



**"Evaluation of nutrition information embedded in the grade 8 TO 12
KwaZulu-Natal school curriculum"**

**Dissertation submitted in fulfilment of the requirements of the Degree of Master of
Applied Science in Food and Nutrition in the Department of Food and
NutritionConsumer Sciences, Faculty of Applied Sciences at the Durban University of
Technology**

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Supervisor: Professor Catherina Napier

Student: Thilavathy Naidoo

Preface

The work described in this dissertation was conducted through the Master's degree of Applied Sciences in Food and Nutrition in the Department of Food Nutrition Consumer Sciences, Faculty of Applied Sciences at the Durban University of Technology, Durban under the supervision of Professor Catherina Napier.

The Revised National Curriculum Statement Grades R–9 School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) changed to the Curriculum Assessment Policy Statement (CAPS) during the course of this study. However, not much change to the content in the learning areas was noted.

This study represents original work by the author and has not otherwise been submitted in any form to any tertiary academic institution to be considered for any degree or diploma. However, for reference purposes and in support of this study, other research studies were reviewed, and are duly acknowledged in the text.

Declaration

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

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Statement 1

This dissertation is being submitted in fulfilment of the requirement of the Master's degree.

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Statement 2

This dissertation is the result of my own independent investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references. A bibliography is attached as an Appendix. I hereby declare that I did not commit plagiarism.

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I hereby give consent for my dissertation, if accepted, to be available for photocopying and for interlibrary loan, and for the title and summary to be made available to outside organisations.

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Acknowledgements

I am greatly indebted to my family for their patience, encouragement, love, care and understanding, always, during the years of study and research.

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**Dedication: *To my husband Kuben, and my daughters Roshenka and
Santhuri***

Definitions of Terms

OBE:	Outcomes-based education which formed the foundation for the curriculum in South Africa from 2004 until 2010.
National Curriculum Statement:	Builds its learning outcomes for Grades 10-12 on the critical developmental outcomes that were based on the Constitution and developed through a democratic process.
Correlation:	The measure of relationship that uses a correlation co-efficient.
Body Mass Index:	A simple index of weight for height that is used to classify the terms underweight, overweight and obesity in both children and adults.
Low birth weight:	Birth weight less than 2,500 grams at birth.
Malnutrition:	A number of forms of poor nutrition caused by a complex collection of factors including dietary inadequacy, infection and socio-cultural factors. Both underweight, or stunting, and overweight are forms of malnutrition.
Obesity:	Excessive body fat content commonly measured by BMI. The international reference for classifying an individual as obese is a BMI greater than 30.
Overweight:	Defined as weight for height above two standard deviations from the median weight for height of the reference population.
Stunting:	A consequence of severe and long lasting malnutrition in which a child fails to achieve the expected height for his or her age
Underweight:	Low weight for age is two standard deviations below the international reference for weight-for-age.
Wasting	Weight divided by height that is two standard deviations below the international reference. It describes a recent or current severe process leading to significant weight loss.
Quintile:	A system of ranking and funding by the Department of Education taking into account the socio-economic circumstances of learners 'inequality and poverty. (For example, the poorest quintiles (1 and 2) receive more funding in terms of the Norms and Standards for Funding Schools compared to quintiles 3,4 and 5.)

Acronyms

ADA	American Dietetic Association
AI	Adequate Intake
AIDS	Acquired Immune Deficiency Syndrome
BMI	Body Mass Index
CASS	Continuous Assessment
CBNP	Community Based Nutrition Programme
CHD	Coronary Heart Disease
CHO	Carbohydrate
CO	Critical Outcome
CVD	Cardiovascular Disease
DGA	Dietary Guidelines for Americans
DO	Developmental Outcome
DOH	Department of Health
DOSD	Department of Social Development
DRI	Dietary Reference Intake
EAR	Estimated Average Requirement
ECD	Early Childhood Development
EFAP	Emergency Food Assistance Programme
FAO	Food and Agriculture Organisation
FET	Further Education and Training
GDP	Gross Domestic Product
GET	General Education and Training
GI	Glycaemic Index
GNP	Gross National Product
ICMR	Indian Council of Medical Research
INP	Integrated Nutrition Programme
IOM	Institute of Medicine
LBW	Low Birth Weight
MAC	Mid upper arm Circumference
MDG	Millennium Development Goals
NCS	National Curriculum Statement
NKQ	Nutrition Knowledge Questionnaire
NHANES	National Health and Nutrition Examination Survey
PEM	Protein Energy Malnutrition
QFFQ	Quantitative Food Frequency Questionnaire
RDA	Recommended Dietary Allowances
SAFBDG	South African Food-Based Dietary Guidelines
SES	Socio-Economic Status
SFT:	School Food Trust
SGB	School Governing Body
TEFAP	The Emergency Food Assistance Programme
TSF	Triceps Skin Fold
UL	Upper Intake Level
UNDESA	United Nations Department of Economic and Social Affairs
UNICEF	United Nations Children's Fund
UNSCN	United Nations Standing Committee on Nutrition
USDA	United States Department of Agriculture
WC	Waist Circumference
WHO	World Health Organisation
WRI	World Resource Institute
YRBS	Youth Risk Behaviour Survey

Abstract

There is a lack of information and research on nutrition content in the curriculum for learners at the secondary school level. While nutrition content is addressed in the curriculum for Grades 8 and 9 in Natural Science, Social Science and Life Orientation, not all aspects of nutrition education are included. In Grades 10 to 12, nutrition content exists in Life Orientation, Agricultural Science, Agricultural Technology, Design Studies, Civil Technology, Electrical Technology, Mechanical Technology, Dance Studies, Information Technology, Consumer Studies and Hospitality Studies, however, not all learners are exposed to the learning areas that contain nutrition content. An important consequence of this lack of exposure to information on nutrition content is that learners who leave school after Grade 12 with inadequate nutrition knowledge potentially become adults who suffer from lifestyle diseases.

This study focused on the nutrition content in the curriculum in Grades 8–12 in Kwa-Zulu-Natal in order to:

- evaluate the content in the curriculum referring to nutrition and to analyse the critical and developmental outcomes of nutrition education;
- assess the nutrition knowledge of learners in Grades 8–12 in the Durban Central area (for the purpose of following a healthy lifestyle);
- determine the views of educators on the inclusion of nutrition content in the curriculum;
- highlight the importance of applying nutrition content in the curriculum to educate learners on disease prevention and good eating habits.

The design of the study was evaluative, analytical and descriptive, and adopted both the quantitative and qualitative methodologies. The purposive sampling method was utilised for the selection of sample. The study was located in Central Durban and the sample comprised of boys and girls in Grades eight–12 at Durban High School and Ridge Park College, respectively. The sample included 343 boys and 360 girls who participated in the study. In order to establish the views of educators who teach nutrition knowledge in the curriculum, the study also included 134 educators purposively selected from 15 schools in the Umlazi District in KwaZulu-Natal. Two sets of instruments were used for data collection. The Nutrition Knowledge Questionnaire (NKQ)(previously developed) was used to determine the nutrition knowledge of learners in Grades eight–12 and across genders in both schools.

An Educator Questionnaire (EQ) (developed for the study) on the learning areas that contained nutrition content was utilised to measure the extent to which the educators teaching those learning areas completed the curriculum content on nutrition. The Educator Questionnaire was used to ascertain the educators' views on the importance of nutrition knowledge.

The results of the research showed that the content dealing with nutrition in the school curriculum for Grades eight–12 was inadequate in certain learning areas to adequately educate learners on nutrition for the purpose of following a healthy lifestyle. The compulsory learning areas that contain aspects of nutrition knowledge were Life Orientation, Natural Science and Social Science for Grades eight and nine. In Grades 10 to 12, Life Orientation is the only compulsory learning area that contains aspects of nutrition knowledge content.

Nutrition knowledge investigation showed that learners are not adequately prepared in respect of all aspects of nutrition knowledge when they leave school at the end of Grade 12. The curriculum analysis of the learning areas in Grades 10 to 12 showed that the learning areas that contain nutrition knowledge are specialist learning areas not offered at all schools in the Durban Central area.

The Educator Questionnaires showed that learning areas that include nutrition content in Grades 10 to 12 are not offered at all schools, thus probably negatively impacting on the learners' level of nutrition content. The results of the Educator Questionnaire reinforced the notion that the curriculum for nutrition education was inadequate.

The research concluded that the curriculum does not prepare learners adequately in respect of all areas of nutrition knowledge to enable them to follow healthy lifestyles. The results revealed that there is a correlation between the nutrition knowledge of learners and certain nutrition education aspects in the curriculum. Such results showed that the total mean scores for all the Food Based Dietary Guidelines ranged from 62.0% as the lowest, to the highest total mean score of 72.0%. However, the scores are low in critical areas of nutrition knowledge when individual scores are taken into consideration. An important consequence is that learners who leave school at the end of Grade 12 with inadequate nutritional knowledge become adults with the potential to suffer from lifestyle diseases. It is recommended that a compulsory learning area for all grades that deals exclusively with health, physical education and nutrition be introduced into the curriculum to assist learners to follow healthy lifestyles during and after school.

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- F- Educator Questionnaire
- G- Nutrition Knowledge Questionnaire
- H- Language Certificate

Chapter 1: Introduction to the Study

1.1 Introduction

Nutrition, poverty, malnutrition, over-nutrition and obesity are health issues that are prevalent in South Africa and globally, impacting on the nutrition status of children and adolescents (Vorster 2010; Van der Merwe, 2013). Studies have shown that many people in South Africa do not eat the kinds and amounts of food needed for optimal health. Although many people can afford to eat a healthier diet, it is often a case of not being interested in changing intake patterns. Education and proper nutrition knowledge play a role in making healthier food choices (DOH 1999).

A review of the South African nutrition situation by Vorster, Love and Brown(2001) concluded that malnutrition, including under-nutrition and over-nutrition, is associated with avoidable morbidity and mortality. Many South Africans are experiencing rapid urbanisation and acculturation, characterised by a nutrition transition often resulting in both over- and under-nutrition. A double burden of under-nutrition and over-nutrition results in nutrition-related diseases prevalent in many households and communities (Vorster *et al.*2001).

Studies conducted in South Africa by Love and Sayed (2001) and Fourie, Rooyen, Huisman, Malan, Schutte, Malan and Schutte (2008), demonstrate that learners in general display poor eating habits. The findings of a study conducted by Venter and Winterbach (2010) concluded that there was a high proportion of South African learners in Grades eight to 11 who consumed large amounts of food rich in fat, including fast food, and cakes and biscuits. The researchers stated that learners who obtained poor academic scores were those learners who consumed diets with a high fat content; that mid-adolescents from urban to upper socio-economic areas were not consuming food in line with the South African Food Based Dietary Guidelines and lacked knowledge on dietary fat. Dietary awareness and nutrition knowledge are seen as key aspects that influence the diet patterns of adolescents and encourage a healthy selection of foods. Draper, de Villiers, Lambert, Fourie, Dalais, Abrahams, and Steyn (2010) emphasised the importance of the educator in implementing a school-based intervention and acknowledged that developing capacity within school staff and stakeholders is a challenge.

The researcher has observed from her professional experience in the school environment administered by the Department of Education in KwaZulu-Natal that nutrition initiatives in the school environment are still not taking place adequately by various stakeholders. Parents have not been fully involved in the process of supporting healthy eating initiatives at school. The role of schools in disseminating intervention strategies is fundamental, especially in low-income areas in South Africa and globally.

The main aim of this study is to analyse the critical and developmental outcomes of the Revised National Curriculum Statement in South Africa and to assess the nutrition knowledge of learners. Views of the educators that teach the nutrition content in the curriculum were analysed so that recommendations on educating learners in Grades eight–12 on nutrition may be strengthened. The study sought to highlight the importance of using the curriculum and educators to educate learners in nutrition education in order to prevent disease caused by poor eating patterns of both girls and boys in schools in the Durban Central area.

1.2 Problem Statement

Nutrition education contributes significantly to a healthy lifestyle and the prevention of disease (Kupolati, Gericke and Macintyre, 2015). Therefore, it is important that the curriculum on nutrition at both the primary and secondary school levels in South Africa is implemented in such a way that learners acquire adequate knowledge to make sound decisions on healthy eating which will contribute to a healthy lifestyle.

Studies conducted in 12 primary schools in the Western Cape have suggested that the implementation of the Food Based Dietary Guideline in the national school curriculum is seen as vital along with the school's physical environment. It is further emphasised that the implementation of a Food Based Dietary Guideline into the curriculum requires sufficient educational materials, adequate time allocation and appropriate training of educators (Nguyen, de Villiers, Fourie, Bourne, and Hendriks, 2013). Among the challenges identified for the implementation of nutrition education and healthy eating initiatives at schools is the lack of funding and resources. While this referred to a study on nutrition content in the curriculum that was conducted at primary school level, it should be noted that there is a scarcity of research literature on nutrition content in the South African school curriculum in secondary schools as well.

Fernandes, de O Bernardo, Compos and de Vasconceles (2009) reported on a study conducted in Brazil and concluded that nutrition education programmes in schools, the creation of healthy environments and the promotion of healthy dietary habits and lifestyles should be fundamental to overcoming lifestyle diseases. The study showed that nutrition education programmes that were implemented improved the quality of food the school children were eating and provided support for nutrition education strategies to form a greater part of the school curriculum.

Similarly, research conducted by Pucciarelli, McNeany and Friesen (2013) with learners from Indiana Junior High School in the USA called for more nutrition education and a standardised nutrition education curriculum for elementary and middle school, and highlighted the importance of developing healthy eating habits. The study also indicated that learners had low levels of nutrition knowledge despite the school's wellness policy, introduced in 2004 to improve the nutrition environment. It was found that the assessment of student learning outcomes related to basic nutrition principles was inconsistent, thus the call for a comprehensive, standardised form of nutrition education to be mandated in order to overcome the low levels of nutrition knowledge amongst students.

Studies on child and adolescent health have affirmed that education on nutrition and the inclusion of nutrition education in the school curriculum is critical for a healthy lifestyle. Under-nutrition, poverty, food insecurity, malnutrition, over-nutrition and obesity are currently the most important nutrition-related health concerns that are prevalent globally. Identifying the problems related to the health status of children and adolescents is critical in developing strategies to address the nutrition-related health concerns. Nutrition is a vital part of health care for all infants and children, and good nutrition is fundamental for growth and development of children (Swart and Dhansay, 2008). Wenhold, Kruger and Muehlhoff(2008) agree that good nutrition and education are critical for the good health, development, performance and future livelihood of children, and that the goal of good nutrition and education is far from being met for many children in South Africa.

A school curriculum on nutrition education should consider the context of children because of the diversity of learners' backgrounds. Studies carried out by Labadarios *et al.* (1999) indicate that 52% of the households surveyed in South Africa experienced hunger, while 23% were at risk of hunger and only a quarter appeared to be food secure. South Africans, generally do not eat the kinds and amounts of food required for improved health. While some people are able to

afford better food choices, they are not interested in changing intake patterns. Recent finding presented by the SANHANES-1 report show that 45.6% of the South African population was food secure, 28.3% was at risk of hunger and 26.0% was food insecure. In addition the researchers reported that 36.1% of people living in urban informal was at a risk of hunger compared to 32.8% living in rural informal areas(Reddy, Shisana, Labadarios, Rehle, Simbayi, Zumak, Dhansay, Hoosain, Parker, Naidoo, Mchiza, Steyn, Makoe, Ramlagan, Zungu, Evans, Faber and Jacobs(2014)

Reddy *et al.*(2014) in a study among South Africans reported that the prevalence of overweight and obesity was significantly higher in girls than boys, 16.5% and 7.1% compared to 11.5% and 4.7% for boys and girls respectively. The authors also reported that overweight and obesity was highest in urban formal and informal areas and lowest in the rural formal and informal areas for both sexes. Labadarios *et al.* (1999) suggested that people made poor food choices despite the economic situation and these poor food choices had adverse effects on their health. Several studies worldwide show the impact of nutrition on the health and overall development of children, adolescents and adults. These studies highlight the need for nutrition education at every level of the school system and also the need to educate adults, specifically parents, on nutrition.

There is no doubt that poverty influences the diet of many people in South Africa and globally. As reported by Goal One of the Millennium Developmental Goals (MDG) set out by the United Nations Department of Economic and Social Affairs (2008), poverty has a huge influence on the eating habits of and food choices available to children. Poor people not producing food for their own consumption allocated a larger proportion of household income to purchase food (United Nations Department of Economic and Social Affairs, 2008).

According to Gracey and King (2009), the world's almost 400 million indigenous people have low levels of health which is associated with poverty, malnutrition, overcrowding, poor hygiene, environmental contamination and prevalent infections. Inadequate clinical care and health promotion, and poor disease prevention services aggravate this situation.

However, some indigenous groups, in the move from traditional to transitional and modern lifestyles, are rapidly acquiring lifestyle diseases, such as obesity, cardiovascular disease, and

Type 2 diabetes as well as physical, social, and mental disorders linked to the abuse of alcohol and drugs (Gracey and King, 2009).

Saha, Frongillo, Alam *et al.* (2009) emphasize that food security in rural households is instrumental in preventing underweight and stunting. Under-nutrition is prevalent globally and can be overcome by improved food security. Households that were food secure displayed fewer nutrition deficiencies while food insecure households low in food security experienced greater malnutrition.

Banerjee, Dias, Shinkre and Patel (2011) report a high rate of hunger and under-nutrition in adolescents of both sexes in schools in rural Goa. The researchers reinforced the need for ongoing maintenance of the health of learners and recommended that food programmes be made available to all school-going children, counselling for underweight adolescents be implemented, and future research on the cause and impact of under-nutrition be done in order to improve and maintain the health of children. The positive effect of a nutritious mid-day meal programme reduces the concern of malnutrition at schools (Banerjee *et al.* 2011).

A study by Gundersen *et al.* (2008) suggests that a substantial number of children in the United States of America (USA) do not have adequate access to food. Food security is a term defined as 'access by all people at all times to enough food for an active, healthy life' (Gundersen *et al.* 2008: 271). Based on the same research findings by Gundersen *et al.* (2008), it was estimated that 12.6 million children (17.2%) in the USA lived in food-insecure households.

The World Health Organisation (WHO) (2000) reported that an estimated 22 million of the world's children under five are overweight or obese. The organization estimates that 300 million people worldwide are obese and 750 million more are overweight. Chronic diseases are prevalent in both developed and developing countries. Various studies address the challenges of obesity and overweight and further emphasise that research on an integrated approach by all the stakeholders in schools is necessary to overcome the challenges of obesity and overweight.

Mosha and Fungo (2010) and Sjöberg, Moraeus, Yngve, Poortvliet, Al-Ansari and Lissne (2011) reported on the prevalence of overweight and obesity among 428 school children, aged six to twelve years in Tanzania. The authors found that gender and age differences in body fat mass distribution were significant factors, with girls and the older children having a significantly higher proportion of body fat mass. The prevalence of overweight and obesity

among children in this study was lower than reported elsewhere; however, with urbanisation, changes in lifestyle and socio-economic transition it is documented from other studies that overweight and obesity occurs. It was suggested that children should be educated on good nutrition practices and trained to develop healthy eating behaviours. Parents should encourage a lifestyle behaviour that promotes a high level of physical activity. Physical education and organised sports at schools should be revived. This has implications for curriculum developers.

A study in the Philippines reinforced that poor food choices and eating patterns are displayed amongst children with different nutrition status. Magbuhat, Borazon and Villarino(2011) examined differences in food preferences and dietary intake among male and female Filipino adolescents. The outcome revealed that a preference for cereals prepared with added sugar or fat, and low fat meat was found to be positively correlated with BMI, while preference for fruits that are high in vitamin A was negatively correlated with the variable. Male respondents had a statistically higher preference for French fries, tofu, garlic and mussels, with a significantly higher intake of energy and carbohydrate than female respondents. The researchers in the study concluded that food preferences be considered in the nutrition care management of malnourished adolescents.

Gundersen *et al.* (2008) state that sufficient iron intake in young children is imperative for proper psychomotor, mental, behavioural and cognitive development during puberty. Inadequate iron intake in the diet of food insecure children and adolescents may result in iron deficiency and iron deficiency anaemia. This clearly indicates that good nutrition is extremely important in order to provide the body with the necessary nutrients to function, reinforcing that children at schools need to be provided with this type of nutrition knowledge so that learners can make informed food choices.

In addition to the challenges that already exist with lifestyle diseases and food insecurity, the National Food Consumption Survey 2005 (Labadarios *et al.* 2008) made accessible the findings on food fortification, giving prominence to the issue of micronutrient deficiencies in South Africa. Intense programmes need to be used to manage the dilemma of micronutrient deficiencies including educating learners on micronutrient deficiency.

Maunder, Matji, Hlatshwayo and Molea (2001) state that South Africa faces over-nutrition related to chronic lifestyle diseases. The South African National Health and Nutrition Survey (2013) of the Department of Health found that overweight and obesity are on the increase in

South Africa. The report highlighted that girls are more overweight and obese (24.8% and 39.2%) than boys and that 20.2 % of males and 68.2% of females had a waist circumference that placed them at a risk of metabolic complications. The researchers reaffirmed that one major cause of obesity and overweight is the sedentary lifestyle of children. The findings show that one in every ten children is overweight and one in every five is stunted. Dietary findings further indicated that one out of two children ate a diet that contained less than half of the energy requirements and micronutrient intake.

In 2000, the WHO had already explained that obesity had reached such epidemic proportions that world health officials decided to take a more aggressive approach to head off a global explosion of fat-related disease. Reports by experts in the WHO have confirmed that obesity, diabetes and heart disease, often associated with afflictions of the affluent, are spreading to the developing world (WHO 2000).

Age, watching television for long hours, urbanisation and perception of body weight were important predictors of overweight and obesity among African women. Obesity in adolescence and its relatedness to the risk of cardiovascular disease, non-insulin dependent diabetes and risk behaviour, such as physical inactivity were present in stunted girls who displayed a greater fat deposition especially in the abdominal area (Kruger, Margetts and Vorster, 2004).

A significant problem is that environments are not adequately equipped to deal with challenges of poor nutrition. Steyn (2010) reports that dietary knowledge of adolescents is influenced by psycho-social and biological factors, social environment, community perspective and the macro-environment, and that nutrition knowledge was associated with school subjects. The results also showed that despite a greater knowledge of fat rich food, many learners consumed higher amounts of fat in their diet compared to the recommended dietary allowances for teenagers.

Despite the various research studies in the field of obesity and overweight globally, there is a lack of commitment to the integration of nutrition knowledge into the curriculum, and activities and plans to promote healthy eating initiatives by all stakeholders. Flegal, Carroll, Kit, and Ogden (2012); Ogden, Carroll, Kit and Flegal (2014), and Foraita, Gunther, Gwozdz, Reisch, Russo, Lauria, Siani, Veidebaum, Tornaritis, Iacoviello, Vyncke, Pitsiladis, Marild, Molnar, Moreno, Bammann and Pigeot(2015) write that lifestyle diseases, also sometimes called

diseases of longevity or diseases of civilization interchangeably, are diseases that appear to increase in frequency as countries become more industrialised and the people live longer. Despite recent efforts to overcome obesity, the prevalence of obesity in the United States of America and England still remains high. The most common lifestyle related risk factors for coronary heart disease are smoking, poor diet, low physical activity, oral contraception use and excess alcohol consumption.

A study by Banerjee (2007) conducted in India revealed that smoking; obesity and reduced physical activity were the primary causes of coronary heart disease. The study also noted a lack of knowledge amongst learners about hypertension and increased blood cholesterol as risk factors. The researchers suggested that interventions at school level be introduced to educate learners on nutrition and health related problems.

Clearly, there is a lack of attention paid to nutrition education generally and research on nutrition education in particular in the South African schooling context. Recent studies have focused on issues related to children's health but not on nutrition and nutrition education in particular. Naidoo, Coopoo, Lambert and Draper (2009) reported on a study in a primary school on the physical activities of learners. This study showed that while the South African National Curriculum Statement has incorporated physical education into the learning area of Life Orientation, providing for 30–60 minutes per week of physical activity, the recommended standard of physical activity is not reached. Abubakar, Holding, Mwangome and Maitland (2011) reported in this article that the school curriculum should include economic, psychological and sociological issues apart from nutrition in order to address the problems highlighted in nutrition education.

Consequently, in the current context of lifestyle diseases in South Africa, nutrition knowledge is critical and so is the involvement of the Department of Education, the school governing body, educators and parents to address the challenges of poor eating habits and lack of nutrition knowledge in the curriculum (Kimani-Murage 2013; Adams, 2013).

The purpose of this study is to highlight the importance of nutrition education in the school curriculum. An overview of the status of child and adolescent health nationally and globally shows that unhealthy dietary behaviour of children and especially adolescents is of serious concern. There is sufficient consistency in the studies conducted on lifestyle diseases to suggest

that interventions need to be developed as part of the national curriculum on nutrition education that targets reduction in unhealthy lifestyles amongst children and future adults.

1.3 Research Question

In view of the above problem, the study asks the following question: Did the Revised National Curriculum Statement Grades R–nine School Policy (2002) and National Curriculum Statement Grades 10–12 (2003) in South Africa teach sufficient nutrition knowledge to prepare learners adequately to follow a healthy lifestyle when they exited school at Grade 12 level?

1.4 Objectives of the Study

1. To evaluate the National Curriculum in Grades eight–12 to determine the learning areas that include nutrition as part of the content.
2. To investigate the extent to which educators teach the content on nutrition in the Grades eight–12 in learning areas that contains nutrition by means of an Educator Questionnaire.
3. To determine the nutrition knowledge of Grade eight–12 learners by means of a Nutrition Knowledge Questionnaire.
4. To draw comparisons between the nutrition content of the curriculum and the learners' nutrition knowledge in an all-girls school and the nutrition knowledge of boys in an all-boys school in the Durban Central area.

1.5 Value of the Study

The purpose of the study is to assess the strengths and weaknesses of the National Curriculum in South Africa to educate learners on nutrition knowledge by the end of Grade 12. The Nutrition Knowledge Questionnaire (NKQ) highlights possible shortcomings in the nutrition content in the curriculum and encourages curriculum developers to look at the curriculum outcomes more realistically in relation to the content referring to nutrition. It is hoped that the study will motivate educators to teach and test nutrition knowledge in more creative and approachable ways so that learners' knowledge of nutrition is broadened, thereby culminating in a healthy lifestyle. The research emphasises that the curriculum should include more aspects of nutrition content to enable learners to reach the goal of following a healthy lifestyle.

1.6 Organisation of the Study

This study is presented as follows:

- Chapter 1 focuses on the overview of the problem, the research question, objectives of the study, the value of the study and the organisation of the study.
- Chapter 2 covers a review of literature pertinent to the topic of nutrition, the understanding of important concepts related to the study, local and global studies related to nutrition, and the need for nutrition education.
- Chapter 3 focuses on the research design and methodology, which includes the aims and objectives, the value of the study, the location of the study, sampling methods, data collection, data analysis, the ethical consideration, and limitation of the study.
- Chapter 4 presents the data collected through the use of a number of instruments, an analysis of the findings, and discussion. .
- Chapter 5 presents the conclusion and recommendations of the study.

1.7 Conclusion

The focus of the study is on nutrition education in the curriculum and the nutrition related health concerns amongst the children in South Africa. The following chapter deals with nutrition related issues that affect both children and adolescents.

Chapter 2: Literature Review

2.1 Introduction

Nutrition and nutrition education are fundamental to health, development, performance and the future healthy lifestyle of children. However, the reality is that many South African children do not benefit from nutrition and nutrition education programmes because such programmes as implemented by the Department of Basic Education and the Department of Health are inadequate and need to be reviewed.

This chapter covers a review of the available literature pertinent to this study. The topics include the role of nutrition education at school level, the nutrition requirements of adolescents, the causes of malnutrition in children and adolescents, and food insecurity. The factors that influence eating behaviours and how multiple environments manipulate eating habits and the education of children and adolescents are investigated. The literature reviewed is intended to contribute towards strengthening the main objective of the study which is concerned with the fact that nutrition content ought to form a greater part of the school curriculum and that healthy eating initiatives must be implemented at primary and secondary schools.

2.2 The Role of Nutritional Education at School Level

A sound nutrition education programme in primary and secondary schools in both urban and rural settings is important since learners spend approximately seven hours a day at school. A school health programme for healthy eating that focuses on values, attitudes and skills related to food and nutrition is ideal in preventing lifestyle disease and promoting lifelong healthy eating habits. However, research studies show that a lack of nutrition knowledge can be one of the leading causes of inappropriate food choices as reported by (Richardson, Burton, Sewell, Spreckelsen and Montgomery, 2012); (Vaczy, Seaman, Peterson-Sweeney and Nondorf, 2011).

2.2.1 Primary school

The purpose of examining the extent to which nutrition knowledge and health initiatives are being implemented in primary schools in South Africa and globally with regard to nutrition

knowledge and health initiatives is to identify both the shortcomings and the strengths of the systems in place.

According to the following research findings, The National School Nutrition Programme has been in place at schools. However, despite the measures mentioned below the prevalence of gaps in nutrition knowledge is a concern. The Department of Education in South Africa (DOE) (2004) set the primary objectives of the National School Nutrition Programme as ‘the feeding of learners at designated schools to enhance nutrition education through the curriculum and facilitate the establishment of sustainable food production initiatives in schools’.

Critical findings on nutrition education in primary schools by Oldewage-Theron and Egal (2010) in a study conducted in QwaQwa amongst 142 primary school children, affirmed the important role of nutrition education at school. The researchers in this study concluded that there was evidence of malnutrition in one specific primary school. The results from the study indicate gaps in nutrition knowledge. The researchers suggested that more nutrition education and healthy eating initiatives are vital at primary school level together with safe hygiene practices.

The aim of feeding scheme The National School Nutrition Programme is twofold to alleviate hunger and encourage better attendance. The meal provided served as a strategy to encourage learners to attend school (DOE2004). The National School Nutrition Programme feedback report stated that the feeding scheme resulted in a reduction of the cases of micronutrient deficiencies, greater control over parasite infestation and an overall increase in nutrition knowledge. The behaviour of learners in primary schools improved as a result of the implementation of the nutrition programme and was successful because of the support and valuable role of parents and educators. In 2010 and 2011, additional benefits were included to the existing feeding scheme. The aims included were to enhance learning through school feeding schemes, strengthen nutrition education at schools; provide sustainable food production initiatives in schools and develop partnerships to enhance the programme.

Glennie and Hobin(2011), while supporting the Department of Education’s objective of implementing school feeding schemes, indicated that inadequate dietary intake at schools was still prevalent and pointed out that eating behaviour can change with the implementation of nutrition education at schools. The health promotion school model, the Ever Active Schools programme, indicates how the school environment and health behaviour (healthy eating,

physical activity and mental wellness) of children and youth improved with the implementation of such programmes, together with the support of the relevant stakeholders (Gleddie and Hobin, 2011).

In the school education system where curriculum changes to increase the nutrition knowledge of learners is implemented, control and checking procedures must be put in place to monitor progress. Evaluation and adaptation of the education system must be implemented to make the system more effective. The health promotion model included checking on evidence used to inform school level changes, students' demographical behaviour, and psychosocial variables linked to school environment data. Administrator-assessed quality of policies, facilities, and programmes related to physical activity should be included in a health promotion model at schools (Gleddie and Hobin, 2011).

The schools involved in the study of the Ever Active Schools programmes were presented with the research results to reflect on and to plan and implement positive health behaviour change. The main lesson learned was that sharing school-specific evidence can operate as a catalyst for initiating, sustaining and promoting policies and practices within the school and culture groups so that health behaviour can improve (Gleddie and Hobin, 2011).

The inclusion of the South African Food Based Dietary Guidelines into the primary school curriculum is supported by Nguyen, de Villers, Fourie, Bourne and Hendricks (2015). The study highlighted that the prerequisite for success will depend on the government providing adequate resources for the implementation of the South African Food Based Dietary Guidelines in the curriculum at primary schools.

2.2.2 Secondary school

An investigation into the secondary school nutrition education programme in South Africa and globally was launched to highlight the health initiatives that have been practiced at schools. With a view to providing nutritious meals to children at school, the feedback report by the Department of Basic Education in South Africa (2010-2011) reported that the National School Nutrition Programme, since implementation, recorded that 8 281 927 learners in 20 815 schools in Quintile 1–3 public primary schools and Quintile 1–3 public secondary schools benefited from the daily nutritious meals. The report highlighted that schools play a vital role in

equipping learners with nutrition education. The main aim of the programme is to improve the health and nutrition status of primary and secondary school learners. The overall aim of the project is that education can be improved and eventually lead to healthy adults who will strengthen the workforce that will drive the economy compared to an unhealthy workforce that will impact negatively on the economy.

