Because children are seen as one of the most nutritionally vulnerable groups of society, dietary recommendations have been developed specifically for children to provide them with adequate and appropriate nutrition information (Bourne *et al.* 2007b:282).

2.3.1 Food-based dietary guidelines for children two-to-five-years

Various factors affect child nutrition in pre-schools, such as FBDG's included in the meal plans, food choices made by the pre-schools menu planners, eating habits of the pre-school children and the food service assistants/caregivers who plan the menus and prepare the meals, the environment, and the nutritional knowledge of the caregivers (Bourne 2007:228). The South African paediatric food-based dietary guidelines (PFBDG's) for children, can be seen in Figure 2.5 (Bourne 2007:228) and can be used to plan menus.

South Africa is one of many countries that have developed and tested, localised FBDG's for people over the age of seven such as adults. In addition, Figure 2.5 is adapted to the South African FBDG's for children aged one to seven (Bourne 2007:228). The South African Working Group that developed and tested the FBDG's recognised that mothers and caregivers of young children also required a set of guidelines. As a result a diverse multi-sectoral Working Group of health professionals with a paediatric focus was formed (Bourne 2007:228). The Paediatric Food-Based Dietary Working Group was tasked with the development of draft 'core' guidelines for school-going children, adolescents and adults, as well as prevailing paediatric nutrition-related public health issues and local dietary habits. To illustrate this, Figure 2.5 sets out the various guidelines, recognising changes through the lifecycle for children aged one to seven. The Working Group decided to use a thematic approach to promote optimal nutrition (Bourne 2007:228).

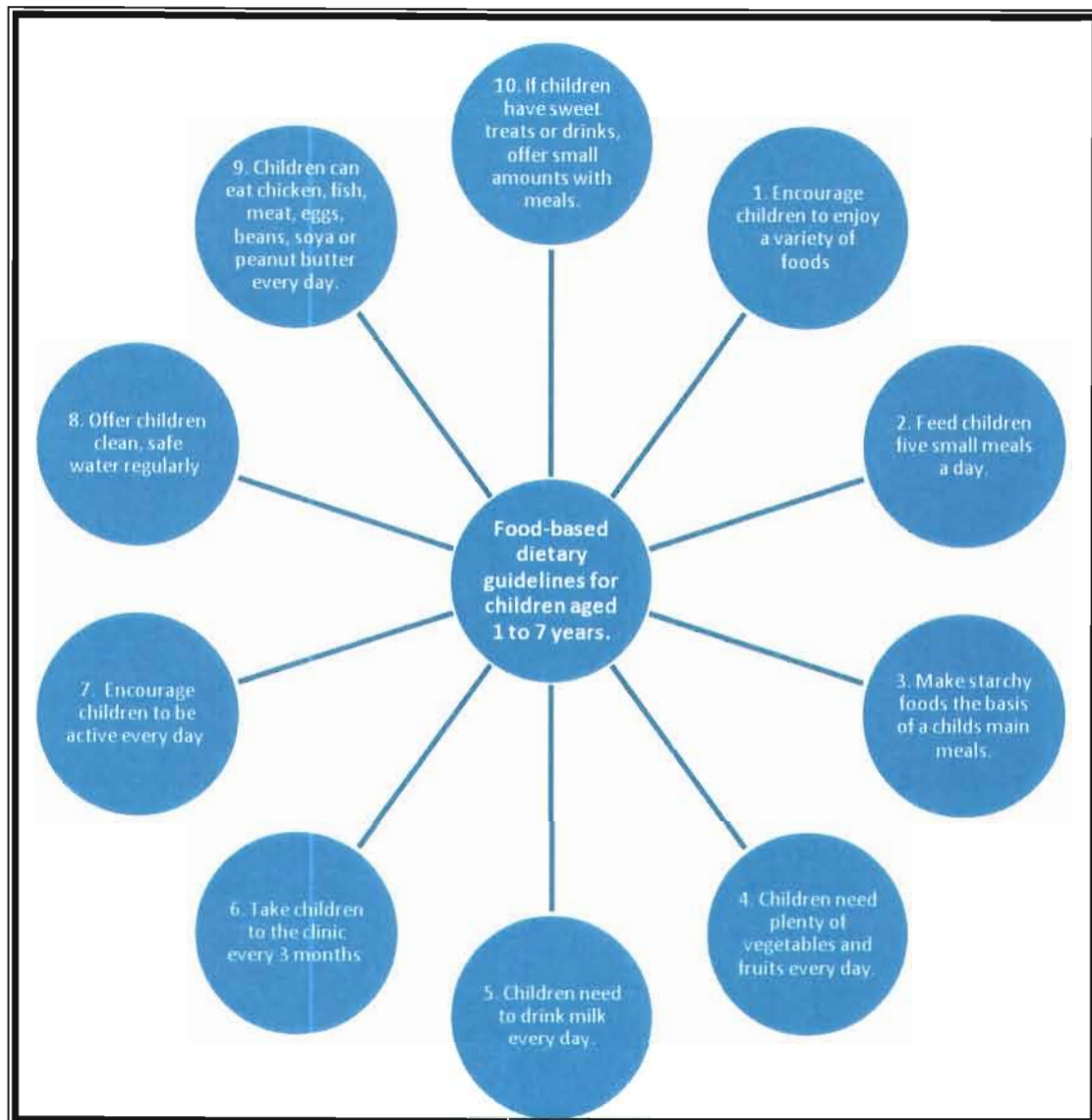


Figure 2.5 South African food-based dietary guidelines for children aged one-to-seven-years (Bourne 2007:228)

The PFBDG for children aged one to seven years old, recommend that children should enjoy a large variety of foods. Children should eat plenty of fruits and vegetables because this provides them with vitamins and minerals that would build up their immune system. Children need food from animal sources, especially milk, because it will strengthen their bones and teeth (Briend 2007:225). Most of the pre-school children in poor communities receive breakfast, lunch and a snack at the pre-schools they attend (USDA/ARS 2003:1).

Currently nutritional problems of infants and pre-school children are being addressed through the INP (Bourne *et al.* 2007a:235), as can be seen in Figure 2.5. The INP is a comprehensive nutrition strategy that focuses on children under the age of six years, at-risk pregnant and lactating women (Bourne *et al.* 2007a:235). As well as those affected by communicable and chronic diseases of lifestyle. The INP has eight interlinked focus areas aimed at addressing the main nutritional problems (Bourne *et al.* 2007a:235) through goals, objectives and targets set for 2007 (Hendricks, Goeiman & Dhansay 2007:252). This forms part of the South African governmental strategy that has been introduced at national level to form part of the health policy that remains at primary level of which the conceptual framework in Figure 2.3 forms part of the causes of malnutrition. The INP focus areas relevant to pre-school children include the following:

- disease-specific nutrition support, treatment and counselling;
- growth monitoring and promotion;
- micronutrient malnutrition control;
- the promotion, protection and support of breastfeeding;
- contributions to household food security, example the National School Nutrition Programme;
- nutrition interventions for children with Human immunodeficiency virus (HIV);
- nutrition promotion, education and advocacy;
- food service management (Bourne *et al.* 2007a:235).

2.3.2 Meal plans and menu planning

Meal plans are the basis for a well-balanced menu, which in turn affects the diet of pre-school children. Menus, especially for children, should be adequate to meet their daily needs (Briley & Roberts-Gray 1999:982). In order to sustain growth, consumption of sufficient energy, proteins and micronutrients are required. Children have smaller gastric capacity and proportionally higher energy requirements than other age groups. This means that children need smaller portions of food with the sufficient energy that would meet their energy requirements throughout the day. In Table 2.8 a basic menu plan can be seen and can be used as a basis for pre-school menus. This basic menu plan will help guide the food service assistant/caregiver who plans the pre-school meals to meet the daily nutritional needs of the pre-school children (Department of Health 1983:6).

It is necessary for pre-school children to ingest nutrient-dense food in the form of two or three healthy snacks, in addition to three small meals each day. The type of snack provided can play a vital role in a child's diet see Table 2.9. Snack foods should complement the main meal choices and provide children with an important basis for lifelong healthy eating habits (Bourne *et al.* 2007b:283).

Nutritionally adequate menus are essential, because a child needs the right quantities and combinations of foods to provide a well-balanced meal in terms of its nutrient content. Menus should be consistent with the recommended dietary guidelines for children set to assist in nutritious menu planning (Briley & Roberts-Gray 1999:982).

Children should receive quantities and combinations of food that provide enough nutrients for them in proportion to the amount of time the children spend in pre-school (Briley & Roberts-Gray 1999:982). The specific nutrient needs of children aged one to three years and children four to eight years are listed in the EAR (see subsection 2.3.6.3).

The EAR provide quantitative estimates of the intake of nutrients that can be used when planning and assessing diets for healthy children. When planning a menu it is important to consider the amount of time the child spends in the pre-school per day in order to provide the child with the right amount of nutrients required while at the pre-school (Briley & Roberts-Gray 1999:982). A balanced diet for children is basically the same as for adults. The only difference is smaller portions to fit the child's nutrition requirements (Kelloggs 2005:1). Providing variety to a meal is very important, it encourages children to eat different food items and ensures that children would acquire a variety of minerals and vitamins. This will encourage children to eat a wide variety of foods over the week (Hersheys 2004:4; Kelloggs 2005:1).

Table 2.8 Basic menu plan for children (Gordon-Davis 2002:143-144)

Basic meal plan for children				
Meal	Meal plan	Portion size for children 1-3	Portion size for children 4-6	Example
Early morning	Tea/milk	1g/100ml	1g/100ml	Tea with milk
Breakfast	Fruit juice (optional) Porridge Milk and sugar Protein Bread Margarine Jam Tea Milk and sugar	125ml 125ml 125ml and 8g 30g 1/2 - 1 slice 8g 15g 1g 100ml and 8g	125ml 125ml 125ml and 8g 40g 1 slice 8g 15g 1g 50ml and 8g	Punchorello/tropika/Liquifruit Maize meal/Cornflakes Milk and sugar Scrambled egg Brown/whole-wheat bread Margarine Apricot jam Tea Milk and sugar
Snack	Fruit juice/soft drink	180ml	180ml	Punchorello/Tropika/Guava juice
Lunch	Protein Starch Vegetable A Vegetable B/salad Dessert Dessert Sauce	40g - 50g 40g - 50g 30g 30g 60g 40ml	60g 60g 50g 50g 60g 50ml	Roast chicken/grilled hake New/mashed potatoes Peas/steamed butternut Sweetcorn/tomato and lettuce salad Jelly Custard
Snack	Soft drink/tea with milk and sugar Biscuits	30ml or 1g/50ml/8g 2	30ml or 1g/50ml/8g 2	Soft drink/tea with milk and sugar Marie biscuits
Supper	Soup Protein Starch Vegetable/salad Fruit Bread Margarine Jam/spread Tea/milk/sugar	100ml 40g - 50g 40g - 50g 40g 80g 1 slice 8g 15g 1g/50ml/8g	150ml 60g 60g 50g 100g 1 slice 8g 15g 1g/50ml/8g	Vegetable/tomato soup Savoury mince Spaghetti/brown rice Gem squash/green beans Banana/peach Brown/whole-wheat bread Margarine Fig/strawberry jam Tea with milk and sugar
Late snack	Milk	100ml/200ml	160ml	Milk

When planning a menu each meal should preferably include food items from every food group. The patterns of the meals would be more or less like Table 2.8 (Department of Health 1983:6). Lastly the menu's presentation should be considered in order to encourage children to eat their food. The basic rules for menu planning are:

- colour combinations should be attractive;
- the texture of different dishes should form an interesting contrast;
- two strongly flavoured foods should be avoided in the same meal;
- vegetables from the same family should not be served together;
- the meal should not consist mainly of food of more or less the same composition e.g. only starch;
- it is better not to repeat a food product more than once a day;
- contrast in temperature makes a change;
- too many rich foods in one meal are undesirable; and
- the size of the kitchen should be taken into consideration when planning the amount of meals (Department of Health 1983:7).

Table 2.9 Suggested foods for healthy snacks (Bourne *et al.* 2007b:284).

Food groups	Examples
Breads and cereals	Preferably whole grain breads, muffins made with low sugar contents and unsweetened dry cereals.
Fruits and vegetables	Raw fruits and vegetables, unsweetened fruit juices and canned fruits.
Milk and milk products	Milk, unsweetened yoghurt, cottage cheese and cheese spreads.
Meat, chicken and seafood	Hard boiled eggs, pieces of lean meat or chicken, tuna, sardines and peanut butter.

Research done in Canada, proved that children who eat more fruits and vegetables perform better academically than those who eat less fruits and vegetables (Florence, Asbridge & Veugelers 2008:209).

2.3.3 Food pyramid of America guiding and directing, food choices and portion size

The choice of food is very important because it establishes good eating habits (Briley & Roberts-Gray 1999:983), it determines the nutritional intake of the children, and it is also relates to diseases such as dental caries and obesity. However food choices are determined by two main aspects, food availability and acceptability of the food by the individual (Barasi 1997:29). There are many factors that influence food availability for food choices such as physical environment, legislation, economy and food handling (Barasi 1997:29). Factors that influence acceptability of food choices are religion and culture, physiological, social and psychological patterns (USDA/ARS 2003:1-2; Barasi 1997:29).

The American food pyramid for young children aged two to six years, (see Figure 2.6), was developed for young children to promote healthy nutrition (Keep kids healthy 2003:1). It serves as a guide for daily food choices, and the portion sizes for children's meals when parents or caregiver prepare food for children. The main emphasis of the food pyramid is on the five major food groups, all of which are required for good health. It also emphasizes foods that should be used sparingly such as fats, oils, and sweets (Keep kids healthy 2003:1).

Starchy foods form part of the grain group. The starchy foods are important because they are rich in carbohydrates, which are the main source of energy for the body (Department of Health 2004b:11). The unrefined and fortified starchy foods such as whole-wheat products, brown rice/pasta and coarse maize-meal, contain vital vitamins such as the B-complex vitamins, fibre and minerals. Starchy vegetables like sweet potatoes contain useful amounts of vitamin A and C (Department of Health 2004b:11). Unrefined starchy foods are also rich in nutrients that fight cancer like antioxidants, vitamin E, folic acid, zinc, selenium and magnesium. All of this supports a healthy bowel functioning and helps lower the risk of chronic diseases such as obesity and cardiovascular diseases (Department of Health 2004b:11).

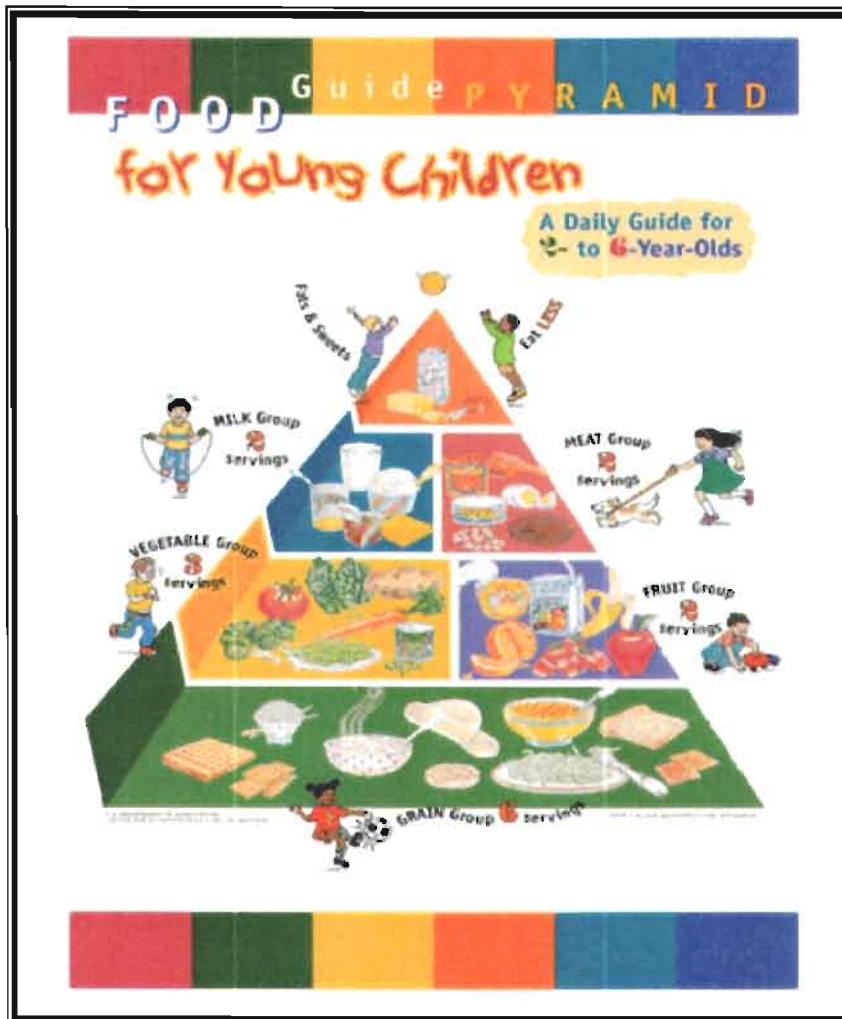


Figure 2.6 The American Food Guide Pyramid for young children aged two-to-six-years (Hersheys 2004:14)

The vegetable and fruit group, (see Figure 2.6), is important because it is high in vitamins and minerals that help to strengthen the body's immune system, which can resist illnesses such as infections, diarrhoea, colds and tuberculosis (Department of Health 2004a:13). Most vegetables and fruits (broccoli, tomatoes, green peppers, Brussels sprouts, oranges, guavas, mangoes and pawpaws) are rich in vitamin C, which is essential for the formulation and maintenance of body tissue. Vitamin C promotes the absorption of calcium and iron. It increases the healing of wounds and the body's resistance to infections (Department of Health 2004b:13). Fruits and vegetables that are good sources of vitamin A are carrots, spinach, butternut, sweet potatoes, pawpaw and mangoes. Vitamin A is so very important to the body because it protects it against infections, ensures adequate growth and development as well as good vision (Department of Health 2004b:13). Fruits and vegetables are high in

fibre, which helps proper bowel functioning and the prevention of constipation. Fruits and vegetables help prevent certain types of cancer through antioxidants (vitamin A, C and E), (Department of Health 2004b:14).

The meat and milk group, (see Figure 2.6), is a very good source of protein. Protein promotes growth, maintenance and repair of body tissue (Department of Health 2004b:19). Dairy products (milk, yoghurt, cheese, etc.) and the soft edible bones of fish (pilchards, sardines) provide calcium, which is essential for strong healthy bones and teeth, blood clotting and for the healing of wounds. Meat, chicken, fish and egg yolks are high in iron, vitamin B12 and zinc, which is necessary for the prevention of anaemia (Department of Health 2004b:19). There are two types of iron found in foods such as haeme-iron and non-haeme iron (Department of Health 2004b:20). Haeme-iron is provided by animal foods (red meat, poultry and fish) and can be easily absorbed. Non-haeme iron is found in plant foods (spinach, beetroot, dry beans, split peas, lentils, soya products and unsalted nuts and peanuts) and is not absorbed into our bodies as efficiently as haeme-iron. Substances found in certain vegetables bind iron making it difficult to absorb (Department of Health 2004b:16, 20). Plant proteins are low in fat and high in fibre, which keeps blood cholesterol low, ensures proper bowel functioning, prevents cardiovascular and other diseases of lifestyle (Department of Health 2004b:16). In Table 2.10 is the recommended food groups and portion sizes for young children in America, FBDG's are used in SA (see Figure 2.5).

No more than 30% of a child's diet should come from fats, which would equal 53g of fat per day, with most pre-school children requiring even less (Keep kids healthy 2003:3). The different types of fat that can be eaten are very important. Saturated fats that are in foods such as meats, dairy products, coconuts, palm and palm kernel oil, raise cholesterol more than unsaturated fats which are found in olive, peanut, and canola oils, or polyunsaturated fats in sunflower, corn, soybeans and cottonseed oils. Saturated fats should be limited to no more than 10% of the daily calories (Keep kids healthy 2003:3).

Sugars supply a large amount of calories, which hold little nutritional value (Keep kids healthy 2003:3). This includes white sugar, brown sugar, corn syrup, honey and molasses. Foods like candy, soft drinks, jams and jellies should be eaten sparingly, and by consuming less of these food items, tooth decay may be reduced (Briley & Roberts-Gray 1999:983; Keep kids healthy 2003:3).

Table 2.10 Recommended food groups and portion sizes for young children in America
(Martin & Kern 1992:2; Keep kids healthy 2003:3; Hersheys 2004:17)

Food Group	Number of servings per day	Sources
Grain group	Six servings	One slice of bread, 180ml of cooked rice or pasta, 125ml of cooked cereal, and 28g of ready to eat cereal
Vegetable group	Three servings	125ml of chopped or raw vegetables, or 1 cup of raw leafy vegetables
Fruit group	Two servings	One piece of fruit, $\frac{3}{4}$ cup of 100% fruit juice, 125ml of canned fruit, 62.5ml cup of dried fruit
Milk group	Two servings	125ml of milk or yoghurt, 56g of cheese
Meat group	Two servings	56g-84g of cooked lean meat, poultry or fish, 125ml of cooked dry beans, 2 tablespoons of peanut butter, or 1 egg or 28g of meat

Food choices have a direct affect on diet quality. A variety of foods for the menu will increase the macro- and micronutrient intakes of the children (Bourne *et al.* 2007b:282). This factor affects the day-to-day eating patterns of children as well as adults (Hersheys 2004:14).

2.3.4 Eating habits of pre-school children

Eating habits are established early in life, which people tend to follow for the rest of their lives (Briley & Roberts-Gray 1999:983; Hersheys 2004; Kelloggs 2005:1). Good eating habits can be established both at home and at the pre-schools (Briley & Roberts-Gray 1999:983; USDA/ARS2003:1-2). These eating habits are essential for the later development of the child. Regular consumption of water, healthy meals and snacks are habits that tend to stay with the child through adulthood (USDA/ARS2003:1-2). When children are encouraged to eat different types of food, it aids in the development of food preferences (USDA/ARS2003:1-2; Hershey's 2004:4). When food habits such as the consumption of healthy snacks, like popcorn and fruit, are established they may prevent future problems such as weight gain and dental caries (USDA/ARS 2003:1-2). Increasing the variety of foods consumed by children, has been shown to improve both macro- and micronutrient intakes. This is essential for nutrients such as calcium, iron and vitamins A, and C which are only found in certain foods. These nutrients are found to be among the most common micronutrient deficiencies in pre-school children in developing countries (Bourne *et al.* 2007a:231).

One of the principal benefits that vitamins, minerals and other nutrients provide is health on a long-term basis, by protecting the human body against chronic, debilitating diseases that pose the most serious threat to longevity. People's daily diet should contain specific nutrients. The human body needs the right quantities of nutrients every day in order to stay healthy (Keep kids healthy 2003:1). Proper nutrition can prevent many medical problems, including obesity, developing weak bones and developing diabetes. It also ensures that children will physically grow to their full potential (Keep kids healthy 2003:1). Nutrition is thus vital to children's health and can be obtained by the right food choices made when developing menus for children. Children tend to eat food that is available and this makes it easier to get them to eat nutrient-dense foods. Foods that are easy to eat such as fruits, vegetables, yoghurt and whole grain snacks including cereals can be included into children's diets. Healthy meals and snacks presented to children will teach them to practice good dietary habits (Briley & Roberts-Gray 1999:983; Hersheys 2004:5; Kelloggs 2005:1). It is important to allow

children to eat a variety of nutritious food (also see Figure 2.5 South African FBDG for children). The best way to keep children healthy includes encouraging them to:

- eat a variety of foods;
- balance the food they eat with physical activity;
- choose a diet with plenty of grain products, vegetables and fruits;
- choose a diet low in fat, sodium and cholesterol;
- choose a diet moderate in sugars and salt; and
- choose a diet that provides enough calcium and iron to meet their growing body's requirements (Briley & Roberts-Gray 1999:983; Keep kids healthy 2003:1).

Children will learn to choose plenty of fruit and vegetables and grain products. They would learn to avoid excessive fat and sodium and to use sugars only in moderation (Briley & Roberts-Gray 1999:983). Children learn best by following good examples of healthy eating habits and regular exercise (Keep kids healthy. 2003:1). Nutritionally adequate menus are essential, because a child needs the right quantities and combinations of foods to provide all the required nutrients.

2.3.5 Physical and environmental factors influencing food choices

The environment plays an important role in food choices. Due to the different seasons, food availability differs all year round, and thus influences food prices, making some foods more or less expensive. These changes in food prices will affect menu compilation, in order to add or withdraw certain foods from the menu (UNICEF 2000:5).

