

Chapter 1 Introduction and background to the problem

1.1 Introduction

Malnutrition means more than feeling hungry or not having enough to eat. The inadequate intake of kilojoules, or of the protein necessary to keep the body healthy and build muscle, or of iron for proper blood cell function, as well as of other nutrients, make up different types of malnutrition (Torpy 2004:648). Under-nutrition, with its two components, protein-energy malnutrition and micronutrient deficiencies, is a major health burden in developing countries and the most important risk factor for illness and death (Muller & Krawinkel 2005:279), affecting approximately 800 million persons worldwide (Torpy 2004:648); it is also a persistent problem in South Africa (SA) (DoH 2002:20). An estimated 55 percent of all childhood deaths are a direct result of malnutrition (Branca & Ferrari 2002:8, Torpy 2004:648, Müller & Krawinkel 2005:279). The National Food Consumption Survey (NFCS), conducted in SA in 1999, was a cross-sectional survey of a nationally representative sample (n=2894) of all children aged one to nine years. The results showed that, at national level, stunting (height-for-age below minus two standard deviations (<-2SD) from the reference median), which affected one in five children, was by far the most common nutritional disorder (Labadarios, Steyn, Maunder, MacIntyre, Gericke, Swart, Huskisson, Dannhauser, Vorster, Nesamvuni & Nel 2005a:533). Children living in informal urban areas were more severely affected (20%) than those living in formal urban areas (16%). The results indicated a similar pattern in the prevalence of underweight (weight-for-age<-2SD), with one in ten children being affected at national level. The intakes of energy, calcium, iron, zinc, selenium, vitamins A, D, C and E, riboflavin, niacin, vitamin B6 and folate were below two thirds of the recommended dietary allowance (RDA) (Labadarios *et al.* 2005a:533. The NFCS indicated that the majority of households experienced food insecurity and that energy deficit and

micronutrient deficiencies were widespread, resulting in a high prevalence of stunting (Labadarios *et al.* 2005a:533).

According to the Food and Agricultural Organization (FAO 2005:6), malnutrition, or undesirable physical or disease conditions related to nutrition, can be caused by eating too little, too much or an unbalanced diet that does not contain all the nutrients necessary for maintaining good nutritional status. Inadequate dietary intake and disease are the most significant immediate causes of malnutrition. Infectious disease affects food intake and nutrient absorption, leading to increased nutritional requirements (DoH 2002:20). A healthy child is not only a child with no clinically noticeable illnesses, but also one with adequate physical development, both in terms of size and acquired motor skills and of adequate neurological, psychological and emotional development. A healthy child should, therefore, be defined as one who is going to be a fit and healthy adult with low morbidity for chronic diseases, adequate capacity for physical work and adequate reproductive performance (Branca & Ferrari 2002:8).

Children with malnutrition, specifically under-nutrition, have inadequate fat stores and very little muscle. Their bones are prominent and they often have disproportionately large abdomens. Brain development can be impaired, and these children have a high incidence of disease because their bodies cannot fight infection (Torpy 2004:648). The consequences of undernutrition may include growth stunting, anorexia, susceptibility to infections, behavioural changes and learning disabilities (Klugman 2002:2). Micronutrient deficiencies, which are widespread among school-age children (WFP 2006), influence children's development (Black 2003:1).

Poverty is the main underlying cause of undernutrition and its determinants (Black 2003:2, Rivera, Hotz, Gozález-Cossío, Neufeld & Carcía-Guerra 2003: 4010S, Müller & Krawinkel 2005:280). However, the causes of undernutrition are complex and differ among countries, communities and households.

Causes of malnutrition also differ over time, and the consequences are far reaching. Because nutrition problems are influenced by human behaviour, cultural, socioeconomic and political factors play a major role in malnutrition worldwide. Attempts should be made to alleviate nutrition problems and sustainable solutions must be customised to fit into a particular environment.

1.2 Background to the study

South African studies conducted in 2002 indicated that 14-19 percent of schoolchildren had nothing to eat before they went to school (Kruger, Dhansay, Labadarios, Kotiah & Kullman 2002:15). White children who had breakfast ate mainly cereals for this meal, while black children most frequently consumed tea and coffee. In SA, where a high rate of stunting has been identified, it is important that children should have adequate energy and protein intake (Kruger *et al.* 2002:15). Results of international studies indicate that breakfast makes such a significant contribution to a child's nutrient intake for the day that a child who misses breakfast is unlikely to make up the deficit of nutrients during the rest of the day (Grantham-McGregor, Chang & Walker 1998:785, Kruger *et al.* 2002:15).