In support of good education and health care, the UNICEF Education Strategy (2006–2015) is based on the three Es, which are: Equal access to universal primary education, Empowerment through girl's education and gender equality, and Emergencies and post crises education. This child-friendly school framework (CFS) is used to analyse areas of support to quality at secondary school level that include a protective environment, sanitation and health. Children's participation and links between schools and communities is based on positive youth development. Positive youth development focuses on encouraging better caring and compassion, character, competence (academic and social), confidence and connection, for all learners must be put in place to improve the health of children.

Schools are the ideal place for nutrition education. Children of school-going age develop behaviour through interaction with other pupils and teachers at school, as well as their parents, siblings and peer groups in their homes and in their communities. Thus, the school is part of a network of influences that shape eating patterns and attitudes (FAO 2005).

2.3 Nutrition Requirements of Adolescents

The purpose of investigating the nutrition requirements of children and adolescents is to highlight micronutrient and macronutrient deficiencies prevalent amongst children and adolescents in South Africa and globally which have serious implications for the growth, immune system health, intellectual development and school performance of both children and adolescents. The following literature reviews showed the importance of macronutrients and micronutrients to children and adolescents so that healthy eating daily is reinforced and implemented.

Furthermore, Story and Stang (2005) report in a study amongst 991 students aged 14–18 years from the city of Maringa in the state of Parand, Brazil, that during adolescence there is an increased demand for energy and nutrients. The researchers in this study reported that adequate nutrition is necessary for adolescents to reach full growth.

The Department of Health (2012) presented healthy eating guidelines and a food guide for South Africans during National Nutrition week in October 2012. The document contained healthy eating guidelines based on appropriate food choices and correct portion sizes for all age groups according to all the food groups. In addition the authors included menu planning, sample menus and procedures to support nutrition activities.

According to Vorster, Badham and Venter (2013) the revised Food Based Dietary Guidelines(FBDG)are evidenced-based recommendations on how to put together a healthy diet with frequency and weight or volume of portion or serving sizes. The researchers suggest that the FBDG is a powerful tool for addressing nutrition-related public health problems in South Africa.

2.3.1 Dietary Reference Intakes

Knowledge of the nutrition requirement of adolescents is crucial in providing adequate nutrition knowledge and education to learners according to Story and Stang (2005). Dietary reference intakes (DRIs) developed by the Food and Nutrition Board of the Institute of Medicine provide quantitative estimates of nutrient intakes to be used for planning and assessing diets for healthy people. The DRIs replace and expand upon the Recommended Dietary Allowances (RDAs).

The DRIs contain four categories of recommendations:

- **Recommended Dietary Allowance (RDA):** The Recommended Dietary Allowance is the average daily dietary intake level that is adequate to meet the nutrient requirement of nearly all (97–98%) healthy individuals in an age-and gender-specific group (IOM 2004).
- **Adequate Intake (AI):** A recommended intake value based on observed or experimentally determined estimates of nutrient intake by a group of healthy people that is assumed to be sufficient when an RDA cannot be determined(IOM2004).
- **Tolerable Upper Intake Level (UL):** The highest level of daily nutrient intake that is likely to pose no risk of adverse health effects for almost all individuals in the general population. As intake increases above the UL, the potential risk of adverse effects increases (IOM 2004).

- **Estimated Average Requirement (EAR):** A daily nutrient intake value that is estimated to provide the requirement of half of the healthy individual's intake for an age group (IOM 2005).

2.3.2 Macronutrients

Table 2.1 Recommended Macronutrient Proportion by Age

	CARBOHYDRATE	PROTEIN	FATS
Young children (1-3 years)	45–65%	5–20%	30–40%
Older children and adolescents (4–18 years)	45–65%	10–30%	25–35%
Adults (19 years and older)	45–65%	10–35%	20–35%
Source: Institute of Medicine (2002) Dietary Reference Intakes for Energy, Carbohydrates, Fiber, Fat, Fatty acids, Protein, Amino Acids. Washington (DC): The National Academics Press, 2002.			

2.3.2.1 Protein

Functions: The Institute of Medicine (2002/2005) reports that protein forms the structural component of all cells in the body. Protein functions as enzymes in membranes, as transport carriers and hormones. Proteins is broken down into amino acids. These are the building blocks of these structural and functional compounds. The nine indispensable amino acids that must be provided in the diet are also called complete protein and are provided by the animal sources of protein. The body can make the other amino acids needed to synthesis specific structures from amino acids.

Sources: According to the United States Department of Agriculture (USDA) (2010), sources of protein include both animal and vegetable sources. Examples include seafood, meat, poultry, eggs and milk, milk products and plant sources including beans, peas, nuts, seeds and soy products. The Institute of Medicine (2002/2005) identifies two sources of protein and these include animal sources of protein called complete protein because it contains all the nine essential amino acids. Examples of these proteins are meat, poultry, fish, eggs, milk, cheese and yogurt. Incomplete proteins are plant sources of protein; these sources of protein lack one or more amino acids; however, two incomplete proteins can be combined to form complete protein. Incomplete proteins include legumes, grains, nuts, seeds and vegetables.

Supporting the fundamental requirement to understand the nutrition requirements of adolescents, (Laberge, 2012) reported that nutrients are substances required for the metabolism

and functioning of the body. These nutrients provide energy. The macronutrients are proteins, carbohydrates and fats. The purpose of macronutrients is to provide energy. However, these macronutrients have specific functions such as building and repairing body tissue and promoting growth in the body. The macronutrients provide aesthetics, texture and taste to the foods.

In addition, Laberge (2012) stated that protein is required for growth, tissue repair, immune system function, and hormone and enzyme production, and ensures lean muscle mass tone maintenance. The protein needs of adolescents are determined by the levels of protein required for the maintenance of existing lean body mass and the accrual of additional lean body mass during the adolescent growth spurt. The protein demands for females are greatest between the ages of 11 and 14 years. The protein demands for males are greatest between the ages of 15 and 18 years. Reduced protein intake results in reduced linear growth and delay in sexual maturation and reduced accumulation of lean body mass.

The USDA and the US Department of Health and Human Services (2010) reported that protein provides four calories per gram; protein also provides amino acids that build and preserve body cells. Inadequate protein intake in the United States is rare and protein includes animal sources, for example seafood, meat, poultry, eggs and milk, milk products and plant sources including beans, peas, nuts, seeds and soy products. In separate studies carried out, Lucas (2004) reported that the protein intake of children should constitute between 10% and 16% of their daily intake and Rolfes, Bruyne and Whitney (1990) concluded that excess protein can cause stress on the liver and kidney which results in acidosis, dehydration, diarrhoea, elevated blood ammonia, elevated blood urea and fever.

According to Story and Stang (2005), an adolescent's protein requirement depends on the amount of protein required for maintenance of existing lean body mass and accrual of additional lean body mass during an adolescent's growth spurt. Females aged between 11–14 years and males aged between 15 and 18 years require the highest amount of protein. Low protein intake will result in reduction in linear growth, delays in sexual maturation and reduced accumulation of lean body mass, this is supported by previous researchers. The researchers report that US adolescents consume almost twice the required amount of protein required. The risk for protein deficiency in adolescents can occur as a result of food insecure households, adolescents that are restricting their calorie intake, and adolescents following a vegan diet.

2.3.2.2. Carbohydrates

Functions: The Institute of Medicine (2002/2005) states that carbohydrates are the primary energy source for the brain. The acceptable Macronutrient Distribution Range indicates that carbohydrate is a source of kilocalories to maintain body weight.

Sources: The Institute of Medicine (2002/2005) indicates that the food sources such as starch, sugar, grains and vegetables (corn, pasta, rice, potatoes, bread), and sugar are found naturally in fruits and fruit juices. Carbohydrates also include the added sugar in soft drinks, candy, fruit drinks and dessert.

Story and Stang (2005) report the findings on carbohydrates as the body's main source of dietary energy. The researchers report that at least 50% of calories consumed daily should be provided by carbohydrates. However, they recommend that no more than 10–25% of the calories should be of sugar or sweeteners.

2.3.2.3 Fats

Functions: The Institute of Medicine (2002/2005) confirms that fat is a source of energy. Then-6 and *n*-3 polyunsaturated fatty acids aid in the absorption of fat soluble vitamins and are precursors of vitamins such as vitamin A and pro vitamin A carotenoids. In addition, *n*-6 polyunsaturated fatty acids are essential components of structural membrane lipids, involved in cell signaling and are the precursor of eicosanoids, which are essential for normal skin formation. Furthermore, *n*-3 polyunsaturated fatty acids are vital for neurological development and growth. Saturated and trans fatty acids and cholesterol are energy sources. The body has the ability to synthesis saturated fatty acids and cholesterol from other sources.

Sources: Sources of fat include butter, margarine, vegetable oils, whole milk, visible fat on meat and poultry products, fat in fish and shell fish, seeds, nuts and bakery products. *n*-6 Polyunsaturated fatty acids sources include nuts, seeds, vegetable oils, for example, soybean oil, safflower and corn oil. *n*-3 Polyunsaturated fatty acid sources include vegetable oil, for example, soybean, canola, flax seed oil, fish oil and fatty fish, and small amounts are found in meat and eggs. Saturated fats include animal fat, which includes meat fat and butter fat and coconut and palm kernel oil. Cholesterol sources include liver, eggs, cheesecake and custard

pie. Examples of trans fatty acid include margarine, and foods with hydrogenated or partially hydrogenated vegetable shortening (Institute of Medicine 2002/2005).

Research based on The Dietary Guidelines for Americans recommended that adolescents consume 30% of calories from fat (10% from saturated fat). This report by Story and Stang (2005) reinforces the fact that adolescent's intake of total fat and saturated fat exceed the recommended amounts in the form of milk, beef, cheese, margarine and foods such as cakes, cookies, donuts and ice cream.

2.3.2.4 Fibre

The Institute of Medicine (2002/2005) reported that the role of fibre in the body is to improve laxation. Fibre assists in maintaining blood glucose levels. Ongoing studies suggest that fibre assists in reducing life threatening diseases such as coronary heart disease and Type 2 diabetes and might even play a role in the treatment of cancer.

Sources: The Institute of Medicine (2002/2005) indicates grains (oats, wheat, unmilled rice) and vegetables and fruits. Story and Stang (2005) identify the following sources of fibre most commonly eaten by adolescents as whole grain cereal, ready-to-eat cereals, potatoes, popcorn and related snack food, tomatoes and corn.

The nutritional requirements of adolescents are further highlighted by Story and Stang (2005), based on research on adolescent nutrition guidelines, which reports that fibre is necessary for normal bowel movement. It further reports that fibre may play a role in the prevention of chronic disease (certain cancers, coronary heart disease, Type 2 diabetes) and are thought to reduce serum cholesterol levels, moderate blood sugar levels and reduce the risk of obesity. The report presented by the researchers emphasises the low consumption of fibre in the form of fruit, vegetables and whole grain breads. Adolescents are at risk of low intake of fibre as a result of skipping breakfast, which is a key contributing factor to low fibre intake. The researchers also reaffirm the fibre requirements of adolescents as the following: girls 9 to 18 years – 12g; males 9 to 18 years – 15g.

2.3.2.5 Water

The Mayo Clinic (2013) reports that the role of water in the body serves vital body functions that include regulating body temperature. Water is also essential to moisten tissue such as the mouth, eyes and nose. Body organs and tissues are protected by water. Water is essential in preventing constipation. The dissolving of minerals and nutrients which are then transported to all parts of the body requires the medium of water. The role of water in the kidney is to lessen the burden on the kidney and liver by flushing out waste products. Lubricating joints is another vital role of water in the body. Water serves as a transport medium to carry nutrients and oxygen to cells.

2.3.3 Micronutrients

Research findings by the DOH (2003) state that micronutrients are vitamins and minerals that are required for a healthy mind and body and to fight off disease. The Academy of Nutrition and Dietetics (2013) reaffirms that micronutrient deficiency results in fatigue, lethargy, reduced learning ability, brain damage, reduced immunity, miscarriages and other pregnancy complications. The report also highlighted that secondary conditions such as blindness, goitre and a higher risk of mortality emanates from diseases such as pneumonia, malaria and measles.

2.3.3.1 Calcium

The calcium needs of adolescents are the greatest with 45% of peak bone mass developing during adolescence (Story and Stang 2005). The development of dense bone mass relies on calcium and this need is strongly emphasized by the researchers with the aim of drawing attention to the results of calcium deficiencies in order to reduce the risk of fractures and osteoporosis and it is reported that by the age of 17, approximately 90% of adult bone mass is attained and therefore the intake of calcium during this development period is crucial.

The researchers also presented research that milk provides the greatest amount of calcium in adolescent diets followed by cheese, ice-cream and frozen yogurt. Calcium-fortified foods, some of which are fortified to the same level as milk, include orange juice, breakfast bars, bread and cereal. Calcium required during adolescence is higher due to high velocity of bone growth (Story and Stang, 2005).

According to Bronner and Abrams (1998), 25% of peak bone mass relies on sufficient calcium intake and physical activity during childhood and lowers the threat of osteoporosis in advancing years. Fad diets that exclude milk can cause reduced levels of calcium.

2.3.3.2 Iron

Story and Stang (2005) report that iron is essential for oxygen transport in the bloodstream and for the prevention of anemia in both male and female adolescents. The demand for iron is the highest during adolescence with rapid growth, expansion of blood volume and muscle mass, and in females, menstruation causes an additional iron demand. The RDA for iron in adolescence is 8mg/day for ages 9–13 years, 11mg/day for males' ages 14–15 years, and 15mg/day for females ages 14–18 years. According to the national data in the same report, 98% of adolescent males met the recommended iron intake whereas 56% of females ages 14–18 had inadequate levels of iron intake.

Story and Stang (2005) also identify ready-to-eat cereal, bread and beef as the most eaten foods by adolescents that contain iron and heme iron as found in meat, fish and poultry which are highly bioavailable, whereas non-heme iron found in grains can be made bioavailable by consuming heme sources of iron or vitamin C. Vegetarians need to eat twice as much iron to meet the daily requirement.

Iron is required for maximum growth, skeletal development, cellular immunity and cognitive function (Yip, 2001). Iron deficiency is a constantly occurring problem in school-age children and is associated with symptoms such as appetite loss, higher morbidity and growth retarding. Generally, children with an iron deficiency show poor cognitive function and educational achievement, a decrease in attentiveness and playing, as well as being physically shorter and lighter.

2.3.3.3 Zinc

Zinc is necessary for normal growth during the protein synthesis process, skeletal development and neuro-psychological function. Lack of zinc in a diet results in short stature. According to reports by Story and Stang (2005), zinc supplementation showed an increase in height and food intake by stunted children compared to non-stunted children. Evidence also suggests that zinc

supplementation is associated with an increase in the lean body mass of undernourished children and not in fat mass (Story and Stang 2005).

Story and Stang (2005) presented zinc requirements for adolescents. The RDA for zinc for males and females ages 9–13 years is 8mg/day; for males and females ages 14–18 years 11mg/day and 9mg/day respectively. The results of the report also indicate that 18%–33% of adolescent females had mild zinc deficiency. Zinc has an association with more than 100 enzymes, and is essential for protein formation and gene expression; in adolescents it plays a role in growth and sexual maturation. Sources of zinc identified in this report include red meat, shellfish, wholegrain and fortified breakfast cereal.

Story and Stang (2005) report changes in an adolescent's serum zinc level which declines as a result of the spurt in growth and hormonal changes. The risk of developing a deficiency is great in adolescents who are on iron supplements due to the fact that iron and zinc compete for absorption. Deficiency in males results in growth failure and delayed sexual development. Adolescents who do not consume animal products and vegans are also at risk to develop zinc deficiency and need to double their intake of zinc foods to accommodate for the deficiency.

2.3.3.4 Vitamins

According to Story and Stang (2005), Vitamin A which is vital for normal vision, plays a role in reproduction, growth and immune function. Boys and girls ages 9–13 years should consume 600mcg/day, females ages 14–18, 700mcg/day and males ages 14–18, 900mcg/day. The sources of Vitamin A consumed by adolescents are reported to be ready-to-eat cereal, milk, carrots, margarine and cheese. The precursor of Vitamin A is Beta-carotene and is found in carrots, tomatoes, spinach and other greens, sweet potatoes and milk. It is further suggested that the low intake of fruits, vegetables, milk and milk products is a contributing factor affecting optimal Vitamin A intake.

To further highlight the problems related to vitamin deficiency, Janisse, Cakan, Ellis and Brogan (2011) report in a study among 99 adolescents who were diagnosed with insulin dependent diabetes, that the Vitamin D consumption was too low (at least 70% of this group were consuming only 50% of the recommended daily intake). The researchers suggested that

intervention was required to increase the Vitamin D content in the daily intake of this group of adolescents.

Table 2.2 Micronutrients, functions, sources and deficiency (DOH 2003) and (IOM 1997/1998)

Micronutrient	Function	Sources	Deficiency
Vitamin A	Essential for vision, growth, and to fight illness	Carrots, yellow and dark green leafy vegetables, pumpkin, apricots, melon, liver, egg yolk, fish, whole milk, butter, cheese and fortified foods.	Night blindness, partial or total blindness, skin sores, loss of appetite, high risk of illness including measles and diarrhoea.
Thiamine Vitamin B1	Healthy blood Helps with digestion	Bread, cereals, pork, fortified foods.	Extreme tiredness, irritability, constipation, loss of appetite
Riboflavin Vitamin B2	Healthy blood, fighting illnesses and growth	Nuts, dairy products, meat, fish, legumes (beans, lentils), whole grain, green leafy vegetables and fortified foods.	Eye problems, skin sores, inflammation of the mouth and tongue, hair loss and slow growth
Niacin	Essential for the metabolism of carbohydrates, fatty acids and amino acids, amino acids and for respiration within cells.	Meat, poultry, fish, peanuts, brewer's yeast and fortified foods	Muscular weakness, indigestion, skin sore and diarrhoea
Folic acid	Needed for DNA and RNA formation, developing white and red blood cells.	Dark green leafy vegetables, liver, kidney, wholegrain cereals, nuts, legumes and fortified foods	Weak blood (anemia) babies born with spinal (back) problems
Pyridoxine Vitamin B6	Healthy blood, helps the body to use protein as a building block and to maintain a healthy nervous system	Fortified cereal, dried beans, peanut butter, potatoes, liver, milk and fortified cereal	Depression, nausea, skin problems, irritability, heart disease, problems with concentration.
Iron	Helps with fighting illnesses, and helps brain development and function, and helps in carrying oxygen from lungs to tissues.	Fortified cereal, dried beans, meat, chicken, liver, kidney, egg yolks, seafood and fortified	Weak blood (anemia), tiredness, reduced concentration, irritability
Zinc	Maintains a healthy immune system, reduces the risk of skin problems (acne, boils)	Meat, fish, poultry, milk products, wholegrain cereal, dried beans and fortified foods	Slow growth, delayed wound healing, loss of taste and appetite, hair loss, immune deficiencies

Shi, Lien, Kumar, Dale and Holmboe-Ottesen (2005) report in a study conducted on 824 students ages 12 to 14 that under-nutrition and stunting was low. Overweight and obesity was higher amongst boys and girls whose parents had a higher level of education. Anemia was higher in girls than in boys; according to the WHO (2005) Iron deficiency anemia is a problem in most developing countries. South East Asia has a prevalence of 63% iron deficiency. According to the study there is a definite decrease in under-nutrition in developing countries and an acute increase in obesity.

The WHO (2005) reported that micronutrient deficiency is a challenging problem worldwide and amongst school-aged children the common symptoms include loss of appetite, higher morbidity and growth retardation, which results are supported by Yip (2001).

2.4 Causes of Malnutrition in Children/Adolescents

The need for investigating the causes of malnutrition in children and adolescents is as a result of the growing number of South African children who are faced with multiple problems of malnutrition.

The following literature review supports the theory that malnutrition impacts negatively on all aspects of human life, especially physical growth and development, morbidity and mortality, and further suggests that nutrition education on this aspect must form part of the curriculum.

This is also supported by Steyn, Bradshaw, Norman, Joubert, Schneider and Steyn (2006) who state that an entire range of problems can occur when nutrient intake is insufficient, excessive or imbalanced. South Africa is currently faced with a double burden of nutrition-related diseases which include micronutrient deficiency, obesity as well as overweight and underweight in children. The above research indicates that poor knowledge of nutrition negatively impacts on the nutritional status of children.

Steyn(2005) reports that possible causes of malnutrition in children and adolescents are as a result of the introduction of television which causes people to spend less time being active and more time in front of the television. Advertising of snack food and drinks encourages snacking of unhealthy food and drinks. The availability of fast food results in a decrease in wholesome home-grown food and an increase in fast food intake. This life-style, according to Steyn (2005), is a contributing factor to the poor eating patterns of many South Africans.

Marraccini, Meltzer, Bourne and Draper (2012) report that the plight of under-nutrition and over-nutrition is a major health concern for South African children. The study examined the existing initiatives directed at promoting healthy eating and nutrition at schools and focused on the Woolworths Making the Difference Programme aimed at reducing the barriers to promoting a healthy lifestyle that exist at schools. The outcome of the study indicated that the Woolworths

Healthy Tuck Shop Guide would contribute to a healthier food environment despite the existing barriers.

Furthermore, Mostafa (2011) reports that development and poverty alleviation programmes should focus on the disadvantaged rural segments of people to improve nutrition status based on the study on socio-economic determinants of severe and moderate stunting among under-five children living in the rural area in Bangladesh. The researcher reaffirms that malnutrition among under-five children is a chronic problem in developing countries. The factors that contributed to the condition included region, father's education, toilet facilities, child's age, birth order of children and wealth index.

Moreover, Feldman, Eisenberg, Neumark-Sztainer and Story (2007) reiterate that the cause of malnutrition based on a study at 31 public schools in the Minneapolis-St Paul area showed that 33.5% of boys and 30.9% of girls watched television while eating. The research revealed the meals eaten were generally low in vegetables, especially dark green and yellow vegetables, as well as calcium rich foods and grains. Soft drink consumption increased amongst families watching television while eating as compared to families that had regular family meals together. The data also reinforced the point that families who eat regular meals together were healthier and displayed positive food intakes compared to those who watched television during meal times.

Ogden, Margaret, Brian and Flegal (2012) reveal that one third of adults and almost 17% of youth were obese in 2009–2010 in the United States. The research findings indicate greater percentages of obesity amongst boys than amongst girls contrary to obesity statistics in South Africa. Statistics revealed that 5 million girls and 7 million boys were obese. The researchers further emphasised the danger factors of obesity, together with risks in health conditions such as hypertension, adverse lipid concentration and type 2 diabetes. The study also reported that obesity is on an increase as a result of changing lifestyles and a move from traditional diets to more western diets. This trend is evident across the globe where a change from a traditional diet to a diet high in energy value has resulted in increased poor health conditions.

2.4.1 Unicef framework – for children

According to Unicef (2012), a report on the most recent finding on children's nutrition, shows that under-nutrition is shifting from rural areas to urban areas. Despite sufficient calorie intake by children for daily activity, micronutrient malnutrition as a result of poor intake of fruit,

vegetables, fish and meat results in deficiencies of vitamin A, iron and zinc. The results of micronutrient deficiency manifests in increased risk of death (a third of under-five deaths is caused by under-nutrition), blindness, stunting and low IQ.

Along with the previous finding, Unicef (2012) reported that stunting occurs in the poorest children in urban areas and disadvantaged children in the countryside. The National Family Health Survey (NFHS-3) in eight cities in India during 2005-2006 revealed high under-nutrition in urban areas. The study also revealed that a quarter of the children in the study population was stunted, indicating under-nutrition over a period of time. Furthermore, under-nutrition is a huge concern in developing countries and contributes to over a third of under-five deaths globally as a result of the poverty syndrome (which includes low income, large family size, poor education and limited access to food, water and sanitation and maternal and child health services).

The rights of children were established at the UN Convention on the Rights of the Child in 1989, which was ratified by all but three of the world's nations – Somalia, South Sudan and the United States of America – have ratified the document. The Convention details universally-recognized norms and standards regarding children's protection and promotion of the rights of children. On the issue of children's right to education, State parties had to commit to making available and accessible compulsory and free education at primary school level and options for secondary schooling and vocational education for every child. State parties are obliged to encourage the provision of appropriate and equal opportunities for cultural, artistic and leisure activities (Unicef, 2012).

2.4.2 Inadequate dietary intake

Inadequate dietary intake among children and adolescents can be the result of a lack of nutrition education or a preference for more unhealthy foods. The following literature reviews show the value of nutrition education and intervention strategies in assisting children and adolescents to make healthy food choices.

Research conducted on inadequate dietary intake by Eisenmann, Alaimo, Pfeiffer, Paek, Carlson, Hayes, Thompson, Kelleher, Oh, Orth, Randall, Mayfield and Holme (2011) as reported in Project FIT, was based on four components, namely the school, community, social

marketing, and school staff wellness. The results of the study show low food consumption of vegetables and whole grains and a high intake of sugar-sweetened beverages, French fries, and desserts. The research findings further illustrate a high prevalence of overweight and obesity (48.5% including 6% with severe obesity) among low income, primarily Hispanic and African American 3rd to 5th grade children coupled with low physical activity (70% did not meet the recommendation of 60 minutes per day), excessive screen time (75% did not meet the recommendation of < 2 hours per day) (Eisenmann *et al.* 2011).

In addition, inadequate dietary intake reported by Sluyter, Schaaf, Metcalf and Scragg (2010) in a comparative study of dietary intakes of European, Māori, Pacific Island and Asian adolescents living in Auckland, indicated that whilst cholesterol intakes were lowest in Europeans, alcohol intakes were highest in Europeans. Compared with Europeans, Maori and Pacific Islanders consumed more energy per day and consumed more carbohydrate, protein and fat. Europeans ate the fewest eggs, and Pacific Islanders and Asians ate more servings of chicken and fish, and fewer servings of milk and cereal than Europeans. Compared to Europeans, Pacific Islanders consumed larger portion sizes for nearly every food item. The researchers recommend the need for reduced frequency of food consumption and serving sizes and the promotion of less-fatty food choices in Māori and Pacific adolescents (Sluyter *et al.* 2010).

Nahas, de Barros, de Assis, Hallal, Florindo and Konrad (2009) presented a cross-cultural, randomized study to observe the effects of a school-based intervention designed to promote physical activity and healthy eating among high school students. The findings provide evidence that school-based interventions in public high schools in Brazil represent an important environment for health promotion. The outcome of the study indicated that school-based interventions that have a simple design and simple measurements increased the chances of its sustainability and dissemination to similar schools in Brazil to overcome inadequate dietary intake.

Zhang, Li and Liu (2010) highlight the issue that migrant schoolchildren who displayed symptoms of poor health had a tendency towards behaviour problems. The behaviour problems included negative learning attitudes and learning disabilities, antisocial behaviour and risk behaviour in addition to social maladjustment. Poor health was identified as a cause that contributed to hinder scholastic achievement in migrant children and adolescents through a

higher prevalence of school-related behaviour problems. Health risk factors included inappropriate parental education methods, fewer classmates, and less social support. Health and individual risk factors were explored further to determine their causal role in migrant children and adolescents with school-related behaviour problems. These results have implications for school health education programmes for students to overcome inadequate dietary intake.

The WHO (2005) further reaffirmed in a report that under- nutrition and in particular the lack of micro-nutrients in the food intake of children causes a reduction in the growth spurt amongst adolescent girls resulting in a short stature which is associated with small pelvises and increased dangers related to pregnancy.

Larson, Neumark- Sztainer, Peter, Hannan, Stat and Story (2007) conclude in their research study that adolescents decreased their daily intake of fruit and vegetables during the transition from early to middle adolescence. The researchers also highlight the fact that dietary patterns that include fruit and vegetables have a positive association with reduced risk of developing heart disease, cancer and other chronic disease. This, too, presents evidence that supports an increased fruit and vegetable intake against higher energy foods helps with controlling weight gain.

Grantham, Mac Gregor and Ani (2009) report on the effects of inadequate dietary intake, stating that stunting and underweight are linked to poor motor and mental development resulting in poor performance at school. Prior research data on worldwide malnutrition presented by FAO (2006) indicates that in 2003, 862 million people, including 9 million in developing countries, 25 million in countries of transition and 820 million in developed countries were affected by stunting and underweight.

Researchers in Canada reported that increasing the understanding of the differences between obesity and overweight status across various geographical areas might have important public health implications. The researchers explored prevalence and factors (demographic and lifestyle) associated with overweight and obesity among youth across urban, suburban and rural settings. A cross-sectional study of students in Grades 9–12 attending 76 high schools in Ontario, Canada indicated that geographical areas influence students' eating patterns. The researchers also explain that excess energy intake and total fat intake exceeding 30% of energy

intake from saturated fats, salt and sugars and a low intake of starch foods rich in vitamins, minerals and soluble fibre such as fruits, green vegetables, pulses and legumes frequently leads to obesity (Ismailov and Leatherdale, 2010).

Global studies conducted in the USA, India, Canada, Sweden and the Philippines also strengthen the argument that learners make poor food choices that negatively affect their health (Micklesfield, Lambert, Hume, Chantler, Pienaar, Dickie, Puoane and Goedecke (2013); Rossouw, Grant and Viljoen (2012); Rani and Sathiyasekaran (2013)). Stung and Story (2005) conducted a study in the United States of America and found that on average, most children and adolescents ate fewer servings of the five major food groups (grains, vegetables, fruit, meat and meat substitutes) than the USDA Food Guide Pyramid recommends.

Most ate fewer than the minimum recommended three servings of meat and meat substitutes. Less than 5% of youth consumed the minimum number of servings specified in the Food Guide Pyramid for all five major food groups. None of the girls of either age group met the recommendations for all five-food groups and only 2% of boys ages 9–13 and 5% of boys aged 14–18 met all the Food Guide Pyramid recommendations.

2.4.3 Illness

Khehlmoos, Anwar and Cravioto (2011) report on the effects of infectious disease and the impact it has on changing and shaping health policies. The impact of non-communicable disease, globally in both developed and developing countries, has seen a sharp and steady increase in deaths caused by the non-communicable disease. The research investigates deeper into mental health, accidents and injuries, urbanisation, climate change and disaster preparedness. The health of people globally requires that health systems and policies are formulated to accommodate the emerging health related issues needed to overcome illness and disease.

The FAO (1997) reinforced research findings that knowledge about food-borne diseases are important and that knowledge on these issues should be imparted to learners in health education at schools to increase health and nutrition awareness.

Palwa, Kumar and Toteja (2010) reported on a study on diarrhoeal infection in the slums. The researchers' examined urbanisation in metropolitan cities in India. The study aimed to provide community-based health and nutritional intervention in a central group and an intervention group.

The mothers from the intervention group were provided with health and nutrition education every fortnight and the control group completed a baseline assessment questionnaire. After the intervention, 65% to 98% were aware of oral rehydration salt. The use of oral rehydration salt improved significantly from 12% to 65% ($p=0.000$) and 12% to 75 % ($p=0.005$) respectively. It suggested that intensive programmes be directed to slum areas to improve the diarrhoeal infection situation (Palwa, Kumar and Toteja 2010).

Carnevale, Gropper, Agnew-Blais, Mimiaga, Mhango, Bail and Ngoma (2011), in a study amongst peri-urban schoolchildren in Lusaka in Zambia investigated the health risks of both urban and rural environments. In a cross-sectional survey with children from ages 5–17 years, it was found that 67% of the children had heard about HIV. The results from the study also revealed that only 26% urban environments and 23% from rural environments could identify the causes of general transmission and prevention measures of HIV. HIV knowledge was more extensive amongst the older children (14–17 years). Evidence from this study suggests that caregivers did not communicate facts about HIV to children. The researchers conclude that there was a lack of knowledge and communication about AIDS and HIV in pre-adolescent youth in peri-urban areas.

2.4.4 Eating disorders

The following literature reviews highlight the importance of nutrition education in overcoming eating disorders in South Africa and globally. In this study of eating disorders associated with weight control in middle school children, it was reported that intervention resulted in a reduction in eating disorders associated with weight control behaviour in schools that had active teamwork and the presence of programmes dealing with assistance and preventative measures to overcome eating disorders. The report emphasised that effectively designed prevention programmes can achieve positive weight control behaviour, (Austin, Spando-Gasbarro, Greaney, Blood, Hunt, Richmond, Wang, Mezgebu, Stavroula, Karan, Osganian and Peterson, 2012).

Eating disorders reported by Dracy, Doyle, Lock, Peebles, Doyle and Le Grange (2012) indicated that child BMI dissatisfaction with body image predicted eating disturbances in boys. However, in girls their self-esteem, maternal BMI and eating behaviour was impaired. It was found that adolescent males scored significantly lower on shape concern, weight concern and global scores compared to females. However, the core symptom for anorexia nervosa was a desire to lose weight. It is further suggested by the researchers that better understanding and experience is needed to deal with eating disorders.