Children and adolescents who live in stable, nurturing homes and communities, with adult protection and guidance have better opportunities for development than children living in poverty (UNICEF 2000:5). Living conditions can only be altered through health, nourishment, education and skills that are not just background knowledge but also practically practiced. Many people living in poverty do not have this opportunity or the resources actively to change the living conditions (UNICEF 2000:5).

Access to services such as basic health, education, family planning, safe water, and sanitation services contributes to sustainable and stable economic progress. This helps people to be

more productive. It also creates a crucial buffer for women and children during difficult times (UNICEF 2000:6).

The physical and emotional environment plays an important role in the encouragement, acceptance and enjoyment of mealtimes for young children (Martin & Kern 1992:2; Briley & Roberts-Gray 1999:989). It is important to take the physical and emotional environment into consideration for two reasons. The first is that furniture and eating utensils should be comfortable, attractive, suitable in size and shape to be age-appropriate and developmentally suitable for children. This ensures child health and safety. If tables and chairs do not enable children to rest their feet comfortably on the floor, the danger exists that the children can fall (Briley & Roberts-Gray 1999:989). If eating utensils are not right in weight and size, children could choke and they will not learn to use the utensils appropriately (Briley & Roberts-Gray 1999:989). The second would be that the space used for children's dining areas must be clean, cheerful, preferably supportive of healthy eating habits, and should be appropriately made to accommodate children with developmental disabilities such as children in wheelchairs (Martin & Kern 1992:2; Briley & Roberts-Gray 1999:989). This will ensure the encouragement of healthy eating through cheerfully decorated and spacious eating areas. Posters and decorations that provide nutritious messages can add cheerfulness to the room and reinforce nutrition concepts taught by the teachers and modelled in the meals and snacks served at the pre-schools (Briley & Roberts-Gray 1999:989).

2.3.6 Nutrient requirements of pre-school children

Pre-school meals should be nutritionally adequate. This means that the combinations of foods should provide both the macro- and micro-nutrient quantities that a child would need for their time spent at the pre-school (Briley & Roberts-Gray 1999:982).

2.3.6.1 Macro-nutrients

Children also need macro-nutrients such as fats, protein, carbohydrates and fibre. Carbohydrates are the main source of energy for the body (Department of Health 2004a:11). Fibre helps to promote a healthy bowel function. Protein promotes growth, maintenance and repair of body tissue (Department of Health 2004a:19). Fats are needed for building cells, to help body processes and to help with the absorption of fat-soluble vitamins A, D, E and K (Department of Health 2004a:22).

2.3.6.2 Micro-nutrients

The human body needs different vitamins and minerals in order to sustain optimum health. Vitamins and minerals work together in order to boost and sustain our body's different systems. Eating lots of fresh fruits, vegetables, whole-wheat products and low-fat dairy products, is one of the best ways to ensure good health. By adding adequate amounts of vitamins and minerals to our daily diet, it will provide a boost to our immune systems. The adequate amount of minerals is vital to the cardiovascular system in the body. The following Tables 2.11 and 2.12 list some of the main advantages and food sources of vitamins and minerals (Australian Government 2006:1-2).

Table 2.11 Advantages and food sources of vitamins (Australian Government 2006:1-2)

Advantages of vitamins		
Vitamins	Advantages	Food sources
Vitamin A (Retinol) Fat soluble	Keeps eyes healthy, helps with the growth and forming of epithelial tissue (tissue that lines the stomach, intestines, lungs, other organs, eye socket and mouth-cavity). Enhances growth, bone development, reproduction, supports the immune system, and protects against certain types of cancers.	Yellow and green fruits and vegetables, fish-liver-oils, herbs like alfalfa, paprika, parsley, etc.

Advantages of vitamins (continued)		
Vitamins	Advantages	Food sources
Vitamin C (Ascorbic acid) Water soluble	Builds collagen, keeps gums; teeth; blood-vessels healthy, enhances iron absorption, builds the immunity against infection.	Broccoli, grape fruit, strawberries, oranges, kiwi fruits, mangos, tomatoes, spinach, cabbage, etc.
Vitamin D Fat soluble	Improves calcium absorption, enhances bone and teeth growth.	Salmon, fresh tuna, eggs, milk, fortified butter, as well as sunlight.
Vitamin E (Tocopherol) Fat soluble	Prevents cell damage, improves circulation, rebuilds tissue, helps prevent cancer.	Almonds, vegetable oils, soya-oils, sunflower oils, milk, apples, peas, peanuts, spinach, mangos, etc.
Vitamin K Fat soluble	Improves blood clotting.	Canola-oil, parsley, spinach, cabbage, broccoli, brussel-sprouts, green tea, eggs, carrots, tomatoes, etc.

Advantages of vitamins (continued)		
Vitamins	Advantages	Food sources
Vitamin B ¹ (Thiamine) Water soluble	Improves circulation, antioxidant, produces hydrochloric that helps with the production of blood, improves energy cycles, improves growth and learning abilities, serves as a co-enzyme in the carbohydrates and protein metabolic process.	Wheat, oats, yeast, sunflower seeds, egg yolk, lean pork chops and ham, fish, peanuts, poultry, etc.
Vitamin B ² (Riboflavin) Water soluble	Co-enzyme in energy production and regulates thyroid hormones.	Liver, cheese, feta cheese, milk, eggs, spinach, mushrooms, broccoli, etc.
Vitamin B ³ (Niacin) Water soluble	Co-enzyme in metabolism of energy and promotes glycogen fermentation.	Carrots, yeast, cheese, eggs, lean meats, fish, peanuts and peanut butter, milk, poultry, etc.
Vitamin B ⁵ (Pantothenic acid) Water soluble	Opposes stress, plays a role in the production of abnormal hormones, essential for cell metabolism, syntheses of cholesterol and steroid-hormone.	Liver, eggs, mushrooms, royal jelly, yeast, kidneys, etc.

Advantages of vitamins continued		
Vitamins	Advantages	Food sources
Vitamin B ⁶ (Piridoksien) Water soluble	Builds immunity against cancer, helps with red blood cell metabolism, prevents arterioscleroses, co-enzyme in protein metabolism.	Chicken, yeast, oats, liver, avocados, potatoes, sunflower seeds, peas, eggs, spinach, etc.
Vitamin B ¹² (Sianokobalamien) Water soluble	Helps prevent anaemia and improves metabolism of all cells.	Shell-fish, liver, salmon, eggs, fish, milk, yeast, yoghurt, etc.
Vitamin H (Biotine)	Helps metabolism of carbohydrates, fats, proteins, helps producing fatty acids, enhances healthy skin and nails.	Kidneys, liver, soya-beans, whole wheat products, yeast, eggs, meats, milk, poultry, etc.
C-enzyme Q ¹⁰	Antioxidant, important for energy production, in the cells of the body.	Salmon, sardines, peanuts, spinach, beef, etc.
Folic acid Water soluble	Promotes energy production, helps with the fermentation of red and white blood cells, as well as the production and sustaining of new cells, important for the metabolism of homosistein.	Yeast, spinach, white beans, avocados, oranges, broccoli, buttermilk, liver, brown rice, whole wheat, chicken, tuna, salmon, dates, etc.

Advantages of vitamins continued		
Vitamins	Advantages	Food sources
Choline (not really a vitamin but shows similar qualities)	Plays an important role in the nervous system, component of cell membranes and lipoproteins.	Liver, oats, soya-beans, eggs, milk, lentils, meat, cauliflower, etc.
Inosite (not really a vitamin but shows similar qualities)	Has a calming effect, lowers cholesterol levels, helps remove fats out of the liver, important for hair growth, regulates enzyme activities and phospholipids syntheses.	Liver, lentils, meat, fruits, vegetables, nuts, raisins, milk, yeast, etc.
Betacaroteen (not really a vitamin but shows similar qualities)	Is changed into vitamin A in the liver, antioxidant, helps immunity, serves as protection against strokes and cardinal diseases, repairs tissue, keeps skin and mucous membranes healthy.	Yellow and orange fruits and vegetables, (e.g. carrots, pumpkins, apricots, peaches, oranges), spinach, broccoli, etc.
Paramidobenzoic acid	Is an ingredient in certain sunscreens that helps prevent skin cancer, antioxidants helps turn grey hair (due to stress) back to original hair colour, can be changed into foliate in intestines.	Liver, spinach, mushrooms, molasses.

Table 2.12 Advantages and food sources of minerals (Australian Government 2006:1-2)

Advantages of minerals		
Minerals	Advantages	Food sources
Calcium	Important for strong bones, teeth, mussel, and nerve functioning, regulates heart beat, helps with blood clotting.	Yoghurt, milk, cheese, salmon, sardines, almonds, broccoli, green beans, etc.
Chrome trace element	Ensures proper metabolism of carbohydrates, fats, proteins	Broccoli, yeast, oysters, liver, brown sugar, potatoes, orange and grapefruit juice, etc.
Copper trace element	Component of enzyme and strengthens collagen.	Salmon, fresh tuna, eggs, milk, fortified butter, as well as sunlight
Florida trace element	Prevents cell damage, improves circulation, rebuilds tissue, helps prevent cancer.	Almonds, vegetable oils, soya-oils, sunflower oils, milk, avocados, pees, apples, peanuts, spinach, mangos, etc.
Iodine trace element	Improves blood clotting.	Canola-oil, parsley, spinach, cabbage, broccoli, brussels-sprouts, green tea, eggs, carrots, tomatoes, etc.

Advantages of minerals continued		
Minerals	Advantages	Food sources
Iron trace element	Builds immunity against cancer, helps with red blood cell metabolism, prevents arterioscleroses, co-enzyme in protein metabolism.	Chicken, yeast, oats, liver, avocados, potatoes, sunflower seeds, peas, eggs, spinach, etc.
Germanium	Helps prevent anaemia and improves metabolism of all cells.	Shell-fish, liver, salmon, eggs, fish, milk, yeast, yoghurt, etc.
Magnesium	Helps metabolism of carbohydrates, fats, proteins, helps producing fatty acids, enhances healthy skin and nails.	Kidneys, liver, soya-beans, whole wheat products, yeast, eggs, meats, milk, poultry, etc.
Molybdenum trace element	Antioxidant, important for energy production, in the cells of the body.	Salmon, sardines, peanuts, spinach, beef, etc.

Advantages of minerals continued		
Minerals	Advantages	Food sources
Potassium chlorate and nitrate	Promotes energy production, helps with the fermentation of red and white blood cells, as well as the production and sustaining of new cells, important for the metabolism of homosistem.	Yeast, spinach, white beans, avocados, oranges, broccoli, buttermilk, liver, brown rice, whole wheat, chicken, tuna, salmon, dates, etc.
Selenium trace element	Plays an important role in the nerves system, component of cell membranes and lipoproteins.	Liver, oats, soya-beans, eggs, milk, lentils, meat, cauliflower, etc.
Sulphur	Has a calming effect, lowers cholesterol levels, helps remove fats out of the liver, important for hair growth, regulates enzyme activities and phospholipids syntheses.	Liver, lentils, meat, fruits, vegetables, nuts, raisins, milk, yeast, etc.

2.3.6.3 Estimated average requirement for children (two-to-five-years)

The EAR is the daily reference values (DRV) that is used for energy. It is the average daily nutrient intake level estimated to meet the requirement of half the healthy individuals in a particular life stage and gender group. Because it is only an average some people will need more than the nutritional values recommended by the EAR than others (NICUS 2003:13-56). According to Table 2.13 this is the daily dietary reference intake of micronutrients for

children between the ages of one year to three years, and four years to eight years. The Recommended Daily Allowance (RDA) is the average daily dietary nutrient intake level sufficient to meet the nutrient requirement of nearly all (97 % to 98 %) healthy individuals in a particular life stage and gender group. The Adequate Intake (AI) is the recommended average daily intake level based on observed or experimentally determined approximations or estimates of nutrient intake by a group (or groups) of apparently healthy people, when an RDA cannot be determined. This study focused on these deficiencies and Table 2.13 of the EAR was adjusted accordingly.

Table 2.13 Estimated average requirements for some micronutrients

Micronutrients	The daily dietary reference intake for micronutrients (children two-to-five years old)	The use of micronutrients in the body
Calcium	800mg	This will enhance the growth, maintenance and strengthening of teeth and bones.
Iron	4.1mg	A major component in red blood cells.
Zinc	4.0mg	Enhances the immune system and growth.

Estimated average requirements for some micronutrients continued		
Micronutrients	The daily dietary reference intake for micronutrients for children two-to-five years old	The use of micronutrients in the body
Vitamin A	275µg	Builds and maintains healthy tissues, especially eyes, skin, bones, tissues of respiratory and digestive tracks.
Folic acid Vitamin B ⁶ Vitamin B ¹²	700mg 0.6mg 1.2mg	B vitamins assist in converting carbohydrates, fat, and proteins into energy, they build and repair body tissues.
Vitamin C	22mg	Assists in bone and teeth formation as well as in improving the immune system.

2.4 NUTRITION EDUCATION

When caregivers have good nutrition knowledge, they will have the ability to provide the children with a balanced diet, at the pre-schools. They will also have the opportunity to create awareness about the importance of nutrition, among the children and the parents, providing a learning opportunity to promote basic nutrition, food, food sources and health (Briley & Roberts-Gray 1999:987).

Nutrition education should be a component of a child-care programme (Briley & Roberts-Gray 1999:987). Children should have the opportunity to learn about food, food sources,

nutrition and the link between nutrition and health. The menu at a pre-school can be used as a “centrepiece” of nutrition education programmes that reinforce healthy eating habits of children attending pre-schools (Briley & Roberts-Gray 1999:987). Food experiences are vital to help children recognise and accept a wide variety of foods. When children learn how to choose and enjoy different types of nutritious foods, it provides the foundation for a lifetime of good food choices (Briley & Roberts-Gray 1999:987; Hersheys 2004:4; Kelloggs 2005:1).

2.4.1 Nutritional knowledge of the food service assistants/caregivers

Pre-schools should have staff members trained as food service assistants, in the basics of children’s nutrition and the methods that promote healthy eating habits. Pre-school owners and other staff members should have a basic knowledge regarding the safety and sanitary regulations regarding food storage and preparation (Briley & Roberts-Gray 1999:986; Dunn 2003:1-2). This will avoid the risk of food-borne illnesses and cross-contamination. Food safety standards specify that foods must be stored and served at the appropriate temperatures to minimise bacterial growth. Storage areas for food and cleaning products and pesticides should be separate from one another. It also suggests that foam cups and plates should not be used, to prevent the risk of choking when pieces are swallowed (Briley & Roberts-Gray 1999:986). Pre-schools should provide safe drinking water to the children at all times (Dunn 2003:1-2; Grandjean & Cambell 2004:27).

It is advised that pre-schools should consult dietetics professional on a regular basis for guidance to develop menus (Briley & Roberts-Gray 1999:987). Foodservice and menu planning for children of different ages, preferences, cultural backgrounds, activity levels, and children with special needs is a complex and challenging task (Briley & Roberts-Gray 1999:987; Dunn 2003:1-2). These dietetics professionals will provide nutrition information and education to the pre-school caregivers and food service assistants as well as assist in the menu planning. This should result in high quality nutrition within the pre-school and ensure higher quality meals for the children (Briley & Roberts-Gray 1999:987).

2.4.2 Nutritional training of the food service assistants/caregivers

There are many different governmental training programmes available for nutritional training. The INP facilitates and coordinates many of these programmes. When approaching such programmes, pre-schools could assist the solving of nutritional problems in South

Africa by using a conceptual framework (see Figure 2.4), which explains malnutrition as the outcome of interrelated, complex basic, underlying and immediate causes. Nutritional training is an ongoing process of assessment, analysis and action, of the so-called Triple A Cycle (see Figure 2.7) at all levels in any given context that is provided by the INP (Kloka 2003:1-17). The Triple A Cycle is assessing a problem/situation, analyzing the causes of the problem and taking action based on this analysis and resources available (Department of Health 2000:4).

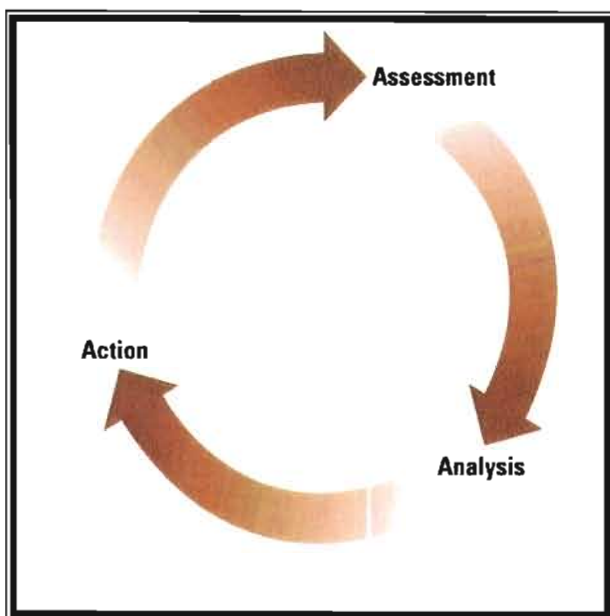


Figure 2.7 Triple A Cycle (Department of Health 2000:4)

It is advised that pre-schools provide staff with nutritional training opportunities, in order to provide the children with the best nutritional meals, as well as training in the basic healthy eating habits (Briley & Roberts-Gray 1999:983; Dunn 2003:1-2; Hershey's 2004:9).

Pre-schools should have food service assistants that are trained in the basic child nutrition and healthy eating habit methods (Dunn 2003:1-2; Hershey's 2004:9). The food service assistants should also know the right portion sizes of the food served to the children (Briley & Roberts-Gray 1999:983; Hershey's 2004:14). The pre-schools should comply with the safety and sanitary regulations regarding food storage and preparation (Briley & Roberts-Gray 1999:983; Dunn 2003:1-2).

2.5 SOUTH AFRICAN PRE-SCHOOLS HEALTH AND SAFETY STANDARDS

The average pre-school in a town or city may include buildings with classrooms, teachers and a safe play area for the children. However the pre-schools in townships are very different from the average provincial pre-schools.

2.5.1 General equipment

There must be adequate storage facilities for food, stretchers, sleeping mats, bedding, linen, indoor and outdoor play equipment. Sanitary ablution facilities for children must have one hand-wash basin installed at such height as to be conveniently used by children with one approved water closet for every fifteen children. There must be a stainless steel sink for the cleaning of play equipment as well as an adequate number of bins with self-closing lids for the disposal of paper towels, tissues and other waste articles (RSA 1992:4-6).

2.5.2 Kitchen layout and equipment

Kitchens must have a minimum floor area of 12m² for every 50 children. The floor area must be increased by 0,1m² per child in excess of 50. The kitchen must have an approved double compartment sink, a hand-wash basin, and if the Head of Health Services deems it necessary, a pot-wash sink and vegetable washing sink. Sinks must be made of stainless steel or other impervious material and have a constant supply of both hot and cold running water (RSA 1992:6-9).

General requirements for all kitchens must include the following:

- all cupboards, shelves, and other storage spaces for kitchen equipment and utensils should be easy to clean;
- all tables should have approved surfaces;
- the stove or other cooking unit shall be installed in such a way that as to allow easy access between the stove or cooking unit and the adjoining wall surface to facilitate cleaning;
- adequate storage facilities for vegetables;
- refrigeration facilities for all perishable foods;
- adequate number of refuse bins provided; and
- no laundry equipment is allowed in any kitchen (RSA 1992:6-9).

2.5.3 Resting, feeding and play area and equipment

A room for playing, eating and sleeping purposes where a minimum area of two cubic metres is available per child. The indoor area may be reduced to one and a half cubic met per child provided that a covered veranda of a minimum of half a cubic metre per child is provided. The covered veranda must adjoin the playroom and be protected against wind, rain and other inclement weather conditions. Both the playroom and covered veranda must have a minimum width of three metres. Playrooms must have adequate heating facilities, and access to the outdoor play area. The outdoor play area must comprise lawns or other surfaces and shady areas with a minimum of five cubic meter per child. The outdoor play areas must be adequately drained and properly fenced off from any parking area which may constitute a danger to the children. It must also be free of any dangerous or hazardous objects such as level of surface, steps, or excavations (RSA 1992:10-11).

Internationally, all playing equipment should be sturdy and free of sharp points or corners, splinters, protruding nails or bolts, loose rusty parts, hazardous small parts, or paint that contains lead or other poisonous materials. This equipment should be constructed and installed in such a manner as to be safe for use by children such as no excessive height. Handrails should match the developmental levels and the equipment and should not be a source of potential entrapment. There should be no pinch, crush, or shear points on or underneath equipment that would be accessible by children. Outdoor play equipment should not be coated or treated with toxic materials (The Supreme Education Council 2007:4).

2.5.4 Safety measures

Safety measures concerning a child's physical needs, means that the care and environment should be of such a kind as to ensure a child's safety. This means that pre-schools should protect children against anything that may be dangerous or cause injury to a child, such as fires, hot water installations, electrical fittings and appliances including heating appliances. There must be a wall or gate around the premises to ensure that children cannot leave the premises on their own accord. This will also prevent entrance of domestic animals (RSA 1992:11-12).

Internationally pre-school outdoor space should be easily accessible and available for all young children. Safety rules must be explained by the educators. Staff should conduct risk assessments regularly to ensure maintenance and safety of outdoor play areas (The Supreme

Education Council 2007:4). Indoor and outdoor playgrounds that meet basic health and safety standards may still present hazards to children in the absence of adequate supervision (The Supreme Education Council 2007:5).

Outdoor activity space must be enclosed by structures such as fences and gates that are maintained so that children cannot leave without an adult's help. Hard surfacing materials, such as concrete, soils or hard packed dirt, are unsuitable for use under and around playground equipment unless they are required as a base for shock absorbing material such as rubber mats or grass. Outdoor play areas should offer sufficient shade covering at least 50% of the play area so that children can spend time outdoors without being in the direct sunlight for extended periods (The Supreme Education Council 2007:5).

2.6 CONCLUSION

There are many different causes that interact and result in malnutrition such as the immediate causes, the underlying causes and the basic causes of malnutrition. Malnutrition is one of the most devastating “diseases” that most young children and pregnant mothers have to face daily. Pre-schools play an important role in the prevention of this “disease” due to the fact that most young children eat one or more of their meals. The FBDG's and Food pyramid directory can form a framework that will affect various factors in child nutrition, especially in pre-schools. These factors are food choices, meal plans, the physical environment, and the nutrient requirements of pre-school children. The nutritional knowledge of the food service assistants/caregivers play a vital role in nutrient intake of the pre-school children. Pre-schools can only fulfil this responsibility through the proper nutritional knowledge and training for the food service assistants/caregivers.

The pre-schools should follow-up on whether the children's food portioning needs are met or not, through contacting the parents and asking them if the children receive enough to eat. When children are ravenous it is possible that the dietary needs have not been met (Dunn 2003:1-2, 2003:1-2). If pre-schools do not furnish meals for the children, there must be adequate supplemental food available that provides food to children that do not receive a meal from the parent, or receive a meal of inadequate nutritional value, according to Dunn (2003:1-2), and when these centres change the meal policy, adequate notice must be provided to the parents.

During mealtimes children must be encouraged to feed themselves, in order to gain independent feeding. Children must be permitted to obtain second helpings of food. The children should also be taught the appropriate and acceptable table manners by the pre-schools. Pre-schools may accommodate food preferences for personal, religious, or medical reasons (Dunn 2003:1-3).

Current meal and snack menus must be reviewed regularly for nutritional content, variety, and quality, by a Federal Child and Adult Care Food programme specialist or by any Federal Health and Nutrition Centre. These reviews should take place at least every two years. The specialist responsible for the reviewing and approving of the menus, must be a registered dietician, or have a master's degree in food and institutional management with a major in food or in a closely related field (Dunn 2003:1-3). Therefore, the next chapter discusses the process of the studies methodology, including a conceptual framework of the study and its implementation. Furthermore, it focuses on the process of the study design, the assumptions, the delimitations and the sample selection.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Pre-schools in very poor communities have children who receive most of their daily meals at these schools (UNICEF 1998:1-3; Briley & Roberts-Gray 1999:981). If the food service assistants/caregivers of pre-schools were to be equipped with the correct nutritional information and the knowledge obtained was used in the correct manner, these children would have a more nutritious diet and a healthier life (Nel & Steyn 2000:11; Kloka 2003:7-8).

This chapter reports on a pilot study that was done in order to test the questionnaire used in the pre-test for content validity. The pre-test and menu analysis followed the pilot study in order to analyse the current situation in the pre-schools. The NEP was developed and presented to the respondents. Thereafter a post-test was done to test the success of the NEP.

3.2 OBJECTIVES

The purpose of this study was to evaluate a NEP to address the lack of nutritional knowledge of service assistants/caregivers who plan the menus in pre-schools as reflected in existing menu content and food choices required for children between two-to-five-years of age.