School feeding programmes are powerful tools for alleviating day-to-day hunger pains. It has been suggested that giving children a daily breakfast at school may improve their scholastic achievement (Grantham-McGregor *et al.* 1998:785). A report of an investigation into protecting children, conducted in 2003 in Southern Australia, suggests school meals as a strategy for enhancing children's well-being (Kennett & Smith 2005:3).

The Primary School Nutrition Programme (PSNP) was introduced in SA as a Presidential Lead Project on 24 May 1994. As such, it was envisaged as being based on the principles of community involvement and empowerment: it embodies an integral approach, linking school nutrition activities to other

initiatives, such as community development and health, in order to improve education quality (van Stuijvenberg 2005:S214).

The main aim of PSNP was:

- to improve education by enhancing active learning capacity, school attendance and punctuality through the provision of an early morning snack, meeting not less than 25 percent of the Recommended Dietary Allowance (RDA) of energy for children between the ages of 7 and 10, and not less than 20 per cent RDA of energy for children between the ages of 11 and 14;
- to improve health through micronutrient supplementation, parasite control/eradication and through providing education on health and nutrition; and
- to enhance broader development initiatives, especially in the area of combating poverty (McCoy, Saitowitz, Saasa, Wigton, MacLachlan, Mokoetle, Swart, Kvalsig, Gordon, Hendricks, Dhansay & Barron 1997:2, Labadarios 1997:91, DoH 2001:4, DoH 2004:14, Tomlinson 2007:2).

The remaining 75 percent of the child's daily nutritional needs is still the responsibility of the parents (DoH 2001:4). The PSNP in South Africa aims at providing approximately 25 percent of the child's daily feeding needs as a snack and not a full meal. It ensures that children are less hungry while having to learn and therefore concentration and learning capacity are increased. To ensure that hunger is effectively alleviated, any snack provided as part of the PSNP should be substantial, containing food that takes "longer" to digest (DoH 2001:4).

Between the establishment of the PSNP in 1994 and the end of March 2002, approximately 15 000 schools participated in the school feeding component

of the PSNP. An average of 5 million schoolchildren have benefited annually since its inception (Roche 2000:3, Labadarios, Steyn, Mjijima & Dladla 2005b:103). The vision of the PSNP is to have a self-sustained school nutrition programme, which is not dependent on funds from the government.

The main purpose of the PSNP compares well with the guidelines of the World Health Organization (WHO) for school feeding programmes. These guidelines are: to alleviate short-term hunger in malnourished or otherwise well-nourished schoolchildren, which helps to increase students' concentration, producing higher levels of cognitive function and learning; to motivate parents to enrol their children in school and have them attend more regularly; and to reduce absenteeism and increase the duration of schooling, as well as performance at school. Both dropout rates and school year repetition diminish with school feeding (Grantham-McGregor *et al.* 1998:785, WFP 2005).

The PSNP was part of the Integrated Nutrition Programme (INP), managed at the national level by the Departments of Health and Education. At the provincial level, it was managed mostly by the Department of Health. It was operationalised locally by entities such as school project committees, school governing bodies (SGBs), non-governmental organisations (NGOs) and community-based organisations (CBOs). In January 2002, Cabinet decided to transfer the PSNP from the Department of Health (DoH) to the Department of Education (DoE), with effect from 1 April 2004. The reason for the transfer was that schools are a component of the DoE and that all large-scale programmes implemented in schools should therefore be managed by DoE as the responsible department. The DoE is convinced that access to good nutrition at the primary school level is one of the most important variables in supporting the national strategic objective of universal primary education. This belief motivated the name-change from Primary School Nutrition Programme to National School Nutrition Programme (NSNP) (DoE 2004:2).

Although multiple beneficial effects are reported regarding the impact of school feeding programmes on children's nutritional status, various alternative products, about which there is little information, are used as part of school feeding programmes implemented by NGOs and other community organisations. The aim of this study was to investigate such products used in the Vaal Region.