The recommendation by the above researchers is that more research into eating disorders be encouraged so that solutions can be found to overcome eating disorders. However, other studies conducted in schools include a study conducted by Nickelson, Bryant, McDermott, Buhi and Debate(2012) using research that included variables which included weight concerns, inability to self-regulate eating, and perceptions about maternal comments about adolescent weight, restrictive feeding practices and maternal weight-related concerns and values.

The results of the study indicated that maternal weight comments and restrictive feeding practices were associated with adolescents' inability to self-regulate eating. Guidance on appropriate feeding practices and the discouraging of mothers from making weight-related comments to children is a recommended intervention to assist in the prevention of disordered eating and obesity (Nickelson, *et al.*2012).

A separate study by Austin, Nelson, Birkett, Calzo and Everett (2013) on eating disorders supported the suggestion that the public service get involved in health promotion programmes and the organisation of activities during spare time spent by teenagers outside of school. The research study conducted was based on analysing anonymous data collected from 24591 high school students of diverse ethnicities, using multivariable logistic regression to establish instances of purging, diet pills and obesity. The results revealed that lesbian, gay and bisexual students were associated with substantially elevated results of purging and diet pills use. This research supports the inclusion of nutrition knowledge in the school curriculum and agrees with the findings of the above study that health promotion programmes at school will benefit all children irrespective of sexual orientation.

According to Pe'rez Rodrigo and Aranceta (2001), nutrition education incorporated into the school curriculum actively involving teachers, family and other community professionals will

assist in reducing eating disorders. School- based nutrition should not only provide nutrition information but should also assist in the development of behaviour-related skills to assist in developing healthier food choices.

2.5 Factors that influence adolescents' nutrition knowledge

2.5.1 Food Insecurity

Food insecurity in South Africa and globally is discussed to show the impact food insecurity has on the health status of children and adolescents. Inflation is a major contributing factor to food security in South Africa (Statistics South Africa, 2007).

According to the Department of Agriculture (2002), South Africa produces most of the main staple food for the nation and exports surplus. The Department of Agriculture also imports what is needed to meet the population's food requirements. However, De Klerk, Drimie and Aliber (2004) suggest that 42% of South Africans are food insecure. Even though the total national food supply maybe sufficient in a country, food insecurity still affects a large portion of the population.

Belachew, Hadley, Lindstrom, Gebremariam, Lachat and Kolsteren (2011) in an article published on food insecurity in Ethiopia, found that food insecurity not only affects physical growth and health of children but also their intellectual development, school attendance and academic performance. The researchers conclude that programmes aiming to achieve universal access to primary education in food insecure environments should integrate interventions to ensure food security of adolescents. In addition, the researcher stated household food insecurity is associated with school absenteeism and a lower educational attainment.

Cacavas, Mavoa, Kremer, Malakellis, Fotu, Swinburn and deSilva-Sanigorski(2011) report that the purpose of this mixed methods study which included anthropometric, behavioural and qualitative types of data was to examine the sources of food and dietary patterns of Tongan adolescents. The adolescents (n=2084) were aged 11 to 22 years and drawn from 22 secondary schools. The study looked at perceptions of sociocultural influences. Food purchased for consumption at school was predominantly energy dense and nutrient poor. Ensuring that students had access to foods of high nutritional quality sourced from school or home, and

restricting access to local food outlets that supply unhealthy products would improve the nutrition status of adolescents in Tonga. It was also important that obesity prevention interventions informed by culture-specific influences to optimise intake of healthy diets as a result of insufficient household food security were implemented.

The implications of food insecurity on the health status of children researched by Eicher-Miller, Mason, Weaver, McCabe and Boushey(2011) indicate that food insecurity is associated with decreased nutrition intake and poor health resulting in low bone mass and poor health in children. The study amongst children aged 8 to 19 years investigated the relationship of diet, bone mass, and food insecurity. The evidence suggests health disparities persist among 8–11year old, food-insecure boys.

Other global studies on food insecurity show that food security affects children globally. Rosas, Harley,Fernald, Guendelman, Mejia, Neufeld and Eskenazi (2009) conducted studies on children of Mexican descent who frequently experience householdfood insecurity both in the United States and Mexico. The research findings based on food insecurity effects on the food intake of children of Mexican origin residing in the United States revealed that approximately 39% of Californian mothers and 75% of Mexican mothers reported low or very low food security in the past 12 months of the study. Children in the United States experiencing food insecurity consumed more fat, saturated fat, sweets, and fried snacks than children not experiencing food insecurity. However, in Mexico food insecurity was associated with lower intake of total carbohydrates, dairy, and vitamin B-6.

In a report presented by Jyoti, Frongillo and Jones(2005) based on data from a nationally representative study amongst 21260 children in 1592 elementary schools between the period 1998–1999 and followed up to Grade 3 , the researchers in the study revealed that in food insecure children, both boys and girls scored lower in maths and reading. However, food insecure girls showed poorer reading scores, higher weight gain and BMI than girls that were food secure. Food insecure boys showed greater decline in social skills compared to food secure boys. Food insecurity adversely influences children’s health and cognitive abilities therefore nutrition knowledge is essential from a young age. The results of food insecurity must also be addressed at the school and community level in order to provide nutritious meals to children.

The research findings of von Braun, Ruel and Gulati (2008) report that, as a result of insufficient household food security, India has malnourished children with low birth weights. In addition, the slow method used to address malnutrition has resulted in India having 40% of the world's malnourished children and 35% of the lowest birth weights in developing countries. The researchers suggested that India investigate other globally successful nutrition strategies and the country's own experience to develop a comprehensive nutrition strategy that would include strategic approaches to curb child malnutrition.

2.5.2 Education and ignorance

Education and awareness of the causes and prevention of lifestyle disease and poor health is elementary in preventing nutrition related diseases amongst children and adolescents in South Africa and globally, so that children and adolescents can lead a healthy lifestyle in the future.

The FAO (2005) suggests a tri-partite curriculum which recognises that there are three areas where the school can help children learn about food and nutrition in the classroom: the school environment, the family, and the local community are the best sources of nutrition education as each of these sectors can reinforce each other.

Reddy *et al* (2014) outlined that at school level curricula should address healthy eating, physical activity and body image perception. The School Nutrition Intervention Programme need to address types of food eaten and portion sizes.

In a study conducted by Hill, Draper, De Villiers, Fourie, Mohamed, Parker and Steyn (2015) the researchers reported on an integrated project specific to the Life Orientation curriculum that focused on healthy lifestyle outcomes. The researchers identified the following factors that contributed to non-compliance, educators heavy workloads, educators reluctant to get involved in non-compulsory activities and time constraints

Jesmin, Yamanoto, Malik and Haque (2011) concluded that chronic malnutrition was the main cause of morbidity and mortality among preschool children. Parents who had tertiary level education had better jobs. Higher level of education show better nutrition knowledge amongst parents. The nutrition status of the children was related to the nutrition status of the mother and this had a direct impact on stunting.

Education is essential to understanding concepts in nutrition education and Crooksan, Dearden, Alder, Poruczhilc, Stanford, Merrill, Dickerson and Penny (2011) recognise that under-nutrition is associated with poor cognitive development, late entry into school, and increased drop-out from school, reduced productivity and smaller stature. The children whose mothers were older, had higher levels of education, lived in urban areas, attended preschool, had fewer siblings, had wealthier backgrounds, and scored higher in the verbal and quantitative assessments thereby showing that ignorance affects lifestyle.

Belachew, Hadley, Lindstrom, Gebremariam, Lachat and Kolsteren (2011) identified that more than 33.0% of food insecure adolescents were absent from school compared with 17.8% of their food secure peers. Evidence suggests that a greater household income, the gender of the household head, adolescent food insecurity and severe household food insecurity affected the highest grade achieved. Other contributing factors that affected the grades attained by learners include illness during the last month and rural residence.

The role of mothers' education levels and the intellectual development of children are vital in understanding the development of children. Kasirye's (2010) report from the United Nations Development Programme, based on 11 survey studies over the years 1992 to 2006 in Kenya, Rwanda, Tanzania and Uganda, revealed that the countries displayed a high percentage of global undernourishment for children age five and under. It was ascertained that the mother's education level plays a significant role in child nutrition health and post primary education has been identified as a means to improve nutritional status. The recommendation that universal secondary school education be emphasised is vital so that the populations can achieve better intellectual status.

2.5.3 Pregnancy

Adolescent pregnancy amongst South Africans is on the increase and this has serious implications for the health status of the young mother and the child. In addition, single motherhood in adolescence may contribute to the intergenerational cycle of malnutrition and poverty and as discussed earlier, education and awareness is imperative (Kurz, Barua, Khale and Prasad, 2005/2006).

The increase in teenage pregnancy amongst school girls and young adults becoming parents at a young age in South Africa makes it essential to reflect on psychosocial factors (Karp, Lutenbacher and Dietrich, 2010). Incorrect infant feeding habits practiced by teenage mothers such as not feeding the infant at set times, excessive eating by constant feeding, and overweight infants were areas identified as areas where young first-time mothers lacked nutrition education. The researchers report that social factors and infant feeding beliefs and practices are necessary at school level for young first-time mothers and should form part of the curriculum.

The fact that mothers have not physically matured into women and as a result the child and the mother compete for dietary energy and nutrients, was reported by WHO (2005). The physiological and psychological immaturity of the mother and the prevailing socioeconomic conditions also negatively affect the mother.

Delaying the age of entry into marriage as well as delaying the first pregnancy after marriage allows for physical maturity prior to becoming mothers (Kurzet *al.* 2005/2006). It is suggested that policies be put in place to encourage formal education in the school curriculum about adolescent pregnancy. The promotion of family planning and the use of contraceptives were suggested as methods to delay early pregnancy among the Indian community.

Fowles, Timmerman, Bryant and Kim (2011) investigated fast-food consumption and its effects in the first trimester of pregnancy among teenagers, and established that high frequency fast-food consumers consumed more vegetables, more grains, less fruit and foods high in fat. Such consumers were more likely to become obese, depressed and stressed and this eventually led to gestational weight gain.

The prevalence of low birth weight (LBW) was investigated in adolescent girls by Muthayya (2009). This study revealed that low birth weight is higher in Asia than elsewhere, predominantly because of under nutrition of the mother prior to and during pregnancy. A number of pregnant women still suffer from varying degrees of anaemia, with the highest prevalence in India, which also has the highest number of maternal deaths in the Asian region. Researchers have found non-compliance with iron supplementation, cultural beliefs regarding diet in pregnancy and the issue of nutrition supplementation and fortification are contributing factors that cause low birth weight (Muthayya, 2009). Higher maternal education (beyond high school) showed positive results in pregnant women seeing that data indicated that such women

reached optimal weight gain during pregnancy. A desirable foetal outcome may be the result of synergistic effects of improved food intake, food supplementation, improved micronutrient intake, education and the physical environment of the pregnant woman and her family.

2.5.4Peer pressure

According to the WHO (2005) peers become important to adolescents during teenage years because adolescents want to conform and feel accepted. Peer pressure also influences dietary intake which simultaneously influences potential risk factors associated with poor eating habits.

Stevenson, Doherty, Barnett, Muldoon and Trew (2007) in their report to identify barriers to healthy eating in adolescents revealed that many factors influenced adolescent eating behaviour, namely: personal factors, cognitive factors, peer groups, parental influence and the media. The outcome of the research presented in this study concluded that adolescent food choices were dictated by the appearance and taste of food. Healthy food was considered not tasty or attractive by most adolescents in the study.

Stevenson *et al.* (2007) report body image was more pronounced among girls compared to boys. However, both boys and girls were aware of 'fat attitudes' such as name calling and social exclusion of overweight peers. The programme on healthy eating on its own was ineffective in dealing with poor eating habits; however, the recommendation was to educate learners on healthy eating and the importance of physical activity.

Furthermore, Gunderson (2012) revealed in the research that, among young adults in the 18 to 21 age group, 89% of the participants responded 'yes' when asked if they compared themselves to their peers. Thirty-three percent answered 'yes' to the question, "Did your friends influence the continuation of an eating disorder?" The researcher also identified certain situations such as praise for weight loss as a positive motivator to lose more weight. It was important for adolescents to be socially accepted. Body image as well as weight loss are seen as contributing factors to being accepted by peers (Gunderson 2012).

2.5.5 Insufficient health services and unhealthy environment

Insufficient health services and unhealthy environments affect children and adolescents' nutrition status and the following research studies emphasise that despite the global improvement in health care, challenges continue to exist in developing and under-developed countries (Garenne 2010).

Although research indicates that the health of children has improved globally in the twentieth century, inadequate health services and unhealthy environments remain a major concern (Garenne 2010). Changes post World War I, such as improved living conditions and sanitation, improved hygiene, better nutrition and child care have, notwithstanding challenges in developing countries and under-developed countries, resulted in lower mortality rates. However, higher urban mortality has recently been seen in the slums of large cities in developing countries as a result of extreme poverty, family disintegration, lack of hygiene, sanitation and medical care, low nutrition status, emerging diseases (HIV and AIDS and tuberculosis) and other health hazards (environmental hazards, accidents, violence).

The research findings on insufficient health services and unhealthy environments by Simiyu (2010) report that the main causes of mortality and morbidity in Mandera are: the water transportation methods, poor handling of water at household level, and inappropriate water treatment methods and sanitation. The study highlights that these adverse conditions can cause diarrhoea that can lead to malnutrition. Illiteracy among people further aggravated the condition. It was reported that education on safe water handling is crucial and that diarrhoea in children with severe acute malnutrition was the main cause of mortality in Sub-Saharan Africa. Other results from similar studies revealed higher mortality among HIV+patients as compared to HIV- patients (Irena, Mwambazi and Mulenga, 2011).

In addition Koehlmoos, Anwar and Cravioto (2011) investigated the effect infectious diseases have on shaping and changing health policy and reported that non-communicable diseases are becoming the leading cause of death in developed and developing countries. The researchers discuss emergent issues in global health related to non-communicable diseases and conditions, with a focus on defining the unique epidemiologic controls of disease, relevant health systems, and policy concerning non-communicable chronic diseases which also includes mental health, accidents and injuries, urbanisation, climate change and disaster management.

School environments influence children's food choices according to Rovner, Nansel, Wang, and Iannotti (2011) in a study conducted among school-aged children in the US, with the purpose of examining the effect of vending machines on the health of students. The vending machines mainly sold soft drinks, chips and sweets and in the younger grades, fruits and/or vegetables. The study revealed that there was no significant effect of the food sold in these machines on the nutritional intake of children. The researchers concluded that vending machines can have either a positive or negative effect on students. The school management should exert control over the food choices in vending machines, offering healthier options in order to encourage healthy eating to improve the overall diet of learners.

Goslinear, Madsen, Woodward-Lopez and Crawford (2011) report that students who eat school lunch are more likely to consume fruit and vegetables. Students who have purchasing power, tend to purchase less healthy options for lunch. The suggested recommendations by the researchers in this study show the need to change food outlets in the school environment. Nutritious and healthy food should be sold to students in order to reduce the prevalence of unhealthy eating habits. Implementation of a healthy environment will have a positive outcome on the learners' eating habits as well as their cognitive ability and discipline.

Changes in the social environment as a result of the independence of children eating away from home is common and impacts on the nutrition status of children and adolescents in South Africa and globally. Obesity is prevalent amongst children from urban areas in high income countries. Reports also confirm that prevalence of obesity is high among a growing number of low and middle income countries. The diets of children are high in saturated fats, refined sugars and salt, coupled with a sedentary lifestyle creates opportunities for increased risk of obesity and chronic ailments such as heart disease and cancer (Unicef, 2012).

A study conducted by Moore and Tapper (2008) based on providing healthy options in the tuck-shop showsthat the benefits of increased fruit consumption on its own had limited effect. Schools that have a healthy food policy and that promote fruit consumption, report greater success in the project compared to the schools that introduced the fruit into tuck-shops that had no policy in place. The researchers concluded that an effective school policy can have positive outcomes on the learners' choice of snacks. By controlling the tuck-shop and promoting healthy lunch packs brought from home, learners will be healthier and the existing health problems amongst British school children could be eliminated.

The purchasing power of learners influences their eating habits and eventually their future. Tester, Yen, Pallis, and Laraia (2011) show that food outlets near the school influence the daily intake of learners. The stores that accepted vouchers in the Supplemental Nutrition Programme for Women, Infants and Children (WIC) and stores around the higher income schools sold more healthy beverages and snacks. The stores that accepted the WIC offered a more healthy option for people from lower-income areas. Research suggested that the impact of this type of federal scheme is extremely beneficial to the health of a nation because it gives the people from lower income areas an opportunity to purchase healthier food. More research in this field needs to be conducted to make this scheme available to more people from lower income areas in order to stop unhealthy eating habits and encourage healthier eating.

2.5.6 Cultural beliefs, traditions and religion

Cultural beliefs and traditions affect childrens' and adolescents' eating habits and health. The school curriculum should include content on the cultural beliefs and tradition so that nutrition intervention can be specific to the learners. Dietary intake by South African children and adolescents is culturally bound and affected by Westernisation (Steyn,2006). According to Steyn, a typical South African meal contains a staple food of rice and or potato, a generous portion of meat or chicken and two vegetables. Traditionally, the Black population consumes a high fibre, high carbohydrate and a very low fat and animal protein diet. Despite the low fruit and vegetables intake, diets were less conducive to lifestyle disease.

Mynard, Baker, Rawlins, Anderson and Harding (2009) conclude that schools provide an ideal opportunity for the implementation of a healthy lifestyle. However, it was found that in addition to schools, places of worship were also instrumental in providing the family with culture specific support in the form of talks and counselling so that obesity can be reduced in children.

Cultural beliefs and traditions, according to a study by BaHamman, Alrajeh, Albabtain, Bahammam and Sharif (2010), based on research among a group of healthy young Muslims, concluded that religious observance necessitated day-long fasts and a sudden shift in mealtimes which resulted in changes in sleep patterns and circadian rhythms and this study supports the theory that cultural beliefs and traditions have an impact on the eating habits of adolescents. The topic of cultural beliefs and traditions should therefore form part of nutrition knowledge in the school curriculum.

Nan and Brown (2010) reported that many Chinese-American families consume convenient American foods at breakfast, whereas they eat mainly Chinese food for lunch and dinner. Researchers reported that most parents struggled to control their children's food choices with inconsistent rules and unfair rule enforcement at dinner. The father's view of the importance of the Chinese dinner pattern had the most impact on its retention in the face of children's demands. Chinese-American parents established rules backed by parental power to maintain a Chinese meal pattern. Parents appear to need guidance to identify healthy Western food items that satisfy children's preferences while preserving Chinese cultural food intake, in line with cultural beliefs and traditions which play a vital role in children's eating behavior.

Dietary practices have been incorporated into religious practices globally amongst all people and range from being very strict to more relaxed. Dietary practices influence eating patterns of children and adolescents and affect health and lifestyle.

Gates and Pritchard (2009) report that although religion has a positive effect on an individual lifestyle, this is not always the case. Negative effects were evident in the manner in which individuals perceive their bodies. The findings revealed that Catholics and Christians displayed significantly more disordered eating than other students in this study. The learners with a higher religious belief also reported more disordered eating behaviour. The intervention strategy practiced show churches of various denominations educate their members on the importance of regular exercise and healthy eating. In addition, education on disease and warning signs and the ability to perform C.P.R. in an attempt to prevent and combat cardio-vascular disease and stroke was considered valuable for learners (Kalenderian Pegus, Francis, Goodwin Jacques and Lasa, 2009). Significant body dissatisfaction, disordered eating and a search of the thin-ideal as a result of loss of cultural eating habits by adolescents was reported by Mussap (2009). The researcher in the study revealed a significantly negative relationship between lack of heritage and the measure of body dissatisfaction. They hold that disordered eating has a negative impact on body image by those who adopt western ideas. The value of upholding heritage and cultural values that promote positive self-image is seen as vital in overcoming disordered eating.

The value of yoga in the modern lifestyle is presented by Thomley, Ray, Char and Bauer (2011). The results were based on a study conducted on employees at a wellness class. The use of yoga and philosophical concepts which focus on mindfulness, breathing and meditation proved to be beneficial in strengthening good health and wellness. Studies conducted by Carei,

Fyfe-Johnson, Breuner and Brown (2010) also agree that individualized yoga therapy is beneficial in reducing food pre-occupation and decreased eating disorders. Research findings have positive implications for the treatment of poor eating habits especially in adolescent children.

A holistic approach needs to be implemented when dealing with overweight and obesity. Sarvestani, Jamalfard, Kargar, Karesh and Tabatabaee (2009) agree with other researchers of previous studies that weight reduction should not be the only focus when dealing with obese adolescents. A lifestyle change should be implemented to replace current eating behaviour. Hart, Bowden, Christensenb, Mafune, Campbell, Saleeba, Kuniyuki and Beresfend (2009) recommend the use of religious organisations to teach children and adults healthy eating activities. It was further reported that the outcome of such activities was positive, which brought about improved dietary related behaviour. The findings of the above research reinforce that religious organisations form an integral part of dealing with community health issues.

Latzer, Azaiza and Tzischinsky (2009) reported on three religious subgroups, namely Moslems, Druze and Christians in the following age groups: 12–13, 14–15 and 16–18 year old adolescent females. The findings show a high prevalence of disturbed eating attitudes amongst the Israeli-Arab adolescent school girls as compared to Jewish adolescent school girls. The desire for the ‘slenderness’ culture was the spotlight of the research finding which requires future investigation so that the religious subgroups can assist adolescents in nutrition education to live a healthy lifestyle. This study reinforces that in addition to nutrition education in the curriculum, community involvement in nutrition education is important in educating the community.

2.5.7 Poverty

Poverty involves deprivation at many levels and can include hunger, unemployment, social exclusion, unhappiness and lack of access to basic services. Poverty affects food security and simultaneously affects food intake and the health status of children and adolescents. Poverty leads to an inadequate daily intake of food and milk (Dror and Allen, 2011). Although there has been a global increase in animal protein and milk consumption, there is still an inadequate daily intake amongst most children in developing countries. It is suggested that fortified milk and other protein sources of food be made available to children in lower income countries.

Poverty affects the eating habits of children. This is supported by the findings of Pinard, Davy and Estabrooks (2011). Low-income families are at a greater risk for obesity as a result of increased consumption of sugar-sweetened beverages. The research confirmed that both children and parents from low-income families consumed less nutrient dense beverages and more energy dense beverages. Future research should be done targeting the home and school, as these are the places where initial behaviour development occurs as parents are the role models for their children.

Keast, Rosen, Arndt and Marquart (2011) presented research findings based on the premise that children do not consume whole-grain foods frequently. The study involved replacing varying proportions of refined flour contained in foods commonly consumed by children with wholegrain. The total intake of wholegrain increased by 1.7 oz eq per day (from 0.5 to 2.2 oz eq per day) showing that substitution of wholegrain for refined cereals can increase the consumption of whole grain products.

A comparison of pre-modelled wholegrain intake showed that children from low income families had a far lower intake of whole-grain food. However, post-modelled wholegrain intake did change, indicating that intervention and nutrition education amongst people living in poverty can change eating behavior (Keast, Rosen, Arndt and Marquart, 2011).

Tsang, Holt and Azevedo (2011) conducted a study in Canada in an area called Cobourg among low-income people to highlight the implication of poverty. In this area, the people who had food insecurity turned to the community and charity organizations for free or low cost food. The study also highlighted the barriers to obtaining a fresh supply of fruit and vegetables, food programmes, access to food and ways of increasing healthy food intake among those who are food insecure. It was further found that lack of transport, scarcity of food in food programmes, lack of fruit and vegetables and reduced income contributed to poor food intake. The researchers suggested that using community-based organisations as a means to assist low-income households to become food secure was one of the ways to alleviate poor nutrition. The development of community gardens and vegetable and fruit bulk buying was suggested as a means of increasing availability to food insecure households to encourage fruit consumption.

Obese families generally have a low education status, live in rural areas, have lower income, skip more meals, especially breakfast and watch more television as compared to families of

normal weight (Christoforids, Batzios, Sidiropoulos, Provatidou and Cassimos, 2011). This study was conducted among overweight and obese people to analyse their socio-economic status and eating behaviour and practices. The results of the study indicated that 31 families showed 18.43% of both parents and children as overweight or obese while 8.46% were of normal weight with normal BMI.

Abrahams, de Villiers, Steyn, Fourie, Dalais, Hill, Draper and Lambert (2011) reaffirmed that school environments affect eating habits and showed that 49% of the learners purchased food from the tuck-shop. The research findings indicated that children who carried packed lunches had a lower BMI, ate more meals and enjoyed a higher standard of living, were from urban areas and had greater food choices. Children who made purchases from the tuck-shop came from impoverished backgrounds with a higher dietary diversity. Two percent were underweight, 19% were stunted and 21% were overweight. It was found that those who took packed lunch boxes to school had greater food and nutritional diversity and ate regular meals. The study conducted by Perez, Pieper and Whaley (2011), which included 3645 low-income families in Los Angeles, concluded that healthy eating behaviours resulted in children reading more frequently and pre-school enrolments were higher. Healthy eating was associated with stronger cognitive ability and learning ability in low-income groups. The study provides evidence that early intervention can bring about positive eating habits amongst all children irrespective of their income level. Home literacy can be a means to educating children on appropriate eating habits and food choices that can prevent obesity among children, so that children can be healthy and develop an improved learning ability.

Poverty influences the eating patterns of children and research studies on a sample group of 507 females by Krall and Lohse (2011) who measured eating competence in low-income populations supports this notion. Positive scores were linked to physical activity, food acceptance, fruit and vegetable intake and food planning and resource management whereas negative scores were associated with BMI, emotional and psychosocial attributes related to overeating and obesity that manifests in eating disorders. Intervention was the key recommendation to normalise the eating competence of low-income females. This process of intervention should be directed at areas that reflected negative scores so that positive, healthy eating habits can be developed.

Along with other studies on poverty and the effects on children, a research study conducted by Williams, Veitch and Ball, (2011) investigated 38 mother and child pairs from disadvantaged

environments. The study sample was selected on predetermined criteria such as healthy weight, adequate fruit and vegetable consumption and a physically active lifestyle. The two main outcomes of this study were over-consumption of unhealthy food and inadequate education on healthy food options. This study offers the insight that among low-income communities, there is still potential to overcome poor eating practices with nutrition education.

Teevale, Thomas, Scragg, Faeamani and Nosa (2010) investigated sociocultural factors that promote or prevent obesity amongst parents and children. The researchers found that healthy eating and the physical activity of parents, the type of occupation of the parents as well as the parents' health education and experiences had a fundamental impact on the children. In their study, social status and environmental factors have a direct impact on poverty, health and behaviour of the children. The researchers' recommendations included food pricing control policies, employment policies, changes to school feeding systems and physical activity to bring about positive changes in learners' eating habits in order to prevent obesity and counter poverty.

2.5.8 Urbanisation

Urbanisation directly impacts on the nutrition status of children and adolescents as people move from rural areas to urban areas. Nutrition transitions take place where people adopt new lifestyles and beliefs (Becquey, Savy, Danel, Dabire', Tapsoba and Martin-Pre'vel, 2010); (Jehn and Brewis, 2009). The following literature reviews highlight the health issues caused in children as a result of urbanisation.

The effects of urbanisation in the research study conducted by Firestone, Punpuing, Peterson, Acevedo- Garcia and Gortmarker in Thailand (2011) show that 27.8% of the children were underweight, 19.9% had short stature and 8.3 % were obese. In the same study, urban residents showed a lower risk for under-nutrition and a greater risk for obesity. The researchers also reported that community wealth, television coverage and sanitation were underlying causes of obesity whereas under-nutrition was associated with poverty. The research findings emphasised that the characteristics of urban environment and household affluence were also associated with obesity. The researchers suggest that future research be conducted to investigate and find solutions to the factors putting children at risk of obesity in developed and developing countries.

According to Goonet *al.* (2011), a study among urban children in Makuridi, Nigeria showed that children's health was adversely affected. The study among 2015 children age 9–12 years composed of 979 boys and 1036 girls using the 2007 WHO BMI thinness classification, revealed that 77.3 % of the study population exhibited Grade1 thinness and 31.3% of the children displayed severe malnutrition. Many learners were underweight, stunted and thin. The researchers affirmed that community education on environment, sanitation and personal hygiene practices, proper child rearing, breast-feeding and weaning practices would possibly elevate the current trends in malnutrition.

On the other hand, a study by Sjoberg, Moraeus, Yngve, Poortvliet, Al Ansari and Lissner (2011) amongst 4538 children in Grades 1 and 2 in 94 primary schools, showed that 17% of the children were overweight and 3% obese. The results, after adjusting for area level education and differences by degree of urbanisation, were greatly attenuated and non-significant. Obesity in urban-rural differences was observed in boys. The results of the study show that the level of education and risk elements were significantly higher amongst both boys and girls in both rural and urban areas and not affected by urbanisation and gender. The researchers suggested that health promotion intervention should include gender in both rural and urban communities.

In a similar study in Meerut in India, Jain, Paint, Chopra and Tiwari (2010) presented research findings in a study that identified the prevalence of overweight and obesity in adolescents as a result of urbanisation. The following statistics on overweight and obesity were observed: 19.7% and 5.3% respectively in girls and 18.36% and 10.82% in boys. The food consumption patterns revealed the following: junk food, binge eating, high calorie intake, low levels of physical activity and long hours of watching television were associated with high levels of obesity and overweight. This reinforces that industrialisation, urbanisation and mechanisation influence childrens' food intake and activity levels adversely. More research and government intervention is necessary to overcome the existing challenges.

Jeemon, Prabhakaran, Mohan, Thankappan, Joshi, Ahmed, Chaturvedi and Reddy (2009) conducted a study in India on the double burden of underweight and overweight among children (10–19 years of age) of employees working in Indian industrial units as a major health concern and greatly affecting the children living in this area. Jeemon *et al.* (2009) reported that underweight was highest in peri-urban areas (30.2% and 53.2% according to Indian and international criteria, respectively). In urban and rural areas, the prevalence of underweight

children was 14.1% and 9.8% respectively, according to the Indian criteria, and 27.1% and 19.2% respectively according to international criteria. The proportion of overweight children was highest in the highly urban category (19.1% and 13.4% according to Indian and international criteria, respectively). The level of urbanisation, physical activity and frequency of meals outside the home were significant predictors of overweight.

2.6 Contribution of nutrition knowledge of school children to intellectual development and malnutrition

An understanding of the contribution nutrition knowledge of school children makes to, malnutrition and poverty is necessary. An understanding of the effects of malnutrition and poverty on intellectual development of children is necessary, in order to develop strategies and policies to include nutritional education at school level.

Research into childhood nutrition in other studies reveals that a poor diet influences mental development in more ways than expected and various aspects of poverty exacerbate the effects of childhood nutrition. Brown and Pollitt (1996) report sufficient intake of nutritional food is essential for normal and intellectual brain development during childhood and especially in the first two years of development. The research findings show that consistent and comprehensive interventions by providing proper nutrition in order to overcome social and physical conditions will provide an opportunity for undernourished children to develop normally. The research further reports that provided there is a feeding scheme commitment from the community and a volunteer infrastructure with financial resources the scheme can be effective.

According to data gathered by the National Health and Nutrition Examination Survey (NHANES) in 2007 and 2008 in the United States among children ages two to 19, it was established that one in every three children were overweight or obese, thus indicating a need for nutrition education for children and adolescents.

Nutrition knowledge of school children, malnutrition, poverty and intellectual capacity are related to children's lifestyles (Olumakaiye, 2013). The results of this study revealed that malnutrition was prevalent among school children. Public schools presented more cases of under-nutrition indicated by wasting, stunting and underweight, as compared to children at private schools who were overweight and obese. The research findings indicated that nutrition

issues in schoolchildren effectively addressed at school is a solution to deal with a lack of nutrition education. Educators that teach nutrition, school administrators and teachers all have a vital role to play in educating the children on good nutrition and eating habits. Other suggestions include incorporating nutrition into the curriculum and establishing nutrition clubs.

Furthermore, policymakers need to introduce sustainable policies to ensure that all children receive nutritious meals. It was found that the school meal programme which provided balanced meals for needy learners was the only balanced meal children ate for the day. Educating parents and family on the importance of good nutrition and variety for development was identified as an important contributing factor to the health of the children (Olumakaiye, 2013).