3.3 ETHICAL CONSIDERATIONS

Ethical considerations play a vital role in research, especially when people are the objects of the study. Social sciences have unique ethical problems that are pervasive and complex. These would not be relevant in a pure clinical laboratory setting of the natural sciences. Data should never be obtained at the expense of other people (Williams, Tutty & Grinnell 1995:30).

Researchers have to follow two basic categories of ethical responsibilities. These are the responsibilities to humans and to non-humans who participate in the research study (Gravetter & Forzano 2003:60). For example the researcher should get permission from the participants to use the data collected, for the research study. There is also the responsibility of the researcher to the discipline of science to be accurate and honest in the reporting of the

research (Gravetter & Forzano 2003:60). For example the researcher should not change the data so as to portray the results desired for the research project. This would be regarded as biased research. There are a few well-known ethical obligations which are to ensure that:

- informed consent of the subjects is obtained;
- no harm is done to experimental subjects;
- there is no deception of subjects;
- there is no violation of privacy;
- actions and competence of researcher;
- there is cooperation with contributors;
- ultimately there is the release or publication of findings; and
- the debriefing of subjects takes place (Strydom 2005a:58).

A proposal for the study was sent to the Faculty Executive Committee of Convocation (EXCO) for Research at Vaal University of Technology (VUT) and it was approved. Before starting with the pilot study, the researcher went to the pre-schools to ask permission of ten volunteer staff members of nine different pre-schools from the Eatonside informal settlement as respondents for the pilot study. Permission was also obtained to collect copies of the existing menus used by each of the selected sixteen pre-schools of the main study. Once the pilot study was completed and the data analysed, permission was asked for volunteers for the NEP at sixteen other pre-schools. All participants of this study remained anonymous.

3.4 PHASE ONE - RESEARCH METHODOLOGY

The study design, sample selection and conceptual framework of the study are discussed below.

3.4.1 Study design

A combination of a Quasi-experimental and quantitative-descriptive research design was used in the form of a survey (Fouché & de Vos 2005:134, 137). A pilot study was used mainly to test the nutrition knowledge questionnaires for content and validity. It was a questionnaire compiled out of specific questions that formed part of the nutrition knowledge questionnaire used in the pre- and post-test. A pre-test was done to determine the service assistants/caregivers knowledge about nutrition, food choices, health and safety. The situation analysis also included the evaluation of menus currently being used at the time of the study

by low-income pre-schools in the Eatonside informal settlement. These pre-schools were randomly selected. The service assistants/caregivers who develop menus in the pre-schools completed a NEP. The NEP was designed after the analysis of the results of the pre-test. Thereafter a post-test was done to determine the change in food service assistant's knowledge about nutrition, food choices, health and safety. Menu-design was tested with a final question in the post-test, where the respondents had to create their own three day menus in order to test the knowledge obtained during the NEP.

3.4.2 Conceptual framework of the study

The study was divided into four phases (see Figure 3.1):

Phase 1 was the planning of the literature study, proposal writing and project formulation.

Phase 2 was the pilot study. Measuring instruments such as questionnaires and interviews were developed. A pilot study was conducted, in order to test the questionnaires (see Annexure A) used in the pre-test and the post-test for content validity.

Phase 3 was the empirical research. The main study includes menu analysis and nutritional intake of two-to-five-year-old children. Nutrition knowledge of menu compilers was reviewed through questionnaires and interviews. The pre-test consisted of data collection capturing, analysis and interpretation. The data assisted in the development of the NEP. The NEP took place and the post-test was done afterwards.

Phase 4 was the finalisation of the data, through data capture, analysis and interpretation and report writing to be finalised. In the diagram (Figure 3.1) on the next page the conceptual framework of the study procedure for this study is clearly illustrated in the different phases.

3.4.3 Population

The discussion of the sample population for both the pilot study and NEP can be seen in Figure 3.1.

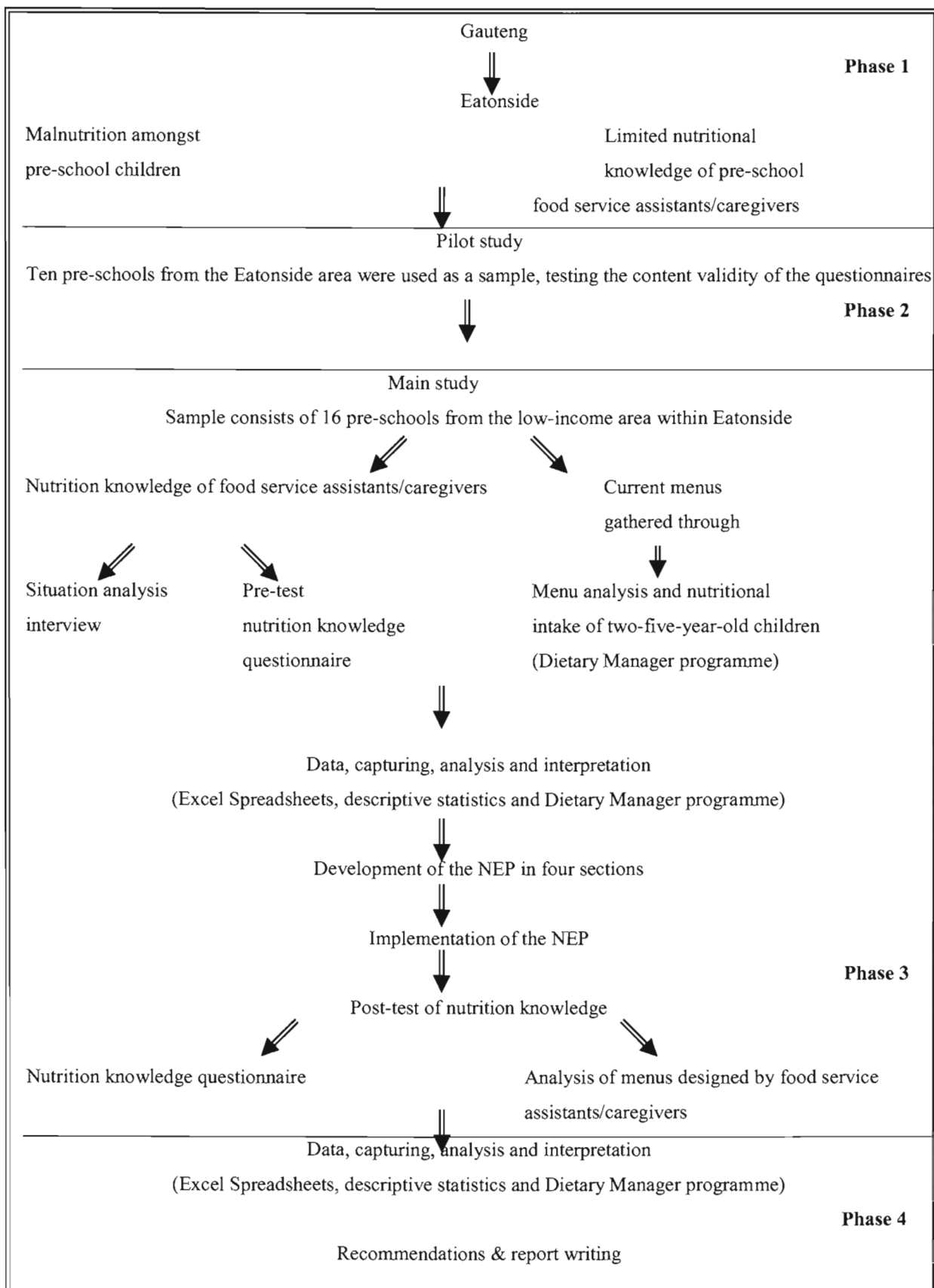


Figure 3.1 Phases of the project: a conceptual framework

3.4.3.1 Sample selection

Convenience sampling (McBurney 2001:246; Bailey 1994:94; Gabor 1993:162) was used to perform the pilot study. Ten pre-schools from the Eatonside area were selected and permission was given, in order to test the content validity of the questionnaires used in this study.

A sample of sixteen pre-schools was selected for the NEP in the same area to conduct the main study. A convenience sample of willing participating pre-schools was selected for the main study. The sample consisted of pre-school owners who acted as food service assistants/caregivers in the area, as well as food service assistants/caregivers within the different pre-schools.

3.4.3.2 Delimitations

The following aspects were excluded:

- nutritional knowledge of menu planners for children between the ages of naught -to -two - years of age, school children, adolescents and adults; and
- the physical and emotional environment.

The following aspects were included:

- menu planning, food choices and eating habits of pre-school children;
- the basic nutrition for health requirements of pre-school children;
- the basic food safety requirements for pre-schools;
- common food-borne illnesses; and
- nutritional knowledge of food service assistants/caregivers for children between the ages of two-to-five-years of age.

3.4.4 Measuring instruments for the pre- and post-test

There are two measuring instruments used namely the situation analysis interview and the nutrition knowledge questionnaires for the pre- and post-test.

3.4.4.1 Situation analysis interview

The situation analysis interview guide (Annexure B) was used to conduct the interview. The food service assistants/caregivers were assisted with the completion of the situation analysis

interview by the researcher and fieldworkers. The situation analysis interview guide was used to determine the current situation at the pre-schools in order to compile an efficient NEP.

3.4.4.2 Nutrition knowledge questionnaires

The study consisted of a pre-test in which nutrition knowledge questionnaires (Annexure C) were used. The food service assistants/caregivers were assisted with the completion of the nutrition knowledge questionnaire, by the researcher and fieldworkers. A NEP was developed, training was provided and a post-test was done. The same nutritional knowledge questionnaires were used in both the pre- and the post-test.

3.4.5 Data analysis

A professional statistician was consulted to assist with data analysis to ensure the validity and reliability of the data being analysed. The pilot study was analysed to test the content validity of the pre- and post-test questionnaire. It also provides an understanding of the questions used in the pre-test and post-test. The analysed data of the pre-test showed the level of knowledge from the data gathered. The information collected helped the design of the NEP. The data were analysed by means of Excel Spreadsheets and descriptive statistics and presented in graph and table forms.

Current menus of the participating pre-schools were analysed. A NEP was developed taking the situation analysis into account. The menu analysis was done by making use of the Dietary Manager Programme. The analysed results of the menus were compared to the DRI, EAR, FBDG's and the American Food Guide Pyramid for children in order to determine where the lack in nutritional knowledge of the food service assistants/caregivers lies.

3.4.6 Assumptions

The following assumptions were made in this study:

- all the pre-schools have children two-to-five-years old;
- all pre-schools have existing menus;
- all the pre-schools have menu planners;
- all the pre-schools have food service assistants/caregivers who compile or plan the menus;

- all food service assistants/caregivers can understand, speak, read and write in English; and
- all the food service assistants/caregivers in the pre-schools know about the importance of a well-balanced menu.

3.5 PHASE TWO - PILOT STUDY

The pilot study (Annexure A) was mainly used to test the nutrition knowledge questionnaires (Annexure C) for content validity.

3.5.1 Sampling procedure of the pilot study

Two samples were used for this study. A convenient sample of nine pre-schools from the Eatonside informal settlement was used to conduct the pilot study. The respondents of the pilot study were ten volunteer staff members of the participating pre-schools. The participating pre-schools were invited to follow the NEP but were not included in the main study. The pilot study's participants could not take part in the main study because they already knew the questions and could be biased.

3.5.2 Development of the pilot study

The pilot study questionnaire was an existing nutrition knowledge questionnaire previously used by the researcher and developed by Whati, Senekal, Lombard, Norris and Steyn (2005:76-85). This valid and reliable nutrition knowledge questionnaire was developed for urban South African adolescents participating in the Birth to Twenty (BTT) cohort study. The questionnaire was based on the FBDG's of South Africa and was adjusted in order to meet this study's requirements.

The pilot study was completed during April and May 2008, two months before the fieldwork started to prepare the researcher for the validation of the pre-test and post-test questionnaires. An adjusted questionnaire (see Annexure A) was used to compile both the situation analysis questionnaire (see Annexure B) and the nutritional knowledge questionnaire (see Annexure C). During the pilot study the nutrition knowledge questionnaire was used to test its content validity. The validity of a questionnaire needs to be tested in order to verify two aspects: the first aspect is that the instrument measures the concept of the question and the second is that the concept is measured accurately (Delpont

2005: 160). Content validity tests the representativeness/sampling adequacy of the content of an instrument (Delpont 2005: 160-161). The sample questionnaire also tested the concepts imbedded in the questions used in the NEP questionnaires.

3.5.3 Data analysis of the pilot study

In accordance with the objectives for phase 1, a pilot study was conducted to determine the reliability of the questionnaires. The results of the pilot study was analysed by a professional statistician who did the data analysis of the pilot study questionnaire to test content validity. The Statistical Package for Social Sciences (SPSS) data editor version 15.0 for Windows version 17.0 program was used to analyse the data, testing for content validity. Only pre-schools not participating in the NEP were used for the pilot study. Each week, for a period of four weeks the group of ten randomly selected pre-schools, completed the questionnaire. The answers were compared by means of Cronbach's Alpha analyses. Based on the results the questionnaire was accepted as valid as a mean $\alpha = 0.712$. Table 4.1 to Table 4.4 show the reliability statistic results of the pilot study week one to four. The analysed data was used to validate the pre- and post-test questionnaire which was used for the main study of the NEP questionnaire.

3.5.4 Results of the pilot study

The pilot study results were used as a basis for the design of the pre- and post-test questionnaires and to ensure content validity of the nutrition knowledge questionnaire. The pilot questionnaire tested the food service assistants/caregivers understanding of the questions used in the pre- and post-test questionnaires.

3.6 PHASE THREE - MAIN STUDY

After the pilot study was completed, the researcher learned that many of the pre-school educators also worked as the food service assistants/caregivers of the pre-schools. Very few pre-schools could afford to have separate food service assistants/caregivers. In some pre-schools the owner or principal would act as the food service assistant/caregiver. The second sample was a convenience sample of another 16 participating pre-schools within the Eatonside informal settlement. This selection was made for the main study.

3.6.1 Selection criteria and sample size for the main study

The sample selection for this study was a combination of convenient sampling and snowball sampling. A convenient sample is also known as an availability or accidental sample (Gabor 1993:162; Bailey 1994:94; McBurney 2001:246). These respondents are normally any one that crosses the researcher's path, or those nearest to the research location or, whoever is available in the specific field of the research study. They must adhere to the inclusion criteria for the study. The researcher did then select the desired sample size required for the study (Strydom 2005b:202). However snowball sampling is very similar to convenient sampling. This involves the researcher approaching a single case that is involved in the study in order to gain information on other similar persons. In turn the person is asked to identify more people who could make up the sample (Baker 1988:159). It is advised that the researcher request five names from each respondent rather than all the names from one because it can happen that the chain is broken (Strydom2005b: 203).

3.6.2 Procedure for data gathering

The phases used to obtain data are represented in Figure 3.1 (1.4.2):

- a pilot study – phase 2;
- in the main study a situation analysis was done and a nutrition knowledge questionnaire was used for the pre- and post-test – phase 3;
- SPSS was used to analyse the statistics of the questionnaires phase 4; and
- the Dietary Manager programme was used to analyse the menus – phase 4.

3.6.3 Measuring instruments

Three measuring instruments were used namely a situation analysis interview, nutrition knowledge questionnaire and a menu analysis.

3.6.3.1 Situation analysis interview

The situation analysis interview (Annexure B) was conducted in the form of an interview. Situation analysis was used as a guide to determine the situation at the pre-schools in order to identify the lack of nutritional value of the current menus. This information helped to design the NEP. During the interviews data was collected on the existing menus of the pre-schools. A nutritional analysis of the menus was done using the computer package Dietary Manager,

2006 version. These menus were compared with the new menus compiled after the NEP, to evaluate the NEP.

3.6.3.2 Nutrition knowledge questionnaire

Food service assistants/caregivers were assisted with the completion of the nutrition knowledge questionnaire (Annexure C). The nutrition knowledge questionnaire was used to determine the nutritional knowledge of food service assistants/caregivers who plan the menus in the pre-schools. The questionnaire was divided into three sections. The first part focused on basic nutritional knowledge and food choices, testing the respondents' basic knowledge of the nutritional requirements for children between two-to-five-years of age. The second section of the questionnaire focused on portion sizes and menu planning in order to identify the areas in which the menu planner's knowledge was lacking. The third section of the questionnaire was based on general hygiene during food preparation and the service area.

Most of the questions were closed-ended, such as true or false, multiple-choice questions and rated questions. The only open-ended question was one where the respondents had to design their own three day menu in the post-test. During the situation analysis current menus of the pre-schools were gathered. This question was specifically added to the post-test in order to evaluate the NEP.

3.6.3.3 Menu analysis

Respondents were asked in the situation analysis interview to provide the researcher with a current three-day menu of the pre-school. The nutritional content of menus from the situation analysis interview, was measured by means of nutritional analysis using the computer package Dietary Manager, 2006 version.

3.6.4 Fieldworkers

Two fieldworkers were recruited from the VUT's research Institute for Sustainable Livelihoods. The fieldworkers were already experienced in assisting respondents to complete questionnaires and interviews. The fieldworkers were briefed on the completion of the nutrition knowledge questionnaires and the situation analysis. The field workers assistance was used for both pre- and post-test.

3.6.5 Procedure for data gathering

Appointments for the pre-test and post-test were arranged almost directly after the pilot study and further arrangements and the confirmation thereof were made telephonically with the participating pre-schools, in order for them to complete the questionnaires and to arrange for interviews. The researcher and fieldworkers provided assistance with the questionnaires, and interviews were held with all the participants. The interviews consisted of questions considering the current menus used in the specific establishment. Questionnaires and interviews were completed by the food service assistants/caregivers of the pre-schools.

Table 3.1 Fieldwork and nutrition education programme timetable

DATE	TIME	Fieldwork and Activities
14-Aug	13:00 - 16:00	Welcome
		Pre-test: Nutrition knowledge questionnaire & Situation analysis
21-Aug	14:00 - 16:00	PowerPoint presentation
	Session 1	on Nutrition (the food pyramid)
		Annexure D
28-Aug	14:00 - 16:00	Discussion on Health and Safety
	Session 2	PowerPoint presentation
		Annexure E
4-Sep	14:00 - 16:00	Practical exercise: Make your own Lunch
	Session 3	Discussion on food choices
		& Menu planning
		Annexure F
18-Sep	14:00 - 16:00	Certificate Ceremony
		Annexure H
		(Handing out booklets of the NEP)
		Annexure G
		Post-test Questionnaire

3.6.6 Nutrition education programme

After the data of the pre-test was analysed the recommendations were made for the NEP, which could lead to more affordable food choices (Nel & Steyn 2000:1-2). The NEP was specifically designed to benefit and educate pre-school owners and food service assistants/caregivers in order to provide the pre-school children with a better and more nutrient-dense menu. The NEP training programme was designed out of the results of the pre-test. The knowledge questionnaires were compiled according to the EAR, DRI, FBDG's for children age two-to-five-years and the American Food Guide Pyramid for adults and children

(Hersheys 2004:14). The NEP was also based on the South African FBDG for children age two-to-five-years. The NEP was conducted for a time period of one day per week for a period of three weeks.

The NEP was developed as a training programme, consisting of the basic nutrition guidelines. The NEP was conducted in one of the pre-schools' classrooms in Eatonside informal settlement. The NEP (Annexure D - F) was divided into three training sessions, as can be seen in Table 3.1.

The first training session was a PowerPoint presentation which forms part of a face to face lecture. The presentation consisted of basic nutritional knowledge, the food pyramid for young children, portion sizes, vitamins and minerals. These were all issues identified as short comings in the nutritional knowledge questionnaire and the situation analysis interview.

During the second training session basic health and safety practices were discussed and demonstrated. It provided insight into a food service environment for pre-schools. Food-borne illnesses were also discussed. After the lecture, the pre-school owners and food service assistants/caregivers were given the opportunity to ask questions about the lesson.

During the third training session a very different approach was taken in order to demonstrate food choices, eating habits and menu planning. The training session was called 'make your own lunch' this was a hand's-on training session, providing the trainees with an opportunity to practice basic health and safety practices they learned about during the previous weeks training sessions, as well as showing them exactly what food choices involve. After the demonstration of food choices, the trainees were given another PowerPoint presentation in which menu planning and eating habits were discussed. Handouts were provided during this training session.

3.6.7 Post-test

The nutrition knowledge questionnaire (Annexure C) was used in the post-test to test the NEP. The questionnaires for both the pre-test and the post-test were the same. Food service assistants/caregivers were asked to design their own three-day menu on the back of the post-test questionnaire. These three day menus was compared to menus obtained in the situation

analysis in order to test whether the food service assistants/caregivers are now able to plan better menus and to evaluate the NEP.

The last session of the NEP consisted of the completion of the questionnaires for the post-test as well as a three day menu plan designed by each NEP trainee in order to test the knowledge obtained through the NEP. On this day a certificate ceremony was held for participation in the NEP. Each participant received a certificate of attendance (Annexure H). Each participant received a booklet containing all the information of the NEP (Annexure G). The post-test' results were then analysed to evaluate the NEP. The post-test was done two weeks after the NEP was concluded. The nutritional knowledge questionnaire was the same in both the pre-test and the post-test. The food service assistants/caregivers had to compile a three-day menu that was compared to menus obtained in the situation analysis in order to test whether or not the food service assistants/caregivers were able to plan better menus.

3.7 PHASE FOUR - DATA ANALYSIS

The data analysis was done for the pilot study questionnaire, the situation analysis interview, the pre-test and the post-test to determine the lack of nutritional knowledge of the food service assistants/caregivers.

3.7.1 Situation analysis interview

The existing nutritional content of menus from the situation analysis interview, currently used by the pre-schools, was done by means of nutritional analysis using the computer package Dietary Manager, 2006 version. The existing menus were evaluated. At the end of the NEP and during the post-test the participants were asked to draw up their own three-day menu. The food service assistant/caregiver's nutritional knowledge of the selected pre-schools was tested through the menu analysis making use of the dietary manager programme. The results of the menus will then be compared to the EAR, DRI and the American Food Guide Pyramid for children.

3.7.2 Nutrition knowledge questionnaire

The data was captured on excel spreadsheets. Descriptive statistics were used to determine the percentage of pre-schools who answered the questions correctly for selected nutrition knowledge, portion sizes and menu planning as well as food safety and health. Formulas were used to compare the correct answers (n) of the respondents in both the pre- and post-test. The

percentages were calculated by dividing the number of correct answers with the number of respondents. The analysed data was then presented in tables. Paired t-tests were carried out to measure the statistically significant difference ($p \leq 0.05$) before and after the NEP were done.

3.8 CONCLUSION

For the purpose of this study a conceptual framework was designed to divide the study into four phases. Phase 1 portrays the planning of the literature of the study, proposal writing and project formulation. Phase 2 the pilot study was done and measuring instruments such as questionnaires and interviews were developed, in order to test the questionnaires used in the pre- and post-test for content validity. Phase 3 was the empirical research of the main study. This included menu analysis and nutritional intake of two to five year old children. Nutrition knowledge of menu compilers was determined through questionnaires and interviews. The pre-test consisted of data collection, capturing, analysis and interpretation. The data assisted in the development of the NEP. The NEP took place over four weeks and the post-test was done three weeks afterwards. Phase 4 was the finalisation of the data, through data capture, analysis, interpretation and report writing. In the next chapter, the results and discussions of the main study are recorded and phase 4 is set in motion. The results of both the pre-test and the post-test will be discussed in chapter four. At the end of each section paired t-tests will show the significance of whether or not there was an increase of knowledge.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 INTRODUCTION

This research project was conducted to identify the nutritional knowledge of food service assistants in pre-schools in order to determine existing nutritional knowledge, and food choices applied in menu compilation in order to make recommendations for a nutritional skills-training programme. This chapter presents the results collected during the various phases of the study based on the research aims and objectives as outlined in Chapters 1 and 3. The results presented for each phase will then be discussed.

4.2 PHASE 1: DESCRIPTION OF THE STUDY

This phase was the planning of the literature study, proposal writing and project formulation. This study was undertaken in the Vaal Region. Specifically the Vereeniging area, Eatonside informal settlement, which lies between Vereeniging and Evaton (see block 30 in Figure 4.1). The Vaal Region is a poverty-stricken industrialised area situated $\pm 70\text{km}$ from Johannesburg. Respondents for both the pilot study and the main study were selected from pre-schools from the Eatonside informal settlement.