1.3 Motivation

School feeding programmes are defined as interventions that deliver a meal or snack to children in the school setting, with the intent of improving attendance, enrolment, nutritional status and learning outcomes (Levinger 2005:S171). One of the most important advantages of an effective school feeding programme is that it can alleviate short-term hunger immediately. Sufficient evidence from various studies shows that merely alleviating hunger in schoolchildren significantly improves their performance at school. School feeding helps to increase the attention and concentration of school learners, thereby improving cognitive function and learning (DoH 2005:32).

The PSNP has a vast number of advantages, as mentioned above, but also experiences difficulties and problems like any other school feeding programme worldwide. Alleviating hunger in school-age children through school feeding is noted for being expensive and logistically complicated. After an extensive evaluation, Wentzel-Viljoen (2003:343) reported that the PSNP, which costs the taxpayer approximately R500 million per year, experienced the following problems: the energy content varied between the different provinces and did not comply with the national criterion that the menu should supply 25 per cent of the RDA for energy for children between the ages of 7 and 10; the energy content of the bread menu was lower than that of the cooked or alternative menus; no guidelines were given on the level of fortification of food items with micronutrients; correct quantities of food items, as specified in the provincially approved menus, were not served at all the

schools; portion control was not exercised at most of the schools; and problems occurred with the delivery and storage of ingredients.

Analyses of PSNP school meals indicate a wide variation in the quality and quantity of meals. Different types of meals have advantages and disadvantages, and it has been reported that some meals fail to meet the basic objectives and standards of the PSNP. One of the benefits, according to the participants, is that the food consumed does relieve temporary hunger; however, greater effort must be made to ensure that meals meet the minimum standards in terms of their macronutrient and micronutrient content. The use of a structural framework may help provinces, districts and schools to decide on which type of meal is most appropriate for their particular situation and needs (McCoy *et al.* 1997:55).

Since not all children qualify to participate in the PSNP, school feeding programmes were introduced by Joint Aid Management (JAM) and researchers of the Institute of Sustainable Livelihoods (ISL) of the Vaal University of Technology (VUT) in primary schools in Orange Farm in Southern Gauteng. These programmes used two commercial products, Corn-soya blend (CSB) and Seja (a sorghum-based product), as part of an intervention to address undernutrition amongst children between the ages of six and 13. Furthermore, a micronutrient-dense “vetkoek” was developed (as part of the researcher’s MTech studies) and implemented in a school feeding programme among children between the ages of six and 13 in Eatonside, which is also situated in the Vaal Triangle. The impact of the “vetkoek” on the nutritional status of the children was measured against a control group receiving fruit, and compared to the existing PSNP (Napier 2006).

The study, therefore, attempted to determine the products’ compliance, acceptability and cost effectiveness, as well as the effect of the products on the children’s nutritional status and school attendance. This was done in order to determine the most appropriate product for school feeding

programmes in the Vaal Region and to provide guidelines for NGOs and the Gauteng Department of Education for future school feeding programmes in this area. It was the first study conducted in South Africa where the PSNP was compared with locally produced commercial products (Seja and CSB), as well as a household recipe (“vetkoek”).

The duration of the intervention was a period of seven months. The initial planning was that the intervention should be implemented for at least one year. However logistical problems prevented this, as the intervention could not take place during any of the school holidays (April, June/July, October and December) which resulted in one and a half months lost to the intervention.

Community workers needed to be trained in product preparation and distribution, and this could only be done after the community members were chosen by the school governing body at the beginning of each new school year.

BTech student needed to be trained as fieldworkers at the beginning of each year. Furthermore, the fieldworkers used for this study were final year BTech hospitality students who had to receive intensive field operations training before the implementation. These students register towards the the end of January each year and are not on campus before then. Fieldworker training could thus only be scheduled for February resulting in the research project implementation towards the middle of February and beginning of March the soonest, which resulted in another one and a half months lost to the intervention. No training could be conducted in November of the previous year due to examinations and students not having received their results for registering as a final year or BTech student.

The school principals also advised that no measurements could be made during examination times, thus follow-up measurements had to be scheduled

for the end of October instead of early December before the schools closed (two months lost).