The quality and level of nutrition knowledge that educators impart to learners is equally important in assessing the learners' nutrition knowledge. Oldewage-Theron and Egal (2012) in a pilot study among Life Orientation educators in the nine provinces of South Africa concluded that 88.9% relied on textbook knowledge, 77.8% on seminars, 7.3% on television, 68.9% on magazines, 33% on nutrition knowledge study and 26.7% on in-service learning. This reveals a need for a Nutrition Education Programme to equip educators with adequate nutrition knowledge, skills, expertise and confidence to teach the content of Life Orientation, which is currently the only compulsory learning area in the school curriculum. Another challenge is that Life Orientation is afforded insufficient notional time in the majority of the schools to have an impact on the teaching of nutrition education.

Based on the research study, for any behavioural change to occur, at least 50 hours of nutrition education is recommended (Briggs, Fleschhacker and Mueller, 2010). The researchers in the pilot study introduced nutrition education as part of an intervention strategy in the Nutrition Education Programme and reported that the confidence and attitude of the educators increased, thereby reinforcing the point that continuous developing and retraining of educators is necessary to improve the education of learners.

The value of feeding strategies to improve the nutrition status of children and thereby improving concentration in the classroom was investigated by Napier, Oldewage-Theron and Kearney (2009) in a study conducted in the Vaal (a place in South Africa formed by three areas: Vereeniging, Vanderbijlpark and Sasolburg) amongst rural primary school children using three

feeding strategies. One group was provided with whole wheat bread, pilchard fish and spinach vetkoek. The second group received the Government Primary School Nutrition Programme and the third group received fruit. The results of the study indicated that all the meals in each of the interventions contributed to combat malnutrition. The fruit consumption was beneficial in improving zinc and iron status. The study also proved that any feeding scheme will add value where there is a scarcity of food and could improve the nutrition status of children. A controlled school-feeding scheme, as previously indicated by other studies, is an ideal way of increasing the nutrition status of children.

The National Department of Health (DOH) started the Health Promoting Schools (an initiative for nutrition education) in 1994 and by 2004 there were 1243 health promoting schools in all nine provinces and it was established that the Western Cape was most successful in implementing it (DOH, 2004).

2.7 Methods to assess the nutrition content of programmes in the school curriculum

The investigations into methods to assess the coverage of nutrition education in the school curriculum are crucial in order to identify short coming of the previous school curriculum and the current school curriculum. The purpose of the investigation is to develop strategies to overcome problems as a result of limited nutrition content in the school curriculum and implement programmes at school and community level to address the shortcomings of the school curriculum.

Eisernmann, Alaimok, Pfeiffer, Paek, Carlson, Hayes, Thompson, Kelleher, Oh, Orth, Randall, Mayfield and Holmes (2011) report that holistic approaches to providing nutrition education and identifying the causes and effects of poor eating habits is essential. Results from the above-mentioned research was based on a study among the public school system, local health systems, physicians, businesses, religious leaders, community agencies as well as university researchers. All the intuitions agree that nutrition education is essential in combating childhood obesity. The aim of the study was to make safe physical activities available and provide nutrition education at schools. The research findings showed general low physical activity, low intake of vegetables and whole grain, and increased intake of fried foods. This type of nutrition intake was the cause of overweight and obesity (Eisernmann *et al.* 2011).

Armstrong *et al.* (2011) in the study on the nutrition status of children indicated that after the introduction of health care programmes and feeding policies, a reduction in the prevalence of under-nutrition was evident. The researchers also suggested that intersect oral policies recognise an increased prevalence in overweight and obesity among young South Africans.

The food consumption patterns of adolescents in a Cape Town school were the subject of a study by Temple, Steyn, Myburg and Nel (2006). A food intake questionnaire was used to collect data. The results from the data revealed that a large majority of the food adolescent learners brought to school or purchased at school was classified as unhealthy. The researchers recommended that policy makers must be cognisant of the unhealthy eating habits of learners and accordingly formulate policies to improve the nutrition education of learners and their parents.

Methods to assess the nutrition content of programmes in school curricula was investigated in a study conducted by Robinson, O'Brien, Burgess-Champoux, Haines, Hannan and Neumark-Sztainer (2010). The study was based on the school breakfast programme and the National Lunch School programme in St. Pauls, Minnesota. The study reported that the average mean fruit and vegetable intake was 3.6 servings, with 80% of the children consuming fewer than 5 daily servings of fruit and vegetables. It was reported that children consumed half the daily fruit and vegetable intake in school because fruit and vegetable intake was encouraged by the programme. The above study reinforces despite healthy eating initiatives, the school curriculum must include nutrition education that reinforces the importance of foods from all the food groups.

The researchers suggested that school programmes can provide an opportunity for fruit and vegetable consumption among ethnically diverse, low socio-economic status children, thus contributing to a greater nutrient intake by children. Encouraging a variety of food at breakfast can help prevent neophobia and children can make food choices within their dietary allowances. The researchers concluded that food cost, shortage in parental time for nutritious food preparation and no supervision of eating practices adversely affects children's food consumption. Despite their nutrition knowledge, cultural factors did not influence eating greatly (Robinson *et al.* 2010).

In research conducted on methods to assess nutrition content of programmes in school curricula, Kondracki, Wellman and Amundson (2002) reported that content analysis has strengths. The retrospective analysing of data, tracking changes over time, assists to strengthen the content in programmes at school. The programmes in school curricula will be effective provided they are unobtrusive and cost-effective. Research also shows that content analysis is useful in measuring knowledge and assessing attitudes and behaviour related to nutrition and health. The strategies suggested are seen as valuable in nutrition education research. The FAO (1997) reported that prior to 1997 nutrition status was directed at households at a local level rather than at national level. Health and nutrition status of communities, according to the authors, should be measured using clinical examination data, anthropometric data, laboratory tests of nutrition status, dietary surveys, vital statistics, nutrition statistics and medical information, food availability and market surveys, agriculture data relevant to food production, economic data, socio-cultural data and food science information.

Van Cauwenberghe, Maes, Van Lenthe, Brug, Oppert and De Bourdeaudhuij (2010) investigated the effectiveness of school-based intervention promoting healthy nutrition in children and adolescents. They found that a healthy diet intake during childhood and adolescence will result in prime health, normal growth as well as cognitive development, in addition to a reduced risk of developing life-style disease. The researchers also stated that the fact that most European children do not eat according to the dietary recommendations as laid down by the Institute of Medicine (2002) on Dietary Reference Intakes. Incorrect dietary intake along with the rapid increase in obese and overweight children indicates a dire need to develop policies and programmes that encourage children and adolescents to follow healthy lifestyles. The researchers support policies that target the school curriculum that strengthen nutrition education, coupled with parental support and increased availability of fruit and vegetables (Van Cauwenberghe *et al.* 2010).

Unicef (2007) reported that schools in developing countries are moving towards a curriculum covering 'life skills' including health, hygiene and vocational skills. The curriculum should also include attitudes, values and behavioural change. Life skills to deal with everyday challenges are covered in the curriculum. The researchers reported that the quality of teaching and learning is affected by the availability of good learning material. An inefficient distribution system of learning material related to nutrition education and corruption (funds allocated for resources by the Government are poorly managed) in many schools results in a lack of

necessary resources such as textbooks, stationery and equipment. This accounts for the high dropout rate at schools because adequate teaching and learning is not taking place at many schools.

According to Vorster *et.al*(2013) FBDGs are important to include in nutrition literature because it improve nutrition and health.

The DOH(2012) reported that food is a source of nutrients needed for life and health; it is part of the way people live. The school curriculum should be designed within the context of the school so that the following factors that are highlighted by the authors of the DOH are considered in the nutrition education of learners.

- The foods eaten by their parents and the ways they prepare these foods.
- The foods that their own family prefer to eat because they like the taste.
- The traditional and cultural backgrounds of communities.
- The amount of money available to spend on food.
- Foods available in local shops and markets.
- Advertisements and promotions for foods.
- Knowledge about food choices for good health.

2.8 Strategies to address malnutrition in children

National and global strategies to address malnutrition in children are fundamental to this research study and show that the dual burden of under-nutrition and over-nutrition that exists in South Africa can be controlled.

Strategies to address malnutrition in children, according to the Food and Agricultural Organisation (FAO) (2005), indicate that countries hardly ever include nutrition knowledge as part of an intervention to improve the lives of people in developing countries. Among the many pillars that form the basis of a thriving nation, three are particularly important, namely, nutrition, health and education. School-based nutrition education touches on all three pillars. Addressing all three of these aspects in combination will be more effective because all three factors are closely interlinked and even dependent on one another. The positive effects of a

strategy that includes nutrition, health and education are seen as a solution to a global crisis in malnutrition. The effectiveness of any strategies and intervention will depend on how the stakeholders implement the process (FAO 2005).

2.8.1 Nutrition education

The current approaches to nutrition education include: social marketing, a community-based approach and social mobilisation. Strut and Achterberg (1997) identified the basic characteristics to these approaches to education as follows:

- Improving the quality of life of people through participation and communication.
- Establishing a dynamic relationship among the participants of the programmes which include the policy makers, the planners, the implementers and the evaluators.
- The building of information, education and communication strategies.

Other strategies to address malnutrition in children include the investigation by Oldewage-Theron and Napier (2011), which refers to the development of nutrition education tools as a strategy to teach primary schoolchildren in Grades one–three from low-income households in South Africa about health issues such as nutrition education which serves to encourage a healthy food intake. Based on a questionnaire presented to Life Orientation educators, it was indicated that time constraints and the lack of nutrition education resources in English such as text and activity books for children aged seven and above and board and card games and food puzzles to supplement the book, based on Food Based Dietary Guidelines, impacted negatively on nutrition education at the primary school level.

A report presented by Mbhenyane, Makuse, Ntuli, Mbhatsani and Sayed (2008) highlighted the following key points to consider when providing nutrition education, namely, good knowledge and understanding of the eating habits of all cultures, the development of culturally sensitive education material, and an assessment of the socio-economic and cultural pressures that influence the groups' eating habits. The aim of nutrition education is to improve the nutrition status of a population, and the prevention of nutrition-related diseases, ultimately improving the quality of life. Nutrition education, as a strategy to address malnutrition in children, should be practical, cost-effective and easy to follow by the community, in order for it to be effective and become a way of life.

The FAO (2005) reported that intense and effective nutrition education is a culmination of various activities that include providing information, increasing people's knowledge, and personal skills development, which motivates and supports people and enables them to follow healthy eating practices. Public policy and access to all people to a variety of nutritious foods that are rich in micronutrients and macronutrients is part of nutrition education which should also be linked to information on how to plant, protect, store, process and prepare these foods. Providing this holistic nutrition education should be consistent in order to get effective results in providing nutritious food.

Further to the research presented, other strategies to address malnutrition in children include a study by Hongo (2003) which states that nutrition education is an intervention whereby a participant is actively engaged in the learning process. Intervention is aimed at changing undesirable nutrition-related habits whereas communication activities aimed at achieving a voluntary change in nutrition-related behaviour can improve the nutrition status of the population.

Nutrition education is essential in the curriculum. However, in disaster-affected areas nutrition education can save lives. Nisar and Hunzai (2011) reported that a study of malnutrition among children in flood-affected areas of Pakistan revealed that providing supplies, technical guidance and training at therapeutic stabilisation centres in local hospitals, was an effective way of dealing with people in crisis situations, so that malnourished patients could be attended to immediately. These measures assisted in preventing crisis situations from worsening. Furthermore, Cooper (2013) reported that nutrient rich therapeutic and supplementary food to treat acutely malnourished children, who lacked essential nutrients for growth and development and who were susceptible to disease, was necessary for the prevention of malnutrition, hence emphasising the importance of food based approach to treat malnutrition globally.

Nutrition education in the school curriculum must impart knowledge on diseases prevalent in the community. Bourne, Hendricks, Marais and Eley (2007) report that in South Africa there is an increase in child mortality, a prevalence of childhood disease and under-nutrition. The researchers also identified that amongst people with HIV and AIDS, poor dietary intake was evident. Findings show that food insecurity, poor quality of basic services and the poor living conditions of many South Africans, is the cause of disease and under-nutrition. The National Integrated Nutrition Policy is a strategy aimed at children under six years, pregnant and

lactating women, and people affected by communicable and non-communicable diseases. The strategy provides the most vulnerable with specific nutrition treatment, support and counselling. Growth monitoring, promotion of micronutrient malnutrition control, breast feeding promotion and support, and providing household food security is facilitated by the National Integrated Policy. The National Integrated Policy supports nutrition intervention amongst children with HIV and AIDS, promotes nutrition and advocates education.

The USDA (2010) reported that most Americans, young and old and across all income levels, ate too few fruits, vegetables, wholegrain and fat free or low fat milk products. However, high levels of fat, sweetened beverages and sodium intake are reported, resulting in 67% of American adults being overweight or obese. The study recommends that effective nutrition education should include:

- skill building to facilitate positive behaviour change;
- environmental and policy changes to make the healthy choice, the easy choice; and
- integrate initiatives and social marketing to build community and social support.

Increased duration of nutrition education in addition to more contact hours of nutrition instruction would produce positive outcomes with regard to nutrition education(USDA,2010).Nutrition education curricula need to focus on specific behaviour changes with regard to nutrition education so that changes to poor eating habits will achieve a positive outcome. It is suggested that multiple components such as classroom-based strategies, cafeteria intervention and home and community programmes are required to focus on increased nutrition education in order to bring about specific behaviour changes. School-based settings, programme interventions designed by school food service personnel and professional development for teachers, are reported to be important factors that would lead to more and improved nutrition education that focus on a food-based approach, not a nutrient-based approach.

The International Food Policy Research Institute (IFPRI) (2012) report on the Zambia National Food and Nutrition Strategic Plan, indicated that the first strategy for a 1000 critical day period is to scale up nutrition. In order to prevent stunting in children under two years of age, national protocols for the management of severe acute malnutrition at hospitals, clinics and

communities should be implemented. Community improvements by providing resources to deal with malnourished children is also recommended.

According to the IFPR (2012), the second plan is to increase micronutrient and macronutrient availability, accessibility and utilisation by improving food and nutrition security. The measure suggested is foreseen as a means to strengthen micronutrient and macronutrient availability, accessibility and utilisation. Practical suggestions include expanding and strengthening school health and nutrition initiatives, institutionalising homegrown school feeding programmes and providing water and sanitation to all learners.

The third plan to combat malnutrition (IFPR 2012), was to treat and follow up on acute malnutrition by providing nutrition education and nutritious feeding through schools. The researchers envisaged that these strategies will prevent malnutrition with the sustainable production, processing, preservation, storage, consumption and marketing of food. The support of food fortification through private and public sectors will also contribute to alleviating malnutrition.

Improving childrens' nutrition and health through nutrition education and improving food security in food insecure households is a means of relief. The United Nations Development Programmes report by Kasirye (2010) revealed that based on the assessment progress in East Africa on improving childrens' nutrition and health, sustained growth in real household income is vital to overcome malnutrition and that cash transfer is a strategy that will bring some relief to some of the population. However, reaching the entire population will be impossible due to high cost implications.

2.8.2 South African Food Based Dietary Guidelines

Awareness of the South African Food Based Dietary Guidelines is essential aspect of nutrition education for all South Africans and they must be part of the primary and secondary school curriculum to promote a healthy lifestyle. The South African Food Based Dietary Guidelines were developed by a working group of various stakeholders over a period of years on the recommendation of the FAO/WHO. The research findings of Gibney and Voster (2001) are based on existing eating patterns and diet related health conditions. The aim of these guidelines,

which targeted South Africans, five years and older without any special dietary needs, is to bring about equity in diet and health. The implementation is a vital tool to promote good health.

The South African Food Based Dietary Guidelines are one of the most important preventative strategies suggested by many researchers to overcome obesity and overweight. The South African Department of Health (1998) presented specific targets for reducing overweight that include a reduction of 15% in males and 20% in females, and for obesity, 7% and 25% respectively. The Food Based Dietary Guidelines provide practical, easy-to-use information to promote a healthy way of living.

The eating habits of South Africans are not desirable according to WHO/FAO (2003). The organisation identified the following contributing factors to poor eating habits of South Africans: poor intake of fruit and vegetables, a high fat (polyunsaturated and saturated) intake, a decrease in milk intake, an overall increase in energy intake, high alcohol intake plus low fibre intake.

In American schools an under-consumption of vitamins, minerals and dietary fibre and a high intake of fats and saturated fats amongst adolescents was observed. This dietary imbalance was cited as a major contributing factor to coronary heart disease and obesity. Levine, Elyse, Guthrie and Joanne (1997) suggest that nutrition education on dietary guidelines can lessen the lifestyle diseases that are present in South Africa and other countries. The issues outlined must be included in the nutrition content in the curriculum.

2.8.3 Food fortification

Food fortification is an essential aspect of nutrition education that curriculum developers need to include in the South African school curriculum. The following studies highlight the benefits of food fortification.

The promotion of micronutrient fortification programmes report on the survey conducted in 1999 by Department of Health (2003) revealed that:

- Most children do not get enough food and micronutrients in their daily meals which resulted in children being underweight and stunted.
- Insufficient money for food means that families go hungry.

- Maize meal, white sugar, tea, whole milk and bread were identified as the foods most often eaten.

The South African Government identified food fortification as a solution to micronutrient deficiency. In 2003, the South African Government Gazette published the contents of Act no.54 of 1972 which contained legislation at national level that stipulated that the fortification of staple foods was mandatory.

Ndekha, van Oosterhout, Zijlstra, Manary, Saloojee, Manary (2009) conducted a study among 491 wasted Malawian adults using ready-to-use fortified spread or corn-soy blend. The results showed a mean increase in BMI and lean body mass in patients receiving fortified spread or corn-soy blend.

The FAO (1997) reported that food fortification contributed to controlling vitamin A and iron deficiencies and that due to the fortification of cereal, one large bowl of cereal and a slice of toast with margarine provided all the carotene and vitamin A required. The school curriculum on nutrition content should include the value of food fortification.

2.8.4 Food supplementation

Food supplementation is an important aspect of nutrition education that must be included in the school curriculum so that learners understand the functions of macronutrients and micronutrients and the value of supplementation in overcoming deficiencies to prevent disease and illness. The following studies show the significance of supplementation. The FAO (1997) reported that micronutrients taken orally or by medication are called ‘supplementation’ rather than ‘medical supplementation’. It is also reported that micro-nutrient supplementation through existing delivery systems is necessary to ensure that micronutrients reach malnourished children.

Kresser (2013) presented reports from various studies on calcium supplementation in food showing the adverse effects on the health of people. A study conducted among 24000 men and women, aged 35–64 years, published in the British Medical Journal (BMJ) 2012, indicated that people on calcium supplementation had a 139% risk of heart attack. The study further highlighted that the intake of calcium from food sources did not increase the risk of heart disease.

The World Food Programme (WFP) (2013) reported that food distribution structures are present in 70 countries that are food insecure. In agreement with Unicef, the WFP initiated food distribution programmes where food is provided which supplements the food of households, by using nutritious products such as fortified blended foods in the treatment of moderate malnutrition. The WFP, together with a Dutch pharmaceutical company, aims to develop cost-effective micro nutrient products to combat malnutrition.

2.8.5 Food diversification – genetically modified food/ agriculture

The following research findings have implications for the planning of nutrition education because learners need to be aware of food diversification and alternative methods of agriculture to increase food production. A report on factors that affect dietary diversification by the DOH (2002), states that nutrition education, promotion and advocacy (to improve related practices in respect of the consumption of available micronutrient-rich food sources) will result in food diversification. It states that horticulture and agriculture intervention (such as home or school gardening) that aims to increase availability of micronutrient-rich foods also increases diversification. The economic and food policies affecting availability, price and effective demand for micronutrient foods and technological advances concerning food preservation and plant breeding also affect dietary diversification.

He Kim (2003) reports that dietary diversification involves the process of ensuring the consumption of a variety of foods that in totality provide all the macronutrients and micro nutrients including phytochemicals necessary for health, through activities such as nutrition education.

Vitamin and mineral requirements can be met by dietary diversification together with animal products and fruit and vegetables (DOH,2004).However, the limitation is that many Africans do not have access to diversity in their meals as a result of food insecurity.

Furthermore, a study carried out by Cabalda, Rayco-Solon, Solon and Solon (2011) indicates that the presence of gardens did not significantly influence food security. However, the existence of gardens in a community provided variety to the diet and showed an increase in vegetable consumption. It is suggested that gardens be established, so that fresh food is available on a regular basis. This will ensure the improvement in the quality of food consumed.

The inclusion of fresh produce into the diet will have a ripple effect on the eating habits of adolescents

The research presented in a paper by the USDA (2012) focuses on the goals of research, development, education and extension. Safety and sustainability increases productivity and the nutrition value of crops and livestock. This is to maximize agricultural productivity growth and minimize human and environmental health risks. The researcher lays emphasis on the importance of collecting and analysing information policies and data of global agricultural markets so that more research can be carried out in order to assist developed and developing countries to improve food security.

2.8.6 School feeding

The purpose of researching school feeding schemes in South Africa is to determine what strategies are in place to lessen food insecurity. Previous research has shown that the school feeding scheme provides the only meal for the day for some children. The South African Department of Health (DOH) (2004) reported on the National School Nutrition Policy that was implemented in schools. The report contained valuable information that indicated a need for the meals based on the resources, constraints, legislation and prevailing circumstances. The menu choices were based on criteria set out by the National Menu Options Document of 2006. The feeding scheme was a government initiative to reduce the number of hungry children at school.

Reporting on the shortcomings of the National School Nutrition Programme, the South African Department of Education (2011) reported that the National School Nutrition Programme must include a variety of food, including fresh vegetables and fruit. The current menus include canned fish, lentils, fresh fruit and vegetables. The schools management was given the option to change the menus to make them acceptable for learners in each school according to the context of the school.

The researchers reported that food variety and dietary diversity seem positively related to the nutrition status of urban households but in rural areas food variety and dietary diversity is less of a priority and the nutrition status of people in rural areas is governed by other factors. Hartley, Hallund, Diarra and Oshaug (2000) reported that the nutrition status of children from urban areas was better than that of rural children. Urban and rural households both had staple

foods. Urban areas indicated more fruit, meat and milk consumption compared to rural areas. In rural areas, leaves and gathered foods were more frequently consumed. Urban households used more vegetables than rural areas. The intake of fruit was double for urban households compared to rural households.

2.9 Government initiatives

Government initiatives towards achieving food security for all in South Africa are provided by the Growth, Employment and Redistribution Strategy of the Government of South Africa. The purpose is to stabilize the economy and promote international competitiveness along with employment creation, new investment and human resources development.

2.9.1 Food parcels

Kelly (2011) reported on the Trussell Trust which was founded in the UK in 1997. The Trust set up a food bank in 2000 and in 2004 launched the food bank social franchise under the Labour government. The Trust handed out food parcel vouchers, which could be redeemed for food, thereby providing for the poor who were living below the breadline. The vouchers provided a family of four with a food parcel containing rice, pasta, jam, biscuits, powered potatoes, tinned fish, pasta sauce and emergency supplies and was sufficient to sustain a family for three days.

2.9.2 Grants

The South African Government's response to the problem of food insecurity was the Reconstruction and Development Programme (Department of Agriculture, 2000). The framework was accepted by the national government and formed part of policy documents such as the Agriculture White Paper (1995). The three strategies that were implemented in the process by the Department were:

- i) The Integrated Nutrition Programme (INP) of 2005 was introduced by the Health Minister in 1995, Dr Nkosizana C Zuma. The Department of Health implemented this programme with the aim of preventing and managing malnutrition and providing nutrition to all South Africans.

- ii) The Integrated Food Security Strategy (IFSS) of 1996 was developed by the South African government at the world summit together with 185 countries with a common aim to either eradicate poverty or expedite the halving of poverty by 2015. It was a joint effort implemented by the Department of Agriculture using national, provincial and local government partnerships with rich experience.
- iii) The Comprehensive Agricultural Support Programme (CASP) of 2005 involved government departments in establishing the Household Food Production programme which financed 273 projects with 17000 beneficiaries receiving surplus food aid. The programme also focused on skills and knowledge transfer, and financial and marketing advice to create wealth through agriculture and improve national and household food security. The One home, One garden (2009) project was a programme that provided seeds and fertilizer packs to households, together with agricultural training and financial advice, with the aim of encouraging households to produce some food for consumption and some for sale at local markets such as the Dube Tradeport. This project was started by DrZ.Mkhize, the Kwa-Zulu Natal premier at the time.

Mthembu (2012) reported in an Association for Rural Advancement article, that in an attempt to eliminate poverty and malnutrition, the Department of Agriculture (2002) identified the main challenges with food insecurity, namely, food availability, a comparison of people's income against food prices, and the empowerment of citizens to make optimal choices regarding nutrition and safe food. The plan also included safety nets and food emergency management systems to ensure effective monitoring, evaluation and reporting on the impact of food security programmes.

Provisions made for people that are food insecure include grants as reported by Foreshaw, (2013).The research reported that the people in Philadelphia who were food insecure, were concentrated in the 50+ age group and children. The Hunger Grants for the Fight Against Food Insecurity provide grants to children and people over 50 who are food insecure. This grant helps to lessen the burden of food insecurity.

Supported by the Community Food Projects Competitive Grants Programme of the National Institute of Food, the Why Hunger Food Security Learning Center (2013) reported that the organisation provides practical resources. It is a community-based organisation that provides capacity building services, technical support, information and financial resources to

community organisations to implement new ideas to develop and transform the community so that the communities can become food secure.

The World Bank (Food Security for Rural Communities) (2013) reported that the Food Security Project for Ethiopia aimed at increasing food access for poor rural households and communities by improving the nutrition levels of children, pregnant women and lactating mothers, improving agricultural research, and increasing food access for poor rural households by means of grants to communities. Capacity building grants were given to improve local institutions. Child growth promotion was assisted by providing trained personnel to monitor the weight of children and provide consultation to caregivers. The promotion of community discussion through monitoring and counselling was also part of the project for rural upliftment. An investment in communication was also highlighted by the project so that funds could be used to promote training and development so that communication can be improved.

Global Philanthropy (2008) in a report states that the Global Philanthropy Food Security Foundation Center provides grants to support governments in developing agricultural and rural policies to provide up-to-date information about soil resources to promote agricultural production, provide correct marketing strategies, and promote the sustainable management of agricultural and natural resources.

The National Sustainable Agriculture Coalition (NSAC) reported in 2013 that Congress had allowed the Farm Bill to expire and this had resulted in various programs being placed at risk of being suspended. The effect of the suspension affects 50% of the agricultural sector, which includes fruit and vegetables, organic renewable energy, livestock, minority and beginning farmers and future job creation, because the grants that supported these projects have been suspended. The farming communities in the United States of America are urging Congress to re-instate the Farm Bill or replace the Bill with support that provides training.

Community Food Project Grants administered by the National Institute for Food and Agriculture (NIFA) and USDA (2008) report that their aims are to fight food insecurity by supporting the development of community-based food projects in low income communities in order to promote healthy eating.

2.9.3 Millennium Development Goals

The purpose of researching the Millennium Development Goals is to understand the role global leaders and local leaders play in alleviating hunger and poverty globally. The millennium development goals (MDG) on poverty aim to halve the proportion of people living under 1 US dollar a day between 1990 and 2015 based on a report by The African Development Bank (2007).

In a contrasting report for Unicef, Ki Moon (2007) states that the achievements in global challenges attained by the World, show a reduction in child and maternal mortality and reduced malnutrition. Findings also indicate achievements in compulsory global primary education for both boys and girls, and the protection of children against abuse, exploitation and violence. The report states that advancement in medical research in combating HIV and AIDS and progress with the treatment of polio and measles is noted globally. The benefits of micronutrient supplementation in the form of iodizing salt, and vitamin A supplementation have resulted in better health for communities. However, despite the reported efforts in increasing education, providing health care and decreasing mortality worldwide, some nations globally show inadequate development, especially countries in Africa. Given the benefits of supplementation it is important for curriculum developers to include this topic in the curriculum.

A follow-up of the MDGs in India indicates that the eradication of extreme poverty and hunger needs to be accelerated (The Government of India, 2011). The focus on children under three years of age has revealed a decrease in malnourished children within this category of children. Enrolments for boys and girls in primary schools was 98.65% and 98.3% respectively according to statistics in 2010, and it was predicted to reach 100% by 2015. India is a male dominated country and a 50:50 ratio is considered the ideal. According to the report, India has maintained ecological balance and has made great improvements in making water safe to drink. The Development of Global partnerships and the private sector have made the benefits of new technology available and this has improved information and technology.

It is reported that 1.1 billion dollars is being pumped into maternal, newborn children and health care so that maternal health problems and child mortality can be reduced in developing countries (Department of Foreign Affairs, Trade and Development in Canada, 2013). By 2011 Canada had contributed 150 million dollars to basic education in Africa. Canada had also

contributed 91% of food aid to Africa in an attempt to assist developing countries to achieve the Millennium Development Goals. Canada is already involved in post 2015 strategies to reach the aims of the MDGs.

2.10 Economic impact of malnutrition

The economic impact of malnutrition has far-reaching consequences nationally and globally and the cycle of malnutrition and poverty adversely impacts on the economy.

2.10.1 Impact of malnutrition on a country's health system

The following research findings strengthen the argument that nutrition education in the school curriculum increases the nutrition knowledge of learners at school. FAO (1993) reported that a well-nourished and healthy workforce is a pre-condition for sustainable development. It reflects social and economic sectors and this is an indication of the nation's resources. Nutrition education at school will help in developing the country's health system because education creates awareness.

According to a report by the World Bank (2006) malnutrition was costing countries up to 3% of the GDP and the implication was that malnourished children are at risk of losing 10% of their lifetime earnings. Other contributing factors negatively impacting on the countries' health systems is the steep increase of HIV and AIDS as well as the fact that malaria is impacting on the health of many African populations. The burden of malnourishment causes children to drop out of school and as a result, these children have little or no education which perpetuates the cycle of poverty. The World Bank encourages governments to develop strategies to reduce malnourishment on their national agenda so that their countries can develop.

The report by the United Nations (2008) states that in Sub-Saharan Africa, limited advancement has been made to improve the survival rate for young children. Furthermore, the poor state of Africa's health systems is a major contributing factor to child deaths. The child birth report concludes that the chance of an African women dying is 1 in 16 compared to 1 in 38 in developed countries, as the result of the absence of skilled attendants at birth.

The World Bank Group (2013) reported that nutrition needs to be the central focus in countries so that development can impact economic and social improvement. Intervention in malnutrition

will impact positively on economic growth and reduce poverty. Micronutrient intervention was targeted in children less than two years of age in an attempt to reduce poverty. According to the document, maternal and child health, HIV and AIDS, education and gender equality can be improved with good nutrition.

It is reported that socio-economic inequality in malnutrition is prevalent in all developing countries, however, affluent people suffer less compared to those who are seriously affected by malnutrition, stunting and wasting (WHO, 2013). The report suggests that socio-economic data should be used when health policies are formulated so that people who are poor can be accommodated in health policies to reduce the burden of malnutrition in a country.

2.10.2 Impact of malnutrition on a country's economy

The health status of children has an impact on the country's economy, according to Lobe (2013), who reports that child malnutrition is costing the economy tens of billions of dollars a year. The result of malnutrition is evident in the poor basic learning skills of children. Today many children in disadvantaged countries are unable to read, write a simple sentence or perform basic arithmetic. The cognitive disabilities caused by malnutrition have affected millions of children resulting in illiteracy. Children who are malnourished go on to earn 20% less than children who are adequately nourished, resulting in poor economic growth in countries which reinforces the need for governments to put mechanisms in place to deal with the burden of malnutrition.

The following research studies also agree that the health status of children impacts on the country's economy. Global Alliance for Improved Nutrition (GAINS) (2012) reported that two billion people in the world suffer from malnutrition which is the underlying cause of death in 2.6 million children. This represents one third of deaths globally. Malnutrition causes stunting in one in every four of the world's children. 11% of the global burden of disease is caused by malnutrition and this is the number one risk factor to health worldwide. In addition, Naidoo (2009) suggests that business, government and non-governmental organizations and communities need to be directly involved in developing a strategy to overcome economic difficulties in order to overcome food insecurity and poor health.

In addition to the previous studies, a report by the United Nations (2008) provides statistics that show that in 1999, 58% of people in Sub-Saharan Africa were living in extreme poverty

and that percentage declined to 50% in 2005. High food prices have caused more people to live in poverty as food is not accessible. High unemployment amongst men indicates that 79% of working-age men are unemployed and that a quarter of the women work for themselves or work for their family and are unpaid. Hunger, as a result of poor crop yield is evident. Climate change has also had an adverse impact on food supply resulting in extreme poverty.

The adverse effects of malnutrition on the economy are as follows: a malnourished person earns 20% less than an average adult without malnutrition and the Gross Domestic Profit of a country is also lower. Global Alliance for Improved Nutrition (GAINS) (2010) provides improved nutrition for the entire global population which includes food fortification, thus improving the availability of nutritious food for mothers and young children. Scaling up targeted nutrition intervention with multi-nutrient supplements and improving the nutritional quality of food through agriculture are also suggested methods.