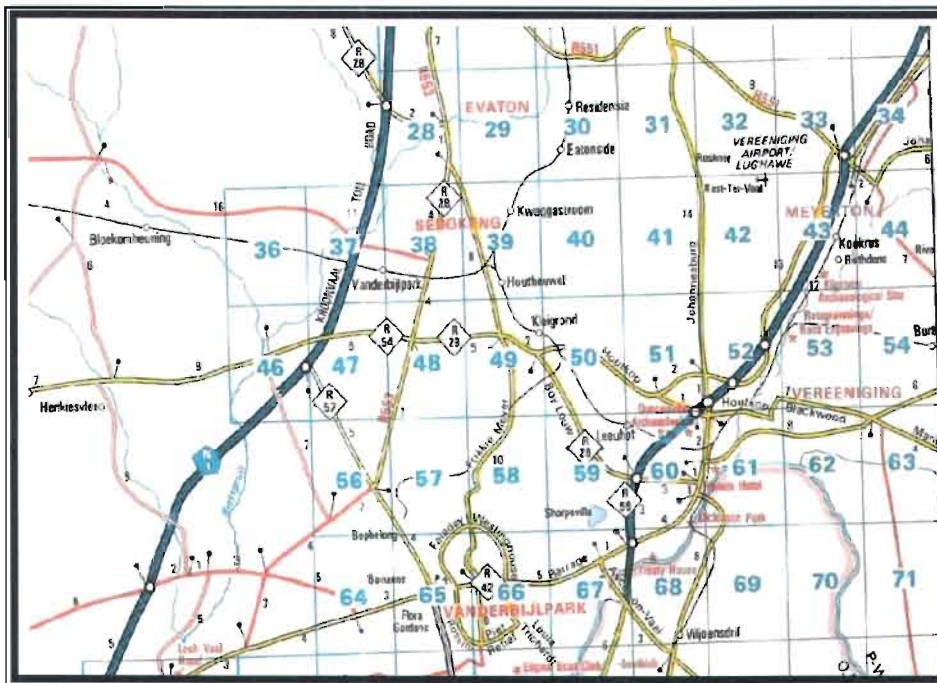


Figure 4.1 Map of the Vaal Region

The pre-schools were all privately owned by some of the members of the Eatonside community. However not all the respondents were owners of their own pre-schools. This

study focused on the nutritional knowledge of service assistants/caregivers who plan the menus in pre-schools in terms of existing menu content and food choices required for children between two-to-five-years of age.

4.3 PHASE 2: RESULTS OF THE PILOT STUDY

The reliability testing results are reflected in Tables 4.1 to 4.4. A questionnaire usually has internal reliability if the $\alpha = 0.7$. The results showed that the α ranged from 0.632 to 0.777 during the four weeks with a mean α of 0.712. The questionnaire was reliable and no changes were made after the initial development and testing. Furthermore, the validity was tested by the Statistical Package for Social Sciences (SPSS) version 15.0 for Windows version 17.0 program was used to analyse the data, testing for content validity (see Chapter 3).

Table 4.1 Reliability Statistics of the pilot study week one

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.680	.411	17

The reliability for week 1 was 0.680

Table 4.2 Reliability Statistics of the pilot study week two

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.757	.701	17

The reliability for week 2 was 0.757

Table 4.3 Reliability Statistics of the pilot study week three

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.777	.715	16

The reliability for week 3 was 0.777

Table 4.4 Reliability Statistics of the pilot study week four

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.632	.563	18

The reliability for week 4 was 0.632

4.4 PHASE 3 RESULTS OF THE MAIN STUDY

The main objectives of this phase were to determine the nutrition knowledge of the menu compilers by reviewing the pre-test questionnaires and situation analysis interview. Other objectives included a menu analysis and nutritional intake of two-to-five-year-old children by analysing the current menus being used at the pre-schools. The pre-test consisted of data collection, capturing, analysis and interpretation. After the results of the pre-test were evaluated, a NEP for food service assistants/caregivers in pre-schools in the Vaal Region was designed to address their lack of nutrition knowledge. The data assisted in the development of the NEP. The NEP took place and the post-test was undertaken afterwards. The results were analysed and then compared to the pre-test results.

The empirical study consisted of a situation analysis interview, a pre- and a post-test for which the same questionnaire was used. The questionnaire consisted of three sections namely:

- nutrition knowledge and food choices;
- portion sizes and menu planning; and
- food safety and health.

4.4.1 Results of situation analysis interview

The situation analysis interview was done before the pre-test, in order to gain background knowledge into the situations in the participating pre-schools. This was a voluntary interview. Only eleven pre-schools participated in the situation analysis interview. The results can be seen in the Tables 4.1 – 4.6.

4.4.1.1 Dining areas at the pre-school

This question was mainly asked for the researcher to better understand the situation of the pre-school eating arrangements, see Table 4.5. More than one option could have been chosen. The results show that all the pre-schools allow the pre-school children to eat indoors. Some of them allow the children to eat outside. Many of the pre-schools use tables and chairs (82%) when children eat their food. Sometimes pre-school children sit on a carpet while eating (27%).

Table 4.5 Dining areas at pre-schools

Places where pre-school children eat their meals at the pre-schools	n	%
a) In a building	11	100
b) Outside	0	0
c) Both inside and outside	2	18
d) At chairs and tables	9	82
e) At chairs only	0	0
f) On a carpet	3	27

4.4.1.2 Student numbers of selected pre-schools

This question was asked to identify how many children were attending the pre-schools. The results indicated that on average there were 65 pre-school children that attended the pre-schools of the respondents, as can be seen in Table 4.6. The smallest pre-school has 32 children and the largest 78.

Table 4.6 Student numbers of selected pre-schools

How many pre-school children are there in your pre-school?	Pre-school	Student numbers
	P1	70
	P2	70
	P3	70
	P4	70
	P5	70
	P6	70
	P7	70
	P8	70
	P9	78
	P10	32
	P11	48
	Total	718
	Average	65

4.4.1.3 Kitchen equipment and vegetable gardens at the pre-schools

Food preparation and storage must be hygienically safe, and food must be served at the correct time intervals. A minimum of two nutritious meals, or one nutritious meal and two healthy snacks per day from the care centre at which they stay. When a child stays at a pre-school for more than four hours or less than eight hours he/she must receive food that provides at least one third of the daily nutrition needs (Briley & Roberts-Gray 1999:982). One nutritious and well-balanced meal per day should be given to the children at the pre-school.

The results show that all the pre-schools had a kitchen, refrigerator, stove and a proper workstation. One of the pre-schools did not have a freezer and only 55% of these pre-schools had a vegetable garden. Ninety one percent the pre-schools buy fresh fruit as well as tinned food. All of the pre-schools buy fresh vegetables and maize meal (see Table 4.7).

Table 4.7 Kitchen equipment and vegetable gardens

Appliances and gardens at the pre-schools	n	%
a) Do you have a kitchen?	11	100
b) Do you have a refrigerator?	11	100
c) Do you have a freezer?	10	91
d) Do you have a stove?	11	100
e) Do you have a workstation (a place where you can prepare the meals)?	11	100
f) Do you buy fresh fruits for the pre-school meals?	10	91
g) Do you buy fresh vegetables for the pre-school meals?	11	100
h) Do you have a vegetable garden?	6	55
i) Do you buy maize meal for the pre-school?	11	100
j) Do you buy tinned food products?	10	91

4.4.1.4 Duration of pre-school days

This question is directly linked to the amount of meals children would consume at the pre-schools (see Table 4.8). The results show that 91% of the pre-school children stay at the pre-schools for the whole day, which means that the pre-school children receive at least two meals and two snacks at the pre-school per day. Only one pre-school has the pre-school children only until lunch.

Table 4.8 Duration of pre-school days

Time period that pre-school children stay at the pre-school	n	%
a) For the whole day	10	91
b) From the mornings only until lunch	1	9
c) Afternoons only	0	0

4.4.1.5 Average food cost for pre-schools

This question was asked for the researcher to better understand the situation of the pre-schools ability to buy different types of food as well as to their limitations in food choices (see Table 4.9). This Table 4.9 shows that R3882.00 was used on average to buy food supplies for the pre-schools per month. When using the average results of the number of children per pre-school in Table 4.6, then combining the average results of food cost for pre-schools in Table 4.9 and then by doing a small calculation, the results are a total of R59.72 per child, per month and R2.99 per child, per day for food supplies.

Table 4.9 Average food cost for pre-schools

Amount of money spent on food for the pre-school	Pre-school	Amount (R)
	P1	2500
	P2	1000
	P3	4500
	P4	4500
	P5	4500
	P6	4500
	P7	4500
	P8	4500
	P9	3000
	P10	700
	P11	8500
	Total	42700
	Average	3882

4.4.1.6 Food items bought for the pre-school meals

This question was asked in order to determine which basic food items are bought for the pre-school meals. See Table 4.10. The results show very few pre-schools buy soup peas, pepper, coffee, cheese, yoghurt, and white bread. All the other basic food items were popular on the pre-schools monthly food items list. Some of these food items that are not bought regularly have a good impact on the menu like the coffee which normally contains caffeine that is not good for children. The yoghurt contains calcium that is good for building strong bones and teeth (Department of Health 2004b:19). Soup peas are a good source of protein but pea soup could be used as a replacement for a meat dish and still provide the appropriate EAR for protein. White bread forms part of the grain group which is a good source of carbohydrates. Pepper however, is considered a spice and is thus optional to use.

Table 4.10 Food items bought for the pre-schools

Food items bought	n	%	Food items bought	n	%
Sugar	11	100	Carrots	11	100
Butter	10	91	Onions	11	100
Salt	11	100	Soya mince	11	100
Pepper	8	73	Mince meat	10	91
Macaroni	11	100	Tinned fish	11	100
Spaghetti	11	100	Chicken	11	100
Oats	9	82	Eggs	10	91
Milk powder	11	100	Beat root	10	91
Milk	11	100	Cabbage	11	100
Matabela	9	82	Yoghurt	7	64
Maize meal	11	100	Cheese	7	64
Mielie rice	10	91	Tea	11	100
Rice	11	100	White Bread	8	73
Samp	11	100	Brown Bread	11	100
Potatoes	11	100	Bananas	11	100
Dry Beans	11	100	Oranges	11	100
Soup Powder	11	100	Pears	11	100
Dry lentils	11	100	Apples	11	100
Soup peas	2	18	Simba Chips	9	82
Spinach	11	100	Fruit Juice	11	100
Pumpkin	11	100	Coffee	8	73

4.4.2 Results of the nutrition knowledge questionnaire: pre- and post-test

The nutrition knowledge questionnaire was designed to test the respondent's knowledge about basic nutrition and food choices for pre-school children before implementation of the NEP. The post-test was used to test the knowledge of food service assistants after the NEP. The data of the pre- and post-test questionnaire were then compared to determine the change in basic nutrition knowledge in order to evaluate the success of the NEP. The results of questions 1 to 19 of the questionnaire (see Annexure C) are reported in Tables 4.11 to Tables 4.29 below.

4.4.2.1 Food service assistants/caregivers nutritional knowledge and food choices

For the first set of questions (1-14), the respondents indicated if the given statements were true, false or they do not know.

4.4.2.1.1 Addition of salt

In question one the respondents were asked if: ‘it is advisable to add more salt to pre-school children’s food before they eat it’. This statement is false. The results of the pre- and post-test for question one is shown in Table 4.11.

Table 4.11 Add more salt to food

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	15	94	11	69	-4	-25
False	1	6	5	31	4	25
Don't know	0	0	0	0	0	0

During the pre-test most of the respondents (94%) believed that it was advisable to add more salt to pre-school children’s food before they eat it. The NEP included a discussion of the food guide pyramid and FBDG for young children and indicates that salt should be used sparingly. However, after the NEP 25% more respondents believed that statement was false. Thus there was a change in knowledge.

4.4.2.1.2 Legumes are as healthy as meat

Question two states that soya mince, dry beans, peas, and lentils are as healthy as meat and should be eaten often as a replacement for meat, because it is less expensive and contains less cholesterol is true. This is to the advantage of consumers especially if the budget for buying food is very small. Plant proteins are also low in fat and high in fibre, which keeps blood cholesterol low, ensures proper bowel functioning, prevents cardiovascular and other diseases of lifestyle (Department of Health 2004b:16). In Table 4.12 it is shown that 13% more respondents believed that legumes are as healthy as meat after the NEP.

Table 4.12 Legumes are as healthy as meat

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	13	81	15	94	2	13
False	2	13	1	6	1	-7
Don't know	1	6	0	0	0	-6

4.4.2.1.3 Variety of food on the menu

During question three, respondents reacted negatively to the statement ‘eating a lot of different kinds of food is healthier than eating only a few kinds of food’. However this statement can be interpreted as both true and false, depending on a person’s point of view.

Table 4.13 Variety of food

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	12	75	11	69	-1	-6
False	4	25	5	31	1	6
Don't know	0	0	0	0	0	0

The respondents show a decrease in the response during the post-test (see Table 4.13). The researcher believes that this particular statement could have been viewed in two different ways by the respondents after the NEP. The first being that ‘as long as one consumes the right amount of micronutrients as prescribed (Briley & Roberts-Gray 1999:982), it does not matter what type of food you consume’. The second being ‘it is important to consume a variety of different types of foods, especially at a young age, because it helps to develop personal food choices’ (Briend 2007:225). The two different points of views could both be considered correct although it is advised to consume a wide variety of foods not only to develop food choices, but also to facilitate proper micro- and macro-nutrient intake (Martin & Kern 1992:2; Keep kids healthy 2003:3; Hersheys 2004:17). By introducing different food items to the meal, it would make the meal more interesting and thus the answer should be true.

4.4.2.1.4 Fruits and vegetables as vitamin sources

The statement of fruits and vegetables being a good source of vitamin C and vitamin A is true and they help to strengthen the body’s immune system (Department of Health 2004b:13) as seen in Figure 2.6. However, it shows a decrease (6%) in the response of the respondents’ answers during the post-test. The researcher believes that the respondents could have changed their opinion about this question because they learned that mostly yellow fruits and vegetables are high in vitamin C and vitamin A after attending the NEP.

Table 4.14 Fruits and vegetables as vitamin sources

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	16	100	15	94	-1	-6
False	0	0	1	6	1	6
Don't know	0	0	0	0	0	0

4.4.2.1.5 Fruits and vegetables strengthen the immune system

Question five asked if: ‘fruits and vegetables have lots of vitamins that will strengthen the body’s immune system and prevent infections, diarrhoea, colds and tuberculosis’. This statement is true. Most vegetables and fruits are rich in vitamin C, which is essential for the formulation and maintenance of body tissue and promotes the absorption of calcium and iron. Vitamin C facilitates the healing of wounds and the body’s resistance to infections (Department of Health 2004:13). The results show an increase of (12%) of the respondent’s perception about the immune system (Table 4.15).

Table 4.15 Fruits and vegetables strengthen the immune system

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	14	88	16	100	4	4
False	0	0	0	0	0	0
Don't know	2	12	0	0	-2	-12

4.4.2.1.6 Calcium rich foods

The statement ‘eating a high content of calcium-rich foods such as milk will strengthen bones and teeth preventing osteoporosis later in life’ was made in question six (Table 4.16). This statement is true. Dairy products and the soft edible bones of fish are high in calcium, which are essential for strong healthy bones and teeth (Department of Health 2004b:19). All respondents indicated that this statement is true in the post-test. The results show an increase of 19% after the NEP.

Table 4.16 Calcium strengthen bones and teeth

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	13	81	16	100	3	19
False	1	6	0	0	-1	-6
Don't know	2	13	0	0	-2	-13

4.4.2.1.7 Chicken liver prevents anaemia

In question seven, the statement ‘chicken liver will help to prevent anaemia’ was made. Chicken liver is a very good source of haeme-iron, which can easily be absorbed by the body and is necessary for the prevention of anaemia (Department of Health 2004b:19-20), making the statement true, if a person consumes chicken liver regularly. Results show a decrease 13.5% in the post-test of the ‘false’ results indicating a positive increase in nutritional knowledge after the NEP. There was no change in the ‘Do not know’ statement.

Table 4.17 Chicken liver prevents anaemia

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	6	37,5	8	50	2	13,5
False	6	37,5	4	25	-2	-13,5
Don't know	4	25	4	25	0	0

4.4.2.1.8 Protein content of meat

The statement ‘beef and chicken have a high content of protein’ is true. All meat and milk products are good sources of proteins (Department of Health 2004b:19-20). Even though the statement is true, the results show a decrease of 7% in the post-test. This could be that the respondents were confused during the NEP training and were too shy to ask for a better explanation.

Table 4.18 Beef and chicken have a high content of protein

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	14	88	13	81	-1	-7
False	2	12	3	19	1	5
Don't know	0	0	0	0	0	0

4.4.2.1.9 Milk products are high in calcium

Respondents were asked if the statement ‘milk, yoghurt and cheese have a high content of calcium’ was true; false or whether they did not know in response to question nine. The statement is true. The results show no change in both the pre-test and post-test. The results indicate that the respondents have good basic nutritional knowledge, concerning milk products.

Table 4.19 Milk products are high in calcium

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	16	100	16	100	0	0
False	0	0	0	0	0	0
Don't know	0	0	0	0	0	0

4.4.2.1.10 Fruits and vegetables are high in vitamins and minerals

In question ten the statement ‘fruits and vegetables have a high content of vitamins and minerals’ was made. This statement is true because the vegetable and fruit group, (see Figure 2.17), are high in vitamins and minerals (Department of Health 2004b:13). Results showed a 6% increase after the NEP.

Table 4.20 Fruits and vegetables are high in vitamins and minerals

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	14	88	15	94	1	6
False	1	6	1	6	0	0
Don't know	1	6	0	0	-1	-6

4.4.2.1.11 Butter and margarine are high in fat

Question 11 tested the respondents basic nutritional knowledge of fat content statement ‘butter & margarine have a high content of fat’. The results in Table 4.21 below indicate that the respondents have good basic nutritional knowledge, concerning fat. There is no change in the pre-test and post-test, it shows 100% accuracy.

Table 4.21 Butter and margarine are high in fat

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	16	100	16	100	0	0
False	0	0	0	0	0	0
Don't know	0	0	0	0	0	0

4.4.2.1.12 Green vegetables are high in B-complex vitamins

Leafy green vegetables like, spinach have a high content of the B-complex vitamins and haeme-iron (Department of Health 2004b:16,20). The results show confusion in the respondent's answers, because 81% of the respondents indicated 'true', however 'false' decrease with 7% and 'don't know' increased with 7%. This indicates that one respondent changed their opinion of 'false' to 'don't know'.

Table 4.22 Green vegetables are high in B-complex vitamins

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	13	81	13	81	0	0
False	2	13	1	6	-1	-7
Don't know	1	6	2	13	1	7

4.4.2.1.13 Fruits are high in vitamin C

The statement in question 13: 'oranges, naartje and strawberries have a high content of vitamin C' is true. Most fruits are rich in vitamin C, (Department of Health 2004:13). The results show a 19 % increase in the post-test results. This shows that the respondents understood the question well but, that they got confused when fruits and vegetables were combined, or when questions were only about vegetables. The respondents could be more familiar with the terms vitamins than with vegetables and vitamins. However it could be more challenging, when thinking of vegetables as having vitamins too. It is thus recommended that a more thorough training programme is developed, focussing mainly on food groups such as fruits and vegetables.

Table 4.23 Fruits high in vitamin C

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	13	81	16	100	3	19
False	2	13	0	0	-2	-13
Don't know	1	6	0	0	-1	-6

4.4.2.1.14 Vegetables high in vitamin A

In question 14 (Annexure C) the statement 'yellow vegetables like, carrots have the most vitamin A' was made. This statement is true, fruits and vegetables that are good sources of vitamins (Department of Health 2004:13). In the pre-test most of the respondent's answers

was correct (75%) while the rest were confused. After the NEP all respondents (100%) knew that carrots are a good source of vitamin A.

Table 4.24 Vegetables high in vitamin A

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	12	75	16	100	4	25
False	1	6	0	0	-1	-6
Don't know	3	19	0	0	-3	-19

4.4.2.1.15 Healthy snacks for children pre-test

In the next question (see Annexure C for question 15) the respondents were asked to rate four options given to indicate which one was the most healthy and which the least healthy for children. The correct answer was fresh fruit, mainly because it is the easiest to acquire and the least expensive. It can serve as a fast and easy snack, containing only minute amounts of fat. Most fruits are high in sugar, which will provide the children with energy and at the same time with vitamins and minerals (Briley & Roberts-Gray 1999:983).

The content of a sandwich usually includes margarine, a spread such as peanut butter or jam. A small packet of chips will provide the children with energy but, it also contains a lot of fat, salt and preservatives and has a low content of vitamins and minerals. Table 4.25 and Table 4.26 shows that the respondents know that a small packet of chips will provide the children with energy, thus making this their first choice. It did not take the large amount of fat, hidden in the chips into consideration. It is recommended that attention be given in the NEP to the fat content of chips.

Table 4.25 Healthy snacks for children pre-test

Rate	Pre-test							
	Fresh fruit		Dried fruit		A sandwich		A small 25g packet of chips	
	n	%	n	%	n	%	n	%
1st	0	0	1	6	2	13	13	81
2nd	3	19	5	31	5	31	3	19
3rd	3	19	5	31	8	50	0	0
4th	10	63	5	31	1	6	0	0

Table 4.26 Healthy snacks for children post-test

Rate	Post-test							
	Fresh fruit		Dried fruit		A sandwich		A small 25g packet of chips	
	n	%			n	%	n	%
1 st	0	0	0	0	4	25	12	75
2 nd	1	6	5	31	6	38	4	25
3 rd	5	31	8	50	3	19	0	0
4 th	10	63	3	19	3	19	0	0

4.4.2.1.16 Healthy snacks for children post-test

In question 16 (Annexure C) respondents had to rate four lunch menus given and were asked to indicate which one was the most healthy and which the least healthy for children. The correct answer was the 'brown bread sandwich with thinly spread peanut butter and jam and a banana'. This menu was chosen because it contains the least amount of fat.

4.4.2.1.17 Fat content of the lunch menu

Fish and chips would only be low in fat content when it is oven baked fish and chips; this however was not the case of our lunch menu options. Menu items were chosen that were easy to cook in these pre-schools as well as the most affordable food items. The 'Pap, salsa and wors' menu choice has a lot of hidden fat in the wors. Roasted chicken, spinach, pumpkin and rice have a lot of fat hidden in the chicken skin. Table 4.27 shows a positive increase in the results of the post-test in (c) with 6.25% However it also shows a negative increase in (a) of 6.25% and no change in the results of (b).

Table 4.27 Fat content of the lunch menu

Nr.	Lunch menu	Fat in grams	Pre-test		Post-test		Change in	
			n	%	n	%	n	%
a.	Fish and chips	35.5	0	0	1	6.25	1	6.25
b.	Pap, salsa and wors	30.24	2	12.50	2	12.50	0	0
c.	Brown bread sandwich with thinly spread peanut butter and jam and a banana	4.32	9	56.25	10	62.50	1	6.25
d.	Roasted chicken, spinach, pumpkin and rice	7.08	5	31.25	3	18.75	-2	-12.50

4.4.2.1.18 Best type of bread for children

Question 17 asked the respondents to indicate which type of bread they thought was best for children as lunch. With this question the basic nutritional knowledge of the respondents was tested, to indicate whether the respondents understood that fibre is very important in a diet. In terms of fibre content whole wheat bread is rated first, brown bread second, Albany best of both third and fourth is white bread.

The ratings of this question show that brown bread and white bread are most commonly served to children in these pre-schools. This could be due to personal preferences, when considering that most (82% in the pre-test and 88% in the post-test) of the pre-schools would serve brown bread to the children at lunch. White bread is not given as often as brown bread. The ratings indicate that this would be used as the third or fourth choice in both the pre-test and the post-test.

Table 4.28 Best type of bread for children

Pre-test								
Rate	Whole wheat bread		Brown bread		Albany best of both		White bread	
	n	%	n	%	n	%	n	%
1 st	0	0%	13	82%	1	6%	2	13%
2 nd	2	13%	2	12%	8	50%	4	25%
3 rd	6	38%	1	6%	2	12%	7	44%
4 th	8	50%	0	0%	5	32%	3	19%
Post-test								
Rate	Whole wheat bread		Brown bread		Albany best of both		White bread	
	n	%	n	%	n	%	n	%
1 st	0	0%	14	88%	1	6%	1	6%
2 nd	7	44%	2	12%	7	44%	0	0%
3 rd	2	12%	0	0%	6	38%	8	50%
4 th	7	44%	0	0%	2	12%	7	44%

4.4.2.1.19 Preparation method of stew

Respondents were asked to indicate the correct order in which to prepare stew. In Table 4.29, the correct steps are shown from one to nine. Many (44%) of the respondents knew that samp must cook for a long time and it is essential to start with the samp. However they did not always follow the correct steps as to which food product takes longer to cook, chicken or vegetables. It is clear that the respondents need more training about the cooking periods of different food items.