An alternative could be to do the intervention over a two year period, however, this would result in older children (13 years) excluded from the study due to the fact that they would be leaving Primary school for Secondary school.

Funding might also be compromised as food provision, as part of a research project, proved to be costly. Thus, the practical implications of extending the intervention to a two year period might not be feasible.

1.4 Aim of the study

Figure 1.1 depicts the conceptual framework of this study. This study aimed to evaluate five school feeding programmes, namely, the PSNP and programmes using Seja, CSB, and “vetkoek”, with fruit as a control group, and also to identify the limitations found in previous studies on this subject through a comparative analysis of these meals (products) used in primary schools in the Vaal Region.

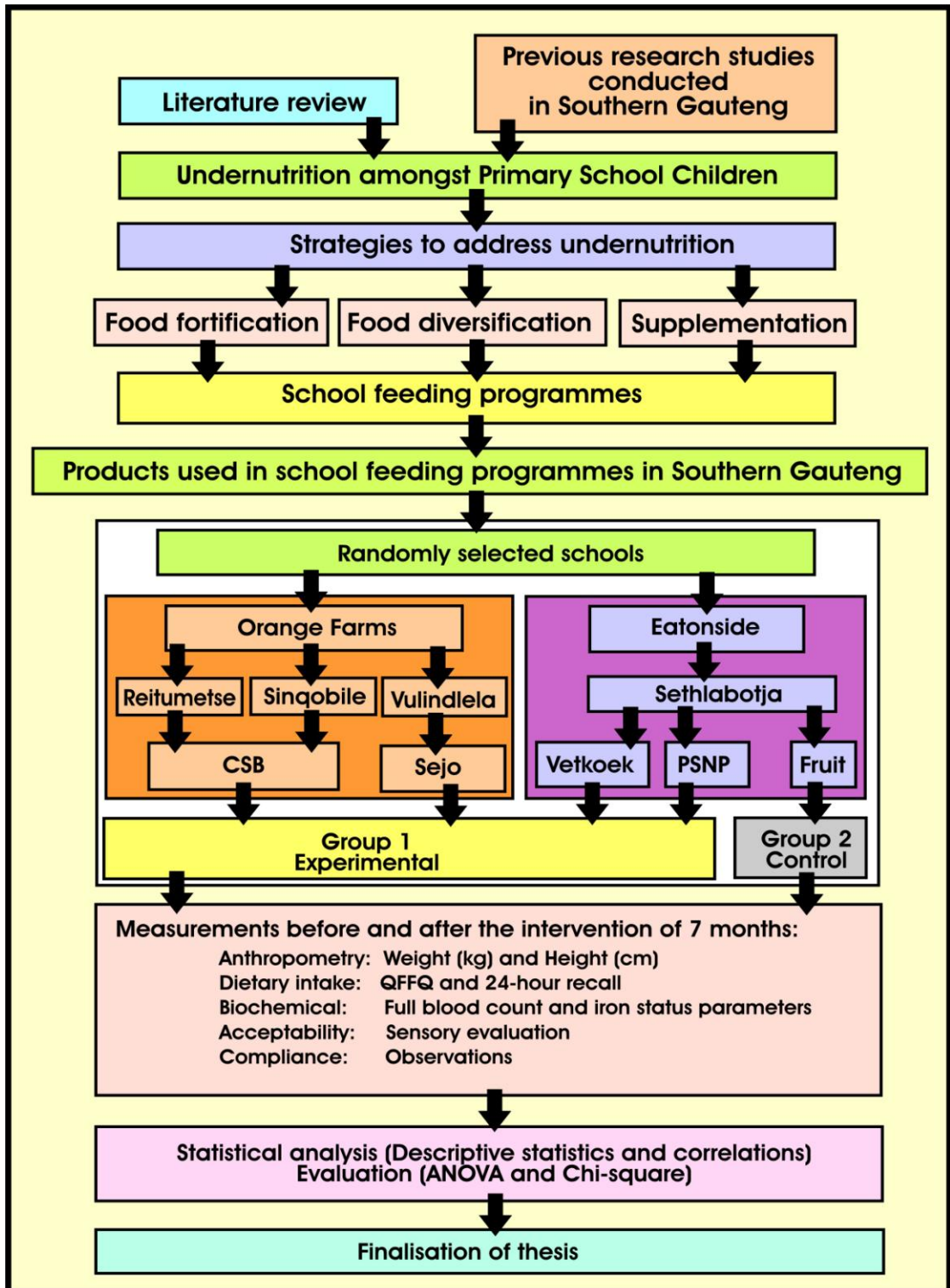


Figure 1.1 Conceptual framework of the study

1.5 Specific objectives of this project

The specific objectives of this project included the following:

- To evaluate school feeding programmes and food being served in Gauteng schools, by conducting a literature survey.
 - This included a survey of a report of the evaluation of PSNP in South Africa by Wentzel-Viljoen (2003). A comparison was also made with the national PSNP guidelines (McCoy *et al.* 1997:41). The review conducted by Wildeman and Mbebetho in 2005 on ten years of the School Nutrition Programme was used to conduct an extensive review of the information on the PSNP's budget during the past ten years.

- To compare the five products in terms of the following:
 - The nutritional content of the product, as determined by means of chemical analyses.
 - The impact of the product on the nutritional status of primary school children, as determined by analysis of their dietary intakes, as well as the biochemical and anthropometric results.
 - The compliance of the product, determined by analysing the sensory assessments and shelf life studies.
 - The cost effectiveness of the product, determined by analysing the total cost per day per child and comparing it with the budget provided for PSNP (Wildeman & Mbebetho 2005:21).
 - The impact of the product on school attendance as determined by analysis of the school attendance records during the implementation of the respective school feeding programmes.

- To provide NGOs and other organisations involved in school feeding programmes, as well as the Gauteng Department of Education, with

guidelines on the optimal school feeding strategy, based on the results of this study.

1.6 Methods and data analyses

This study was undertaken in four phases. Phase 1 involved the baseline survey, phase 2 included product development and selection of all the products as well as nutritional analysis, sensory evaluation and shelf life testing, and phase 3 covered the intervention, analyses and evaluation. Phase 4 integrated the comparison of the five different feeding strategies.

The results of the five school feeding programmes previously undertaken were analysed statistically (in close cooperation with a statistician at the Vaal University of Technology), in order to determine significant differences by means of independent t-tests, analysis of variance (ANOVA) and Chi-square tests for the following:

- Impact on nutritional status, by comparing and evaluating the anthropometric indices: weight-for-age, height-for-age and body mass index (BMI), as well as the biochemical variables, specifically iron;
- Dietary intake, by comparing the Top 20 foods consumed in the communities with the nutrient intake, using the 24h-recall method;
- Sensory evaluation, by comparing the sensory acceptance results of all the products;
- Compliance, by monitoring portion size and consumption patterns;
- Cost, by comparing the total cost per portion; and
- Impact on school attendance.

All these results will be compared to determine the best product for each of the measurement criteria. These will further be analysed to determine the best overall strategy for primary school children in Southern Gauteng.

1.7 Relevance of the study

The results of this study will provide NGOs, the Department of Education and other organisations with a cost effective and efficient strategy for school feeding programmes in Southern Gauteng in order to optimise the children's well-being and improve their nutritional status and cognitive performance, as well as to save taxpayers' money. Guidelines will advise not only on the most suitable product for use in school feeding programmes, but will also give information to NGOs and the Department of Education on how to include the communities more effectively so that eventually the school feeding projects will be run without government funding.

1.8 Organisation of the thesis

The introductory chapter will discuss the background to the problem of undernutrition amongst primary school children, and school feeding programmes and products. In Chapter 2, a literature synthesis will be presented regarding the background information on global and South African interventions used to address undernutrition, in which school feeding programmes are a major element. Chapter 3 will discuss two of the four phases for each of the five products being used: phase one – the baseline survey, and phase two – the product development and selection, a nutrient analysis, sensory evaluation and shelf life testing. This chapter will also deal with the first part of phase three – the intervention. In Chapter 4, the second part of the third phase, namely, the analyses and evaluation, will be discussed, as well as the fourth phase, namely, the comparison of the five different feeding strategies, including the evaluation of the study and statistical results. This chapter will include the new knowledge contributed by this study. Chapter 5 will consist of discussion, conclusion and recommendations, as well as guidelines for future school feeding programmes.