Ssemutooke (2013) presented a report on the factors adversely affecting economic productivity in Uganda. The aim of the study was to determine the national socio-economic costs of child under-nutrition. The study highlighted economic growth as being insufficient to transform the current issues. The cost included medical costs (caused by poor nutrition), the impact on education and training as well as productivity at the workplace.

The Ugandan government pledged to address child nutrition with a five-year plan with the help of international organizations because malnutrition results in weakening the labour force through child mortality that adversely impacts on the country's economy. The above report supports the conception that nutritional education is valuable at school.

2.10.3 Role of recession on malnutrition

A report on eradicating hunger and malnutrition and ensuring food and nutrition security proposes improvements in agriculture (UN System Task Team, 2012). The report states that improving access to sufficient nutritious food as well as stabilising food supplies can be done by cutting post-harvest losses in an attempt to provide for food insecure people. The report suggests ways to contribute to the economy and to thrive in a socially well-adjusted community. Obesity in both developed and developing countries is causing a double burden of malnutrition and is a threat to health, progress, household incomes and economic growth.

Malnutrition amongst pregnant women and giving birth to stunted children strengthens the vicious cycle of hunger, malnutrition and poverty. Non-communicable disease in adulthood also results in the GDP of countries being affected by almost 11%. It is suggested that countries assess and identify gaps in National Policies, institutional framework, capacity, financing and innovation and facilitate the changes necessary to overcome poverty and increase the GDP of a country.

A report by Bobb, (United Nations, 2009) emphasized by Unicef, reports that economic recession is hurting children and the most vulnerable of the poor in developing countries. Africa was identified as being the continent most affected by poor nutrition and dietary diversity, resulting in children being withdrawn from school. The risk of child labour has aggravated the situation. The effects of poverty and the lack of access to nutritional foods results in poor health and susceptibility to disease. The implications of increased health problems have a ripple effect that impacts on access to health services that are already over- burdened. However, strengths were noted in the social services and these include free primary school education and school-feeding programmes that elevated nutrition levels and boosted school attendance. This report validates the importance of nutrition education in the school curriculum. The researcher suggests that more investigation into economic downturn be conducted to improve the quality of life of the malnourished population in Africa.

2.11 Conclusion

This literature review points out that in the absence of proper health, for instance, good education is not possible and without proper education, health suffers. The FAO (2005) agreed that feeding children in the school setting seems to be the most common form of nutrition education but schools can do much more than this to contribute to good nutrition.

The need for enduring, effective and economic interventions has until now been relatively neglected. The government needs to have firm plans in place to strengthen the curriculum to accommodate nutrition education as an investment to the country so that children develop into healthy adults and contribute to the economy of the country. Nutrition education is extremely important and the school is seen as the most important place to start the process of learning about nutrition because learners spend twelve years in the school environment. Strategies should include active community involvement in all stages of planning, implementation and

evaluation to strengthen programmes to ensure sustainability with advocacy efforts. Curriculum developers need to overhaul the school curriculum to provide adequate nutrition education in compulsory learning areas at school.

Chapter 3: Research Design and Methodology

3.1 Introduction

This chapter presents the research design and methodology adopted for the study. It provides details on the objectives of the study, sample, data collecting methods, data analysis, ethical consideration, value of the study, limitations and challenges.

3.2. Aims, Research Question and Objectives

3.2.1 Aims

The main aim of the study was to investigate the South African education curriculum Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) about educating learners in Grades eight–12 on nutrition content. The Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) were used to analyse the content of nutrition knowledge in each learning area. The Revised National Curriculum Statement included eight learning areas in Grades seven, eight and nine namely Languages, Mathematics, Natural Science, Technology, Social Science, Arts and Culture, Life Orientation and Economic Management Science (DOE 2002–2005). The National Curriculum Statement for Grades 10 to 12 included the following subjects: Languages, Arts and Culture, Business, Commerce, Management and Service Studies, Manufacturing, Engineering and Technology, Human and Social Sciences, and Physical, Mathematical, Computer, Life and Agricultural Sciences (DOE 2002–2003).

The intention of the investigation was to highlight the importance of using the curriculum, educators and learners within a secondary school environment to educate learners on promoting a healthy lifestyle and preventing disease caused by poor eating patterns.

3.2.2 Research Question

The research question was: To what extent does the South African school curriculum in the form of the Revised National Curriculum Statement Grades R–nine (2002) and the National

Curriculum Statement Grades 10–12 (2003) contain nutrition content to prepare learners adequately to follow a healthy lifestyle when they exit school at the end of Grade 12.

3.2.3 Objectives of the study

The purpose of the research was to determine the extent of nutrition information contained in the curriculum for Grades eight to 12, to analyse the nutrition education content of the curriculum and to identify the learning areas that offer nutrition content. The objectives of the study were:

1. To evaluate the National Curriculum for Grades eight to 12 to identify the learning areas that include nutrition education as part of the content.
2. To investigate the extent to which educators teach the nutrition contained content in the curriculum for Grades eight to 12 by means of an Educator Questionnaire.
3. To determine the nutrition knowledge of Grade eight to 12 learners by means of a Nutrition Knowledge Questionnaire (NKQ).
4. To draw comparisons between the nutrition content of the curriculum and the learners' nutrition knowledge in an all-girls' school and the nutritional knowledge of boys in an all-boys' school in the Durban Central area.

The purpose of drawing comparisons between an all-boys' and all-girls' school was to investigate whether the assumption that boys in general do not pay much attention to food and nutrition is true.

3.3 Research Design and Methodology

The design was both exploratory and descriptive. According to Kowalczyk (2014) and Creswell (2003), exploratory research is where a researcher has an idea or has observed something and seeks to understand more about it. The researcher had observed that learners in secondary school display poor food choices despite nutrition education being part of the curriculum and sought to understand if the nutrition education in the curriculum is adequate to educate learners on following a healthy lifestyle.

Kowalczyk (2014) further states that descriptive research attempts to explore and explain topics with additional information. Descriptive research was used to explore and explain additional information about nutrition education in the Revised National Curriculum Statement Grades

R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) and from educators teaching the content on nutrition information from the curriculum in the Durban Central area.

The quantitative methodology was adopted to observe and measure the quantity of nutrition content in the Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) published by the Department of Education in South Africa.

Anderson (2006) describes the characteristics of a quantitative methodology as objective and measurable. The report is statistically analysed and has a sample size of the research group. In addition, Creswell (2003) states that a quantitative approach includes the collection of data on predetermined instruments to obtain statistical data.

Johnson and Christensen (2008) and Lichtman (2006) highlight the fact that quantitative research shows comparisons of means and statistical significance of findings. A predetermined Nutrition Knowledge Questionnaire (NKQ) and an Educator Questionnaire (EQ) were used to obtain information from the learners and the educators.

3.4 Permission and Consent

3.4.1 Permission from the Durban University of Technology

In the process of conducting research, the researcher must take ethical considerations seriously. The ethics guidelines as recommended by the Human Sciences Research Council (HSRC) were considered during the research. Ethical approval was obtained from the Faculty Research Committee (FRC) at the Durban University of Technology (DUT) as part of the proposal approval.

3.4.2 Permission from the Department of Education

Permission was sought in writing from the Department of Education (Annexure A) to conduct the study in the schools. The circuit manager for the Durban Central Schools gave permission to the researcher for the study to be conducted in the relevant schools (Annexure B).

3.4.3 Permission from the schools for the Nutrition Knowledge Questionnaire (NKQ) to be administered

A request in writing was sent to principals of the two secondary schools to request permission to conduct the research at the schools (Annexure C). The principals of both of the study sample schools agreed to participate in the research study. Durban High School responded telephonically and Ridge Park College in writing (Annexure D).

The Heads of Department (HOD) of both schools convened a meeting with the Life Orientation educators who agreed to assist and the researcher then explained the purpose of the study and what would be required from the participants. The Life Orientation educators from Ridge Park College and Durban High School volunteered to participate in the research without any incentives. The researcher trained the Life Orientation educators from both schools on administering the NKQ to learners. The time allocation and the nature of the information that required was explained to the educators from the respective schools.

3.4.4 Permission from the Schools for the Educators' Questionnaire

The researcher sent a request in writing to the principals of 15 schools in the Durban Central area that offered learning areas or subjects that contain nutrition content to conduct the research (Annexure E) and to approach educators for participation in the study. The principals of 15 conveniently selected schools agreed that their educators could be approached to participate in the study. The educators volunteered to participate in the study with no incentives and no personal details of the educators were required. All schools that are in Durban Central area where the research was taking place was included in the study.

3.4.5 Confidentiality and anonymity

The educators and learners were informed that all the information would be anonymous as no names were required on any of the questionnaires. The only information required from the learners included age, gender, school and grade. The information from the teachers included school and subject taught.

The information will be stored at DUT in the Department of Food and Nutrition for a period of five years; thereafter the information will be disposed of by shredding. Only the Researcher and Supervisor had access to the data.

3.5. Sample Selection

3.5.1 Selection of the schools and learners for the Nutrition Knowledge Questionnaire (NKQ)

The study group for the nutrition knowledge questionnaire was purposefully selected so that an all-girls' secondary school and an all-boys' secondary school were included in the study from the Durban Central area. The schools selected in the study had approximately 900 learners in the school population. The schools chosen were in Berea and approximately a kilometre away from each other. The study focussed on Durban High School and Ridge Park College, focusing on girls and boys from Grades eight–12. All 703 learners (343 boys and 360 girls) between the ages of 13 and 18 attending the Life Orientation classes were included in the study. The learners completed the questionnaire anonymously during the Life Orientation lesson. The educators administered the questionnaires, and the researcher had no contact with the learners.

3.5.2 Selection of educators for the Educator Questionnaire (EQ)

The selected participants for the Educator Questionnaire (Annexure F) were purposefully selected to include educators from the Durban Central area. The educators selected teach learning areas in the National Curriculum Statement Grades 10–12 (2003) that contain nutrition content. All the schools in the Durban Central area do not necessarily offer specialised learning areas that are in the curriculum and it was therefore necessary to include several schools so that a variety of learning areas were included in the study.

The selection of schools for the completion of the Educator Questionnaires included schools that were ex model C schools (that is they were previously private schools and after 2004 became partly subsidised by the Department of Education) and Government schools (schools that are run by the Department of Education) selected from a list of schools provided by the Department of Education. The educators selected were educators that agreed to participate and who were teaching the learning areas in the secondary school curriculum that included nutrition

information. These were educators who were teaching the Revised National Curriculum Statement Grades R–nine School Policy (2002) and National Curriculum Statement Grades 10–12 (2003) to learners in Grades eight and nine. Educators from the Agriculture Technology, Dance Studies and Design Studies learning areas were excluded as these learning areas are only offered at a few schools.

The schools indicated in Table 3.1 were eligible and agreed to participate in the study.

Table 3. 1 Schools that agreed to participate in the study

CODE	SCHOOL NAME	NUMBER OF EDUCATORS IN EACH SCHOOL THAT WERE INCLUDED IN THE STUDY	REASONS FOR PURPOSEFUL INCLUSION
1	RIDGE PARK COLLEGE	14	SCHOOL IN AREA OF STUDY.
2	OPEN AIR	5	SCHOOL IN AREA OF STUDY.
3	NEW WEST SECONDARY	8	SCHOOL IN AREA OF STUDY.
4	HILLGROVE SECONDARY	10	SCHOOL IN AREA OF STUDY.
5	EFFINGHAM	10	SCHOOL IN AREA OF STUDY.
6	LAKEHAVEN SECONDARY	8	SCHOOL IN AREA OF STUDY.
7	MAYVILLE SECONDARY	7	SCHOOL IN AREA OF STUDY.
8	WIGGENS SECONDARY	10	SCHOOL IN AREA OF STUDY.
9	BRETENWOOD SECONDARY	10	SCHOOL IN AREA OF STUDY.
10	DURBAN GIRLS HIGH SCHOOL	8	SCHOOL IN AREA OF STUDY.
11	DURBAN GIRLS SECONDARY	6	SCHOOL IN AREA OF STUDY.
12	CHESTERVILLE SECONDARY	15	SCHOOL IN AREA OF STUDY.
13	DURBAN HIGH SCHOOL	5	SCHOOL IN AREA OF STUDY.
14	ORIENT ISLAMIC SECONDARY	8	SCHOOL IN AREA OF STUDY.
15	HILLVIEW SECONDARY	10	SCHOOL IN AREA OF STUDY.

3.6 Inclusion Criteria

Learners in Grades eight–12 at Ridge Park College and Durban High School were included in the study.

Learners that were following the Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) education system from grade R to grade 12 were eligible to be included in the study.

The learners present in the Life Orientation class at both secondary schools on the day the Nutrition Knowledge Questionnaire (NKQ) was completed.

The educators that volunteered to be part of the study and were teaching at schools offering the subjects indicated in Table 3.2 were eligible to be included in the study.

Table 3. 2 The schools included in the study are all secondary school that offer the following learning areas:

GRADE 8/9	GRADE 10/11/12
Natural Science	Agricultural Science
Social Science	Civil Technology
Life Orientation	Electricity Technology
	Mechanical Technology
	Information Technology
	Life Science
	Physical Science
	Consumer Studies
	Hospitality Studies
	Life Orientation
	Dance Studies
	Design Studies
	Agricultural Technology

3.7 Exclusion Criteria

The learners from Ridge Park College and Durban High School who were not present on the day the research was conducted were excluded. All the learners from the other schools were excluded.

The learners from Ridge Park College and Durban High School whose Life Orientation educators did not volunteer to be part of the research to complete the Nutritional Knowledge Questionnaire (NKQ) were excluded.

The Educator Questionnaire was only completed by educators from the Durban Central area and all other educators were excluded.

Educators teaching at schools situated outside the Umlazi District were excluded from the study.

3.8. Data collection methods

Data was collected from the following sources:

- i) The Curriculum
- ii) Learners
- iii) Educators

3.8.1 Data from the Curriculum

An analysis and summary of the Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) that contained nutrition education content in the curriculum were identified. The analysis was based on the information obtained from the Department of Education in Pretoria. The researcher carried out a curriculum analysis of the Grade eight–12 learning area content. The aim was to identify the learning areas in Grades eight–12 that include information on nutrition. Each field of study was broken down into its learning areas and analysed for nutrition content across all the learning areas.

3.8.2 Learners: Nutrition Knowledge Questionnaire (NKQ)

A predetermined Nutrition Knowledge Questionnaire (Annexure G) was used to collect the data from August to October in 2011.

The Nutrition Knowledge Questionnaire based on the 2003 South African Food Based Dietary Guidelines for urban South African adolescents to evaluate nutrition knowledge developed by Whati, Senekal, Steyn, Nel, Lombard, and Norris (2005) was used to evaluate the nutrition knowledge of the adolescents being taught the South African National Curriculum.

The educators were trained on how to administer the questionnaires to the learners. While completing the questionnaire the learners were not allowed to communicate with each other. Each learner was handed a nutrition knowledge questionnaire consisting of 60 questions during the Life Orientation lesson and was given 120 minutes to answer the multiple-choice questions.

The learners were not allowed to request additional time and were not allowed to discuss the questionnaire amongst themselves. The Life Orientation educators were not allowed to explain the questions or assist with answers. The learners had to complete the nutrition knowledge questionnaires based on the nutrition knowledge they had. 343 boys and 360 girls completed the nutrition knowledge questionnaire.

3.8.3 Educators: Educator Questionnaire (EQ)

An Educator Questionnaire (Annexure F) developed by the researcher included questions on the learning areas that contained nutrition information. Questions to measure the extent to which the educators teaching learning areas that included nutrition information completed the curriculum content on nutrition information were asked. The data collection for this research was done in July and August in 2011.

The Educator Questionnaire was delivered by hand to schools by the researcher. An educator from the school was appointed by the principal to administer the questionnaires to the relevant educators. The educator who was appointed by the principal was briefed by the researcher as to how the questionnaire was to be completed and this educator briefed the participating educators accordingly.

One hundred and twenty seven educators teaching Agricultural Science, Civil Technology, Electrical Technology, Mechanical Technology, Information Technology, Consumer Studies, and Hospitality Studies completed the Educator Questionnaire. Seven educators who were not teaching the above subjects but include nutrition information in their lessons even though it is not part of the curriculum for their subject or learning area also completed the questionnaires. The total number of educators who completed the questionnaires was 134 educators from 15 schools.

No personal details were required on the Educator Questionnaires that were coded and numbered according to the 15 schools. The completion of the questionnaires by educators was conducted in the educator's free time on a voluntary basis. The educator in charge collected the questionnaires when all the educators had completed the questionnaire and the researcher collected the questionnaires from the schools.

3.9. Data Analysis

In this section the data capturing and analysis is presented.

3.9.1 Curriculum analysis

The Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) were used to analyse the nutrition content in each learning area or subject. The Revised National Curriculum Statement included eight fields of knowledge in Grades eight and nine – Languages, Mathematics, Natural Science, Technology, Social Science, Arts and Culture, Life Orientation and Economic Management Science (DOE 2002). Each learning area in the curriculum was identified and the nutrition content in each one was captured in a table. The National Curriculum Statements Grades 10–12 was also analysed for nutrition content in the learning fields of Languages, Arts and Culture, Business, Commerce, Management and Service Studies, Manufacturing, Engineering and Technology, Human and Social Science, Physical Mathematical, Computer, Life and Agricultural Sciences (DOE 2003).

3.9.2 Nutrition Knowledge Questionnaire (NKQ)

The researcher checked all the completed Nutrition Knowledge Questionnaires for completeness on receiving them. Data from the completed questionnaires were captured by the researcher on an Excel spreadsheet. The data was analysed for descriptive statistics using the Statistical Software Package for Social Sciences (SPSS) for Windows version 19.0 and variances were determined with the assistance of a statistician. Data was presented in tables indicating frequencies and percentages. The FBDGs were used to assess whether knowledge was adequate because it contains positive dietary recommendations based on South African eating patterns and health problems. The messages contained in the FBDGs are based on scientific evidence that show connections to what we eat and the health.

The questions on the Nutrition Knowledge Questionnaire were sorted under each of the 11 South African Food Based Dietary Guidelines (2003) for analysis purposes (refer Table 3.3).

Table 3.3 The number of each question sorted under the 11 categories according to the South African Food Based Dietary Guidelines.

Classification according to the South African Food Based Dietary Guideline	Question numbers
1. Enjoy a variety of food.	2, 12, 16,48, 51, 53, 37, 38, 40, 44, 17, 18, 19, 21, 23, 24, 35,
2. Be active.	11, 14, 22, 26, 29
3. Drink lots of clean safe water.	5, 27, 30
4. Make starchy foods the basis of most meals.	4,45, 47, 49, 9,
5.Eat plenty of fruit and vegetables.	7, 15, 25, 42, 57
6. Eat dry beans, peas, lentils and soya regularly.	54, 55, 58, 60
7. Chicken, fish, meat, milk and eggs can be eaten daily.	13, 33, 56
8. Eat fats sparingly.	2, 8, 43, 46, 50, 59
9. Use salt sparingly.	6, 20, 28, 34
10. Use food and drinks containing sugar sparingly.	1, 32, 36, 39, 52
11. If you drink alcohol, drink sensibly.	10, 31,41

ANOVA (test of homogeneity of variance) was conducted to determine significant differences, where $p < 0.05$ is seen as significant, between male and female adolescents in the Durban Central area in terms of nutrition knowledge for each of the 11 sections as indicated above. The percentage of boys that correctly answered each question for Grades eight–12 was compared to the percentage of girls in Grades eight–12 that correctly answered each question. The mean score for each of the eleven sections for boys and girls were analysed to indicate significant differences between the two genders and between the grades. The overall mean for the whole test was also determined between gender and grade.

3.9.3 Educator Questionnaire

The researcher checked the returned educator questionnaires from the 15 schools for completeness on receiving them. Data from the completed and incomplete questionnaires was captured by the researcher on an Excel spreadsheet. The data was analysed for descriptive

statistics using the statistical software package for social science (SPSS) for Windows version 19.0 and variances were determined with the assistance of a statistician. Data are presented in the tables indicating frequencies and percentages.

3.11. Research limitations and challenges

Each learner was handed a Nutrition Knowledge Questionnaire (NKQ) consisting of 60 multiple-choice questions to be answered within 120 minutes during Life Orientation, irrespective of the grade. The Grade eight learners, in comparison to the learners in the senior grades, found some questions difficult to understand as the questionnaires were only in English. Some learners answering the questionnaires were learners for whom English was either a second or third language. Interpretation of questions took longer for these learners.

The Nutrition Knowledge Questionnaire (NKQ) not questions was completed by learners across the grades. Lack of understanding, language barriers, limited time in the lesson was identified as reasons for the question not being completed.

Due to the strike action in the Education Sector in 2011 and the fact that schools were closed for two months impacted negatively on data collection and resulted in the process taking longer than planned.

3.12 Conclusion

The instruments used in this chapter were appropriate in gathering the data to achieve the purpose of the study which was to analyse the Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) for Grades eight–12, and to determine the nutrition knowledge of learners in Grades eight–12 and the nutrition education practices of the educators in schools in the Durban Central area. The results drawn from the research into the nutrition content of the curriculum, the educator questionnaires, and the nutrition knowledge questionnaire will be interpreted and discussed in Chapter 4. The results are presented in Chapter 4.

Chapter 4: Results and Discussion

4.1 Introduction

This chapter will focus on the analysis and interpretation of the data obtained by the researcher in this study. Statistics used to analyse the data that was received from the Questionnaires (NKQ) and the Educator Questionnaires (EQ) will be interpreted and discussed.

4.2 Revised National Curriculum Statement Grades R–9 School Policy (2002) and National Curriculum Statement Grades 10–12 (2003)

The South African education curriculum was revised and implemented during the period of 2002 and 2003. The South African National Curriculum was written for South Africans by South Africans.

4.2.1 Content of Nutrition Knowledge in the Revised National Curriculum Statement Grades R–9 School Policy (2002) for the Foundation Phase, Grades R to 3

Table 4.1 indicates the Learning Areas in the Foundation Phase that teach nutrition knowledge to learners in Grades R to three. Grades R to 12 were included in the analysis to indicate the build-up of nutrition content in the curriculum from primary school to high school.

Natural Science in Grade R, Grade one and Grade two has embedded nutrition content that focuses mainly on the need for food by plant and animal life. Social Science in Grade one discusses issues of personal health and safety. The Life Orientation module in Grade one deals with nutrition (refer to table 4.1), personal hygiene and health.

Life Orientation in the Grade two curriculum includes content on the purification of water in order to make it safe for consumption, to make the home and school environment healthy and to prevent communicable diseases.

The Grade three Life Orientation curriculum content enriches the learner's knowledge of health and outlines the results of poor dietary habits (refer to table 4.1). It also focuses on communicable diseases (DOE 2002).

Table 4.1 Foundation Phase, Grade R to Grade three Learning Areas containing nutrition content (DOE 2002)

NUTRITION CONTENT IN THE FOLLOWING LEARNING AREAS				
SUBJECT	GRADE R	GRADE:1	GRADE:2	GRADE:3
NATURAL SCIENCE	<p>Like humans, animals and plants have similar needs for food, water and air.</p> <p>We depend on plants and animals for food and we breed certain animals and grow certain plants and crops for consumption.</p>	<p>Animals and plants have similar needs to humans for food, water and air.</p> <p>We depend on plants and animals for food and we breed certain animals and grow certain plants and crops for consumption.</p>	<p>Animals and plants have similar needs to humans for food, water and air.</p> <p>We depend on plants and animals for food and we breed certain animals and grow certain plants and crops for consumption.</p>	<p>Animals and plants have similar needs to humans for food, water and air.</p> <p>We depend on plants and animals for food and we breed certain animals and grow certain plants and crops for consumption.</p>
SOCIAL SCIENCE	None	<p>Identifies and describes issues affecting personal health and safety in the school and or the environment.</p> <p>Suggests ways to improve personal health or safety by proposing solutions or alternatives that will reduce the risk to personal health or safety.</p>	None	None
LIFE ORIENTATION	None	<p>Identifies nutritious choices from a range of commonly available foods and drinks. Explains steps to ensure personal hygiene and links these steps to environmental health.</p> <p>Distinguishes between situations that are safe and those that require precautions against communicable disease.</p>	<p>Describes sources of clean and unclean water and simple water purification methods.</p> <p>Suggests and investigates actions to make the home and school environment healthier.</p> <p>Identifies communicable disease and explains measures to protect self and others.</p>	<p>Compares healthy and unhealthy dietary habits and describes the effects of such habits on personal health.</p> <p>Discusses myths surrounding communicable disease, and the causes and prevention of these.</p>

4.2.2 Nutrition content in the Revised National Curriculum Statement Grades R–9 School Policy (2002) for the Intermediate Phase, Grades 4–6

Table 4.2 presents the nutrition content included in the curricula for the learning areas for Grades four–six. Natural Science in Grades four–six explores the function of food and the nutrients in food that perform various functions in the body, and the need for humans to have a balanced diet and a variety of food groups to keep healthy.

Technology for Grade four includes content on the properties of materials in food, preservation of foods, and causes of food deterioration.

Social Science for Grade four explores food production in South Africa, and access to food and water; the consequences of a lack of proper food, nutrition, accessing food and water, and using resources is also included in the content. In Grade five the focus is on disease and reducing the risk of disease.

The Life Orientation curriculum for Grades four–six contains a relatively wide range of topics dealing with nutrition knowledge. The content taught in these grades builds on the learners' basic knowledge of healthy eating and balanced diets. The Economic and Management Science curriculum for these grades explores content that deals with health epidemics (DOE 2001).

Table 4.2 Intermediate phase, Grades 4–6 Learning Areas containing nutrition content (DOE 2002)

NUTRITION CONTENT IN THE FOLLOWING LEARNING AREAS			
SUBJECT	GRADE:4	GRADE:5	GRADE:6
NATURAL SCIENCE	<p>Life processes and healthy living: Animals cannot make their own food while some animals eat plants and some animals eat other animals.</p> <p>Living things need food for energy, to move, grow and to repair damage to their bodies (tissue). Animals including humans have a digestive system for getting nutrients from food. Humans need a balanced diet from certain groups of food to be healthy.</p>	<p>Life processes and healthy living: Animals cannot make their own food while some animals eat plants and some animals eat other animals.</p> <p>Living things need food for energy, to move, grow and to repair damage to their bodies (tissue). Animals including humans have a digestive system for getting nutrients from food. Humans need a balanced diet from certain groups of food to be healthy.</p>	<p>Life processes and healthy living: Animals cannot make their own food while some animals eat plants and some animals eat other animals.</p> <p>Living things need food for energy, to move, grow and to repair damage to their bodies (tissue). Animals including humans have a digestive system for getting nutrients from food. Humans need a balanced diet from certain groups of food to be healthy.</p>
TECHNOLOGY	Demonstrates knowledge and understanding of the properties of common materials (e.g. food)		Demonstrate knowledge and understanding of the reasons different materials deteriorate and ways of preserving them.
SOCIAL SCIENCE	<p>Food production in South Africa: subsistence and commercial farming grain crops grown and animals reared. location and process.</p> <p>Access to food and water: consequences of lack of access to food and proper nutrition. ways of accessing food and water in different contexts. wise use and management of resources.</p>	<p>Identifies challenges to societies and settlements, with a focus on the spread of disease. Explains the factors that cause some people to be more at risk of disease than others.</p> <p>Suggests the best way, from a range of alternatives, to reduce risks of disease.</p>	None
LIFE ORIENTATION	<p>Investigates menus from various cultures and suggests plans for healthy meals.</p> <p>Explores and reports on links between a healthy environment and personal health.</p> <p>Explains children's health rights and responsibilities, and suggests ways in which to apply these in a familiar situation.</p>	<p>Explores and reports on ways to protect quality of food and water in various contexts.</p> <p>Investigates a local environment health problem using different data sources, and plans a strategy to address the problem.</p> <p>Recognises the symptoms and causes of locally occurring disease and discusses prevention strategies.</p>	<p>Interprets food labels and critically discusses health effects of listed ingredients.</p> <p>Participates in a problem-solving activity to address an environmentally sound choice and/or action.</p> <p>Explains causes of communicable disease (including HIV and AIDS) and available cures, and evaluates prevention strategies, in relation to community norms and personal values.</p>
ECONOMIC AND MANAGEMENT SCIENCE	Explains the effect of natural disasters(e.g. drought) and health epidemics (e.g. HIV and AIDS) on formal and informal business.	None	None

4.2.3 Nutrition content in the Revised National Curriculum Statement Grades R–9 School Policy (2002) for the Senior Phase, Grades 7–9

Table 4.3 outlines the nutrition and health content included in the curriculum for Grades seven–nine. The Natural Science curriculum for Grades seven–nine contains nutrition-related content that deals with micro and macro nutrients, the sources, absorption, storage and functions of these nutrients in the body. The Natural Science content provides a detailed understanding of the process that takes place when food is eaten.

The Social Science curriculum for these grades focuses on HIV and AIDS and the effects of the disease.

Life Orientation in Grade seven deals with personal diets with a view to promoting healthy eating, improving health problems and providing information on how to live with diseases. The Grade eight content focuses on environmental health and safety problems, and health issues in the prevention of disease. The Grade nine content critically analyses health information and services for a range of diseases. These topics will enrich the learner's nutrition knowledge (DOE, 2001).

Table 4.3 Senior Phase, Grade 7 to 9 Learning Areas containing nutrition content (DOE, 2002)

NUTRITION CONTENT IN THE FOLLOWING SUBJECTS			
SUBJECT	GRADE:7	GRADE:8	GRADE:9
NATURAL SCIENCE	<p>Living processes and healthy living: Animals including humans require protein, fat, vitamins and water. Food taken in is absorbed into the body via the intestine. Surplus food is stored as fat or carbohydrate.</p> <p>Animals, including humans, have a circulatory system which includes the heart, veins, arteries and capillaries and which carries nutrients and oxygen to all parts of the body and removes waste products. Oxygen, which is provided by the breathing system, reacts with food substances to release energy.</p>	<p>Living processes and healthy living: Animals including humans require protein, fat, vitamins and water. Food taken in is absorbed into the body via the intestine. Surplus food is stored as fat or carbohydrate.</p> <p>Animals, including humans, have a circulatory system which includes the heart, veins, arteries and capillaries and which carries nutrients and oxygen to all parts of the body and removes waste products. Oxygen, which is provided by the breathing system, reacts with food substances to release energy.</p>	<p>Living processes and healthy living: Animals including humans require protein, fat, vitamins and water. Food taken in is absorbed into the body via the intestine. Surplus food is stored as fat or carbohydrate.</p> <p>Animals, including humans, have a circulatory system which includes the heart, veins, arteries and capillaries and which carries nutrients and oxygen to all parts of the body and removes waste products. Oxygen, which is provided by the breathing system, reacts with food substances to release energy.</p>
SOCIAL SCIENCE	<p>Population growth and change: Disease and poverty. Impact of HIV and AIDS.</p>	None	None
LIFE ORIENTATION	<p>Proposes ways to improve the nutrition value of own personal diet.</p> <p>Evaluates actions to address an environmental health problem.</p> <p>Describes strategies for living with disease, including HIV and AIDS.</p>	<p>Plans an action in which laws and/or policies for protecting environmental health are applied to address an environmental health issue.</p> <p>Critically analyses the cause of common disease in relation to socio-economic and environmental factors.</p> <p>Describes what a healthy lifestyle is in own personal situation, as a way to prevent disease.</p> <p>Demonstrates informed, responsible decision-making about health and safety.</p> <p>Examines a health and safety issue related to violence, and proposes alternatives to violence as well as counter-strategies.</p>	<p>Illustrates and evaluates the influence of ecological, social, economic, cultural and political factors on own personal choice of diet.</p> <p>Develops and implements an environmental health programme.</p> <p>Investigates personal and social factors that contribute to substance abuse and suggests appropriate responses and rehabilitation options.</p> <p>Critically evaluates resources on health information, health services and a range of treatment options, including HIV and AIDS.</p> <p>Discusses ways to apply insights gained from participating in an activity related to national health or safety promotion programme.</p>

4.2.4 Nutritional content in the Revised National Curriculum Statement Grades 10, 11 and 12 School Policy (2002)

Table 4.4 contains learning areas covering nutrition and health-related content. Life Orientation, a compulsory subject in Grades 10, 11 and 12, contains content on living a balanced and healthy lifestyle, promoting health to prevent disease, and health and safety issues. The Grade 12 curriculum also investigates causes of ill health and ways of dealing with these conditions.