Table 4.29 Preparation method of stew

Steps	Preparation method	Pre-test			
		Correct answer		Alternative answer	
		n	%	n	%
1	Wash samp & soak	7	44	9	56
2	Cook samp	6	38	10	63
3	Remove feathers from chicken	0	0	16	100
4	Wash chicken meat	1	6	15	94
5	Cook chicken meat	5	31	11	69
6	Wash vegetables	5	31	11	69
7	Cut vegetables	4	25	12	75
8	Cook vegetables	5	31	11	69
9	Add spices such as salt and pepper	9	56	7	44
Steps	Steps Preparation method	Post-test			
		Correct answer		Alternative answer	
		n	%	n	%
1	Wash samp & soak	7	44	9	56
2	Cook samp	6	38	10	63
3	Remove feathers from chicken	4	25	12	75
4	Wash chicken meat	4	25	12	75
5	Cook chicken meat	9	56	7	44
6	Wash vegetables	10	63	6	38
7	Cut vegetables	9	56	7	44
8	Cook vegetables	10	63	6	38
9	Add spices such as salt and pepper	14	88	2	13

4.4.2.1.20 Evaluation of nutrition knowledge and food choices training

The results of the section on nutrition knowledge and food choices are summarised in Table 4.30. A 95% confidence interval was used. The t-tests results showed a statistically significant difference in knowledge for question 1, 14 and 18. This indicates that there was a small increase in the respondent's knowledge of nutrition and food choices.

Table 4.30 Evaluation of nutrition knowledge and food choices training

	Question	Correct answer pre-test (%)	Correct answer post-test (%)	Statistical Significance between the pre-test and the post-test ($p \leq 0.05$)
1	Add more salt	6	31	0.041
2	Legumes are as healthy as meat	81	94	0.164
3	Variety in food	75	69	0.333
4	Fruits and vegetables are a good source of vitamin C and vitamin A	100	94	0.333
5	Fruits and vegetables strengthen the immune system	88	100	0.164
6	Calcium strengthens bones and teeth	81	100	0.083
7	Chicken liver prevent anaemia	37.5	50	0.164
8	Beef and chicken have a high content of protein	88	81	0.333
9	Milk products are high in calcium	100	100	0.000
10	Fruits and vegetables are high in vitamins and minerals	88	94	0.333
11	Butter and margarine are high in fat	100	100	0.000
12	Green vegetables are high in B-complex vitamins	81	81	0.000
13	Fruits are high in vitamin C	81	100	0.083
14	Yellow vegetables are high in vitamin A	75	100	0.041
15	Healthy snack for children pre-test	0	0	0.000
16	Lunch menu containing the least amount of fat	56,25	62,5	0.333
17	Best type of bread for children for lunch	82	88	0.333
18	Preparation method of stew	263	456	0.020

4.4.2.2 Portion sizes and menu planning

For the second section of questions (1-4) the respondents indicated if the given statements were true, false or they do not know. In questions (5-12) the respondents had to indicate the correct answer from a series of options.

4.4.2.2.1 Frequency of meals per day

In question one the respondents were asked if: 'It is better to eat six small meals per day than two big meals'. This statement is true. The results of the pre- and post-test for question one is

shown in Table 4.31. Pre-school children need nutrient-dense food in the form of two or three healthy snacks, in addition to three small meals each day, see Table 2.9 (Briley & Roberts-Gray 1999:982). In Table 4.31, results show that the respondent's nutritional knowledge increased after the NEP, in this question with 50%.

Table 4.31 Frequency of meals

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	4	25	12	75	8	50
False	9	56	4	25	-5	-31
Don't know	3	19	0	0	-3	-19

4.4.2.2.2 Meat portion size

Question two's statement: 'It is healthy for children to eat only one portion of meat everyday' is false. The Food Guide Pyramid for young children (aged two to six years) (Hersheys 2004:14) see Figure 2.6, shows that children should consume at least two portions of the meat and milk group per day (Department of Health 2004b:19). Results show that 31% more respondents choose the correct answer after the NEP.

Table 4.32 Daily meat portion size for pre-school children

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	11	69	7	44	-4	-25
False	4	25	9	56	5	31
Don't know	1	6	0	0	-1	-6

4.4.2.2.3 Salt portion size

During question three, respondents reacted to the statement 'There should be a little bit of salt included to children's diets because most salt has iodine that prevents goitre'. This statement is true. The results in Table 4.33 show, an increase of 13% in the post-test.

Table 4.33 Daily salt portion size for pre-school children

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	13	81	15	94	2	13
False	1	6	1	6	0	0
Don't know	2	13	0	0	-2	-13

4.4.2.2.4 Starch portion size

In question four the respondents were asked: ‘should starchy foods (like porridge, rice, bread) be included in pre-school children’s meals?’ This statement is true. Starchy foods are important because they are rich in carbohydrates, which are the main source of energy for the body (Department of Health 2004b:11). Unfortunately results show a decrease of 6%.

Table 4.34 Daily starch portion size for pre-school children

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	14	88	13	81	-1	-6
False	0	0	3	19	3	19
Don't know	2	13	0	0	-2	13

4.4.2.2.5 Well-balanced diet For question five, respondents had to indicate which statement reflected a well-balanced diet. The correct statement was c. This statement was formulated based on the Food Guide Pyramid for young children, see Figure 2.6. As can be seen from the results, the respondents got confused with this question. It proves that more in-depth training is necessary on the Food Guide Pyramid for young children.

Table 4.35 A well-balanced diet

A well- balanced diet		Pre-test		Post-test		Change in	
		n	%	n	%	n	%
a	Consists mostly of meat, with smaller amounts of starch, fruits, vegetables, and dairy products	3	19	3	19	0	0
b	Consists mostly of vegetables, and smaller amounts of meat and dairy products	8	50	8	50	0	0
c	Consists mostly of starches, vegetables and fruits, with smaller amounts of meat and dairy products	5	31	4	25	-1	-6
d	Consists mostly of sweets, fruits and vegetables, with small amounts of meat and starch.	0	0	1	6	1	6

4.4.2.2.6 Types of pre-school menus

Question six was mainly based on respondents types of menus used in their pre-schools. This question was selected to understand the types of menus that the respondents were familiar with, especially during the pre-test. In the post-test, the respondents were tested on whether any knowledge regarding types of menus were gathered from the NEP. The results show an increase in the post-test, with the choice of a five-day cycle menu. A different menu everyday' can also be seen as the correct answer, which was equally selected in the post-test, with a five-day cycle menu.

Table 4.36 Types of pre-school menus

Types of pre-school menus	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
A different menu every day	4	25	6	38	2	13
A five-day cycle menu	3	19	6	38	3	19
Budget Menu	8	50	4	25	-4	-25
No menu	1	6	0	0	-1	-6

Question seven to eleven was multiple questions, mainly based on portion sizes for pre-schools children. The respondents had to choose the correct answer.

4.4.2.2.7 Vegetable portion size

In question seven (Table 4.37) the respondents were asked ‘what is the portion size of cooked vegetables for a pre-school child?’. The correct portion size is half a cup (125 ml). According to the recommended food groups and portion sizes for young children (Martin & Kern 1992:2; Keep kids healthy 2003:3; Hersheys 2004:17), children can consume three portions of vegetables per day. The results of the pre- and post-test for question seven is shown in Table 4.37. The results of 31% indicate that the respondents who have the right idea stay consistent. Respondents with wrong ideas, stayed wrong. The respondents did however improve in their belief that one tablespoon (15ml) would be a sufficient portion for a pre-school child. This could be because some of the respondents work with small children, some of whom may only be a few months old. Some of the respondents thought that one or more cups (>250ml) of vegetables would be correct. This could be that the respondents remembered that vegetables were important and they could have got confused with the portion sizes for the whole day. The results indicate that more training is needed with regards to portion sizes. No improvement is shown in correct portion sizes.

Table 4.37 Vegetable portion sizes for pre-school children

Portion size	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
1 Tablespoon	6	38	4	25	-2	-13
Half a cup	5	31	5	31	0	0
1 Cup or more	1	6	4	25	3	19
1/4 Cup	4	25	3	19	-1	-6

4.4.2.2.8 Dairy products portion size

Question eight focused on the daily milk group portions sizes for pre-school children. Pre-school children can drink two cups (500ml) of milk per day (see Table 2.10) (Martin & Kern 1992:2; Hersheys 2004:17. The unchanged results in Table 4.38 prove that there is still a lot of training needed in portion sizes for pre-school children. It could be that the respondents need one or more training sessions that focus only on portions sizes. The results indicate that the respondents did not fully understand the lesson on portion sizes.

Table 4.38 Milk or maas daily portion sizes for pre-school children

Portion size	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
1 Tablespoon	1	6	1	6	0	0
Half a cup	9	56	9	56	0	0
1 Cup or more	5	31	5	31	0	0
2 Cups	1	6	1	6	0	0

4.4.2.2.9 Fruit and vegetable portion size

In question nine, the respondents were asked ‘how many portions of fruits and vegetables should pre-school children be eating daily’. Figure 2.6 indicate that children may consume two portions of fruit and three portions of vegetables daily. The correct answer would be (a), see Table 4.39 below for the results. Results show an increase of 6% in the post-test. However one can still see that there is confusion in portion sizes, especially when one combines fruits and vegetables in one question. The results also show that there was an increase in the basic nutrition knowledge and that one cannot eat as much fruit and vegetables as one desires. Thus more training in portion sizes is recommended.

Table 4.39 Daily fruit and vegetable portion sizes for pre-school children

Portion size		Pre-test		Post-test		Change in	
		n	%	n	%	n	%
a	2 fruit and 3 vegetable a day	12	75	13	81	1	6
b	3-4 fruits and vegetables a day	0	0	0	0	0	0
c	As much fruits and vegetables as they can eat everyday because you can never eat too much fruits and vegetables	3	19	1	6	-2	-13
d	There is no need to eat fruits and vegetables daily when children is young	1	6	2	13	1	6

4.4.2.2.10 Water intake

Question ten asked respondents what the daily water intake of a pre-school child should be. This question was asked to test if the respondents know that water is important in the diet of young children. It is important to teach children to drink water and not just cold drink or milk when they are thirsty. In Table 2.4 we see that the daily water intake for children is four to five cups (1ℓ - 1.25ℓ) (Grandjean & Cambell 2004:29). Results indicate that the respondents have a very good basic knowledge of water intake. The post-test show an

increase of 31% after the NEP has been completed. It also shows that the respondents believe that one does need to drink water every day.

Table 4.40 Daily water intake for pre-school children

Portion size	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
4-5 cups	8	50	13	81	5	31
2-7 cups	4	25	2	13	-2	-13
2 liters	2	13	1	6	-1	-6
You do not have to drink water every day, only when you feel like it	2	13	0	0	2	13

4.4.2.2.11 Breakfast menu

In question eleven the respondents were again asked to choose a menu for the pre-school children, this time for breakfast. The main aim of this question was to see what type of porridge the pre-school children get for breakfast. This also forms part of food choices. None of the food choices were wrong but the researcher did find that the most popular food choice was ‘maize meal porridge and milk’. See Table 4.41 for the results.

Table 4.41 Breakfast menu for pre-school children

Portion size		Pre-test		Post-test		Change in	
		n	%	n	%	n	%
a,	Maize meal porridge and milk	9	56	10	63	1	6
b,	Maltabella porridge and milk	4	25	2	13	-2	-13
c,	Maize meal porridge with salsa	1	6	1	6	0	0
d,	Crumbly maize meal porridge and milk	2	13	3	19	-1	-6

4.4.2.2.12 Evaluation of portion sizes and menu planning training

The t-test results of the section on portion sizes and menu planning are summarised in Table 4.42. There is statistically significant difference for question 1, 2 and indicating a improvement in the knowledge of these areas after completion of the NEP. This indicates that the respondent’s knowledge increased in menu planning and portion sizes. After the NEP the respondents understand portion sizes for pre-school children’s meals better in order to meet their daily nutritional requirements. They also understand the importance of daily water intake and meat portion sizes for pre-school children.

Table 4.42 Evaluation of portion sizes and menu planning training

Question		Correct answer pre-test (%)	Correct answer post-test (%)	Statistical Significance between the pre-test and the post-test ($p \leq 0.05$)
1	Amount of meals per day	25	75	0.002
2	Daily meat portion for children	25	65	0.020
3	Daily salt portion size	81	94	0.164
4	Daily starch portion for children	88	81	0.333
5	A well-balanced diet	31	25	0.333
6	Types of pre-school menus	19	38	0.083
7	Vegetable portion sizes for pre-school children	31	31	0.000
8	Milk or mass daily portion sizes for pre-school children	6	6	0.000
9	Daily fruit and vegetable portion sizes for pre-school children	75	81	0.333
10	Daily water intake for pre-school children	50	81	0.020
11	Breakfast menu for pre-school children	56	63	0.333

4.4.2.3 Nutritional food safety and health

For the third set of questions (1-9) the respondents' knowledge was tested on basic food-handling practices. Respondents were asked to indicate whether the given statements in questions (2, 3, 6, 7 and 9) were true or false. In questions (1, 4, 5, 8) the respondents had to choose the correct answers from a series of options.

4.4.2.3.1 Food service assistants/caregivers hand-washing practices

In question one the respondents were asked to respond to the statement: 'When working with food, it is important to wash your hands'. The correct answer was 'all of the above'. Lack of sanitation, could cause food poisoning (Bennion 1995:69), thus it starts with basic hygiene. Results show (Table 4.43) that the 44% of the respondents have a good basic knowledge of food handling practices in the pre-test. In the post-test, after the NEP was completed 56% of the respondents indicated the correct answer which is 'all the above' and a total increase of 13%.

Table 4.43 Food service assistants/caregivers hand-washing practices

Washing your hands:	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
Before you start preparing the food	9	56	6	38	-3	-19
After you go to the bathroom or blow your nose	0	0	1	6	1	6
All of the above	7	44	9	56	2	13
None of the above	0	0	0	0	0	0

4.4.2.3.2 Food-washing practices

During question two, the respondents were asked to say whether the statement: ‘you should not wash fresh fruit and vegetables before you cook them’ was true or false. The statement is false. Respondents show an increase of 25% in the basic safe food handling practices knowledge after the NEP was completed.

Table 4.44 Food washing practices

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	5	31	1	6	-4	-25
False	11	69	15	94	4	25

Good food-handling practices should be established early in life, as people tend to follow such behaviour for the rest of their lives (Briley & Roberts-Gray 1999:983; Hersheys 2004:4; Kelloggs 2005:1). Thus it is important to teach children basic food-handling practices.

4.4.2.3.3 Pre-school children’s hand-washing practices

In question three the respondents were asked to state whether the statement: ‘It is important to encourage pre-school children to wash their hands before they eat’ was true or false. This statement is true. These results (Table 4.45) show 100% accuracy in both the pre-test as well as the post-test, indicating that the respondents have a good basic knowledge on teaching children basic hygiene habits of washing hands.

Table 4.45 Pre-school children’s’ hand-washing practices

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	16	100	16	100	0	0
False	0	0	0	0	0	0

4.4.2.3.4 Wearing gloves

In question four the respondents were asked to comment on the statement that when preparing food, ‘one should wear gloves’. In basic health and safety practices, it is important not to spread germs that may contaminate food (Bennion 1995:69), moreover it is important to cover wounds when preparing food. Results already show a good basic knowledge of 69% in the pre-test and 63% in the post-test on hygiene and safety; however it indicates that the respondents believed that one must wear gloves when one is sick as well. When one is sick it would be best if that person does not work with food. Because there is sometimes no other person to cook the food in very small pre-schools, wearing gloves while preparing the food could be a solution to prevent food contamination.

Table 4.46 Wearing gloves during food preparation

When preparing food, wear gloves:	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
Always wear gloves	5	31	5	31	0	0
Only wear gloves when you have a cut on your hand.	11	69	10	63	-1	-6
Only wear gloves when you are sick	0	0	1	6	1	6
Never wear gloves	0	0	0	0	0	0

4.4.2.3.5 Defrosting of meat practices

Question five the respondents were asked to choose ‘the best place to defrost meat from a frozen state’. The correct method of defrosting would be to leave it in the fridge to defrost. Twenty five percent of the respondents in the post-test indicate that some of them tend to use methods that they are used to, such as leaving meat to defrost in the sunlight. Results show a decrease in the post-test results of 6% for the correct answer. This could be due to the fact that this particular method of defrosting takes a very long time. More training is recommended.

Table 4.47 Procedures to defrost meat

Defrosting methods	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
Leave it at room temperature	7	44	8	50	1	6
Leave it in the fridge	5	31	4	25	-1	-6
Leave it in sunlight	2	12.5	4	25	2	13
Meat should never be defrosted	2	12.5	0	0	-2	-13

4.4.2.3.6 Use of chopping boards

Respondents were asked whether or not they should use chopping boards when preparing food in question six. The correct answer is true. The results show an increase of 6% as well as an outstanding basic knowledge in this particular question.

Table 4.48 Using chopping boards

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	15	94	16	100	1	6
False	1	6	0	0	-1	-6

4.4.2.3.7 Different chopping boards in use

In question seven the respondents were asked to state whether the statement ‘different chopping boards should be used when working with bread, raw food and cooked food’ is true or false. This statement is true. When using different chopping boards, the risk of cross contamination is lowered. After the completion of the NEP, the respondents show a positive increase in their understanding to use different chopping boards (56%).

Table 4.49 Using different chopping boards

	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	6	38	15	94	9	56
False	10	63	1	6	-9	-56

4.4.2.3.8 Storage of meat

Question eight asked the respondents to choose ‘the best storage place for meat, fish and chicken. The correct answer is (d). In a fridge for two days only and in a freezer for three to four months. Results show an overall increase in knowledge about defrosting meat. This shows that the respondents did understand this section in the NEP. However the respondents

could have answered according to their pre-schools facilities. It could be possible that some of the smaller pre-schools do not have a freezer or that it is a very small freezer and then this would force the food service assistants to buy fresh food regularly.

Table 4.50 Storage of meat

Storage places for meat, fish and chicken	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
In a cupboard for a few days	1	6	0	0	-1	-6
In a fridge for 2 days only	11	69	6	38	-5	-31
In a freezer for 3-4 months	3	19	5	31	2	13
In 2 and 3 above	1	6	5	31	4	25

4.4.2.3.9 Holding temperatures of cooked food

In question nine the respondents were asked to indicate whether the statements were true or false regarding 'the holding temperatures for cooked food'. This is a vital aspect of basic food hygiene and safety. All bacteria need food, moisture, the right temperature and time to grow and this could causes food poisoning. Statement (a) is false and statement (b-d) is true. Results of 56% in the post-test, show a positive increase. However the researcher would recommend more training in holding temperatures of food.

Table 4.51 Holding temperatures of cooked food - at room temperature

a) At room temperature	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	10	63	6	38	-4	-25
False	5	31	9	56	4	25
Don't know	1	6	1	6	0	0

The results of Table 4.52 show a decrease of 50% in the correct answers. This could be due to misunderstanding of the danger zone of bacteria. More training is definitely needed.

Table 4.52 Holding temperatures of cooked food - in the danger zone

b) Not at room temperature because this is the danger zone where bacteria are most active	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	14	87	6	38	-8	-50
False	2	13	10	63	8	50
Don't know	0	0	0	0	0	0

There was an increase of 13% in the post-test results after the NEP was completed, indicating that the NEP training was successful regarding this particular question (see Table 4.53).

Table 4.53 Holding temperatures of cooked food –above room temperature

When keeping food warm it should be above room temperature and when storing food it should be in a refrigerator.	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	12	75	14	88	2	13
False	3	19	1	6	-2	-13
Don't know	1	6	1	6	0	0

In this statement there is an increase of 13% in the post-test results. The respondents show an improvement in basic knowledge of health and safety practices after they have participated in the NEP.

Table 4.54 Holding temperatures of cooked food – kept warmed up

Food should not be kept warm, only when it is cold and someone wants to eat some of it, should food be warmed.	Pre-test		Post-test		Change in	
	n	%	n	%	n	%
True	13	81	15	94	2	13
False	2	13	1	6	-1	-6
Don't know	1	6	0	0	-1	-6

4.4.2.3.10 Evaluation of nutrition food safety and health training

Table 4.55 show the summarised t-test results of the section on nutritional food safety and health. A statistically significance difference can be seen in question 2, 7 and 9.1 indicating an increase in knowledge after the NEP was completed. Question 9.2 shows a statistically significant difference between the pre- and post-test. This section in the NEP indicated that

the respondents did learn more about nutrition food safety and health training. Mainly in areas such as food washing practices, the use of different chopping boards and the holding temperatures for cooked food at room temperature. Question two indicated that holding temperatures for cooked food in the danger zone confused the respondents and that further training is still necessary.

Table 4.55 Evaluation of nutrition food safety and health training

Question		Correct answer pre-test (%)	Correct answer post-test (%)	Statistical Significance between the pre-test and the post-test (p≤0.05)
1	Wash your hands when working with food	44	56	0.164
2	Wash fruit and vegetables before cooking	31	6	0.041
3	Encourage pre-school children to wash their hands	100	100	0.000
4	Wearing gloves	69	63	0.333
5	Defrosting meat	31	25	0.333
6	Using chopping boards	94	100	0.333
7	Using different chopping boards	38	94	0.001
8	Storage places for meat	6	31	0.083
9.1	Holding temperatures for cooked food - at room temperature	31	56	0.041
9.2	Holding temperatures for cooked food - in the danger zone	87	38	0.041
9.3	Holding temperatures for cooked food –above room temperature	75	88	0.164
9.4	Holding temperatures for cooked food – kept cold and warmed up.	81	94	0.164

4.4.3 Menu analysis

The menu analysis was used to determine the nutrition content of existing menus in pre-schools, before the NEP was done. It was necessary to determine whether these menus met the daily nutritional requirements of pre-school children. The pre-school children should receive two thirds of their daily nutrient intake at the pre-schools taking into consideration that they spend two thirds of their day at the pre-school (Briley & Roberts-Gray 1999:981). During the post-test the respondents were asked to design a three-day menu that they could serve to the pre-school children after the NEP. The data of the pre- and post-test menus were then compared with the EAR in order to determine any change in the menus nutritional

values after the NEP was presented. The EAR quantities had to be adjusted to 60%, in order to compare with the pre- and post-test results. To meet all the pre-school children's nutrient requirements, only the highest EAR recommendations for nutrient intake were used for the comparisons of the menus. However RDA was used for proteins because the pre-school children were not measured or weighed and the EAR could not be calculated on the 0.76g/Kg/day basis. Calcium is measured in AI because the EAR was not available. In this study the EAR and RDA's were used for children four-to-eight-years because the only two age groups that were available were for children aged one-to-three-years and children aged four to eight. This study's age group focused on children aged two-to-five-years.

4.4.3.1 Average nutrient content of the menu for day one

The nutrient content of the menu for day one can be seen in Table 4.56. In this Table, both the pre- and post-test menus nutrient content exceeded the EAR's daily recommendations for pre-school children. However it is clear that there was a small difference in the post-test results. The post-test results show a decrease in almost all the nutrient content levels, except for vitamin C which increased by 17.95 times more than the daily prescribed 60% of the EAR requirements for the pre-school children.

Table 4.56 Average nutrient content of the menu for day one (NICUS 2003:13-56)

Menu 1						
Nutrient and unit of measurement	100% of EAR	60% of EAR	Pre-test	Post-test	% of EAR before NEP	% of EAR before NEP
Energy kJ	7924.5	4754.7	3520.71	3309.57	74.05	69.61
Protein g	19	11.4	29.00	25.46	254.42	223.30
Fat g	-	-	26.60	22.97	-	-
Carbohydrates g	100	60	122.53	121.61	204.22	202.69
Vitamin A µg	275	165	1147.14	1045.29	695.24	633.51
Vitamin C mg	22	13.2	68.71	100.00	520.56	757.58
Vitamin B ⁶ mg	0.5	0.3	1.57	0.97	522.95	322.52
Vitamin B ¹² mg	1	0.6	2.56	1.83	426.67	305.00
Folate mg	160	96	262.43	246.14	273.36	256.40
Calcium AI	800	480	594.86	524.86	123.93	109.35
Iron mg	4.1	2.46	12.36	11.48	502.50	466.67
Zinc mg	4	2.4	10.22	9.14	426.01	380.65

4.4.3.2 Average nutrient content of the menu for day two

Table 4.57 shows the nutrient content of menu two. In this Table, both the pre- and post-test menus nutrient content exceeded the EAR's daily recommendations for pre-school children. However in this table it can be seen that the pre-test menus were better than the post-test menus in terms of nutrient content levels. The biggest difference in the post-test results was that most of their nutrient content levels increased such as the total energy, protein, total fat, vitamins A, C, B⁶ and Calcium intakes. The post-test results also indicate that there was a decrease in the nutrient content levels of, carbohydrates, vitamin B¹², folic acid, iron and zinc.