Agricultural Science contains content on health and nutrition in Grades 10, 11 and 12 and includes the study of a healthy environment and sustainable agriculture in Grades 10 and 11. In Grades 10 and 11 the impact of malnutrition on health, and undernourishment is investigated. Content on global and local production is included in Grade 11. Grade 12 considers the development of agricultural commodities to meet the increasing food demands of a growing population. The curricula for Agricultural Technology, Design, Civil Technology, Electrical Technology, and Mechanical Technology Grades 10, 11 and 12 include nutrition and health issues but this is limited to responding to medical emergencies, in particular HIV and AIDS.

The curriculum for Dance Studies in Grade 10 contains content on optimum nutrition, the importance of food, water and a balanced diet and the need for macronutrients and micronutrients. Eating disorders, health care and the creation of a positive body image are discussed. In Grade 11, health care, cardiovascular fitness, strength, flexibility and lifestyle are covered. In Grade 12, the focus is on injury prevention and care and how to increase physical fitness.

The Information Technology curriculum discusses health and ergonomics issues. The curriculum for Life Science Grade 10 explores content on digestion: problems related to digestion, nutrition-related health problems, and home remedies for nutrition disorders. In Grade 11, the content covers HIV and AIDS and the health and lifestyle of peers.

The curriculum for Consumer Studies Grade 10 explores the food intake of young adults and factors that influence food intake, as well as the SAFBDGs. The curriculum for Grade 11 includes content on nutrient analysis and RDA for stages in the life cycle, and criteria for

buying food. The Grade 12 curriculum includes nutrition-related health issues and consumer issues related to food. The Hospitality Studies curriculum progressively investigates meal and menu planning, from simple menus to relatively complex menus through Grades 10, 11 and 12 (DOE 2002).

Table 4.4 Grade 10-12 Learning Areas containing nutrition content (DOE, 2003)

NUTRITION CONTENT IN THE FOLLOWING SUBJECTS			
SUBJECT	GRADE:10	GRADE:11	GRADE:12
LIFE ORIENTATION	None	Characteristics of a healthy and balanced lifestyle, factors influencing responsible choices and behaviour in the promotion of health, and the impact of unsafe practices on self and others.	Investigate the human and environmental factors that cause ill health. Investigate how unequal power relations between the sexes are constructed and how they influence health and well-being and apply this understanding to work, cultural and social context.
AGRICULTURAL SCIENCE	Analyse and describe the value of a healthy environment and ecosystem for the healthy functioning of a democratic, productive society.	Recognise and analyse the impact of malnutrition on the health of people and describe the importance of sustainable agricultural production in combating under-nourishment. Understand and analyse the impact of global agriculture on local production.	Investigate and analyse the importance of continual development of agricultural commodities to meet the increasing food demands of a growing population.
AGRICULTURAL TECHNOLOGY	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV and AIDS.	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV and AIDS.	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV and AIDS.
DANCE STUDIES	Demonstrate knowledge and understanding of the human skeleton, by naming major bones and joints and how they move; effective nutrition,(importance of food and water, balanced diet, need for protein, carbohydrates, fats, minerals and vitamins. eating disorders, health care and a positive body image for the dancer).	Demonstrate knowledge and understanding of health care, e.g. cardiovascular fitness, strength, flexibility and lifestyle choices(substance abuse- drugs, dieting pills, cigarettes and alcohol, diet and HIV and AIDS).	Demonstrate knowledge and understanding of the application of practical strategies for injury prevention and care; how to increase physical fitness.
DESIGN	Health and safety issues with specific reference to HIV and AIDS.	Health and safety issues with specific reference to HIV and AIDS.	Health and safety issues with specific reference to HIV and AIDS.
CIVIL TECHNOLOGY	Responding to basic emergencies in context, taking cognizance of health issues such as HIV and AIDS.	Responding to basic emergencies in context, taking cognizance of health issues such as HIV and AIDS.	Responding to basic emergencies in context, taking cognizance of health issues such as HIV and AIDS.
ELECTRICAL TECHNOLOGY	Responding to basic emergencies in context, taking cognizance of health issues such as HIV and AIDS.	Responding to basic emergencies in context, taking cognizance of health issues such as HIV and AIDS.	Responding to basic emergencies in context, taking cognizance of health issues such as HIV and AIDS.
MECHANICAL TECHNOLOGY	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV and AIDS.	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV and AIDS.	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV and AIDS.
INFORMATION TECHNOLOGY	Discuss health and ergonomic issues related to frequent computer use.	None	None

LIFE SCIENCE	<p>Identifies structures and processes as food passes through the digestive system.</p> <p>Describes causes of various digestive problems (e.g. heartburn, gastric ulcers, irritable bowel syndrome, colon cancer and piles).</p> <p>Explains the cause of nutrition problems (e.g. bulimia, anorexia, obesity, kwashiorkor, rickets and gout).</p> <p>Investigates various home remedies for nutritional disorders.</p>	Writes reports on the impact of HIV and AIDS on the health and lifestyle of peers.	None
PHYSICAL SCIENCE	Human nutrition- chemical change	None	None
CONSUMER STUDIES	<p>When discussing the daily food intake of young adults, considers the food practices of various groups of people as influenced by culture, religion and socio-economic status, as well as the influence of knowledge, attitudes and education on food habits and patterns.</p> <p>Compare the food-based dietary guidelines with the daily food intake of young adults in terms of foods, portions and portion sizes. The information obtained can then be used to describe the impact of food choices on own health.</p> <p>When explaining food choices in terms of resources available to the household, include the human and material resources needed for obtaining and preparing food and how this relates to food choices made by young consumers.</p> <p>In describing safe food-handling practices, focus on hazards to food (bacteria, moulds, parasites, natural toxicants, storage procedure).</p>	<p>Compares a young adult's daily food intake with the recommended nutritional requirements so that suggestions for improvements can be made.</p> <p>Use nutrients and other components of food and their function as a point of departure.</p> <p>Use the Recommended Daily Allowances (RDAs) for different stages in the life cycle and for people with different nutritional requirements (e.g. pregnancy, illness), physical requirements (such as work and sport) when explaining the nutrient needs of consumers from different age groups and with differing energy requirements.</p> <p>Apply the criteria for food buying (safety, quality, pricing) to evaluate food outlets in the local community.</p> <p>Discuss the pathogenic organisms related to food spoilage and food safety.</p>	<p>When suggesting guidelines for the prevention or management of nutritional and food-related health conditions, including one or more health problems (e.g. HIV and AIDS, obesity, osteoporosis, high cholesterol or high blood pressure) as well as food related allergies and eating disorders.</p> <p>Investigate any consumer issue related to the impact of the selection and use of food on the natural or economic environment.</p>

HOSPITALITY STUDIES	<p>Produce and present a range of breakfasts and light meals incorporating rules for menu planning using the following commodities: cereals, eggs, fruit, salads and salad dressing, scones and muffins, pasta, mincemeat, sausage, dairy products, teas and coffee.</p>	<p>Plan menus for teas and light meals using the following commodities: poultry, fish, rice, soups, sauces, stocks, vegetables, yeast products, cakes and biscuits.</p>	<p>Describe the origin and symptoms of infection disease, including HIV and AIDS, in the food and beverage industry.</p> <p>Plan menus for special dietary requirements (e.g. diabetic, low fat, low sodium, HIV and AIDS, vegetarian, Hindu, halaal and kosher).</p> <p>Plan and prepare a range of dishes for a formal dinner.</p>
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4.3 Discussion

The National Curriculum Statement Grades R–12 clearly defines the knowledge, understanding, skills, attitudes and values that learners are to attain during their school career. The purpose of including the curricula for Grades R–seven in this analysis was to show that the amount of nutrition content covered in preschool and primary school is limited. The content on nutrition is very basic in Grades R–seven and is inadequate for school children to make healthy food choices. This limited knowledge leads to lifestyle diseases. The learners exit primary school at the end of Grade seven and enter secondary school with limited nutrition knowledge. The limited content on nutrition in the curriculum, together with the change in environment at secondary school affects learners' food choices.

The analysis of the Revised National Curriculum Statement Grades R–9 School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) in South Africa (Tables 4.1 to 4.4) shows that nutrition education and health information is documented in the curricula for Grades seven–nine. The following learning areas contain nutrition knowledge: Natural Science, Social Science and Life Orientation. An investigation by Oldewage-Theron and Napier (2011) describes the development of nutrition education tools as a strategy to teach primary school children in Grades one–three from low-income households in South Africa. The purpose of nutrition education at school is to educate learners to improve their health and nutrition knowledge, and to provide services such as cooking demonstrations on nutrient retention when cooking food and drawing up healthy menus according to the income of the family to encourage healthy food intake.

The purpose of analysing the National Curriculum Statement Grades 10–12 (2003) is to establish the amount of content on nutrition and to highlight the importance of including more practical content on nutrition in order to bring about healthy lifestyle changes. The intention of the investigation is to highlight the importance of including more nutrition education content in the curriculum to educate learners, in order to prevent disease caused by poor eating patterns of girls and boys in secondary schools in the Durban Central area. Learners need to acquire the knowledge, understanding, skills, attitudes and values associated with healthy eating and living healthy lives during their years at school so that they can continue practising a healthy lifestyle throughout their lives.

Van Deventer (2009), in the Western Cape, explains that Life Orientation was taught by a broad spectrum of educators who are not specialists in the learning area. The researcher stress that Life Orientation educators thus need support and training in the form of workshops and in-service training.

According to Gleason and Sutor (2001), the school food environment has the potential to influence the diets of children and adolescents as between 19% and 50% of children's daily energy is consumed at school. Kann, Telljohann and Wooley (2007) agree that nutrition education is vital in co-ordinating a school health approach.

Learning areas from Grades 10, 11 and 12 that contain content on nutrition and health-related knowledge, include Life Orientation which is a compulsory subject from Grades 10, 11 and 12. The learning areas that learners must choose for Grades 10–12 must include three electives and learners might in fact choose subjects that do not include nutrition and health knowledge because schools do not necessarily offer a full complement of subjects.

The Food and Agriculture Organisation (FAO) (2005) states that feeding children in the school setting seems to be the most common form of nutrition initiatives but schools can do much more to contribute to good nutrition. Nutrition education is extremely important and the school setting is seen as the most important place to start the process of learning about nutrition as learners spend twelve years in the school situation. The need for enduring, effective and economic nutrition interventions has been relatively neglected. Government needs to adopt firm plans that have been tried and tested in other countries so that the South African curriculum can be strengthened to accommodate more nutrition education. This intervention would be an investment in the country because children will develop into healthy adults who will contribute to the economic development of the country.

Due to economic constraints many schools do not offer specialist subjects which ideally need to be taught by educators who have specialised in these fields and which require relatively expensive teaching aids (refer to Table 4.4). Hospitality Studies, Consumer Studies, Agricultural Science, Agricultural Technology, Dance Studies, Design, Civil Technology, Electrical Technology, Mechanical Technology and Information Technology that all contain nutrition content cannot always be offered because of limited resources to fund the subject and

the specialised educators. The restriction placed on the availability of all the learning areas in the curriculum at secondary school level has a negative influence on the learners' nutrition knowledge. These learning areas contain valuable nutrition content that can impact on healthy food choices and healthy living amongst secondary school children. These learning areas discussed do not reach all of the learners in a school because at the end of grade nine learners choose learning areas which are not compulsory. Life Orientation is the only compulsory subject that has a percentage of nutrition content. However, as seen from other research studies (Van Deventer, 2009) and (Oldewage-Theron and Napier, 2011), this learning area has shortcomings (DOE 2003).

The National Curriculum Statement Grades 10–12 (DOE 2003) reinforces the perspective that the curriculum is not designed to teach nutrition knowledge adequately according to the FBDGs, thereby limiting learners' ability to achieve the benefits of a positive lifestyle for the future. Bojuwoye, Moletsane, Stofile, Molla and Sylvester (2014) indicate in a study on curricula at schools, that learners from selected Western Cape schools stressed the need for nurturance and the inclusion of nutrition as an important aspect in school. The learners viewed support from both teachers and parents as essential in their development.

Schools have the potential to contribute to health promotion and schools can support healthy eating habits (Rowa, Steward and Somerset, 1992). However, as this study shows, learning areas that contain nutrition content are limited.

A study conducted amongst 181 students in two private schools in Chennai state in India that exposed learners to nutrition education in interactive discussions for one hour per week showed a significantly improved dietary knowledge from 37% to 67% (Rani, Shriraam, Zachariah, Harris, Satyanarayana, Tetali, Anchala, Muthukumar and Sathiyasekaran, 2012).

In a study conducted by Anderson, Stanberry, Blackwell and Davidson (2001) in Southern Mississippi in the United States of America it was revealed that students who have instruction in nutrition gain knowledge on nutrition. However, students who showed improvement in nutrition knowledge showed minimum improvement in food selection. The study emphasised that nutrition education must include transformative learning experiences so that behavioural change in the selection of food occurs. This study also reinforced the findings that the nutrition

curriculum must include nutrition instruction as well as motivate behaviour change so that students make informed choices about the foods consumed. The above study supports the current study on evaluating the National Curriculum for Grades 8–12 in KwaZulu-Natal with special reference to the value of nutrition education. The aim of both studies is to bring about a behavioural change in order to reduce future health costs and develop a healthier lifestyle for future generations.

Research has revealed that coordinating school nutrition education with community-based nutrition is effective in combating poor nutrition (The American Dietetic Association (ADA), 2003). In a separate study supporting school nutrition education, Glickman (1999) states that all the role-players involved in children's lives need to make a contribution if they are to learn to enjoy healthy eating. Involvement at Federal, State and local level is necessary so that funding, training materials, technical assistance and resources are made available so that the goals of providing adequate nutrition information can be achieved.

Establishing nutrition and health education as an element of the school curriculum remains crucial, according to Chang, Xin-Wei, Yang, Ming, Hai, Aldinger and Glasauer (2004). In the study conducted at three primary schools and three secondary schools in Zhejiang in China, it was concluded that interventions must include the introduction of nutrition education in the classroom, changes to school policy and school environment along with school-based health and nutrition services plus active outreach to family and community. The study further emphasised the point that schools alone cannot meet the need for increased nutrition information and that a collaboration of community and quality teacher training is critical for nutritional education.

4.4 Results and discussion of Nutrition Knowledge Questionnaire

The sample comprised of 703 learners (343 boys and 360 girls) from Grades eight–12 in an all-girls' and an all boys' school, in the Durban Central area. These learners have access and finance, on a daily basis, to shopping malls, supermarkets, fast food outlets, school tuck-shops and street vendors that may influence food choices.

The Nutrition Knowledge Questionnaire (NKQ) was used to compare the nutrition knowledge of learners in Grades eight–12 across gender. The NKQ developed by Whati *et al.* (2005) was used in the research and consisted of sixty questions based on the 2003 South African Food Based Dietary Guidelines (SAFBDGs) for healthy people over the age of seven and was sorted into 11 categories for the purpose of reporting (Table 3.3 in Chapter 3).

4.4.1 SAFBDG 1: ‘Enjoy a variety of food’

The results for FBDG 1 ‘Enjoy a variety of food’ are presented in Table 4.5 above. The food variety that is required during pregnancy was grouped under this guideline to test the learner’s ability to identify the importance of healthy eating during pregnancy. The mean score for this FBDG: ‘Enjoy a variety of food’ showed that 55.4% of the boys and 56.3% of the girls answered correctly in this section.

Question 12 on not gaining weight during pregnancy, saw a correct score of 59.4% and 48.8% for the boys and girls, respectively. The results show that 48.2% of the Grade nine girls reported a higher percentage of correct responses as compared to the Grade nine boys with correct responses of 54.2%. The Grade 11 boys reflected 69.2% compared to 37.0% of the Grade 11 girls who answered correctly. Question 38 testing the knowledge on weight gain during pregnancy reflected that the 63.7% of the boys achieved a higher correct score across all the grades compared to 59.2% of the girls.

The results of Question 44 on the variety of foods that pregnant women should consume, reflected that 51.9% of the girls and 47.5% of the boys in Grade eight answered this question correctly.

Question 53 asked which foods pregnant women should eat more of. The results reflected that 48.0% of the boys answered correctly and 55.7% of the girls selected the correct answer. Noticeable differences in the percentage of children that answered correctly were observed between the Grade 10 boys (45.2%) and the Grade 10 girls (66.7%), and the Grade 11 boys and girls at 40.3% and 70.4% respectively.

Questions 16, 17, 18, 19, 21, 23, 24, 35, 37, 40, 48 and 51 asked questions regarding the general variety of food that one should include in one's diet.

The results for Question 16 that asked about eating a variety of foods and different portion sizes of certain foods revealed that the lowest percentage of children with correct responses was attained by girls from Grade eight with 11.1%. The highest percentage of children who correctly answered the questions was 52.5% of the Grade 11 boys. A visibly low percentage of correct responses to Question 16 was 29.6%, and 11.1% by Grade eight boys and girls, respectively. On comparing the percentage of correct responses in Grade 11, 52.5% of the boys and 27.2% of the girls answered correctly. A significantly low percentage of children with correct answers was noted between the Grade nine boys and girls with 22.0% and 24.7% respectively. A notable percentage of children that answered the questions correctly was the Grade 10 boys and girls with 28.8% and 23.3% correspondingly.

The mean score for Question 16 was higher amongst all the boys (35.8%) compared to the mean score of all the girls (24.3%).

Almost 35% of the girls answered the question concerning the choice of food to lose weight correctly (Question 17). Furthermore, 23.7% of the Grade nine boys answered correctly compared to 41.2% of the Grade nine girls, as well as 27.8% of the Grade 11 boys and 49.4% of the girls. A low percentage of children who obtained correct responses was amongst the Grade 10 boys and girls and Grade 12 boys and girls with 21.2%, 22.2%, 29.7% and 29.2% respectively.

Question 18 testing knowledge on the sources of calcium reflected a low percentage of learners with correct responses. The percentage of children with correct answers was between 14.8% and 18.2% amongst the boys and girls, respectively. The lowest score observed in this question was 6.2% by the Grade 12 boys and the highest 30.1%, by the Grade nine girls. A low percentage of children answered questions correctly, 16.7% and 19.7% amongst the Grade eight boys and girls respectively.

A low percentage of children who responded correctly to Question 18 were the Grade 12 boys and girls with 6.2% and 13.8% correspondingly. A low percentage of children who made

correct responses was the Grade 10 boys and girls and the Grade 11 boys and girls with 13.6%, 11.3%, 24.1% and 16.0% respectively.

The question pertaining to healthy snacks (Question 19) shows a slightly higher percentage of children with correct answers compared to the previous question. An above average mean scores of 58.3% and 60.6% for the boys and girls answering the question correctly is noted in this question. The low percentage of children with correct answers recorded for this question was 46.3% and the highest 80.0% by the Grade 10 boys and Grade 12 girls, respectively.

The answers regarding the fibre content in foods (Question 21) revealed that the 56.4% of the girls answered the question correctly compared to 46.5% of the boys. Likewise, in the question dealing with food choices that can prevent disease (Question 23), more girls (72.6%) scored correctly compared to 66.0% of the boys. There was a large difference in the percentage of children who scored correctly between the Grade 11 girls (78.8%) and boys (54.4%). Question 2, which asked about foods that contain fibre, was answered correctly by 82.0% of the boys compared to 85.9% of the girls.

In response to Question 35 on a well-balanced diet, both the groups showed a low score in that 31.1% of the boys and 36.7% of the girls answered correctly. The lowest score (21.5%) was observed in the Grade 10 boys and the highest score (56.7%) in the Grade 10 girls.

However, Question 37 indicated a much higher correct response with 62.2% of the boys and 56.8% of the girls getting the answers correct. This question tested knowledge of the benefits of eating a variety of foods. A large difference was observed between the Grade eight boys (64.3%) and girls (46.0%) and Grade 12 boys (73.8%) and girls (54.7%). Question 38 asked about losing weight during pregnancy where 63.7% of the boys attained a correct score compared to 59.2% of the girls.

In respect of Question 40 on vitamin and mineral supplementation, the learners responded with a correct score of 68.5% and 73.3% by the boys and girls, respectively.. Responses to healthy eating options in Question 48 indicated a high percentage (77.7%) of boys who answered correctly compared to 81.1% of the girls. The lowest percentage of children with correct answers was the Grade 11 boys with 65.8% and the highest percentage of children with correct

responses was 92.3% by the boys in Grade 12. In Grade 11, 81.5% of the girls answered the question correctly compared to 65.8% of the boys. In Grade 12, 92.3% of the boys compared to 76.2% of the girls had correct responses.

Which foods should be consumed in a bid to prevent disease was asked in Question 51. The scores ranged from a low correct score of 47.5% on the part of the Grade 11 girls to 74.0% on the part of the Grade 11 boys. The percentage of boys who answered correctly was slightly higher than the girls i.e. 62.3% compared to 52.8% of the girls.

Question 40 on vitamin and mineral supplementation elicited a correct response by 68.5% of the boys and 73% of the girls. Responses to healthy eating options in Question 48 indicated a high percentage of children with correct answers with 77.7% of the boys and 81.1% of the girls answering correctly. The lowest response was from the Grade 11 boys with 65.8% answering correctly and the highest percentage of correct responses was 92.3% by the boys in Grade 12. The percentage of Grade 11 girls who answered the question correctly (92.3%) was higher than the boys with 81.5%. A high percentage (92.3%) of the Grade 12 boys answered correctly right compared to 76.2% of the girls.

No major difference was observed when comparing the overall score achieved by the boys and girls of the various grades for this FBDG. In Grade eight, 47% of the girls answered correctly. This group attained the lowest percentage. The Grade 12 boys achieved the highest overall correct score (63.8%) for this section. The mean score for this FBDG was 55.4% of the boys and 56.3% of the girls answered correctly.

No significant statistical differences were observed between the boys and girls in the various grades for this section.

Table 4.5 Percentage of learners who answered questions correctly for SAFBDG 1 according to gender for Grades 8, 9, 10, 11 and 12

SAFBDG question number and answer per guideline FBDG 1: Enjoy a variety of food	Boys –grade 8 % correct answers (n=72)	Girls – grade 8 % correct answers (n=65)	Boys – grade 9 % correct answers (n=60)	Girls – grade 9 % correct answers (n=63)	Boys – grade 10 % correct answers (n=67)	Girls – grade 10 % correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
<u>2.</u> Food that pregnant women eat during pregnancy has an effect on her health and the health of her unborn baby.	79.2	66.7	88.1	90.6	95.5	98.4	77.5	92.5	90.6	92.2	86.2	88.1
<u>12.</u> It is necessary for women to gain weight when they are pregnant.	54.2	44.4	54.2	48.2	56.7	71.7	69.2	37.0	62.5	65.6	59.4	48.8
<u>16.</u> The key to a healthy way of eating is to eat different kinds of food, eat some foods more than others and eat certain kinds of food in moderation.	29.6	11.1	22.0	24.7	28.8	23.3	52.5	27.2	46.2	35.4	35.8	24.3
<u>17.</u> Bread, rice, meat, fish and margarine can be eaten when one is trying to lose weight	19.4	31.3	23.7	41.2	21.2	22.2	27.8	49.4	29.7	29.2	24.4	34.7
<u>18.</u> Foods that contain a lot of calcium include milk, yogurt and pilchards.	16.7	19.7	13.6	30.1	13.6	11.3	24.1	16.0	6.2	13.8	14.8	18.2
<u>19.</u> Unbuttered popcorn is a healthy snack.	58.3	50.0	57.6	56.5	46.3	62.9	55.7	53.8	73.8	80	58.3	60.6
<u>21.</u> By eating more apples and carrots the amount of fibre in your diet is increased.	40.0	53.1	36.2	53.7	52.3	69.4	43.0	56.6	60.9	49.2	46.5	56.4
<u>23.</u> Fish, chicken without skin and lean meat prevent certain diseases.	55.6	62.9	72.9	62.7	69.	73.8%	54.4	78.8	78.1	84.6	66.0	72.6
<u>24.</u> Oats, apples and beans contain a lot of fibre.	77.8	75.0	86.2	77.1	87.9	95.1	65.8	89.9	92.2	92.3	82.0	85.9
<u>35.</u> A balanced diet consists of starches, vegetables and fruit with small amounts of meat and dairy.	37.1	31.7	27.6	36.1	21.5	56.7	32.5	29.6	36.9	30.2	31.1	36.9
<u>37.</u> Eating a lot of different kinds of foods is healthier than eating only a few kinds.	64.3	46.0	56.9	61.0	47.6	58.3	68.4	64.2	73.8	54.7	62.2	56.8

38. Overweight women should not try to lose weight when they are pregnant.	52.9	47.7	60.3	51.8	61.9	71.7	66.7	51.2	76.6	73.4	63.7	59.2
40. It is possible to get all the vitamins and minerals you need from food; you do not need to take a vitamin and mineral pill.	71.4	75.0	67.2	75.3	76.9	84.5	56.4	50.0	70.8	81.5	68.5	73.3
44. Pregnant women should not avoid eating different kinds of foods.	48.4	30.6	48.3	50.6	62.7	57.1	57.3	44.3	65.1	54.8	56.4	47.5
48. To make sure that you eat healthily you should eat lean meat, fruits and vegetables, low fat dairy products and breads and cereals.	70	74.6	79.3	86.7	81.3	86.4	65.8	81.5	92.3	76.2	77.7	81.1
51. Avoiding different kinds of foods does not protect you from disease.	57.1	50.0	50.9	50.6	60.7	60.3	74.0	47.5	68.8	55.6	62.3	52.8
53. Pregnant women should eat more milk, cheese, meat, chicken, fish, fruit and vegetables.	39.7	29.5	53.4	60.2	45.2	66.7	40.3	70.4	61.5	51.6	48.0	55.7
Mean % correct answers for FBDG 1	51.2	47.0	52.8	56.3	54.6	62.9	54.7	55.2	63.8	60.1	55.4	56.3
Significance (<i>p-value</i>)	0.334		0.452		0.363		0.177		0.390			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.2 Discussion of the results for SAFBDG 1: ‘Enjoy a variety of food’

Maunder, Matji and Hlatwayo-Molea (2001) acknowledge and support the perspective that consumers purchase appropriate foods from the food groups. However, altering the methods of preparation in order to achieve taste preference can alter the nutritional value of food. Preparation methods to consider when preparing food should include the following, namely: overcome low micronutrient, low energy levels and overconsumption. Despite the importance of the FBDG, the researchers outline the fact that a variety of food is not readily easily available to many South Africans due to food insecurity where millions of people are dependent on staple foods and processed foods on a daily basis.

Steyn and Ochse (2013) report that diets low in variety are likely to be deficient in certain nutrients that can result in food insecurity and consequently result in malnutrition. The report further stated that South Africans do not have sufficient variety in their diet.

Learners’ responses to questions under this FBDG indicated that learners did not have adequate nutrition knowledge with regard to eating a variety of foods. The low percentage of learners who answered the questions correctly is an indication that the curriculum for Grades eight– 12 in secondary schools does not adequately equip the learners with sufficient nutrition knowledge to enable them to lead a healthy lifestyle when they leave school at Grade 12 level. The lack of knowledge of food choices in Question 17 which asked about eating bread, rice, fish and margarine when intending to lose weight resulted in a mean score of 24.4% for the boys and a mean score of 34.7% for the girls.

A lack of knowledge about sources of calcium was evident in the learners’ responses to Question 18, with the percentage of correct answers below 20% (14.8% of the boys and 18.2% of the girls). Steyn and Ochse (2013) reported that the importance of variety ensures adequate dietary intake to promote optimal health. Variety also makes provision for sufficient nutrient intake.

These mean scores for this FBDG indicate that learners from Grades eight–12 have limited nutrition knowledge. Steyn and Ochse (2013) report that ‘Enjoy a variety of foods’ is important and are hopeful that the statement will sensitise and encourage South Africans to select a more diverse diet.

4.4.3 SAFBDG 2: ‘Be active’

The results for FBDG 2 ‘Be active’ are presented in Table 4.6. Question 11 asked about the activities of pregnant women. The following low percentages of boys in Grade 8, 9, 10, 11 and 12 was 26.4%, 30.5%, 23.1%, 40.0% and 33.8%, respectively. The mean score for the boys was 30.8% compared to the mean score of 51.6% for the girls. The percentage of girls that answered Question 11 correctly was 46.9% (Grade eight), 44.7% (Grade nine), 66.1% (Grade 10), 48.1% (Grade 11) and 52.3% (Grade 12).

Question 14 that asked about physical activity and overweight indicated a high percentage of children with correct answers. The results showed that the lowest percentage (86.4%) of boys with correct answers was in Grade eight. The highest percentage of learners to answer the questions correctly was 96.9% by the Grade 12 boys.

Question 22 asked about physical activity and its meaning. The lowest percentage of children who answered the question correctly was 78.5% (Grade 11 boys) compared to 98.8% (Grade 11 girls who also had the highest correct responses).

Eating a healthy diet and being physically active in order to be healthy, was asked in question 26. The results indicated that the lowest percentage of children to attain correct answers was the Grade eight girls (89.1%). All the girls in Grade 12 answered the question correctly. The mean score for Question 26 across all grades showed that the boys scored 94.7% and the girls 97.1%.

Question 29 asked about being involved in physical activity and dieting for weight loss. The lowest percentage of children to achieve correct answers in this question was the girls in Grade eight with 84.1% which was in fact significantly high. The highest percentage of children that answered correctly was 96.9% by the Grade 12 girls. The mean score for Question 29 for all the boys was 90.6% and the score for all the girls was 93.5%. Amongst the Grade 10 boys, 89.4% answered correctly compared to 98.4% of the girls in Grade 10 that answered the question correctly.

The mean score for this FBDG was 78.7% for the boys and 85.3% for the girls. There was no statistical significance for the overall score for this FBDG.

Table 4.6 Percentage of learners who answered questions correctly for SAFBDG 2 according to gender for Grades 8, 9, 10, 11 and 12

SAFBDG question number and answer per guideline: FBDG 2: Be active	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=86)	Boys – grade 10 % of correct answers (n=67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
<u>11.</u> Pregnant women should not sleep most of the day.	26.4	46.9	30.5	44.7	23.1	66.1	40.0	48.1	33.8	52.3	30.8	51.6
<u>14.</u> People who are overweight should be physically active.	88.7	95.3	86.4	94.0	90.9	88.9	87.5	90.0	96.9	87.5	90.0	91.1
<u>22.</u> Being physically active means going to gym, walking a lot, playing sport like soccer and netball.	86.1	81.5	86.4	96.4	92.5	95.2	78.5	98.8	93.8	95.4	94.7	93.4
<u>26.</u> Eating a healthy diet and being physically active is important to stay healthy.	93.0	89.1	98.3	97.6	92.5	100.0	91.1	98.8	98.5%	100.	94.7	97.1
<u>29.</u> Weight loss is better with being physically active and one simple diet.	88.7	84.1	94.8	96.5	89.4	98.4	86.1	91.4	93.8%	96.9	90.6	93.5
Mean % correct answers for FBDG 2	76.5	79.3	79.2	85.8	77.6	89.7	76.6	85.4	83.6%	86.4	78.7	85.3
Significance (<i>p-value</i>)	0.304		0.304		0.257		0.248		0.301			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.4 Discussion of the results for SAFBDG 2: ‘Be Active’

The results of this study for the FBDG: ‘Be Active’ indicate that although the mean results were between 70% and 80%, there was still a lack of knowledge on being active in certain areas. Botha, Wright, Moss and Kolbe- Alexander (2013) reported that SAFBDG 2: ‘Be Active’ is a determinant of energy balance and linked to a reduction of mortality and morbidity that is associated with physical activity.

Ding and Hu (2010) concluded that promoting a healthy diet and physical activity are equally important to maintain a healthy body weight and reduce the risk of non-communicable disease and premature death. Question 11 that asked about women sleeping during the day when pregnant, revealed that a low percentage of learners attained correct answers. A high percentage of learners responded with correct answers to Questions 14, 22, 26 and 29 about physical activity to lose weight and stay healthy – here there was evidence of knowledge of the importance of physical activity. The lowest percentage of learners to attain correct responses was 78.7% compared to 97.1% which was the highest percentage of learners who responded with correct answers. However, in a contrasting study amongst students in Tswaing High School in Pretoria by Letlape, Mokwena and Oguntibeju (2010), it was established that 77.0% of the students do not have adequate knowledge on diet, nutrition and exercise and that the majority of the students did not engage in physical activities. Botha *et al.* (2013) concluded that the consequence of inactivity in South Africans is increased levels of overweight and obesity. This, coupled with a poor diet, can lead to chronic disease.

4.4.5SAFBDG 3: ‘Drink lots of clean, safe water’

The results for the Food Based Dietary Guideline ‘Drink lots of clean safe water’ are presented in Table 4.7. In Question 5, 55.2% of boys in Grade 9 attained correct responses which was the lowest of all the groups, compared to 78.8% of the girls in Grade 9, with the highest percentage of children with correct responses. In this question the percentage of boys that answered the questions correctly was lower than that of the girls across all grades.

The mean score for Question 5 for the all the boys was 64.6% compared to the score for the girls which was 76.1%. With regard to knowledge of the number of glasses of water to consume per day, more than 50% of all learners attained correct responses from Grades 8 to 12.

Question 27 asked whether boiled water should be drunk to lose weight. The result revealed that the lowest percentage of children to respond correctly to this question was 35% of the Grade 11 girls, whereas 58.2% of the boys in Grade 11 obtained correct responses. The highest percentage of children who correctly answered Question 27 was the Grade 12 boys with 66.2%. A remarkably low percentage of girls in Grade 12 (40.6%) attained correct answers. In Question 27 a higher percentage of boys attained correct responses compared to the girls across all the grades. The mean score for the question for the boys was above average with 61.8% compared to the mean score for the question for the girls at 39.6%.

Question 30 asked whether all water is safe to drink and the analysis revealed that the lowest percentage of correct answers of 89.9% was returned by the boys in Grade 11 and the highest percentage was returned by the boys in Grade 9 (98.3%). The mean score for the question was 94.0% for the boys compared to the mean score for the girls at 94.7%.

The mean score for this FBDG: ‘Drink lots of clean safe water’ was 73.4% for the boys and 70.1% for the girls. There were no statistical significance differences between the boys and girls in all the grades.

Table 4.7 Percentage of children that answered questions correctly for SAFBDG 3 according to gender for Grades 8, 9, 10, 11 and 12

SAFBDG, question number and answer per guideline	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=86)	Boys – grade 10 % of correct answers (n=67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
FBDG 3: Drink lots of clean, safe water												
5. Drink 7 to 9 glasses of water daily.	64.8%	76.9	55.2	78.8	75.8	76.2	64.6	75.3	62.5	73.4	64.6	76.1
27. Drinking boiling water does not cause weight loss.	62.9	35.9	57.6	44.6	64.1	41.9	58.2	35.0	66.2	40.6	61.8	39.6
30. All water is not safe for drinking.	94.1	92.2	98.3	95.2	92.5	96.8	89.9	92.4	95.4	96.9	94.0	94.7
Mean % correct answers for FBDG 3	73.9	68.3	70.3	72.8	77.4	71.6	70.9	67.5	74.7	70.3	73.4	70.1
Significance (<i>p-value</i>)	0.262		0.227		0.417		0.240		0.280			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.6 Discussion of the results for SAFBDG 3: ‘Drink lots of clean safe water’

The results for this FBDG suggest that learners did not have adequate nutrition knowledge and could not distinguish between myth and fact when confronted by Question 27 which asked about drinking boiling water to lose weight. The mean score for boys in this question was 61.8% and the mean score for girls was 39.6%. The percentage of boys that answered Question 5 (how many glasses of water to drink per day) correctly was 64.6% and the percentage of girls was 76.1%.

Von Graan, Bopape, Phooko, Bourne and Wright (2013) outlined the importance of FBDG 3: ‘Drink lots of clean safe water’ and indicated that water is essential to life, and is an important multifunctional constituent of the body. These results show that more than two thirds of the learners across the grades from Grade 8 to Grade12 knew how many glasses of water should be drunk. Von Graan *et al.* (2013) reported that water deficiency results in dehydration which is detrimental to the health.

Wenhold and Faber (2009) postulated that water is essential for all people. The researchers also reported that in South Africa where there is a major concern about excess body weight, the balance between energy and nutrient content of beverages must be investigated. Another vital issue raised in the study was that in some provinces in South Africa only 9.4% of households had piped water and this could lead to households using unsafe or contaminated water resulting in disease.

4.4.7 SAFBDG 4: ‘Make starchy foods the basis of most meals’

The Food Based Dietary Guideline ‘Make starchy foods the basis of most meals’ is represented in Table 4.8. Question 4 asked whether starch should be included in most meals. The results show that the lowest percentage of children to answer correctly was 47.5% for the Grade 8 girls whilst the highest percentage of 75.4% was for the Grade 10 girls. The mean score for Question 4 for the boys was 65.9% compared to the mean score for the girls which was 64.4%. In Grade 8, 66.2% of the boys answered this question correctly compared to 47.5% of the girls. However, a higher percentage of 53.8% of the boys in Grade 11 answered correctly compared to 70.4% of the girls in Grade 11.

The mean score for Question nine (Should most foods come from the starch food group?) for all the boys was 35.3% compared to the mean score of 32.2% for all the girls. A percentage of 36.3% of boys in Grade 11 achieved correct answers compared to a low 16.0% of the girls in Grade 11. The percentage of children in Grade 12 that answered correctly was 29.7% of the boys compared to the low percentage of 12.3% of the girls in Grade 12. The highest percentage of children with correct responses was 68.6% of the Grade 8 boys followed by 59.4% of the Grade 8 girls. A particularly low percentage of children to attain correct responses was the Grade 9 boys and girls with 27.1% and 27.9% respectively. An astonishingly low 14.9% of boys in Grade 10 answered this question correctly.

Correct responses to Question 45 that asked about foods that are rich in fibre ranged from the lowest percentage of children with correct answers by the Grade 8 boys (63.3%) to the highest percentage of children that answered correctly which was the Grade 10 girls with 86.9%. The percentage of boys in Grade 10 that answered this question correctly was 62.5% compared to 86.9% of girls in Grade 10. The results also showed a considerable difference between the Grade 11 boys and the Grade 11 girls, at 63.3% and 86.3% respectively who answered the question correctly.

The mean score for Question 47 about eating starchy foods when one is trying to lose weight showed a mean score of 42.6% by the boys compared to 47.7% by the girls. In this question the percentage of children in Grade 11 that attained correct responses was 40.3% achieved by boys compared to 55.0% by girls. In Grade nine, 37.3% of the girls attained the lowest correct

responses to this question. Apart from the girls in Grade nine, notably all the other girls attained a higher percentage of correct answers for this question compared to the boys. The results also reflected that the percentage of children in Grade eight who answered this question correctly was 45.2% of the boys and 50% of the girls which was better than for most grades.

The results for Question 49 which asked whether weight would be gained by eating bread show that the lowest percentage of children that answered this question correctly was 57.8%. This low percentage was attained by the Grade nine girls compared to the highest percentage of children which was 79.7% of the Grade 12 boys. The percentage of boys and girls in Grade eight who attained correct answers was higher than that of the Grade nine learners. The mean score for Question 49 for boys was 66.2% for the boys compared to a mean score of 65.3% for the girls.

The mean score for FBDG 4 was 55.3% for the boys and 57.8% for the girls. There was no statistical significance between the grades and the genders for the overall score for this FBDG.

Table 4.8 Percentage of children that answered questions correctly for SAFBDG 4 according to gender for Grades 8, 9, 10, 11 and 12

SAFBDG question number and answer per guideline FBDG 4: Make starchy foods the basis of most meals	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=63)	Boys – grade 10 % of correct answers (n=67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
4. Eat starches at most meals	66.2	47.5	74.1	64.3	69.7	75.4	53.8	70.4	65.6	64.5	65.9	64.4
9. Eat most food from the bread, samp, rice, and porridge food group every day.	68.6	59.4	27.1	27.9	14.9	45.2	36.3	16.0	29.7	12.3	35.3	32.2
45. Whole-wheat bread contains the most fibre.	62.3	67.2	65.5	75.9	62.5	86.9	63.3	86.3	81.5	82.5	67.0	79.8
47. Starchy foods must be eaten when one is trying to lose weight.	45.2	50.0	40.4	37.3	41.9	42.1	40.3	55.0	45.3	54.0	42.6	47.7
49. Eating bread does not cause weight gain.	64.2	70.1	56.9	57.8	66.7	77.0	63.9	58.8	79.7	62.9	66.2	65.3
Mean % correct answers for FBDG 4	61.3	58.8	52.8	52.6	51.1	65.3	51.2	57.3	60.3	55.2	55.3	57.8
Significance (<i>p-value</i>)	0.372		0.591		0.333		0.125		0.429			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.8 Discussion of the results for SAFBDG 4: ‘Make starchy foods the basis of most meals’

Vorster (2013) reported that this FBDG is valuable to the diet because it contributes the principal energy source. In addition; it provides fibre and micronutrients that contribute to adequate nutrition plus grains that are minimally processed. Legumes and root vegetables help to protect against non-communicable diseases. The implication of the results in this study suggests that the secondary school curriculum does not prepare the learners adequately to understand and apply nutrition knowledge to everyday life as the highest percentage of correct responses by the learners for this guideline was 65.3%.

This study also revealed that for Question 45, related to the fibre content of wholegrain cereal, the lowest percentage of children to attain correct responses was 62.3% compared to the highest percentage of children, 86.9% who responded with correct answers. Results show that for this question a high number of children were aware of the importance of unrefined starchy foods. The health benefits of fibre-rich foods are supported by Vorster (2013).

4.4.9 SAFBDG 5: ‘Eat plenty of fruit and vegetables’

The results for the Food Based Dietary Guideline ‘Eat plenty of fruit and vegetable’ are presented in Table 4.9. Question 7 asked about the portion size of vegetables and the lowest percentage of children who correctly answered the question was 23.1% of the Grade 12 boys compared to the highest percentage of children, 41.5% of the Grade 12 girls. Other notable low percentages of children that answered the question correctly included 25.4% of Grade nine boys and 27.6% of Grade 10 girls. The mean score for this question for boys was 30.4% compared to a mean score for girls at 33.4%.

The hygienic preparation of vegetables is the focus of Question 15. The percentage of Grade 11 children that responded correctly included the lowest percentage of children at 86.3% amongst the boys compared to the highest percentage of 97.5% girls. The percentage of boys that scored correct answers in Grade eight was 90.1%, whereas 87.5% of the boys in Grade 12 attained correct responses. The mean score for Question 15 for the boys was 90.9% compared to a mean score of 94.4% for the girls.

Question 25 asked the children about the quantity of fruits and vegetables for daily intake. In Grade eight, 31.4% percentage of boys achieved correct responses in contrast to 16.9% of the girls. The percentage of children in Grade nine to attain correct answers for boys and girls was 25.4% and 25.9% respectively, which indicates a low percentage of correct responses. In Grade 12, 23.1% of the girls answered the question correctly which is low compared to 46.0% of the boys who answered the question correctly. The mean score for the question by all the boys was 32.4% and the mean score by the girls was 21.8%.

Question 42 enquired about the nutrients found in vegetables and fruit. The lowest percentage of children that correctly answered this question was for the Grade 11 boys with 52.6%, and the highest percentage of children that responded correctly was 86.0% by the Grade 10 girls. With the exception of the Grade nine girls, the percentage of girls from other grades that answered the question correctly was lower than that for the boys. The mean score for this question for the boys was 65.0% compared to the girls at 65.5%. For Question 42 the boys in Grade 10 achieved a 66.7% percentage of correct scores and the girls achieved 86.0% which

was a much higher percentage than the boys. The boys in Grade 12 achieved 78.5% of correct answers and the girls in Grade 12 attained 57.1% of correct answers.

Question 57 asked which food group contains the most vitamin A. The lowest percentage of children to respond correctly to this question was for the Grade nine girls with 52.5%, and the highest percentage of children that answered this question correctly was 75.4% for the Grade 12 boys.

In Grade 10, the percentage of boys that correctly answered the question was 57.6% compared to 75.0% of the Grade 10 girls. However, in Grade 12, the percentage of children that answered the question correctly was 75.4% which was higher compared to the low percentage of 57.1% for the girls in Grade 12. The mean score for Question 57 was 60.6% for the boys compared to the mean score of 58.6% for the girls. The mean score for this FBDG showed very similar results with the boys at 53.8% and girls at 54%.

Table 4.9 Percentage of children that answered questions correctly for SAFBDG 5 according to gender for Grades 8, 9, 10, 11 and 12

SAFBDG question number and answer per guideline FBDG 5: Eat plenty of fruits and vegetables	Boy- grade 8 % correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=60)	Boys – grade 10 % of correct answers (n=67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
<u>7.</u> Half a cup is a portion of cooked vegetables.	30.6	30.2	25.4	36.5	42.4	27.6	30.4	31.3	23.1	41.5	30.4	33.4
<u>15.</u> It is necessary to wash vegetables before you cook them.	90.1	88.9	96.6	95.2	94.0	96.8	86.3	97.5	87.5	93.8	90.9	94.4
<u>25.</u> 5 or more fruits and vegetables should be eaten daily	31.4	16.9	25.4	25.9	32.8	22.2	26.6	21.0	46.0	23.1	32.4	21.8
<u>42.</u> Fibre and vitamin A are found in large amounts in fruit and vegetables.	58.8	62.9	68.4	53.8	66.7	86.0	52.6	67.9	78.5	57.1	65.	65.5
<u>57.</u> Carrots, spinach and sweet potatoes have the most Vitamin A.	48.6	50.8	53.4	52.5	57.6	75.0	68.0	54.8	75.4	59.7	60.6	58.6
Mean % correct answers for FBDG 5	51.9	49.9	53.8	52.7	58.7	61.5	52.8	54.1	51.8	55.0	53.8	54.6
Significance (<i>p-value</i>)	0.625		0.558		0.154		0.114		0.064			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.10 Discussion of the results for SAFBDG 5: ‘Eat plenty of fruit and vegetables’

Naude (2013) explains that the FBDG ‘Eat plenty of fruits and vegetables’ is a guideline that shows the importance of this food group to reduce disease risk and indicated that South Africans consumed lower quantities of fruit and vegetables than recommended by the WHO at >400g per day (WHO 2003). Naude’s research supports this research on the evaluation of the National School Curriculum for Grades eight to 12 with a focus on nutrition, which revealed that the children attained a very low score when asked about the number of portions of fruit and vegetables to be eaten daily. The boys had a mean score of 32.4% and the girls’ mean score was 21.8%.

Question 7 asked about portion sizes of cooked vegetables. The boys scored 30.4% of correct answers and the girls scored 33.4%, suggesting that the current school curriculum does not contain enough nutrition content to educate the learners on the importance of fruit and vegetables in the diet.

Love and Sayed (2001) agree with Naude that Question 7 presents a challenge to South African educators who would find it difficult to convince their learners to increase their daily consumption of fresh fruit and vegetables because of economic constraints. In this research it was evident that learners’ knowledge about the value of fruits and vegetables in the diet was low.

Tuso, Ismail, Ha and Bartolotto (2013) reported on the benefits of plant-based diets, and outlined that this type of diet is cost-effective and carries a lower risk to health problems when used to treat various lifestyle disease. In a study amongst American adolescents, the students agree that fruit and vegetables are an essential component of a healthy diet that is directly related to positive health. The researchers support other research findings that the recommended intake of fruit and vegetables is not followed by most people (Kimmos, Gillespie, Seymor, Serdula and Blanck, 2009).

4.4.11FBDG 6: ‘Eat dry beans, peas, lentils and soya regularly’

Table 4.10 indicates the results based on the Food Based Dietary Guideline ‘Eat dry beans, peas, lentils and soya regularly’. Question 54 asked about including dry beans, lentils and soya often in the diet. The learners in Grade 12 achieved low correct responses with 23.1% for the boys and 41.5% for the girls. The percentage of children in Grade 12 that attained correct responses was the lowest across all the grades. The highest percentage of children in Grade 10 that answered the question correctly was for the girls who attained 82%, whereas the percentage of boys in Grade 10 who attained correct answers was 69.4% and this is significantly lower than the girls’ score. The mean score for this question was above average for the boys at 59.4% compared to a mean score for the girls of 63.6%.

For Question 55, asking about soya mince being healthier than meat, the percentage of children who correctly answered the questions in Grade 12 was 87.5% for the boys and 93.8% for the girls. Low percentages of children who answered correctly are reflected amongst the Grade eight and nine boys and girls, being 45.7%, 47.5%, 53.4% and 46.9% respectively. The mean score for the question for boys was 54.8% and for the girls was 57.2%.

The use of dry beans, peas and lentils as a healthy replacement for meat is suggested in Question 58. Results for this question reflect that 55.1% of the boys in Grade eight attained correct answers whereas 77.0% of the girls in Grade eight answered the question correctly, showing a remarkable difference between the percentages for boys and girls in that grade. The percentages for boys and girls in Grade 12 who attained correct responses to Question 58 were the lowest amongst all the grades at 46.0% and 23.1% respectively. The percentage of boys and girls in Grade 11 who answered the question correctly was 65.8% and 86.4% respectively, indicating that a higher percentage of girls responded with correct answers. The mean score for the boys in this question was 57.9% and for the girls it was 71.4%.

The value of beans, peas and lentils in the diet is raised in Question 60. The results showed that the percentage of children in Grade 12 who attained correct responses was 78.5% and 57.1% for the boys and girls, respectively, indicating a higher percentage of correct responses amongst the boys in this grade. The percentage of Grade 11 children who attained correct answers was 43.6% and 67.9% for boys and girls respectively, showing that for this question, more girls

than boys in Grade 11 answered correctly. The Grade 10 results showed the percentage of correct responses as 34.4% and 54.1% respectively for boys and girls. Results indicated a difference of 19.9% between the girls and boys who had correct responses. The percentage of Grade eight girls that answered the question with correct responses was 27.9% which is a lower percentage than that of boys in the same grade with 44.3% who attained correct responses. The mean score for boys was 48.8% as compared to the mean score of girls 51.3% for Question 60.

The mean score for this FBDG: 'Eat dry beans, peas, lentils and soya regularly' showed 55.2% for boys and 60.8% for girls.

Table 4.10 Percentage of children that answered questions correctly for SAFBDG 6 according to gender for Grades 8, 9, 10, 11 and 12

SAFBDG question number and answer per guideline FBDG 6: Eat dry beans, peas, lentils and soya regularly	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=86)	Boys – grade 10 % of correct answers (n= 67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
54. Dry beans, peas, and lentils should be eaten often.	62.9	50.8	77.6	69.5	69.4	82.0	64.1	74.1	23.1	41.5	59.4	63.6
55. Soya mince is as healthy as meat.	45.7	47.5	53.4	46.9	41.3	41.0	46.2	57.0	87.5	93.8	54.8	57.2
58. Dry beans, peas, lentils are a healthy choice to eat in place of meat.	55.1	77.0	74.1	85.5	48.3	85.0	65.8	86.4	46.0	23.1	57.9	71.4
60. Beans, peas and lentils contain small amounts of fats, large amounts of fibre and protect you from disease therefore they are good for you.	44.3	27.9	43.1	49.4	34.4	54.1	43.6	67.9	78.5	57.1	48.8	51.3
Mean % correct answers for FBDG 6	52.0	50.8	62.0	62.8	48.3	65.5	54.9	71.3	58.7	53.8	55.2	60.8
Significance (<i>p-value</i>)	0.268		0.326		0.277		0.889		0.064			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.12 Discussion of the results for SAFBDG 6: ‘Eat dry beans, peas, lentils and soya regularly’

The results for FBDG 6: ‘Eat dry beans, peas, lentils and soya regularly’ show that a low percentage of girls responded correctly to Questions 54, 55, 58 and 60. Venter and Vorster (2013) report that educational programmes on legume consumption for the entire public should be encouraged because pulses have a high protein value, and contain slow release carbohydrate, dietary fibre, various vitamins and mineral substances, fat and sodium. The benefits that have been highlighted contribute to dietary adequacy and protection against non-communicable disease. This question yielded a low 23.1% for learners who answered correctly, indicating that learners need to be educated on the benefits of eating pulses and soya.

Craig (2010) based his research on vegetarian diets and highlighted that increased consumption of dietary fibre, low saturated fat and cholesterol intake, greater intake of fruit and vegetables, whole grain, legumes and nuts as well as soya products generally contributes to better health.

Scully, Bixon, White and Beckmann,(2007) conducted a study amongst Australian secondary students using 24-hour dietary recall from the 1995 National Nutrition Survey and concluded that most adolescents aged 10–15 years do not consume legumes. The research strongly recommended that policies must be put in place to encourage healthy food choices. However, in a study conducted by Perez-Rodrigo, Ribas, Serra Majem and Aranceta, (2003) it was evident that lentils and garbanzo beans was a popular food choice amongst both boys and girls of Spanish origin.

4.4.13SAFBDG 7: ‘Chicken, fish, meat, milk and eggs can be eaten daily’

The Food Based Dietary Guideline ‘Chicken, fish, meat, milk and eggs can be eaten daily’ analysis is presented in Table 4.11. The inclusion of milk, cheese and yoghurt intake in the diet of pregnant women is asked in Question 13. A high percentage of the learners answered this question correctly with the lowest percentage of learners being 78.9% amongst the Grade eight boys compared to the highest percentage of learners which was 93.8% for both the Grade eight and 12 girls. The results also reflected that 79.7% of the boys in Grade nine achieved correct answers and 91.8% of the girls answered the question correctly and this indicates a considerable discrepancy. The mean score for the boys in this question was 84.8% and the mean score for the girls was 94.2%.

The milk or maas intake for a day is asked in Question 33. The results showed that below 40% of children in most of the grades answered the question correctly. The percentage of girls in Grade 12 who answered correctly was 9.2% and this was the lowest percentage of children to attain correct answers. The percentage of Grade 12 boys who attained correct answers was 40.0%. This was the highest percentage of children with correct responses amongst all the children in the study. A notable result was that in all grades except Grade nine, the percentage of boys in each grade that answered the question correctly was higher than for the girls. The mean score for this question for the boys was 31.4% and the mean score for the girls was 20.9%.

In Question 56, the size of the portion of meat to be consumed daily was asked, and the percentage of children that attained correct answers ranged from 80.9% to 96.7% across the grades. The percentage of boys in Grade 10 that attained correct responses was 83.9% compared to 96.7% of the girls who achieved correct responses. The percentage of boys in Grade 11 who answered this question correctly was 71.4%, whereas 91.3% of the girls attained correct responses. The mean score of correct answers for this question was 83.0% for the boys and 90.7% for the girls.

The mean score for SAFBDG 7: ‘Chicken, fish, meat, milk and eggs can be eaten daily’, was 66.4% for the boys and 68.7% for the girls. There was no statistical significance for the overall score for this FBDG between the grades or between the boys and girls.

Table 4.11 Percentage of children that answered questions correctly for SAFBDG7 according to gender for Grade 8, 9, 10, 11 and 12

SAFBDG question number and answer per guideline FBDG: Chicken, fish, meat, milk and eggs can be eaten daily	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=86)	Boys – grade 10 % of correct answers (n=67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
13. It is healthy for pregnant women to eat foods like milk, cheese, and yoghurt.	78.9	93.8	79.7	91.8	89.1	95.2	90.0	97.5	86.2	93.8	84.8	94.2
33. 2 cups milk of maas should be consumed daily.	29.0	20.0	22.0	20.5	29.2	24.1	36.7	30.9	40.0	9.2	31.4	20.9
56. One cannot eat as much meat as you want every day.	80.9	85.0	93.1	88.8	83.9%	96.7	71.4	91.3	85.9	91.9	83.0	90.7
Mean % correct answers for FBDG 7	62.9	66.2	64.9%	67.0	67.4	72.0	66.0	73.2	70.7	64.9	66.4	68.7
Significance (<i>p-value</i>)	0.259		0.416		0.247		0.163		0.121			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.14 Discussion of the results for SAFBDG 7: ‘Chicken, fish, meat, milk and eggs can be eaten daily’

Vorster, Wenhold, Wright, Wentzel-Viljoen, Venter and Vermaak (2013) reported that FBDG7: ‘Chicken, fish, meat, milk and eggs can be eaten daily’ is important because these foods play an important part in human development and wellbeing. Furthermore, this FBDG encourages the consumption of complete protein that is of high quality and easily digested and which provides essential micronutrients. The results for this FBDG ‘Chicken, fish, meat, milk and eggs can be eaten daily’ in this study reinforce the premise of this study that the school curriculum for Grades 8 to 12 does not equip children with appropriate nutrition knowledge to enable them to make correct food choices and live a healthy lifestyle. In Question 33 asking about portions of milk or maas to be consumed daily, the mean score for boys was 31.4% and the mean score for girls was 20.9%, showing limited nutrition knowledge amongst the learners in this sample group.

A review by Schonfeldt, Pretorius and Hall (2013) highlighted the nutritional benefits of eating chicken, fish, meat, milk and eggs daily because they contains complete protein and essential micronutrients. The researchers also stress that appropriate quantities will be of significance to good health; however, overconsumption of chicken, fish, meat, milk and eggs can lead to overweight, obesity and result in unhealthy lifestyle.

4.4.15 SAFBDG 8: ‘Use fats sparingly’

The results for the Food Based Dietary Guideline ‘Use fats sparingly’ are presented in Table 4.12. Question 2 asked if cooked meat, fish, chicken sold on the street issafe to eat. The highest percentage of children with correct answers was 98.4% of Grade 10 girls, whereas the lowest percentage of children to achieve correct responses was 66.7% of the Grade 8 girls. The percentage of children that answered correctly indicates an awareness of the health risks involved when buying food on the street. The percentage of boys in Grade 11 who attained correct answers was 77.5% compared to the girls in the same grade where 92.5% answered this question correctly. The mean score for this question was high, for the boys it was 86.2% and for the girls 88.1%.

With reference to identifying a healthy snack as asked in Question 8, the percentage of children that answered the question correctly ranged from 68.6% to 95.4%. The percentage of boys in Grade 12 who attained correct responses was 95.4% which was the highest percentage of children to answer the question correctly. In Grade nine a higher percentage of boys, 77.6%, attained correct answers compared to 70.6% of the girls. The mean score for this question was 79.9% for the boys and 78.5% for the girls.

The choice of a breakfast menu with a low fat content was asked in Question 43. The results showed that 21.9% of the boys in Grade 10 achieved correct answers in this question compared to 62.7% of the girls in Grade 10. The percentage of boys in Grade 11 that answered this question correctly was 32.9% compared to a higher percentage of 49.4% for girls in Grade 11. The mean score for this question for boys was 38.8% and for the girls it was 46.2%.

How to defrost meat correctly in Question 46 reflected the following responses: the lowest percentage of learners with correct answers was 14.1% from Grade 12 boys compared to the highest percentage, 39.0%, for the Grade 9 girls. The results for other grades in respect of learners who correctly answered this question ranged from 18.5% to 29.7%. In Grade nine, 19.0% of the boys achieved correct answers compared to 39.0% of the girls. The results indicated that 20% more girls than boys answered this question correctly in Grade nine. The mean score for this question was low – for the boys it was 20.4% and for the girls it was 25.1%.

In Question 50 that asked about identifying foods with a fat content, the lowest percentage of learners who responded correctly to this question was in Grade nine with 39.7%. A percentage of 59.0% of the Grade nine girls answered this question correctly. The highest percentage of learners to respond with correct answers was for the Grade 12 boys with 75.4%. The percentage of boys and girls in Grade eight who correctly answered the question was 41.4% and 41.0% respectively. The mean score for this question for boys was 55.6% and for the girls it was 56.5%.

Question 59 asked about correct food storage and food spoilage and the lowest percentage of learners to correctly answer the question was 26.2% of the Grade eight girls and the highest percentage of learners to correctly answer this question was 53.8% of the Grade 12 boys. The percentage of Grade 12 girls who answered the question correctly was 33.9%, which was

19.9% less than the boys in Grade 12. The percentage of boys and girls who answered this question correctly in Grade 10 was 41.9% and 37.7% respectively. The mean score for Question 59 was below average, being 43.8% for the boys and 38.6% for the girls.

The mean score for this FBDG: 'Eat fats sparingly' showed a 4.1% difference in scores for boys and girls at 54.1% and 55.5% respectively. However the statistical significance for the overall score for this FBDG was for the Grade eight boys and girls $p<0.358$; Grade nine boys and girls $p<0.383$; Grade 10 boys and girls $p<0.443$; Grade 11 boys and girls $p<0.349$; and Grade 12 boys and girls was $p<0.290$.

Table 4.12 Percentage of children that answered questions correctly for SAFBDG 8 according to gender for Grades 8, 9, 10, 11 and 12

SAFBDG question number and answer per guideline	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=86)	Boys – grade 10 % of correct answers (n=67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Meanscore for the question all Girls %
FBDG: Eat fats sparingly												
<u>2.</u> Cooked meat, fish and chicken sold on the street may be undercooked, and may have been kept for a long time before being sold and therefore may not be safe to eat.	79.2	66.7	88.1	90.6	95.5	98.4	77.5	92.5	90.6	92.2	86.2	88.1
<u>8.</u> Popcorn is a low fat snack.	68.6	59.4	77.6	70.6	83.1	88.5	75.0	85.0	95.4	88.9	79.9	78.5
<u>43.</u> Whole wheat toast with thinly spread margarine and weetbix with 2% fat milk has less fat than bacon and egg.	40.6	34.4	44.8	43.9	21.9	62.7	32.9	49.4	53.8	40.6	38.8	46.2
<u>46.</u> The best place to defrost meat from a frozen state is to leave it in the fridge.	20.3	29.7	19.0	39.0	18.5	23.0	24.4	19.8	20.0	14.1	20.4	25.1
<u>50.</u> Grilled lean steak and boiled carrots are lowest in fat compared to cornflakes and full cream milk, pizza and milkshake and fried lamb chops and creamed spinach.	41.4	41.0	39.7	59.0	60.3	57.6	61.0	58.0	75.4	66.7	55.6	56.5
<u>59.</u> Meat, fish and chicken will not spoil if you store them in a fridge for 2 days only or store them in the freezer for 3-4 months.	38.6	26.2	36.2	43.9	41.9	37.7	48.7	51.2	53.8	33.9	43.8	38.6
Mean % correct answers for FBDG 8	48.1	42.9	50.9	57.8	53.5	61.3	53.2	59.3	64.8	56.0	54.1	55.5
Significance (<i>p-value</i>)	0.358		0.383		0.443		0.349		0.290			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.16 Discussion of the results for SAFBDG 8: ‘Use fats sparingly’

Smuts and Wolmarans (2013) report that the FBDG: ‘Eat fats sparingly’ is important for people eating a Western diet which is rich in saturated fatty acids. They are at risk of developing cardiovascular disease and weight gain. They are encouraged to consume vegetable oils rather than hard fats. In this research children showed limited knowledge in identifying products low in fat. For Question 43 which asked about the use of low fat products in a meal, the mean scores was low – for boys it was 38.8% and the mean score for girls was 46.2%. In Question 50 the learners were asked to identify foods with either a high fat content or a low fat content. The results show that the mean scores for the boys and girls was 55.6% and 56.5% respectively. Question 59 tested knowledge about storage conditions for perishable foods and the all grades scored below 60%. Boys’ attained a mean score of 43.8% and girls’ mean score of 38.6% suggests that the school curriculum lacks essential relevant content.

Question 46 that asked for a response about storage conditions resulted in very low mean scores of 20.4% and 25.1% attained by boys and girls respectively. The mean scores attained in the question above reinforces the perception that the school curriculum fails to equip learners with adequate essential nutrition knowledge.

The results further strengthen the conclusion of the researcher in this study that the secondary school curricula for Grades eight to 12 do not effectively equip learners leaving school at Grade 12 level with sufficient nutrition knowledge. The overall mean score for the Grade 12 boys and girls was 54.1% each for this FBDG, indicating that 46.9% of the nutrition knowledge in this FBDG was lacking. Smuts and Wolmarans (2013) reported further that although fat is an important source of energy it is recommended that energy intake is balanced with energy expenditure.

However, in Question 50 which required learners to identify high fat meals, the percentage of learners that correctly answered the question ranged from 39.7% to 75.4% indicating that many learners do not know the sources of high fat foods.

Supporting the research findings of this study, Venter and Winterbach (2010) reporting on findings made by the National Risk Behaviour Survey (2008) found that there was a high

proportion of South African learners in Grades eight to 11 who consumed large amounts of foods rich in fat, fast food, cakes and biscuits. The study showed that learners who obtained poor scores were the learners who consumed high fat diets. The study also showed that mid-adolescents from urban to upper socio-economic areas are not consuming food recommended in the South African dietary guidelines. A lack of knowledge on dietary fat was outlined in the abovementioned study. Dietary awareness and knowledge are seen as key aspects to influence dieting patterns of adolescents and encourage healthy selection of foods.

The ramifications of overweight and incorrect eating and an exercise routine is outlined by the Mayo clinic (2012), who states that an improved eating plan and exercise routine for the whole family improves and combats obesity. Obesity is seen to physiologically manifest itself in type 2 diabetes and metabolic syndrome. In addition to the health issues mentioned above, high cholesterol and high blood pressure are also associated with obesity. Asthma and other breathing problems are also exacerbated by obesity. Sleeping disorders, early puberty or menstruation are also signs of obesity. In school, socially and emotional complications that are evident include low self-esteem along with bullying, behaviour and learning problems, and depression. These conditions further disrupt the process of teaching and learning, limiting the coverage of curriculum content.