Table 4.57 Average nutrient content of the menu for day two (NICUS 2003:13-56)

Menu 2						
Nutrient and unit of measurement	100% of EAR	60% of EAR	Pre-test	Post-test	% of EAR before NEP	% of EAR before NEP
Energy kJ	7924.5	4754.7	3103.71	3409.00	65.28	71.70
Protein g	19	11.40	25.71	30.10	225.53	264.04
Fat g	-	-	16.48	23.80	-	-
Carbohydrates g	100	60	128.87	122.95	214.78	204.92
Vitamin A µg	275	165	718.43	940.29	435.41	569.87
Vitamin C mg	22	13.2	47.86	128.71	362.58	975.08
Vitamin B ⁶ mg	0.5	0.3	0.79	1.29	263.33	430.00
Vitamin B ¹² mg	1	0.6	2.90	1.79	483.33	298.33
Folate mg	160	96	325.43	264.00	338.99	275.00
Calcium AI	800	480	402.57	486.57	83.87	101.37
Iron mg	4.1	2.46	22.46	16.13	913.01	655.69
Zinc mg	4	2.4	9.90	7.49	412.50	312.08

4.4.3.3 Average nutrient content of the menu for day three

In Table 4.58 the nutrient content of menu three, both the pre- and post-test menus nutrient content exceeded the EAR's daily recommendations for pre-school children. The differences in the post-test results was that the nutrient content levels increased in the total energy, protein, total fat, vitamins A, B⁶, calcium and zinc intakes. The other post-test results also indicate that there was a decrease in the nutrient content levels of, carbohydrates, vitamin C, B¹², folic acid and iron.

Table 4.58 Average nutrient content of the menu for day three (NICUS 2003:13-56)

Menu 3						
Nutrient and unit of measurement	100% of EAR	60% of EAR	Pre-test	Post-test	% of EAR before NEP	% of EAR before NEP
Energy kJ	7924.5	4754.7	2993.29	3396.43	62.95	71.43
Protein g	19	11.4	23.73	29.37	208.16	257.63
Fat g	-	-	17.13	27.92	-	-
Carbohydrates g	100	60	119.73	111.65	199.55	186.08
Vitamin A µg	275	165	539.14	919.71	326.75	557.40
Vitamin C mg	22	13.2	154.29	73.00	1168.86	553.03
Vitamin B ⁶ mg	0.5	0.3	0.81	1.43	270.00	476.67
Vitamin B ¹² mg	1	0.6	2.09	1.76	348.33	293.33
Folate mg	160	96	272.43	243.29	283.78	253.43
Calcium AI	800	480	366.00	586.14	76.25	122.11
Iron mg	4.1	2.46	18.08	12.12	734.96	492.68
Zinc mg	4	2.4	7.08	9.36	295.00	390.00

4.4.3.4 Evaluation of menu planning programme

Menu discussions can be divided into certain groups such as colour, texture, food combinations and portion sizes. Some of the menus were well-balanced in colour and others were not. All the menus contain a lot of carbohydrates, making the intake of the grain group for the pre-school children too high for the time spent at the pre-school. Breakfast mainly starts with some type of porridge. Sometimes the snack the pre-schools give to the children is bread, crisps or a fruit. Then at lunch time the pre-school children receive mainly a cooked meal with vegetables, sometimes meat, fish or beans and starch. The pre-schools struggle with portion sizes because the results of the menu analysis show that most of the daily nutrient intakes for the pre-school children are sometimes double or even three times higher than prescribed in the EAR. Texture is mostly soft foods, such as, porridge, stews, pumpkin, mashed potato and mince. It could be argued that the pre-school children are still small but the researcher believes that the pre-schools still need training in this aspect of menu planning. There were however other textures brought into the menus such as fresh fruit, bread, crisps, cooked peas and chicken. There was one lunch menu containing mashed potato, fish and a pear, which is very bleak regarding colour, and another containing samp and beans which does not have a lot of variety nor colour. The researcher believes that the respondents still need further training in menu planning regarding colour, texture and portion sizes.

4.5 General discussion and conclusion

The knowledge of the caregivers at baseline pertaining to basic nutrition was reasonable but was poor in portion sizes. This was reflected in the caregiver practices and the menu served to the children as the menu indicated deficient intakes of the macro- and micro-nutrient intakes. All the nutrient intakes exceeded the EAR and RDA's daily allowances of macro- and micro-nutrient intake for children aged two-to-five-years old. However, after the training programme, the knowledge of the caregivers improved significantly and it can thus be concluded that the NEP was partly successful because t-test results indicated a small increase in the respondent's knowledge of nutrition and food choices, specifically the t-test results of the section on nutrition knowledge and food choices (see Table 4.30) indicated a significant difference in knowledge for question one ($p=0.041$), fourteen ($p=0.041$) and eighteen ($p=0.020$). The t-test results of the section on portion sizes and menu planning (see Table 4.42), showed a significant difference for question one ($p=0.002$), two ($p=0.020$) and ten ($p=0.020$) indicating an improvement in the knowledge of these areas after completion of the NEP. The respondents now better understand portion sizes for pre-school children's meals as an improvement can be seen in the menu analysis of the post-test. T-test results of the section on nutritional food safety and health (see Table 4.55) reflect a significance difference that can be seen in question two ($p=0.041$), seven ($p=0.001$), 9.1 ($p=0.041$) and 9.2 ($p=0.041$) indicating an increase in knowledge after the NEP was completed. Main areas were food-washing practices, the use of different chopping boards and the holding temperatures for cooked food at room temperature. The respondents also understand the importance of daily water intake for pre-school children. The NEP and menu analysis results show that the respondents did increase their nutritional knowledge but that more detailed training is still needed. This is consistent with a study done by Bourne, Hendricks, Marais & Eley in (2007a:235) where it was found that a training programme significantly improved the knowledge of food service workers after training.

According to the NICUS (2007:7) study done on feeding children, it was found that preventive strategies against childhood overweight and obesity would be to establish healthy environments for the children, at home, at the pre-schools, at school and in the community. This encourages healthy practices and maintenance of life skills to maintain a healthy weight. The importance of parenting skills and teacher training was also recognised (Labadarios *et al.* 2008:256-257; NICUS 2007:5). In this study, the aim was to improve the knowledge of the food service workers of pre-school facilities in the Vaal region in order to assist in

establishing a healthy environment for the children at these pre-schools through training of the caregivers. It was concluded that a healthy diet, with a variety of food will help ensure adequate nutrition. It was also stated that a diet with adequate energy and protein intake will lessen deficiencies of nutrients (Labadarios *et al.* 2008:256-257; NICUS 2007:7). In this study it was found that the menus' showed little variety in the breakfast menus but a lot of variety in the lunch menus. The main snacks for the pre-school children were a slice of bread, fruit or a packet of crisps.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The main objective of this investigation was to evaluate a Nutrition Education Programme to address the lack of nutritional knowledge of food service assistants /caregivers who plan the menus in pre-schools in terms of existing menu content and food choices required for children between two to five years of age.

5.2 LIMITATIONS OF THE STUDY

During the study, the expected limitations were that the pre-school food service assistants/caregivers would have transport difficulties. That many of the pre-school food service assistants/caregivers that came for the training were from the same pre-schools and would then have to be excluded from the main study even though they would be allowed to be present at the NEP. Limited venues were available to conduct the research.

Limitations that were identified during the fieldwork and the implimentation of the NEP were language differences which caused communication barriers that made the interpretation of the information from the NEP difficult for the respondents. This in turn caused difficulty for the respondents to link the NEP's information with their background and nutritional knowledge. The English language also had a great influence on the understanding and interpretation of the questionnaire and the NEP. This was not a problem during the pilot study, but the researcher did take fieldworkers to help with the pre- and post-test. These fieldworkers helped with the translation of the questionnaires, unfortunately this was not a real problem during the pre-test and the fieldworkers did not accompany the researcher during the NEP. The respondents did not have any questions regarding language difficulty that they experienced during the NEP. It was only picked up during the data analysis of the post-test by the researcher. It was the only logical explanation for the decrease or confusion found in some of the questions in the post-test.

The small sample size, represents only a fraction of the Vaal Region's food service assistants/caregivers in pre-schools of the informal settlements. This sample was voluntary and the results of this study could therefore not be generalised.

The respondents have a low literacy level. Using a rating scale in the questionnaire confused the respondents although it was not noticed during the pilot study. Moreover these types of questions are very time-consuming both for the respondents when answering the questions, as well as for the researcher when capturing the data.

In this study the *Nutrition education training manual* was designed as a reference book to be used after the NEP. The idea was that the respondents should use it to assist them in future menu planning and it was given to them at the end of the programme. *The nutrition education training manual* would have been more practical to be handed out during the first NEP session. This could have assisted the respondents in preparing for the next NEP sessions and to review the previous sessions. The respondents wanted something to take home and to start using.

5.3 MAIN FINDINGS

The main findings from the literature study were:

- * Malnutrition has many causes such as immediate, underlying and basic causes. It is one of the most devastating “diseases” that most young children and pregnant mothers face daily and it should thus be addressed. Various strategies for addressing malnutrition are recommended by the SA DoH such as NEP, school feeding programmes and food diversification.
- * Pre-schools play an important role in the prevention of malnutrition because most young children eat one or more of their meals at a pre-school. The nutritional knowledge of the food service assistants/caregivers plays a vital role in nutrient intake of the pre-school children. Pre-schools can only fulfil this responsibility through the proper nutritional knowledge and training for the food service assistants/caregivers.
- * The FBDG’s for South Africa formed a framework that affects various factors in child nutrition, especially in pre-schools such as food choices, meal plans, the physical environment, and the nutrient requirements of pre-school children.
- * Current meal and snack menus for America must be reviewed regularly for nutritional content, variety, and quality, by a Federal Child and Adult Care Food programme specialist or by any Federal Health and Nutrition Centre. These reviews should take place at least every two years. The specialist responsible for the reviewing and approving of the menus, must be a registered dietician, or have a master’s degree in food and institutional management with a major in food or in a closely related field (Dunn 2003:1-3). In South Africa there is not

currently a specific programme to assist the pre-schools with their menus for pre-school children. However there are campaigns such as the National Nutrition Week (NNW) that is celebrated in South Africa in October each year and World Food Day which is every year on 16 October. The week is an awareness campaign, during which teaching around a nutrition theme at the time of NNW. This may help improve the quality of menu preparation in schools and pre-schools, thus contributing to improving the nutrition of children. The project offers a workshop for teachers/cooks, run by dietitians' and nutritionists from the Association for dietetics in South Africa (ADSA) and/or Department of Health (Browne 2010:3).

The main findings from the baseline survey were the following:

- * Caregivers of the crèches showed poor nutritional knowledge due to their education levels and little in-service training in this field. Furthermore, no short courses are attended by the caregivers to improve their knowledge.
- * As a result of the poor nutritional knowledge, the menu's showed that all the nutrient intakes exceeded the EAR and RDA's daily allowances of macro- and micro-nutrient intake for children aged two to five years old.

The main findings of the food training intervention were:

- * The NEP was partly successful as the results indicated a small but significant increase in the respondent's knowledge of nutrition and food choices. The t-test results of this section indicated a difference in knowledge for question one ($p=0.041$), fourteen ($p=0.041$) and eighteen ($p=0.020$). The sections on portion sizes, menu planning indicated t-test results of a significant difference for question one ($p=0.002$), two ($p=0.020$) and ten ($p=0.020$) indicating an improvement in the knowledge of these areas after completion of the NEP. Also in the nutritional food safety and health section, t-test results indicated a significant difference that can be seen in question two ($p=0.041$), seven ($p=0.001$), 9.1 ($p=0.041$) and 9.2 ($p=0.041$) after the training programme was implemented. The respondents also understood the importance of daily water intake for pre-school children and this can be seen in the improved results of the post-test menu analysis. Menu one showed a positive decrease in the macro- and micro-nutrient intake from the pre-test menu analysis. Menu two and three indicated that some of the macro-nutrient increase and many of the micro-nutrient intakes decreased from the pre-test menu analysis. The change can be seen in the menu compilation, the nutrient intakes mostly still exceed the daily allowances of EAR and RDA's for children aged two to five years.

The expected outcome of this study was that pre-school food service assistants/caregivers would learn how to prepare more nutritious and well-balanced meals for the pre-school children. Food service assistants/caregivers would obtain the appropriate nutrition education and information concerning nutritional consumption of meals for pre-school children, such as menu planning, nutritional knowledge, basic health and safety procedures. This was achieved as the menu's were revised after the training programme to reflect the newly acquired knowledge of the caregivers.

5.4 CONCLUSIONS

It can be concluded that malnutrition, both under- and over nutrition is a persisting problem in pre-school children (Labadarios *et al.* 2008:255). By equipping the caregivers in pre-schools with proper food preparation skills and by improving their nutrition knowledge, the result is better hygiene and safety practices and more nutritional meals being prepared for the pre-school children in their care. This directly assists in providing good care of these children and promoting good health.

Pre-schools should thus provide food service assistants/caregivers with training, in the basics of children's nutrition and guidelines that promote healthy eating habits. The pre-schools should further comply with the safety and sanitary regulations regarding food storage and preparation as prescribed in the government regulations.

In this study it was found that many of the food service assistants/caregivers did not have a nutrition education background, the basic nutrition knowledge that most of the respondents have was passed down to them from earlier generations. The researcher believes that the respondents did learn from the NEP, but that the training should have been done over a longer period of time with more detail in the problem areas, such as menu planning and portion sizes. However this study has also proven to be helpful in providing better understanding in the respondent's knowledge of nutrition, food choices, portion sizes and menu planning after completion of the NEP. The respondents now also understand the importance of daily water intake. The NEP was most successful in nutritional food safety and health in areas such as food washing practices, the use of different chopping boards and the holding temperatures for cooked food at room temperature. Holding temperatures for cooked food in the danger zone still confused the respondents and this needs more training in

applying knowledge. The menu analysis shows that the NEP did increase the respondent's knowledge. It is also clear that the respondents need more training in order to prepare more nutritious meals for the pre-school children. The respondents also need more training in portion sizes in order not to exceed the pre-school children's daily RDA's and EAR allowances for macro- and micro-nutrients. The researcher found that the respondents enjoyed group participation lessons. It also helped with the interpretation of the lessons.

5.5 RECOMMENDATIONS

5.5.1 Improving nutrition training programme

It is recommended that the macro- and micro-nutrients with specific reference to fruit and vegetables should be discussed as two separate NEP sessions. There should be a translator present during the NEP in order to assist with the interpretation of the sessions, as English is not necessarily the respondent's first or second language. It would also be recommended that the questionnaire be shorter and that a more basic English is used. No rating scale questions should be used because it is time-consuming and in this study it caused confusion for some of the illiterate respondents. Completing the questions as a group, one question at a time, will help in that all the respondents will understand and complete the questionnaire simultaneously.

It is therefore recommended that in future studies a training manual containing the information that would be discussed in the NEP should be handed out at the first NEP session. A second booklet containing additional information should be given out at the end of the NEP.

The NEP did not include food label information. It is recommended that further studies should include the importance of food labels and the influence thereof on the menu. It is recommended that in future studies the NEP should be longer and have more detailed lessons such as the 'hidden' fat in meals and healthy foods.

It is recommended that further studies are done regarding food items used for pre-school meals, where a group of pre-schools are monitored daily for a specific period. This will determine which food items are used and how regularly they are being used, enabling further studies to recommend better menu planning and food choices.

5.5.2 Policy recommendations

The researcher recommends that the Department of Health should create an extra service at the health clinics where nutritionists would be available to assist the registered urban and rural pre-school food service assistants/caregivers with their menu planning. The nutritionists could also provide/create recipes for the menu planning of the pre-schools so that it remains within their food budget. The government can then provide these pre-schools with a subsidy to be able to buy the food for these menus. This will then enable the pre-schools to provide the nutritious meals required by the pre-school children in order to meet their daily nutritional requirements. These nutritionists could also assist the pre-schools with the correct portion sizes for the pre-school children. This will also help to minimise malnutrition in pre-school children.

5.5.3 Recommendations for future research

The researcher recommends that future research involves menu planning and portion size training. This would assist the pre-schools to provide the pre-school children with healthier meals and it would help prevent under- and over nutrition. This, in turn, would address the over-weight, obese and stunting problems found in South African children.

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PILOT STUDY QUESTIONNAIRE

The purpose of this questionnaire is to determine the nutritional knowledge of food service assistants who plan the menus in your pre-schools. The focus of the questionnaire will be on the food choices and nutritional requirements for children between two-to-five-years of age, general hygiene of the food preparation and service areas, portion sizes and menu planning in order to develop a Nutrition Education Programme. This Nutrition Education Programme will be specifically designed to benefit and educate pre-school owners in order to provide the pre-school children with a better and more nutrient dense menu. At the end of this training programme each participating pre-school representative will be provided with a certificate of participation from the Vaal University of Technology.

CONTACT PERSON

--

DATE

Y	M	D

PLACE/AREA

--

PRE-SCHOOL NAME

--

QUALIFICATION OF TEACHER OR
FOOD SERVICE ASSISTANT/CAREGIVER

Instructions

Please read the statements below and choose the answer that you think is correct, choosing true, false, or don't know, marking it with a cross.

Example:

	True	False	Don't know
To protect children from disease they should avoid eating many different types of food.		X	

Please read the following multiple choice statements below and choose the answer that you think is correct, marking it with a cross.

Example:

Sugar should be part of a well- balanced diet	
a. Sugar is a good source of energy for children	
b. Sugar should not be included in children's diets because it will make them fat.	
c. When sugar is included in children's diets it should be through the natural components like vegetables and fruits.	X
d. The only good and healthy source of sugar is through sweets and cakes.	

SECTION A NUTRITIONAL KNOWLEDGE AND FOOD CHOICES:

	True	False	Don't know
1. It is advised to add more salt to pre-school children's food before they eat it.			
2. Eating a high content of calcium rich foods such as milk will strengthen bones and teeth preventing osteoporosis later in life.			
3. Oranges, naartje and strawberries have a high content of vitamin C			

4. From which group of foods should children eat the most daily?	Children should eat a lot of:	Children should eat a little of:	Don't know
a. Bread			
b. Apples			
c. Milk			

SECTION B PORTION SIZES AND MENU PLANNING:

5. Which preparation method would you use to prepare stew:	Method used	Method not used	Don't know
a. Cut vegetables			
b. Cook vegetables			
c. Wash vegetables			

6. A well balanced diet:	
a. Consists mostly of meat, with smaller amounts of starch, fruits, vegetables, and dairy products	
b. Consists mostly of vegetables, and smaller amounts of meat and dairy products	
c. Consists mostly of starches, vegetables and fruits, with smaller amounts of meat and dairy products	
d. Consists mostly of sweets, fruits and vegetables, with small amounts of meat and starch.	

7. What type of menus do you use in the pre-school?	
a. A different one every day, depending on how you feel and what the budget allows	
b. The same five day cycle menu every week	
c. Depending on the specials and promotions for the month, the menu will be planned accordingly	
d. No menu	

8. What would you give a pre-school child to drink?	Always	Never	Sometimes
a. Coffee			
b. Milk			
c. 100% Fruit juice			

9. How many portions of fruits and vegetables should pre-school children be eating daily?	
a. Two fruit and two vegetable a day	
b. Three to four fruits and vegetables a day	
c. As much fruits and vegetables as they can eat everyday because you can never eat too much fruits and vegetables	
d. There is no need to eat fruits and vegetables daily when children are young	

10. How much water should pre-school children drink per day?	
a. 4-5 cups	
b. 2-7 cups	
c. 2 litres	
d. You do not have to drink water every day, only when you feel like it.	

SECTION C NUTITIONAL HEALTH AND SAFETY:

11. Different chopping boards should be used when working with bread, raw food and cooked food.

TRUE	FALSE
------	-------

12. Meat/ fish/ chicken will not spoil if you store it

a. In a cupboard for a few days	1
b. In a fridge for two days only	2
c. In a freezer for three to four months	3
d. In b and c above	4

13. Please write down three daily menus that you would use for the pre-school children in your pre-school.

MENU 1	MENU 2	MENU 3
Breakfast:	Breakfast:	Breakfast:
Snack:	Snack:	Snack:
Lunch:	Lunch:	Lunch:

14. What type of food do you buy for the pre-school meals?

Annexure B

SITUATION ANNALYSIS GUIDE FOR INTERVIEW

The purpose of this questionnaire is to determine the situation in the pre-schools in order to design an effective Nutrition Education Programme.

Please note that all the information gathered for this study will be regarded as confidential, and that the data will be analysed into statistics.

Instructions

This questionnaire contains two types of question,
OPEN and YES/NO questions.

- OPEN questions: These questions must be answered according to the situation in your pre-school.
- YES/NO questions: Choose **YES** or **NO** and tick your answer.

Please answer all the questions.

CONTACT PERSON

DATE

Y	M	D
2008	08	14

PLACE/AREA

PRE-SCHOOL NAME

YOUR QUALIFICATIONS

1. Please write down three daily menus that you would use for the pre-school children in your pre-school.

MENU 1		MENU 2		MENU 3	
Breakfast:	Portion Size	Breakfast:	Portion Size	Breakfast:	Portion Size
Snack:		Snack:		Snack:	
Lunch:		Lunch:		Lunch:	

4. Please tick the following questions as yes or no according to your situation:

	Yes	No
a) Do you have a kitchen?		
b) Do you have a refrigerator?		
c) Do you have a freezer?		
d) Do you have a stove?		
e) Do you have a workstation (a place where you can plan the meals)?		
f) Do you buy fresh fruits for the pre-school meals?		
g) Do you buy fresh vegetables for the pre-school meals?		
h) Do you have a vegetable garden?		
i) Do you buy maize meal for the pre-school?		
j) Do you buy tinned food products?		

5. How long do the pre-school children stay at the pre-school?

a) For the whole day	
b) From the mornings only until lunchtime.	
c) Afternoons only	

6. How much money do you spend on food for the pre-school?

R

7. What type of food do you buy for the pre-school meals?

FOOD ITEM	YES	NO
Sugar		
Butter		
Salt		
Pepper		
Macaroni		
Spaghetti		
Oats		
Milk powder		
Milk		
Maltabela		
Maize meal		
Mielie rice		
Rice		
Samp		
Potatoes		

Dry Beans		
Soup Powder		
Dry lentils		
Soup pies		
Spinach		
Pumpkin		
Carrots		
Onions		
Soya mince		
Mince meat		
Tined fish		
Chicken		
Eggs		
Beat root		
Cabbage		
Yoghurt		
Cheese		
Tea		
White Bread		
Brown Bread		
Bananas		
Oranges		
Pears		
Apples		
Simba Chips		
Fruit Juice		
Coffee		
Other:		

NUTRITION KNOWLEDGE QUESTIONNAIRE

The purpose of this questionnaire is to determine the nutritional knowledge of food service assistants/caregivers who plan the menus in your pre-schools. The focus of the questionnaire will be on the food choices and nutritional requirements for children between two-to-five-years of age, general hygiene of the food preparation and service areas, portion sizes and menu planning in order to develop a Nutrition Education Programme. This Nutrition Education Programme will be specifically designed to benefit and educate pre-school owners/food service assistants/caregivers in order to provide the pre-school children with a better and more nutrient dense menu. At the end of this training programme each participating pre-school representative will be provided with a certificate of participation from the Vaal University of Technology.

Please note that all the information gathered for this study will be held confidential, and that the data will be analysed into statistics.

Instructions

This questionnaire contains two types of questions,

MULTIPLE CHOICE and TRUE/FALSE

- MULTIPLE CHOICE: Choose the **ONE** that you think is the correct answer and tick the corresponding number that is next to the answer.
- TRUE/FALSE: Choose **TRUE** or **FALSE** and tick your answer.

Please answer all the questions.

CONTACT PERSON

DATE

Y	M	D
<input type="text"/>	<input type="text"/>	<input type="text"/>

PLACE/AREA

PRE-SCHOOL NAME

QUALIFICATION

EXAMPLES OF QUESTIONS

Please read the statements below and choose the answer that you think is correct, choosing true, false, or don't know, marking it with a cross.

Example:

	True	False	Don't know
To protect children from disease they should avoid eating many different types of food.		X	

Please read the following multiple choice statements below and choose the answer that you think is correct, marking it with a cross.

Example:

Sugar should be part of a well- balanced diet.	
a. Sugar is a good source of energy for children	
b. Sugar should not be included in children's diets because it will make them fat.	
c. When sugar is included in children's diets it should be through the natural components like vegetables and fruits.	X
d. The only good and healthy source of sugar is through sweets and cakes.	

The following statements below must be rated according from what you think the best choice are to what you think the least suitable choice is. Mark your choice of answers beginning with one for the best suitable choice to eg.ten for the least suitable choice.

Example:

The best source of vitamin C is.	
a. Sugar	6
b. Fruits.	1
c. Vegetables.	2
d. Meat.	5
e. Vitamin enriched Maize meal	3
f. Vitamin enriched bread	4

SECTION A NUTRITIONAL KNOWLEDGE AND FOOD CHOICES:

	True	False	Don't know
1. It is advised to add more salt to pre-school children's food before they eat it.			
2. Soya mince, dry beans, peas, and lentils is as healthy as meat and should be eaten often as a replacement for meat, seeing as it is less expensive and contains less cholesterol.			
3. Eating a lot of different kinds of foods is healthier than eating only a few kinds foods.			
4. Fruits and vegetables are a good source of vitamin C and vitamin A.			
5. Fruits and vegetables have lots of vitamins that will strengthen the body's immune system and prevent infections, diarrhoea, colds and tuberculosis.			
6. Eating a high content of calcium rich foods such as milk will strengthen bones and teeth preventing osteoporosis later in life.			
7. Chicken liver will prevent anaemia.			
8. Beef and chicken have a high content of protein.			
9. Milk, yoghurt, cheese have a high content of calcium.			
10. Fruits and vegetables have a high content of vitamins and minerals.			
11. Butter and margarine have a high content of fat.			
12. Leafy green vegetables like, spinach have a high content of the B-complex vitamins.			
13. Oranges, naartje and strawberries have a high content of vitamin C.			
14. Yellow vegetables like, carrots have the most vitamin A.			

15. Rate a healthy snack for children is:	
a. A small 25g packet of chips	
b. Dried fruit	
c. A sandwich	
d. Fruit	

16. Which of the following lunch menus would you rate, contained the least fat?	
a. Fish and chips	
b. Pap, salsa and wors	
c. Brown bread sandwich with thinly spread peanut butter and jam and a banana	
d. Roasted chicken, spinach, pumpkin and rice	

17. Indicate which bread do you think is the best to give to children for lunch?	
a. White bread	
b. Brown bread	
c. Whole wheat bread	
d. Albany best of both	

18. Indicate the preparation method that you would use to prepare stew:	
a. Wash samp	
b. Cook samp	
c. Cut vegetables	
d. Wash vegetables	
e. Cook vegetables	
f. Remove feathers from chicken	
g. Wash chicken meat	
h. Cook chicken meat	
i. Add spices such as salt and pepper	

SECTION B PORTION SIZES AND MENU PLANNING:

	True	False	Don't know
1. It is better to eat six small meals per day than two big meals.			
2. It is healthy for children to eat only one portion of meat everyday.			
3. There should be a little bit of salt included to children's diets because most salt has iodine that prevents goiter.			
4. Should starchy foods (like porridge, rice, bread) be included into pre-school children's meals?			

5. A well- balanced diet:	
a. Consists mostly of meat, with smaller amounts of starch, fruits, vegetables, and dairy products	
b. Consists mostly of vegetables, and smaller amounts of meat and dairy products	
c. Consists mostly of starches, vegetables and fruits, with smaller amounts of meat and dairy products	
d. Consists mostly of sweets, fruits and vegetables, with small amounts of meat and starch.	

6. What type of menus do you use in the pre-school?	
a. A different one every day, depending on how you feel and what the budget allows	
b. The same 5 day cycle menu every week	
c. Depending on the specials and promotions for the month, the menu will be planned accordingly	
d. No menu	

7. What is a portion of cooked vegetables for a pre-school child?	
a. 1 Tablespoon (15ml)	
b. Half a cup (125ml)	
c. 1 Cup or more (250ml)	
d. 1/4 Cup (62.5ml)	

8. How much milk or maas should pre-school children have per day?	
a. 1 Tablespoon (15ml)	
b. Half a cup (125ml)	
c. 1 Cup or more (250ml)	
d. 2 Cups (500ml)	

9. How many portions of fruits and vegetables should pre-school children be eating daily?	
a. two fruit and three vegetable a day	
b. Three to four fruits and vegetables a day	
c. As much fruits and vegetables as they can eat everyday because you can never eat too much fruits and vegetables	
d. There is no need to eat fruits and vegetables daily when children is young	

10. How much water should pre-school children drink per day?	
a. Four to five cups (1ℓ - 1.25ℓ)	
b. Two to seven cups (500ml - 1.75ℓ)	
c. 2 liters	
d. You do not have to drink water every day, only when you feel like it.	

11. What would you give a pre-school child to eat for breakfast?	
a. Maize meal porridge and milk	
b. Matabella porridge and milk	
c. Maize meal porridge with salsa	
d. Crumbly maize meal porridge and milk	

SECTION C NUTRITIONAL HEALTH AND FOOD SAFETY:

1. When working with food, it is important to wash your hands

Before you start preparing the food	1
After you went to the bathroom or blown your nose	2
All of the above	3
None of the above	4

2. You should not wash fresh fruit and vegetables before you cook them.

TRUE	FALSE
------	-------

3. It is important to encourage pre-school children to wash their hands before they eat.

TRUE	FALSE
------	-------

4. When preparing food you should:

Always wear gloves	1
Only wear gloves when you have a cut on your hand	2
Only wear gloves when you are sick	3
Never wear gloves	4

5. The best place to defrost meat from a frozen state is to

a. Leave it at room temperature	1
b. Leave it in the fridge	2
c. Leave it in sunlight	3
d. Meat should never be defrosted	4

6. When preparing food chopping boards should be used.

TRUE	FALSE
------	-------

7. Different chopping boards should be used when working with bread, raw food and cooked food.

TRUE	FALSE
------	-------

8. Meat/ fish/ chicken will not spoil if you store it

a. In a cupboard for a few days	1
b. In a fridge for 2 days only	2
c. In a freezer for 3-4 months	3
d. In b and c above	4

9. The holding temperatures for cooked food should be:	True	False	Don't know
9.1 At room temperature			
9.2 Not at room temperature because this is the danger zone where bacteria are most active			
9.3 When keeping food warm it should be above room temperature and when storing food it should be in a refrigerator.			
9.4 Food should not be kept warm, only when it is cold and someone wants to eat some of it, should food be warmed.			

NUTRITION EDUCATION PROGRAMME 1 - THE FOOD PYRAMID

Nutrition Education Programme

1



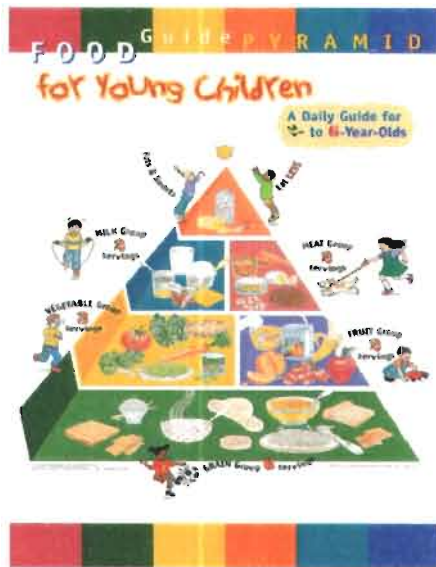
The Food Pyramid



The food pyramid

- What the food pyramid is
- Different food sources
- Vitamins & minerals
- How vitamins & minerals prevent diseases

What is a food pyramid?



- A food pyramid is a basic guide of food sources and their portion sizes
- This is a food pyramid specifically designed for young children
- The food pyramid is made up out of the five major food groups

At the top of the pyramid – fats, sugars and salts

- **These** should be **used sparingly!!!**
- **Salt** contains the **mineral iodine** which helps to **prevent muscle spasms**
- **Sugar** provides **instant energy** to the body
- **Fat** is stored in the body to be used later as:
 - Protection for organs
 - A energy source for the body
- **BUT fat can also cause cholesterol!!!**

The Milk & Protein group

<u>Milk group:</u>	Contains calcium	
Sources	Portions	Prevents diseases
Milk, maas, cheese, yogurt, ice cream	2 portions per day of one cup each (500ml)	<ul style="list-style-type: none"> ■ Calcium makes bones and teeth strong, this prevents bones to become brittle. ■ When a body has a lot of calcium, broken bones will heal quickly ■ Promotes blood clotting ■ Promotes wound healing

The Milk & Protein group

<u>Protein group:</u>	Contains iron, some of the vitamin B complex group and zinc	
Sources	Portions	Prevents diseases
Soya, beans, chicken, fish, pork, beef, lamb, eggs, mince, spinach, beetroot	2 portions per day of about 60g each (120g)	<ul style="list-style-type: none"> ■ Protein promotes growth, maintenance and repair of body tissue ■ Prevention of anaemia

Fruit & Vegetable group

<u>Fruit group:</u>	Are high in vitamins and minerals	
Sources	Portions	Prevents diseases
Apples, bananas, oranges, pears, etc.	2 portions of fruit per day: 1 piece of fruit, $\frac{3}{4}$ cup of 100% fruit juice, $\frac{1}{2}$ cup of canned fruit, $\frac{1}{4}$ cup of dried fruit	■ Helps to strengthen the body's immune system, which resists illnesses such as infections, diarrhoea, colds and tuberculosis

Fruit & Vegetable group

<u>Vegetable group:</u>	Are also high in vitamins and minerals	
Sources	Portions	Prevents diseases
Spinach, carrots, tomatoes, beetroot, peas, beans, etc.	3 portions of vegetables per day: $\frac{1}{2}$ a cup (125ml) of chopped or raw vegetables, or 1 cup (250ml) of raw leafy vegetables	■ Helps to strengthen the body's immune system, which resists illnesses such as infections, diarrhoea, colds and tuberculosis

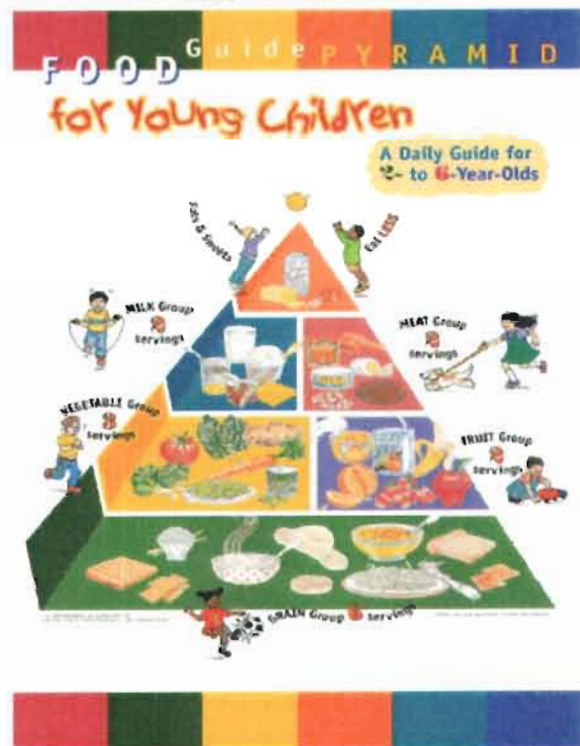
Grain group

<u>Grain group:</u>	They are rich in carbohydrates	<ul style="list-style-type: none"> ■ They contain vital vitamins such as the B-complex vitamins, fibre and minerals and starchy vegetables like sweet potatoes contain useful amounts of vitamin A and C ■ Unrefined starchy foods are also rich in nutrients that fight cancer like antioxidants, vitamin E, folic acid, zinc, selenium and magnesium
---------------------	--------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Grain group

Sources	Portions	Prevents diseases
Potatoes, samp, rice, maize meal, bread, pasta, cereals etc.	6 portions per day: 1 slice of bread, ½ cup (125ml) of cooked rice or pasta, ½ a cup (125ml) of cooked cereal, and 28g of ready to eat cereal.	<ul style="list-style-type: none"> ■ Starch is the main source of energy for the body ■ Starch supports healthy bowel functioning ■ This helps lower the risk of chronic diseases such as overweight and cardiovascular diseases

The food pyramid



Annexure E

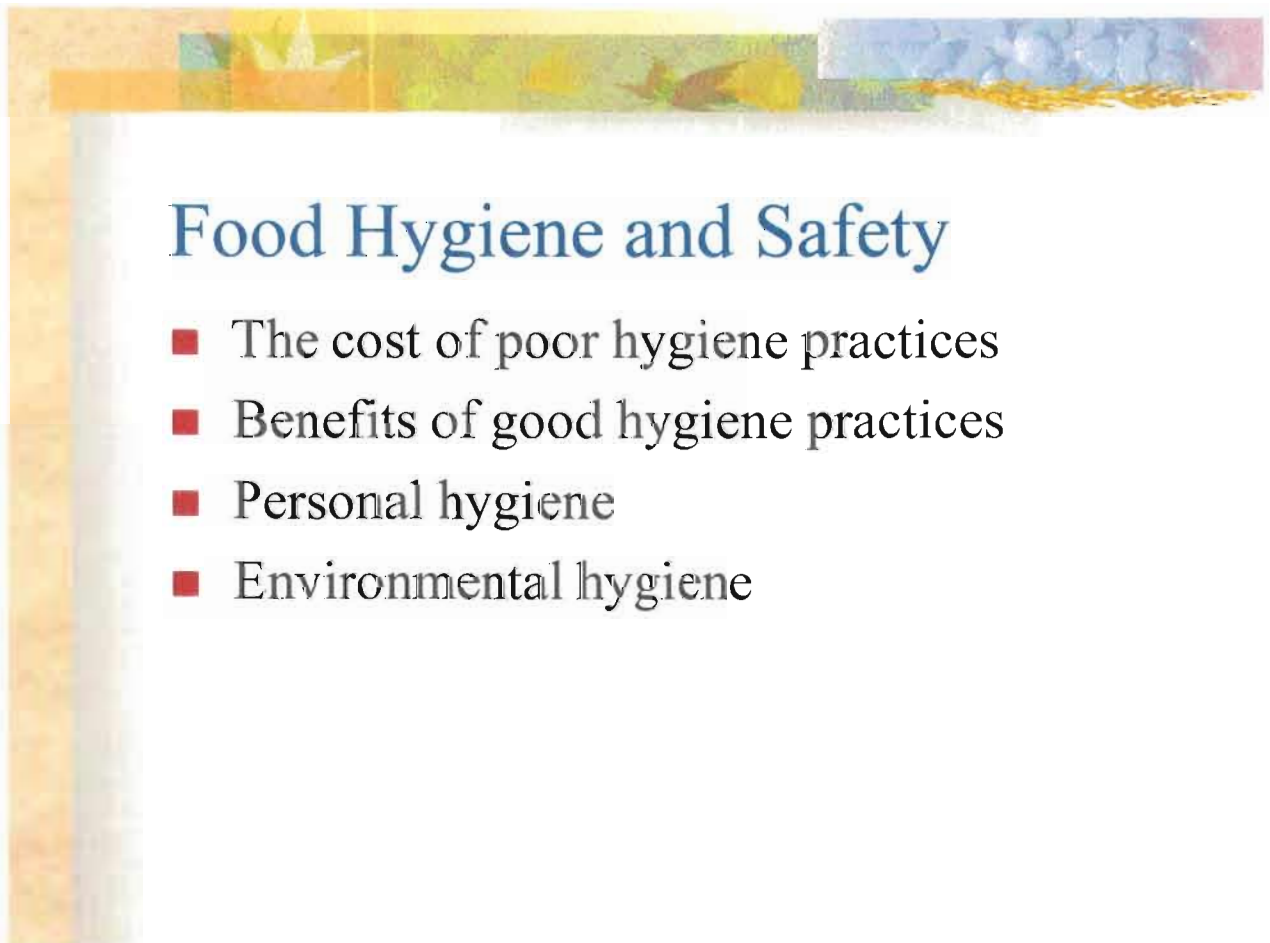
NUTRITION EDUCATION PROGRAMME 2 - FOOD HYGIENE AND SAFETY

Nutrition Education Programme

2



Food Hygiene and Safety



Food Hygiene and Safety

- The cost of poor hygiene practices
- Benefits of good hygiene practices
- Personal hygiene
- Environmental hygiene

Food and Environmental hygiene is vital

- This will prevent outbreaks of food poisoning.
- Food poisoning can be severe, especially to young children and the elderly.
- In most cases people will suffer from diarrhea, vomiting and stomach cramps.

The cost of poor hygiene practices

- Outbreaks of food poisoning can lead to death.
- Food contamination.
- Pest infestations like rats, mice and cockroaches.
- Food waste caused by spoilage.
- Legal action taken by people affected by food poisoning.
- De-contamination cleaning.
- Legal costs and fines imposed by the health authorities.

Benefits of good hygiene practices

- **Satisfied parents**, because their children will not suffer from food poisoning.
- **Increased shelf-life of food.**
- **Compliance with the law.**

Five key rules for personal hygiene

- **Practice personal cleanliness**, like bathing every day, keeping your nails short and wearing clean clothes etc.
- Change into your uniform at work, this will help lessen bacteria and **always wear a clean apron** when you cook food.
- **Wash your hands regularly**, especially after working with raw food and handling refuse.
- **Avoid bad habits** like scratching, picking pimples and sores and wiping your hands on your clothes. This will transfer bacteria from your body to the food.
- **Never smoke when cooking food** or while the food is being cooked. Smoking causes coughing and this sprays saliva droplets in the kitchen which will contaminate the work surfaces.



Environmental hygiene

- Your work surfaces must ALWAYS be clean before and after you work with food.
- All the cooking utensils you use must be kept clean and in a good working condition.
- All the equipment in the kitchen, like the refrigerator, microwave oven, stove, freezer etc. must be kept clean and in a good working condition.
- All the cutlery and crockery must be clean.

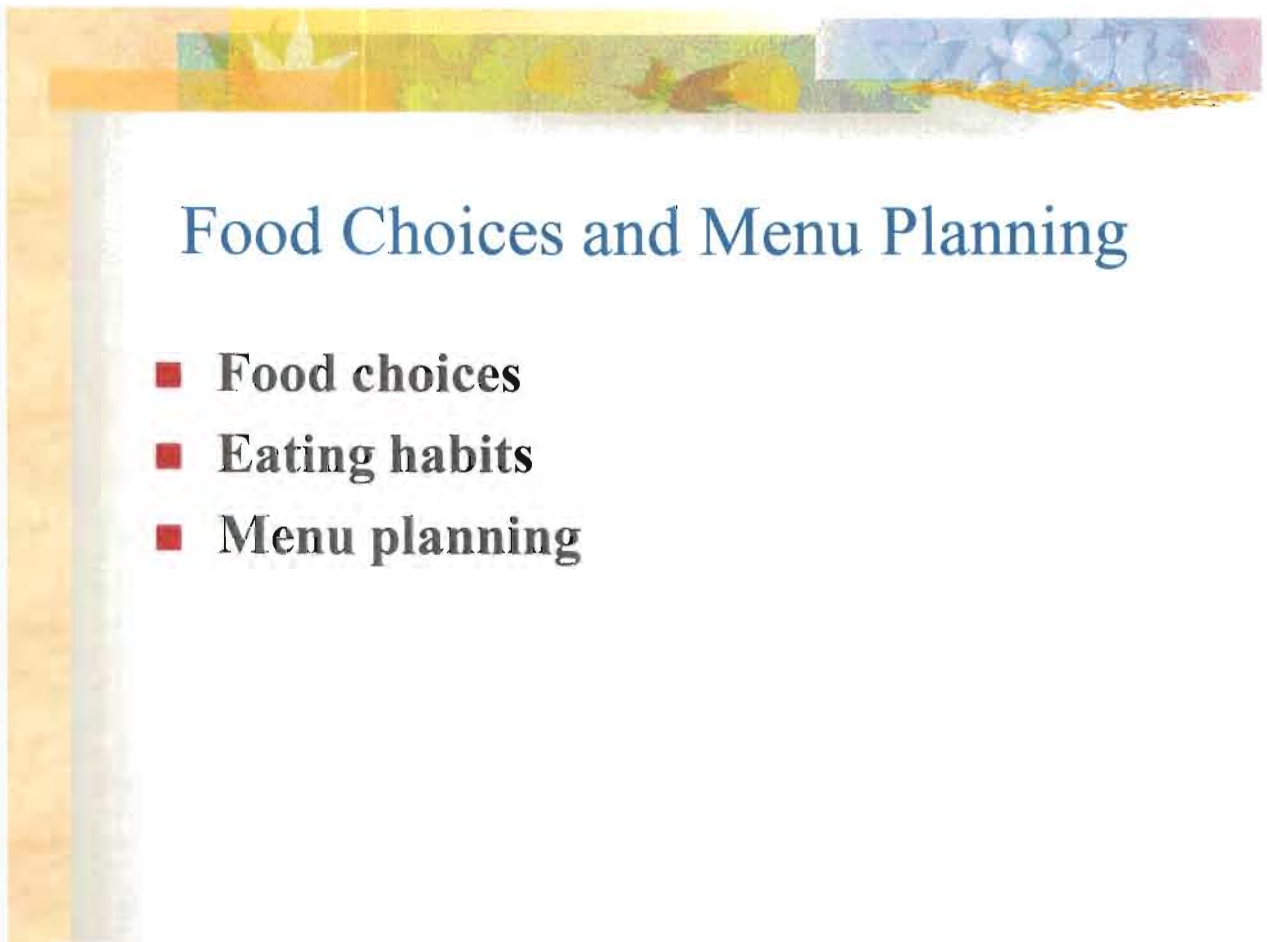
**NUTRITION EDUCATION PROGRAMME 3 - FOOD CHOICES AND MENU
PLANNING**

Nutrition Education Programme

3



Food Choices and Menu Planning



Food Choices and Menu Planning

- Food choices
- Eating habits
- Menu planning

Food choices are:

- The choices of food we make when planning a menu.
- **They are** also the choices we make when buying food for the menu.
- Food choices for a pre-school menu depends on the time that the pre-school children will spend at the pre-school.
- The daily nutrient requirements of children must be taken into consideration.
- Food choices have a direct affect on diet quality.
- This factor affects the day-to-day eating patterns of children as well as adults.

Advantages of food choices

- **They** will establish good eating habits.
- **They** will determine the nutritional intake of the children.
- **They** also relate to diseases such as dental caries and obesity.
- There are many aspects that influence food choices such as religion and culture, social and economical factors, and psychological patterns.

Eating habits

- Good eating habits can be established both at home and at pre-schools.
- Eating habits are essential for the later development of the child.
- Regular consumption of water, healthy meals and snacks are habits that tend to stay with the child through adulthood.
- Encouraged children to eat different types of food, it helps to development of food preferences.
- Food habits such as the consumption of healthy snacks, like popcorn and fruit, are established they may prevent future problems such as weight gain and dental caries.

Menu Planning

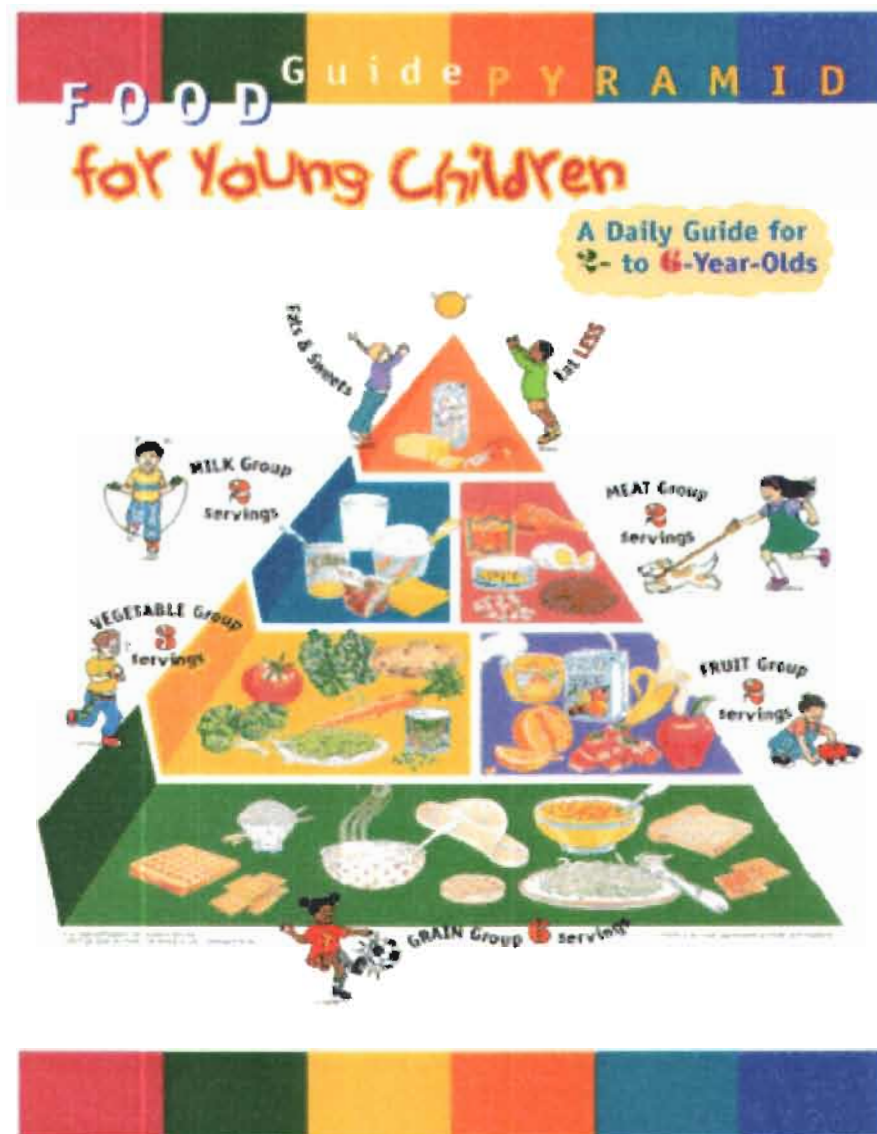
- This is where you as caregiver plan the daily meals and snacks for the pre-school children.
- The menu must be well planed according to the food pyramid in order to be balanced.
- You need to plan the menu within your budget so that it will still be healthy.



Basic step for menu planning

- Use a variety of foods.
- Use the correct portion sizes for the children's meals, according to the food pyramid.
- Avoid too much fat.
- Provide foods with adequate starch and fibre.
- Avoid too much sugar.
- Avoid too much sodium.

Nutrition Education Program



R. Spillman

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The food pyramid
Basic health and safety
Food choices
Suggested cycle menu
Recipes

The food pyramid

- A food pyramid is a basic guide of food sources and their portion sizes.
- This is a food pyramid specifically designed for young children
- The food pyramid is made up out of the five major food groups

At the top of the pyramid there are fats, sugars and salts.

- This should be used sparingly!!!
- Salt contains the mineral iodine which helps to prevent muscle spasms
- Sugar provides instant energy to the body
- Fat is stored in the body to be used later as:
 - Protection for organs
 - A energy source for the body
- BUT fat can also cause cholesterol!!!

The Milk & Protein group

<u>Milk group:</u>	Contains calcium	
Sources	Portions	Prevents diseases
Milk, mass, cheese, yogurt, ice cream	2 portions per day of one cup (250ml)	<ul style="list-style-type: none">■ Calcium makes bones and teeth strong, this prevents bones to become brittle.■ When a body has a lot of calcium, broken bones will heal quickly■ Promotes blood clotting■ Promotes wound healing
<u>Protein group:</u>	Contains iron, vitamin B12 and zinc	
Sources	Portions	Prevents diseases
Soya, beans, chicken, fish, pork, beef, lamb, eggs, mince, spinach, beetroot	2 portions per day of about 60g	<ul style="list-style-type: none">■ Protein promotes growth, maintenance and repair of body tissue■ Prevention of anaemia

Fruit & Vegetable group

<u>Fruit group:</u>	Are high in vitamins and minerals	
Sources	Portions	Prevents diseases
Apples, bananas, oranges, pears, etc.	2 portions of fruit per day: 1 piece of fruit, $\frac{3}{4}$ cup (187.5ml) of 100% fruit juice, $\frac{1}{2}$ cup (125ml) of canned fruit, $\frac{1}{4}$ cup (62.5ml) of dried fruit	<ul style="list-style-type: none"> ■ Helps to strengthen the body's immune system, which resist illnesses such as infections, diarrhoea, colds and tuberculosis
<u>Vegetable group:</u>	Are also high in vitamins and minerals	
Sources	Portions	Prevents diseases
Spinach, carrots, tomatoes, beetroot, peas, beans, etc.	3 portions of vegetables per day: $\frac{1}{2}$ a cup (125ml) of chopped or raw vegetables, or 1 cup (250ml) of raw leafy vegetables	<ul style="list-style-type: none"> ■ Helps to strengthen the body's immune system, which resist illnesses such as infections, diarrhoea, colds and tuberculosis

Grain group

<u>Grain group:</u>	They are rich in carbohydrates	<ul style="list-style-type: none">■ It contains vital vitamins such as the B-complex vitamins, fibre and minerals and starchy vegetables like sweet potatoes contain useful amounts of vitamin A and C■ Unrefined starchy foods are also rich in nutrients that fight cancer like antioxidants, vitamin E, folic acid, zinc, selenium and magnesium.
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Sources	Portions	Prevents diseases
Potatoes, samp, rice, maize meal, bread, pasta, cereals etc.	6 portions per day: 1 slice of bread, ½ cup of cooked rice or pasta, ½ a cup of cooked cereal, and 28g of ready to eat cereal.	<ul style="list-style-type: none">■ Starch are the main source of energy for the body■ Starch support healthy bowel functioning■ This help lower the risk of chronic diseases such as overweight and cardiovascular diseases

Basic health and safety

- The cost of poor hygiene practices
- Benefits of good hygiene practices
- Personal hygiene
- Environmental hygiene

Food and environmental hygiene is vital.

- This will prevent outbreaks of food poisoning.
- Food poisoning can be severe, especially to young children and the elderly.
- In most cases people will suffer from diarrhea, vomiting and stomach cramps.

The cost of poor hygiene practices

- Outbreaks of food poisoning can lead to death.
- Food contamination.
- Pest infestations like rats, mice and cockroaches.
- Food waste caused by spoilage.
- Legal action taken by people affected by food poisoning.
- Decontamination cleaning.

- Legal costs and fines imposed by the health authorities.

Benefits of good hygiene practices

- Satisfied parents, because their children will not suffer from food poisoning.
- Increased shelf-life of food.
- Compliance with the law.

Five key rules for personal hygiene

- Practice personal cleanliness, like bathing every day, keeping your nails short and wear clean clothes etc.
- Change into your uniform at work, this will help lessen bacteria and always wear a clean apron when you cook food. Do not wipe your hands on your apron, you will create a suitable environment for bacteria to grow and every time you wipe your hands on the apron you will contaminate your hands with new bacteria and then spread it to the food you are cooking.
- Wash your hands regularly with hot soapy water, especially after working with raw food and handled refuse. Even after you have coughed, sneezed, blown your nose or went to the bathroom.
- Avoid bad habits like scratching, picking pimples and sores and wiping your hands on your clothes. This will transfer bacteria from your body to the food.
- Never smoke when cooking food or while the food is being cooked. Smoking causes coughing and this sprays saliva droplets in the kitchen which will contaminate the work surface.

Environmental hygiene

- Your work surfaces must ALWAYS be clean before and after you work with food. Use different chopping boards for the different foods you cook. Never use a wooden chopping board for cutting meat, fish, or chicken. The blood will be absorbed into the wood and this will create comfortable living conditions for bacteria.
- All the cooking utensils you use must be kept clean and in a good working condition.
- All the equipment in the kitchen, like the refrigerator, microwave oven, stove, freezer etc. must be kept clean and in a good working condition.
- All the cutlery and crockery must be clean.

Common food poisoning bacteria

- All bacteria need is food, moisture, the right temperature and time.
- Bacteria can spread through cross-contamination, this is when bacteria is transferred from a contaminated area to food or a clean surface. E.g. using the same chopping board for cutting the day's meat, vegetables and bread. After the cutting each food item the chopping board must be washed with soap and hot water, rinsed and dried before using it again.
- Bacteria cannot live or multiply in temperatures that are higher than 60°C or temperatures lower than 1-4°C.

Salmonella	Infective food poisoning
<u>Source:</u>	Raw foods, especially meat, poultry, milk and eggs, human

	carriers, pets, rodents, birds, flies and sewage.
<u>Onset Period:</u>	12-48 Hours
<u>Symptoms:</u>	Headache, fever, abdominal pains, vomiting and diarrhea which last up to seven days.
<u>Mode of spread to high risk food:</u>	Through cross-contamination, undercooked food, by keeping food too long in the danger zone (10°C - 59 °C).
<u>Control:</u>	Good personal hygiene, hygienically clean kitchen, utensils and equipment, cooking food properly and excluding pests.
<u>Destruction:</u>	Easily destroyed by heat.

Staphylococcus aureus	Toxic food poisoning
<u>Source:</u>	Human nose, mouth, skin boils and cuts, and unpasteurised milk.
<u>Onset Period:</u>	1-7 Hours
<u>Symptoms:</u>	Vomiting, diarrhea, sometimes abdominal pains lasting up to six to twenty four hours.
<u>Mode of spread to high risk food:</u>	Usually via your hands by touching/scratching your nose, mouth, skin boils and cuts and then touching cooked food.
<u>Control:</u>	Good personal hygiene, washing your hands with soap regularly and using waterproof dressings for wounds.
<u>Destruction:</u>	Easily destroyed by heat.

Clostridium perfringens	Both toxic and infective food poisoning
<u>Source:</u>	Animal and human excreta, soil (on vegetables), dust, raw meat and poultry, flies and cockroaches.
<u>Onset Period:</u>	8-22Hours
<u>Symptoms:</u>	Diarrhea, abdominal pains, sometimes vomiting, lasting up to twelfth to forty eight hours.
<u>Mode of spread to high risk food:</u>	Direct contact with contaminated raw meat or vegetables, though a contaminated surface and by not cooking food properly and cooling it too slowly.
<u>Control:</u>	Good personal hygiene and good hygiene practices in the kitchen, keeping raw and cooked foods separate and temperature control.
<u>Destruction:</u>	Can be destroyed by heat, but spores can withstand four hours of boiling.

Food choices

- The choices of food we make when planning a menu.
- It is also the choices we make when buying food for the menu.

- Food choices for a preschool menu depends on the time that the preschool children will spend at the preschool.
- The daily nutrient requirements of children must be taken into consideration.
- Food choices have a direct affect on diet quality.
- This factor affects the day-to-day eating patterns of children as well as adults.

Advantages of food choices

- This will establishes good eating habits.
- It will determine the nutritional intake of the children.
- It is also related to diseases such as dental caries and obesity.
- There are many aspects that influence food choices such as religion and culture, social and economical factors, and psychological patterns.

Eating habits

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- Eating habits are essential for the later development of the child.
- Regular consumption of water, healthy meals and snacks are habits that tend to stay with the child through adulthood.
- Encouraged children to eat different types of food, it helps to development of food preferences.
- Food habits such as the consumption of healthy snacks, like popcorn and fruit, are established they may prevent future problems such as weight gain and dental caries

Menu planning

- This is where you as caregiver plan the daily meals and snacks for the preschool children.
- The menu must be well planed according to the food pyramid in order to be balanced.
- You need to plan the menu within your budget so that it would still be healthy.

Basic step for menu planning

- Use a variety of foods.
- Use the correct portion sizes for the children's meals, according to the food pyramid.
- Avoid too much fat.
- Provide foods with adequate starch and fiber.
- Avoid too much sugar.
- Avoid too much sodium.

Basic rules for menu planning

- Colour combinations should be attractive.
- The texture of different dishes should form an interesting contrast.
- Two strongly flavoured foods should be avoided in the same meal.
- Vegetables from the same family should not be served together.
- The meal should not consist mainly of food of more or less the same composition e.g. only starch..
- It is better not to repeate a food product more than once a day.
- Contrast in temperature makes a change.

- Too many rich foods in one meal are undesirable.
- The size of the kitchen should be taken into consideration when planning the amount of meals.

Basic menu plan

<u>Breakfast</u>	<u>Light Meal</u>	<u>Main Meal</u>
Fruit Porridge and/or breakfast dish Bread, butter/margarine and jam (if desired) Tea or coffee for adults Milk for children	Protein rich dish (meat, fish, cheese, eggs, dry legumes, or a combination of two or more) One vegetable and/or fruit, preferably raw. Bread, butter/margarine and jam (if desired) Milk	Protein rich dish (meat, fish, cheese, eggs, dry legumes, or a combination of two or more) Potato or sweet potato One green and yellow vegetable, (one raw and one cooked) Dessert (if desired) Tea or coffee for adults Milk for children

Suggested three day cycle menu

<u>MENU 1</u>		<u>MENU 2</u>		<u>MENU 3</u>	
Breakfast:	Portion Size	Breakfast:	Portion Size	Breakfast:	Portion Size
Soft maize meal porridge	$\frac{3}{4}$ cup = 1 $\frac{1}{2}$ portion	Oats	$\frac{3}{4}$ cup = 1 $\frac{1}{2}$ portion	Soft maltabella	$\frac{3}{4}$ cup = 1 $\frac{1}{2}$ portion
Snack:		Snack:		Snack:	
Apple	1	Orange	1	Pear	1
Lunch:		Lunch:		Lunch:	
Mince with mixed vegetables	$\frac{3}{4}$ cup = 1 portion	Chicken pieces	60g = 1 portion	Vegetable stew	$\frac{1}{2}$ cup = 1 portion
Rice	$\frac{1}{2}$ cup = 1 portion	Mielie rice	$\frac{1}{2}$ cup = 1 portion	Samp	$\frac{1}{2}$ cup = 1 portion
		Sweet carrots	$\frac{1}{4}$ Cup = 1 portion		
		Spinach	$\frac{1}{2}$ cup = 1 portion		

Recipes

Amount g ml	Ingredient	Procedure	Time min sec	Equipment and Utensils per action	
				Type and Quantity	Measure
		Add egg-milk mixture to flour mixture Mix at low speed The batter must still be lumpy	1 min 5 sec	mixer bowl ■ mixer whisk ■ mixer ■ dough scraper	20ℓ
29 000 g	PANNING meat mixture, cooked	Weigh 2 400g per pan Spread evenly	6 min	boiling pot ■ G-oven pan (12) flour scoop weighing scale mobile table pan trolley dough scraper ■ measuring jug ■ mixer bowl ■ mixer bowl dolly	60ℓ 40mm deep 15kg 1x1m 20pan 2ℓ 20ℓ
12 800 ml	pouring batter	Measure 1 000ml per pan Spread evenly over meat	6 min		
39 600 g	mince meat pie	Bake at 180°C	20 min	convection oven pan trolley ■ G-oven pan ■ (12)	20pan 20pan 40mm deep
36 000 g	PORTIONING mince meat pie, baked	Cut into 4x5 per pan	6 min	G-oven pan ■ (12) pan trolley ■ cutting frame cook's knife ■	40mm deep 20 pan 4x5 portions
36 000 g	SERVING mince meat pie	Serve 1 piece, ±150g per portion		G-oven pan ■ (12) egg lifter	40mm deep

Remarks, variations, etc.



CHICKEN, baked

RECIPE PROCEDURE	man minutes
ACTION TIME	15
BAKING/FRYING TEMPERATURE	160°C 180°C
BAKING/FRYING TIME	50 min 10 min

Portion size :

120 g

UPDATED :

240 portions

CHECK LIST FOR : UTENSILS				EQUIPMENT	
G-oven pan (530x325x40mm)(16) mixing bowl (2l) cook's spoon dredger (200ml)		G-serving pan (530x325x150mm)(2) egg lifter food tongs		pan trolley (20 pan) convection oven (20 pan)	
Amount g ml	Ingredient	Procedure	Time min sec	Equipment and Utensils per action	
				Type and Quantity	Measure
43 000 g	PREPARATION chicken thighs*	Put into pans skin side up, (± 15 thighs per pan)	10 min	G-oven pan (16) pan trolley	40mm deep 20 pan
15 g 200 g 20 g 60 g 10 g 10 g	cloves, ground salt, fine pepper, white, ground Aromat seasoning thyme, dry garlic salt	Mix Sprinkle over chicken thighs	5 sec 2 min	mixing bowl cook's spoon G-oven pan ■ pan trolley ■ dredger	2l 40mm deep 20 pan 200ml
		Bake at 160°C Bake at 180°C	50 min 10 min	G oven pan ■ pan trolley ■ convection oven	40mm deep 20 pan 20 pan
29 000 g	chicken, baked	Put into serving pans**	2 min	G-serving pan egg lifter	150mm
29 000 g	SERVING chicken, baked	Serve one chicken thigh, ± 120g per portion		G-serving pan ■ food tongs	150mm

Remarks, variations, etc.

* Count chicken thighs (240 portions)

** Use dripping in pans for gravy (see recipe)

Amount g ml	Ingredient	Procedure	Time min sec	Equipment and Utensils per action	
				Type and Quantity	Measure
16 000 ml 6 250 g	PREPARATION Macaroni chicken stock, drained-off** macaroni	Measure Bring to boil Add	5 min	measuring jug ■ boiling pot ■	2l 60l
		Boil	15 min	boiling pot ■	60l
		Drain if necessary	5 min	colander ■	400mm
7 000 ml 5 000 g	Soup mixture water tomato soup powder	Measure Add Mix until smooth (lump free)	1 min 1 min	measuring jug ■ container wire whisk ■	25l 450mm
	500 ml 4 000 g	Heat to 180°C Add Fry at 180°C Put into container	5 min 5 min 1 min	tilting frying pan cook's spoon ■ container	20l 25l
15 000 g 10 000 g 3 000 g 18 500 g 70 g 20 g	Chicken-macaroni dish macaroni, cooked soup mixture onions, fried chicken, cubed, cooked salt, fine pepper, white, ground	Mix lightly	2 min	stirring paddle boiling pot ■	1 200mm 60l
46 500 g 2 180 g	PANNING chicken-macaroni mixture cheese topping	Weigh ± 3 675g per pan Spread evenly Weigh 180g per pan Sprinkle evenly over chicken-macaroni mixture	6 min 5 min	boiling pot ■ G-oven pan weighing scale mobile table flour scoop dough scraper pan trolley	60l (12) 40mm deep 15kg 1x1m 20 pan
		Bake at 200°C	5 min	convection oven pan trolley ■ G-oven pan ■	20 pan 20 pan (12) 40mm deep
48 600 g	PORTIONING chicken-macaroni dish	Cut into 4x5 per pan	5 min	cook's knife ■ cutting frame G-oven pan ■ pan trolley ■	(12) 4x5 portions 40mm deep 20 pan
48 600 g	SERVING** chicken-macaroni dish	Serve 1 piece, ± 200g per portion		G-oven pan ■ egg lifter	(12) 40mm deep

Remarks, variations, etc:

** Serve with a crisp salad

MIXED VEGETABLE TART (with bottom crust)

RECIPE PROCEDURE ACTION TIME	max minutes 102
BAKING/FRYING TEMPERATURE	200°C
BAKING/FRYING TIME	7 min

Portion size	170 g
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UPDATED :
240 portions

CHECK LIST FOR : UTENSILS	EQUIPMENT
G-oven pan (530x325x40mm)(12) vegetable knife container (25ℓ) G-steamer pan, perforated (530x325x55mm)(9) flour scoop cook's spoon	measuring jug (2ℓ) mixing bowl (5ℓ) dough scraper cutting frame (4x5 portions) egg lifter pan trolley (20 pan)(2) food processor (5ℓ) weighing scale (15kg) convection steamer/oven (20 pan) tilting frying pan (60ℓ) electric mixer (hand model) mobile table (1x1m)

Amount g ml	Ingredient	Procedure	Time min sec	Equipment and Utensils per action	
				Type and Quantity	Measure
6 000 g	PRE-PREPARATION pastry 1, baked	Prepare according to recipe (use egg whites in mixed vegetable filling)	40 min	G-oven pan ■ (12) pan trolley ■	40mm deep 20 pan
5 000 g	onions	Peel Chop finely	3 min 20 sec	vegetable knife food processor container	5ℓ 25ℓ
18 000 g	mixed vegetables, frozen *	Weigh 2 000g per steamer pan	6 min	G-steamer pan, perforated (9) weighing scale flour scoop pan trolley	55mm deep 15kg 20 pan
		Steam	5 min	pan trolley ■ convection steamer ■ G-steamer pan, perforated ■ (9)	20 pan 20 pan 55mm deep
2 500 g	PREPARATION Vegetable filling margarine, yellow (at 24°C)	Heat to 180°C	5 min	tilting frying pan	60ℓ
4 000 g	onions, chopped	Add Fry at 180°C	5 min	tilting frying pan ■ cook's spoon	60ℓ
1 000 g 1 500 g 30 g 15 g	onion soup powder cake flour salt, fine pepper, white, ground	Add Stir until well mixed	4 min	tilting frying pan ■ cook's spoon ■	60ℓ
12 000 ml	milk, skimmed	Measure Add while stirring Bring to boil Boil Turn off heat	1 min 2 min 3 min 2 min	measuring jug tilting frying pan ■ cook's spoon ■	2ℓ 60ℓ
17 000 g 7 000 g	mixed vegetables, steamed cheese, Cheddar, grated	Add Mix	1 min 2 min	tilting frying pan ■ cook's spoon ■	60ℓ

Remarks, variations, etc.

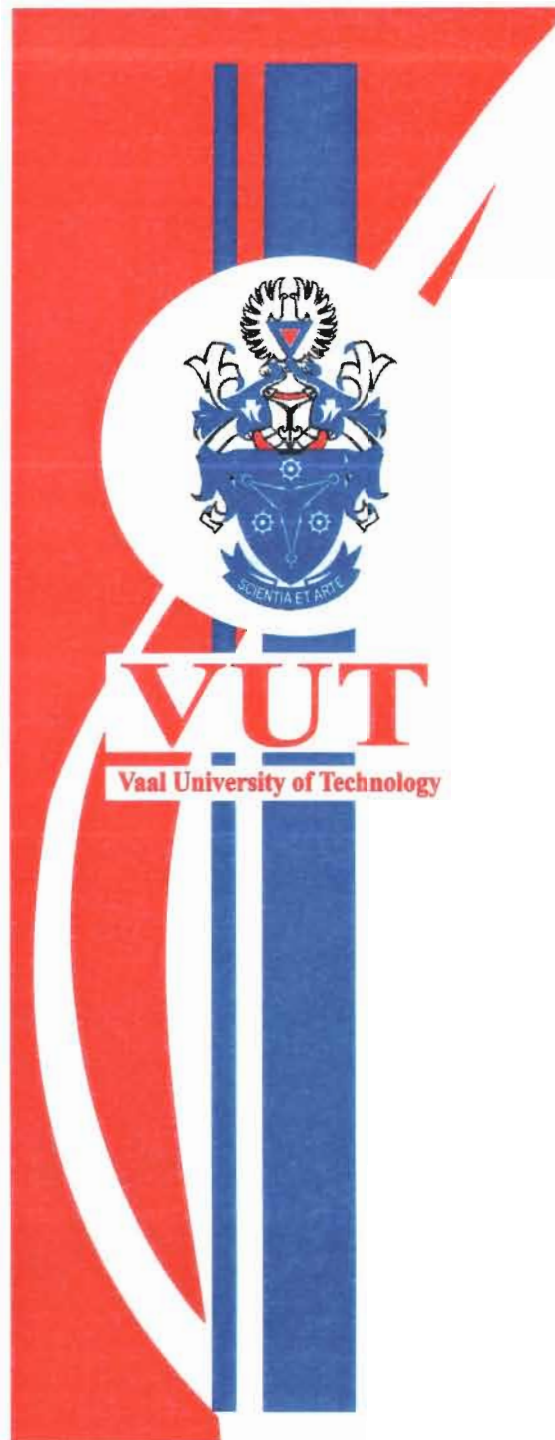
- * Left over mixed vegetables can be used instead of frozen mixed vegetables

Amount g ml	Ingredient	Procedure	Time min sec	Equipment and Utensils per action	
				Type and Quantity	Measure
4 000 g 187 g 15 000 g 3 800 ml	Cheese and onion filling onions, chopped, blanched parsley, chopped cheese, Cheddar, grated eggs, beaten	Add to white sauce Mix	1 min 2 min	boiling pot ■ stirring paddle	80ℓ 1 200mm
12x800 g 42 000 g	PANNING pizza crust, baked cheese and onion filling	Weigh 3 500g per pan Spread evenly over baked crust	6 min	boiling pot ■ G-oven pan ■ (12) pan trolley ■ mobile table flour scoop weighing scale dough scraper	80ℓ 40mm deep 20 pan 1x1m 15kg
		Bake at 180°C	25 min	G-oven pan ■ (12) pan trolley ■ convection oven	40mm deep 20 pan 20 pan
		Leave to cool slightly	5 min	G-oven pan ■ (12) pan trolley ■	40mm deep 20 pan
51 000 g	PORTIONING cheese and onion savoury tart, baked	Cut into 4x5 per pan	5 min	G-oven pan ■ (12) pan trolley ■ cutting frame cook's knife	40mm deep 20 pan 4x5 portions
51 000 g	SERVING** cheese and onion savoury tart, baked	Serve 1 piece, 200g per portion		G-oven pan ■ (12) egg lifter	40mm deep

Remarks, variations, etc.

** Serve with a crisp salad

CERTIFICATE FOR COMPLETION OF NEP



Vaal University of Technology

Nutrition Education Programme

This is to certify that

Anna Swarts

*has attended the Nutrition Education Programme on basic
nutrition, food hygiene and safety, food choices and menu
planning.*

Date: 18 September 2008

R. Spillman

Dr E. Dicks