4.4.17 SAFBDG 9: ‘Use salt sparingly’

Table 4.13 indicates the results based on the Food Based Dietary Guideline ‘Use salt sparingly’. Results for Question 6 which asked about adding salt to cooked food before eating showed that the lowest percentage of children to answer this question correctly was 79.2% amongst the boys in Grade eight compared to the highest percentage of learners which was 89.1% for the Grade 12 girls with correct answers. In all grades except for the Grade eight boys, the percentage of children to attain correct responses was over 80%. The mean score for the boys and girls was high with 84.3% and 86.2%, respectively.

Question 20 asked about iodine-rich foods. The percentage of learners with correct responses varied from 35.7% for the Grade eight boys to 61.5% for the boys in Grade 12. In Grade nine, 36.2% of the boys and 53.7% of the girls achieved correct answers for Question 20, which shows that 17.5% more girls scored correct answers. The percentage of children in Grade 10 that answered the question correctly was 32.3% of the boys and 41.0% of the girls, indicating here that 7.7% more girls attained correct answers for this question. In Grade 11 the percentage of boys that attained correct responses was 47.4% compared to 55.1% of the girls who answered the question correctly. The mean score for Question 20 was 42.6% for the boys and 48.0% for the girls.

The adding of salt to all foods except fruits was the focus of Question 28. The percentage of Grade 10 girls to answer this question correctly was 65.6% which was the lowest compared to 79.7% of Grade 12 boys which was the highest percentage of children to answer the question correctly. The percentage of girls and boys in Grades 11 and 12 who correctly answered the question was over 70%. The high mean score achieved by the boys for this question was 70.9% and for the girls it was 67.8%.

The responses to Question 34 that asked about the body not needing much salt to be healthy showed that the lowest percentage of learners with correct scores was 61.4% for the Grade nine boys, and the highest percentage of learners with correct answers was 88.3% for the Grade 10 boys. The percentage of boys in Grade 10 that attained correct answers for this question was 65.6% whereas 88.3% of the girls in Grade 10 attained correct responses, which shows a 22.7% difference between the percentage of boys and girls in the grade. In Grade 12 over 80% of the

boys and girls answered the question correctly. The mean score for this question for the boys was 70.9% and for the girls it was 79.9%.

The mean score for this FBDG: 'Use salt sparingly' was 66.6% for the boys and 70.6% for the girls.

Table 4.13 Percentage of children that answered questions correctly for SAFBDG 9 according to gender for Grades 8, 9, 10, 11 and 12

SA FBDG question number and answer per guideline FBDG: Use salt sparingly	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=86)	Boys – grade 10 % of correct answers (n=67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
6. Do not add extra salt to your cooked food before you eat it.	79.2	86.2	81.4	84.7	84.8	88.7	87.3	86.1	88.9	89.1	84.3	86.2
20. Table salt has iodine added to it.	35.7	36.2	36.2	53.7	32.3	41.0	47.4	55.1	61.5	54.2	42.6	48.0
28. Salt should not be added to all foods.	58.6	66.2	66.1	57.1	67.2	65.6	71.8	76.5	79.7	73.4	70.9	67.8
34. Your body needs a little bit of salt to be healthy.	67.6	72.3	61.4	73.2	65.6	88.3	73.7	80.2	86.2	85.5	70.9	79.9
Mean % correct answers for FBDG 9	60.2	65.2	61.3	67.1	62.4	70.9	70.0	74.4	79.0	75.6	66.6	70.6
Significance (<i>p-value</i>)	0.541		0.269		0.423		0.497		0.678			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable: (independent t-test)

4.4.18 Discussion of the results for SAFBDG 9: ‘Use salt sparingly’

Wentzel-Viljoen, Steyn, Kelterer and Charlton (2013) outlined the importance of the FBDG: ‘Use salt sparingly’. Dietary salt reduction has health benefits especially a reduction in blood pressure. The results of this study show that the limited content on nutrition in the school curriculum for Grades eight to 12 does not equip children with appropriate nutrition knowledge to make correct food choices and live a healthy lifestyle. The findings showed that learners in the sample group had limited knowledge about using salt sparingly. Responses to Question 20 that asked about the nutrient iodine found in salt yielded a mean score of 42.6% for the boys and the mean score for the girls was 48.0%.

Data showed good nutrition knowledge for ‘Use salt sparingly’ (Question 28). The results of the mean scores show the boys scoring 70.9% compared to the girls’ score of 67.8% and in Question 34 that asked about the body needing only a little salt to be healthy, the mean score for boys were 70.9% and the mean score for girls was 79.9%. Wentzel-Viljoen *et al.* (2013) also emphasise that the adverse effects of excessive dietary salt consumption amongst South Africans need to be curtailed to reduce the increased cases of hypertension.

He, Li and Gregor (2013) reported that a reserved salt intake for four or more weeks showed a drop in systolic blood pressure in hypertensive and normotensive individuals. The researchers also agree with other research findings that a lower sodium intake was associated with reduced risk of stroke and coronary heart disease. A similar study conducted by Aburto, Ziolkovska, Hooper, Elliot and Cappuccio (2013) supports the previous study that adults and children in general benefit from reducing salt in the diet. A decreased salt intake in both adults and children was associated with a reduced risk of blood pressure, stroke and fatal coronary heart disease.

In a separate study, Henney, Taylor and Boon (2010) agree with other research findings that an overall sodium reduction is essential and that high sodium levels are associated with blood pressure, increased risk of heart disease, stroke, congestive heart failure and renal disease. A strategy to reduce the levels of sodium in food supply, especially in processed foods and restaurant-prepared food, was implemented thereby restricting consumers to purchasing sodium-reduced foods. The researchers also highlighted that the sodium intakes were not consistent with the Dietary Guidelines for Americans. The challenge of implementing this

strategy was that the sodium reduction by food suppliers was not consistent with lowering sodium in food.

4.4.18SAFBDG 10: ‘Use food and drinks containing sugar sparingly’

The results for the Food Based Dietary Guideline ‘Use food and drinks containing sugar sparingly’ are indicated in Table 4.14. Question 1 asked about eating extra sugar to get enough energy. According to the statistics, 80% percentage of children across the study population attained correct scores except for the Grade 12 girls at 76.9%. The highest percentage of children to attain correct answers was 98.4% of the Grade 10 girls. The percentage of girls in Grade 11 providing correct answers was 69.1%, which was the lowest percentage of children with correct responses compared to 87.5% of Grade 11 boys of whom 87.5% answered the question correctly. The boys achieved a mean score of 88.0% and the girls 81.6%.

Question 32 asked whether a small amount of sugar can be consumed when one is trying to lose weight. The lowest percentage of children to correctly respond to the question was 62.5% in respect of the Grade eight girls. The highest percentage of children to achieve correct answers for this question was 81.5% for the Grade 12 boys. The mean score was above average for this question: for the boys it was 76.9% and the mean score for the girls was 72.4%.

Identifying foods that contain sugar, and asking whether sugar-rich foods should only be eaten in small amounts was asked in Question 36. The percentage of children in each grade that achieved correct responses was over 84.5%. The percentage of Grade eight girls that answered this question correctly was 94.3% which was the highest percentage of children who attained correct responses. The mean score for this question was 86.9% for the boys and for the girls it was 93.2%.

Whether sugar contains vitamins and minerals was asked in Question 39. The lowest percentage of children who responded with correct answers was 77.2% for the Grade 11 girls and the highest percentage of children that attained correct answers was 91.7% for the Grade 10 girls. Except for the Grade 11 and 12 boys and the Grade 11 girls, the percentage of children that answered the question correctly was over 80%. The mean score for Question 39 was 81.9% for the boys and the mean score for the girls was 84.6%.

The results for Question 52 that asked whether it is healthy to eat snacks with a high sugar content showed that the lowest percentage of children that responded with correct answers for this question was 74.7% for the Grade 11 boys whereas the highest percentage of children who correctly answered this question was 93.8% for the Grade 12 boys. Apart from the Grade 11

boys, all the other boys and girls scored over 80%. The results also show that 74.7% of the boys in Grade 11 achieved correct answers compared to 90.9% of the girls in this grade. The mean score for question 52 was 87.3% for the boys and 88.6% for the girls.

The mean score for this FBDG: 'Use food and drinks containing sugar sparingly and not between meals' indicated that boys attained 84.2% and girls achieved 81.3%.

Table 4.14 Percentage of children that answered questions correctly for SAFBDG 10 according to gender for Grades 8, 9, 10, 11 and 12

SA FBDG question number and answer per guideline	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=86)	Boys – grade 10 % of correct answers (n=76)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
1. You do not need to eat a lot of sugar to have enough energy.	80.3	82.8	87.7	81.0	95.5	98.4	87.5	69.1	89.2	76.9	88.0	81.6
32. A little sugar can be eaten when one is trying to lose weight.	75.7	62.5	78.0	72.9	76.1	71.4	73.4	76.5	81.5	78.5	76.9	72.4
36. Sugar and foods that contain sugar should be eaten in small amounts.	94.3	96.9	84.5	91.6	89.2	91.8	77.2	92.6	89.2	93.8	86.9	93.2
39. Sugar does not contain a lot of vitamins and minerals.	82.9	81.3	86.2	85.4	85.7	91.7	78.2	77.2	76.6	87.3	81.9	84.6
52. It is not healthy to snack on foods that contain a lot of sugar	88.1	86.4	91.4	86.6	88.7	93.3	74.7	90.9	93.8	85.7	87.3	88.6
Mean % correct answers for FBDG 10	84.2	81.9	85.6	69.6	87.0	89.3	78.2	81.2	86.0	84.4	84.2	81.3
Significance (<i>p-value</i>)	0.575		0.447		0.385		0.310		0.266			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable:(independent t-test)

4.4.19 Discussion of the results for SAFBDG 10: ‘Use food and drinks containing sugar sparingly’

With reference to the FBDG ‘Use food and drinks containing sugar sparingly’, Temple and Steyn (2013) reported that South Africans have increased their sugar intake and a typical adolescent consumes as much as 100g/day. It is further reported that increased sugar causes dental caries, displaces foods that are rich in micronutrients and is related to obesity and type 2 diabetes. The results of this study showed low average mean scores of 69.6% to high scores of 87.0% for this FBDG. Remesh (2013) in a study of 560 overweight students and 27 obese students concluded that creating awareness among adults and school goers on the dangers of obesity to the health is vital to overcome this problem.

The results for the FBDG ‘Use food and drinks containing sugar sparingly’ further highlights that nutrition knowledge about the effects of diets with a high sugar content is understood by the learners from Grades eight to 12. In a separate study, de Mar Bibiloni, Pons and Tur (2013) report that overweight and obesity amongst adolescents is high. However, the researchers reported that obesity was higher amongst the boys. In this research the results show that the mean scores for Questions 1 and 32 on nutrition knowledge were higher for boys compared to the mean scores for girls.

FBDG 10 stipulates the consumption of food and drinks containing sugar should be used sparingly.. The results of this study indicated that learners displayed good knowledge on questions related to sugar consumption. Nicklas, O’Neil, and Liu (2011) further reported on the intake of added sugar based on the National Health and Nutrition Examination Surveys (2003-2006). The mean intake of added sugar was 23 ± 0.55 teaspoons – 21 teaspoons for children aged 6–11 years and 25 teaspoons for children aged 12–18 years. No significant association was made between a high sugar intake and weight. However, it was suggested that future study is required in this regard. Encouraging fruit consumption as a method of improving the diet of adolescents and limiting the consumption of sugar is strongly recommended. Further suggestions from the study include community involvement to assist low-income households become food secure so that the community can have healthy future generations.

In a similar study, Story and Stang (2005) in South Africa reported that the most commonly consumed foods by adolescents include yeast bread, soft drinks, milk, ready-to-eat cereal, food such as cakes, cookies, quick breads, donuts, sugar, syrup and jams. It is estimated that about

20% of the total calories are provided by sweeteners and sugar with a mean intake of 23 teaspoons for females aged 9–18 years and 36 teaspoons for males ages 14–18 years. 12% of the carbohydrates consumed by adolescents were derived from soft drinks and added sugar, suggesting that added sugar contributes to adolescents' poor eating habits.

Lasater, Piernas and Popkin (2011) reported on findings in an investigation on beverage patterns and trends among United States school-aged children. It was revealed that children showed an increased intake of high fat, high sugar milk, fruit drinks, soda and sports drinks. The researchers recommended that policy initiatives that target children's consumption of sweetened beverages, fruit drinks and soda be implemented to overcome the trends in childhood obesity. The low mean scores attained by learners in this study is an indication that an intervention is necessary at school level.

4.4.20 SAFBDG 11: 'If you drink alcohol, drink sensibly'

Table 4.15 indicates the results based on the Food Based Dietary Guideline, 'If you drink alcohol, drink sensibly'. Question 10 asked if drinking wine, beer or cider can cause weight gain. The results for this question revealed that the lowest percentage of children that scored correct answers in this question was 59.7% of the Grade eight girls. The highest percentage of children who responded correctly for Question 10 was 89.6% of the Grade 10 boys. In Grade eight the percentage of boys that correctly answered the question was 79.2% compared to 59.7% of the girls indicating that 19.5% more boys than girls responded with correct answers. The mean score for Question 10 for the boys was 83.9% and for the girls it was 79.4%.

Whether you can drink as much wine, beer and cider as you like provided you have eaten was asked in Question 31. The lowest percentage of learners to answer this question correctly was 75.0% attained by the Grade eight girls compared to the highest percentage of learners that produced correct responses which was 95.4% in respect of by boys in Grade 12. In Grade 9, 93.2% of the boys produced correct answers compared to 74.1% of the girls in this grade. The mean score for this question for the boys was 86.4% and for the girls it was 79.1%.

The results of Question 41 that queried alcohol consumption during pregnancy, showed that the lowest percentage of children to correctly answer this question was 86.2% for the Grade 12 boys. The highest In Grade 10, 90.6% of the boys answered this question correctly and the girls

in this grade achieved 100.0%. A higher percentage of girls in all the grades attained correct answers for this question compared to the boys. The mean score for this question for the boys was 86.2% and the mean score for girls was 96.2%.

The mean score for this FBDG: 'If you drink alcohol, drink sensibly', showed that the boys achieved 85.7% and the girls 85.0%.

Table 4.15 Percentage of children that answered questions correctly for SAFBDG 11 according to gender for Grade 8, 9, 10, 11 and 12

SA FBDG question number and answer per guideline	Boys – grade 8 % of correct answers (n=72)	Girls – grade 8 % of correct answers (n=65)	Boys – grade 9 % of correct answers (n=60)	Girls – grade 9 % of correct answers (n=86)	Boys – grade 10 % of correct answers (n=67)	Girls – grade 10 % of correct answers (n=63)	Boys – grade 11 % of correct answers (n=79)	Girls – grade 11 % of correct answers (n=81)	Boys – grade 12 % of correct answers (n=65)	Girls – grade 12 % of correct answers (n=65)	Mean score for the question all Boys %	Mean score for the question all Girls %
10. Drinking a lot of wine, beer, cider causes weight gain.	79.2	59.7	77.2	85.9	89.6	80.3	84.4	82.7	89.2	88.5	83.9	79.4
31. Drink as much wine, beer, cider as you want provided you have eaten first.	77.5	75.0	93.2	74.1	83.6	77.8	82.3	84.0	95.4	84.4	86.4	79.1
41. It is not healthy for pregnant women to drink any wine, beer or cider.	89.7	96.7	91.2	92.7	90.6	100.0	77.2	98.8	86.2	95.2	86.2	92.2
Mean % correct answers for FBDG 11	82.1	77.1	87.2	84.2	87.9	86.0	81.3	88.5	90.2	89.3	85.7	85.0
Significance (<i>p-value</i>)	0.288		0.321		0.190		0.518		0.339			

Significance $p \leq 0.05$ considered significant between means of boys and girls for same variable:(independent t-test)

4.4.21 Discussion of the results for SAFBDG 11: ‘If you drink alcohol, drink sensibly’

The results for the FBDG ‘If you drink alcohol, drink sensibly’ indicate that the Grade 10 girls scored 100% for this FBDG. Question 10 that asked whether drinking a lot of wine, beer and cider causes weight gain produced a mean score of 83.9% for the boys and the mean score for the girls was 79.4%.

Question 31 asked about having a meal before consuming alcohol. The mean score for the boys was 86.4% and the mean score for the girls was 79.1%.

Jacobs and Steyn (2013) reported on the positive health benefits of moderate alcohol intake in the case of increased levels of high density cholesterol. However, they added that the negative consequences of alcohol abuse should be emphasised. This research shows nutrition content on the adverse effects of consuming alcohol is not included in the current secondary school curriculum as part of nutrition knowledge.

Moodley, Matjila and Moosa (2012), in a study at Atteridgeville secondary school, reported that substance abuse was widespread. Initiation into substance abuse showed the lowest mean age was 14.6 years. The statistics also showed that 51.4% of the learners were consuming alcohol and other substances. The data obtained also showed that 41.5% to 61.5% of children consumed alcohol, 25.2% smoked cigarettes and 13.2% used cannabis. The abovementioned study highlighted the dilemma that most schools in South Africa and globally face. The need for intervention at a social, educational and government level is necessary.

MacArthur, Smith, Melotti, Heron, MacLoed, Haickman, Kipping, Campbell and Lewis (2012) reported that amongst the sample group of boys and girls, 50% of the learners were involved in alcohol consumption by the age of 15 years. One fifth of the learners engaged in binge drinking and the risk behaviours included physical inactivity, antisocial and criminal behaviour and hazardous driving.

In a similar study Seggie, (2012) reported that five million litres of alcohol is being consumed annually by South Africans and that alcohol use among youth is common. Researchers cite the following reasons for abuse of alcohol: peer pressure, desire to fit in, poor home environment, boredom, ignorance of the harmful effects of alcohol, cheapness of alcohol products and the

easy availability of alcohol from stores, supermarkets, bars and shebeens. The side effects of alcohol consumption is poisoning of the liver. The researchers call for the intervention of education initiatives from a young age to eliminate alcohol abuse.

Fieldstein Ewing, Sakhardande and Blackmore (2014) also identified a large proportion of adolescents aged 19 years and younger who drink alcohol. Fieldstein *et al.* (2014) pointed out that alcohol consumption during adolescence was associated with a significant difference in the structure and functioning of the developing brain as well as negatively impacts on behaviour and social functioning.

Table 4.16 Mean correct answers with statistical significant differences for each FBDG for each grade for boys and girls

MEAN SCORE AND SIGNIFICANT DIFFERENCES PER FBDG FOR ALL THE GRADES FOR BOYS AND GIRLS (%)															
FBDG	GR 8 BOYS (n=72)	GR 8 GIRLS (n=65)		GR 9 BOYS (n=60)	GR 9 GIRLS (n=86)		GR 10 BOYS (n=67)	GR 10 GIRLS (n=63)		GR 11 BOYS (n=79)	GR 11 GIRLS (n=81)		GR 12 BOYS (n=65)	GR 12 GIRLS (n=65)	
1. Enjoy a variety of food.	51.2	47.0	0.334	52.8	56.3	0.452	54.6	62.9	0.363	54.7	55.2	0.177	63.8	60.1	0.390
2. Be active.	76.5	79.3	0.304	79.2	85.8	0.304	77.6	89.7	0.257	76.6	85.4	0.248	83.6	86.4	0.301
3. Drink lots of clean safe water.	73.9	68.3	0.262	70.3	72.8	0.227	77.4	71.6	0.417	70.9	67.5	0.240	74.7	70.3	0.280
4. Make starchy foods the basis of most meals.	61.3	58.8	0.372	52.8	52.6	0.591	51.1	65.3	0.333	51.2	57.3	0.125	60.3	55.2	0.429
5. Eat plenty of fruit and vegetables	51.9	49.9	0.625	53.8	52.7	0.558	58.7	61.5	0.154	52.8	54.1	0.114	51.8	55.0	0.064
6. Eat dry beans, peas, lentils and soya regularly.	52.0	50.8	0.268	62.0	62.8	0.326	48.3	65.5	0.277	54.9	71.3	0.889	58.7	53.8	0.064
7. Chicken, fish, meat, milk and eggs can be eaten daily.	62.9	66.2	0.259	64.9	67.0	0.416	67.4	72.0	0.247	66.0	73.2	0.163	70.7	64.9	0.121
8. Eat fats sparingly.	48.1	42.9	0.358	50.9	57.8	0.383	53.5	61.3	0.443	53.2	59.3	0.349	64.8	56.0	0.290
9. Use salt sparingly.	60.2	65.2	0.541	61.3	67.1	0.269	62.4	70.9	0.423	70.0	74.4	0.497	79.0	75.6	0.678
10. Use food and drinks containing sugar sparingly.	82.1	77.1	0.575	87.2	84.2	0.447	87.9	86.0	0.385	81.3	88.5	0.310	90.2	89.3	0.266
11. If you drink alcohol, drink sensibly.	82.1	77.1	0.288	87.2	84.2	0.321	87.9	86.0	0.190	81.3	88.5	0.518	90.2	89.3	0.339
Total mean score per grade	63.8	62.0	0.380	65.7	67.6	0.390	66.0	72.0	0.317	64.8	70.4	0.257	71.6	68.7	0.292
Significance $p \leq 0.05$			0.380			0.390			0.317			0.257			0.292

4.4.22 Interpretation of total median scores and significance $p<0.05$ for each FBDG for all boys and girls in each grade

The lowest total mean score attained was 62%, attained by the Grade eight girls. No significant difference was observed between the boys and girls in Grade eight ($p<0.380$). The total mean scores for the boys and girls in Grade nine was 65.7% and 67.6% respectively, with no statistical difference between the two groups ($p<0.390$). The results of the total mean scores are reflected in Table 4.16 and indicate that all learners attained a total mean score of over 60%. Grade 10 girls at 72% achieved the highest total mean score. The total mean scores for the boys and girls in Grade 10 was 66.0% and 72.0% respectively with no significant difference of $p<0.317$. The total mean scores for the boys and girls in Grade 11 was 64.8% and 70.4% respectively, also presenting no statistical significance ($p<0.257$). The total mean scores for the boys and girls in Grade 12 was 71.6% and 68.7% respectively ($p<0.292$).

4.4.23 Discussion of total mean scores for each FBDG for all the boys and girls in each grade

The results of the total mean scores reveal that percentage wise the Grade eight learners in this study attained the lowest overall mean score compared to the Grade nine, 10, 11 and 12 learners with 63.8% for the boys and 62.0% for the girls. The Life Orientation and Natural Science content in Grade eight contains some aspects of nutrition knowledge. The Grade nine learners in this study attained total mean scores of 65.7% and 67.6% for boys and girls respectively. Here the curriculum content in Natural Science and Life Orientation deals with healthy eating and healthy living in each learning area (Table 4.3). However, in related individual questions in each FBDG, the learners did not perform well.

In Grades 10, 11 and 12 the boys attained total mean scores of 66.0%, 64.8% and 71.6% respectively, whereas the girls in Grades 10, 11 and 12 scored mean scores of 72.0%, 70.4% and 68.7% respectively. Life Orientation is the only compulsory learning area (Table 4.4) that contains nutrition knowledge in Grades 10, 11 and 12. The data reveals that learners did not perform well with respect to many questions in the FBDG (Table 3.3). No statistical significance in correct answers for the whole test was observed between boys and girls ($p=0.691$).

Story, Nanney and Schwartz (2009) support the finding that schools have made some progress in nutrition education initiatives such as improving the school food and physical activity environment. However, more can be done in the form of stronger policies to provide healthier meals. The focus should be on limiting low nutrient, energy-dense foods in school tuck-shops and school managers need to maximise the time allocated for physical activity at school.

4.5 Results and Discussion: Educator Questionnaire

Learning area	Number (n=134)	Percentage %
Natural Science	31	23.1
Social Science	14	10.4
Life Orientation	36	26.9
Agricultural Science	3	2.2
Agricultural Technology	0	0
Dance Studies	0	0
Design	0	0
Civil Technology	1	0.7
Electrical Technology	1	0.7
Mechanical Technology	1	0.7
Information Technology	3	2.2
Life Science	15	11.2
Consumer Studies	5	3.7
Physical Science	5	3.7
Hospitality Studies	12	9
Other educators who taught nutrition that was not included in the curriculum for their learning area or subject.	7	5.2
Total	134	100

Table 4.17 Number and percentage of educators teaching various learning areas that have a nutrition component included in the curriculum

4.5.1 Educator Questionnaire administered to participants

The Educator Questionnaire (EQ) was administered to educators at schools in the Durban Central area. The educators, who completed the questionnaire on a voluntary basis, were 128 educators who taught nutrition knowledge as part of the Revised National Curriculum

Statement Grades R–9 School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) and seven educators who incorporated nutrition content into their lessons even though it was not part of the curriculum.

The Educator Questionnaire was administered to the participants who consisted of 26.9% Life Orientation educators and 23.1% Natural Science educators. No educators who taught Agricultural Technology, Dance Studies and Design participated in the study. In the study 5.2% (n=7) of the participants taught nutrition content in language learning areas (English and Afrikaans) that did not contain nutrition content in the curriculum (Refer to Table 4.17).

		Number of educators completing the percentage of curriculum content on nutrition in each learning area.				
Learning area	Percentage of educators (n=125)	100%	75%	50%	25%	0%
Natural Science	23.49%	21	10	-	-	-
Life Orientation	27.28%	27	9	-	-	-
Life Science	11.37%	10	5	-	-	-
Physical Science	3.79%	4	1	-	-	-
Hospitality Studies	9.09%	8	4	-	-	-
Consumer Studies	3.79%	4	1	-	-	-
Social Science	10.61%	10	4	-	-	-
Civil Technology	0.75%	1	-	-	-	-
Electrical Technology	0.75%	1	-	-	-	-
Information Technology	0.75%	1	-	-	-	-
Mechanical Technology	0.75%	-	-	1	-	-
Agricultural Science	2.28%	-	-	3	-	-
Total number	125	87	34	4	0	0
Percentages	100%	69.6%	27.2%	3.02%	0	0

Table 4.18 Percentage of nutrition content taught in each learning area

4.5.2 Educator Questionnaire - percentage of nutrition content that is actually covered in each of the learning areas.

Table 4.18 indicates the number of educators (n=125) who completed the section on the percentage of nutrition content that is actually covered in each of the learning areas. The data

indicated that 69.6% (n=87) of the educators in the sample group of 125 completed 100% of the nutrition content included in the curriculum. The findings also revealed that 27.2% (n=34) of the educators completed 75% of the nutrition content that was included in the curriculum. The results also indicated that 3.02% (n=4) of the educators completed 50% of the nutrition knowledge component included in the curriculum.

Assessment method	Number of educators (n=134)	%
Test/formal	115	84.6%
Project	83	61.0%
Assignment	79	58.1%
Test/informal	74	54.4%
Test/open book	56	41.2%
Presentation	53	39%
Debates	15	11%
Speeches	13	9.6%
Other	6	4.4%

Table 4.19 Assessment methods used to test nutrition knowledge

4.5.3 Educator Questionnaire – forms of assessment used to test nutrition knowledge

The forms of assessment used to test the nutrition knowledge of the learners and the learners' understanding of the nutrition content in the curriculum is indicated in Table 4.19. Educators indicated the use of more than one assessment method to test the learners' nutrition knowledge. The data also reveals that the most popular method used by most educators to assess nutrition knowledge was formal tests (84.6%), followed by assignments (58.1%), projects (61.0%) and informal tests (54.4%). The least popular methods of assessing nutrition knowledge were presentations (39%) followed by debates (11%) and speeches (9.6%). Six educators indicated that they used other methods to assess the nutrition knowledge.

Teaching Tool	Number (n=134)	%
Textbooks	105	77.2%
Notes	85	62.5%
Case studies	74	54.4%
Practical work	72	52.9%
Charts	62	45.6%
Magazines	54	39.7%
Power point presentations	35	25.7%
Other	26	19.1%
Games	13	9.6%

Table 4.20 Teaching tools used by educators to teach the nutrition content in the learning areas

4.5.4 Educator Questionnaire – teaching tools used by the educators to teach nutrition content in the learning areas

The teaching tools used by the educators to teach nutrition content are indicated in Table 4.20. Educators indicated that more than one teaching tool was used in the process of teaching nutrition content. The tool most often used in schools is text books (77.2% (n=134) of the educators). The use of notes was the second most popular teaching tool with 62.5% (n=85) of the educators choosing notes to teach nutrition content. Case studies were used by 54.4% (n=74) of the educators in the sample group to teach nutrition education. Practical work was a popular choice, used by 52.9% (n=72) of the educators. Charts were used by 45.6% (n=62) of the educators, power point presentations by 39.7%, followed by other teaching methods used by 19.1% of the educators. The least popular teaching tool was games, used by 9.6% (n=13) of the educators in the sample group.

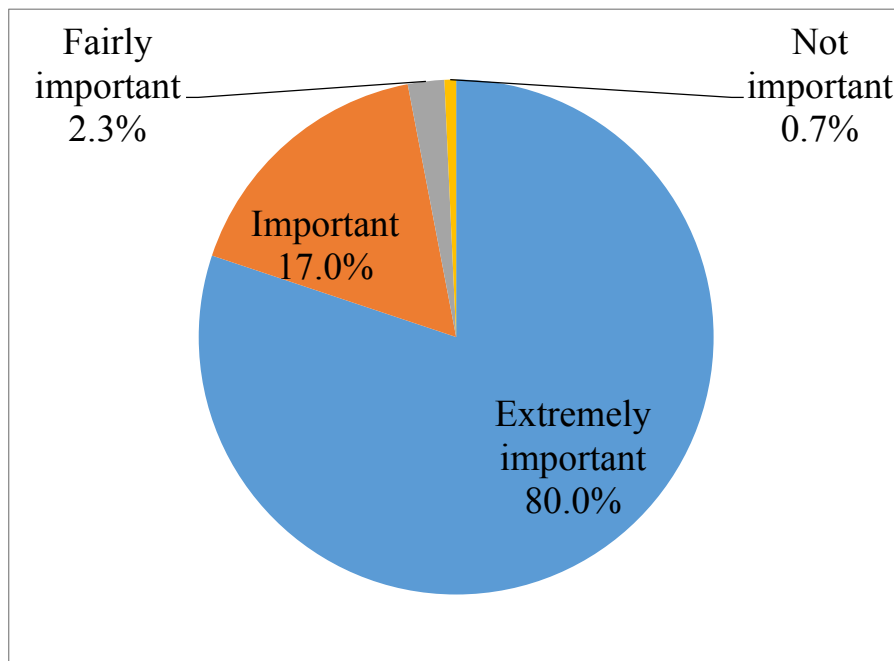


Figure 4.1 Educators' opinion on the importance of nutrition education for learners (n=131)

4.5.5 Educator Questionnaire - importance of nutrition education in school according to the educators' (sample group) opinion

The importance of nutrition education in school according to the educators' (sample group) opinion is illustrated in Figure 4.1. Data revealed that 80% percent (n=105) of the educators considered nutrition education to be extremely important for learners in secondary school. However, 17.0% (n=22) considered nutritional education to be important, whereas 2.3% (n=3) of the educators in the sample group were of the opinion that nutrition education is fairly important, and only 0.7% (n=1) of the educators in the study reported that nutrition education is not important.

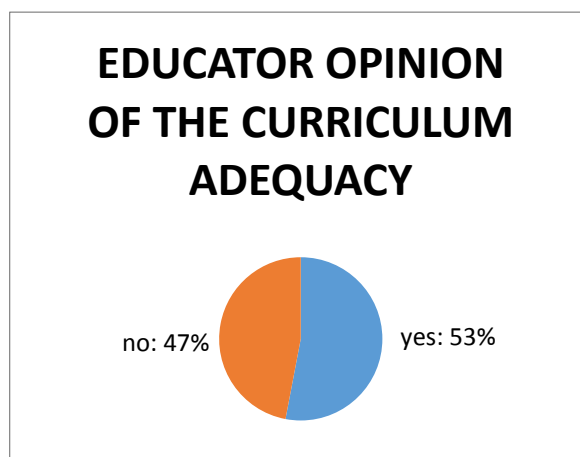


Figure 4.2 Educators' opinion of the curriculum adequacy in teaching nutrition education to learners who are leaving school at end of Grade 12

4.5.6 Educator Questionnaire – opinion of the educators on the adequacy of nutrition education for learners who are leaving school at end of Grade 12

The opinion of the educators on the adequacy of nutrition education for learners who are leaving school at end of Grade 12, is indicated in Figure 4.2. Data showed that 53% (n=71) of the educators indicated that the learning area content set out in the national curriculum adequately provides the learners with nutrition knowledge, whereas 47% (n=63) of the educators do not believe that the curriculum content adequately provides the Grade 12 learners with nutrition education.

Learning area	Educators (n=134)	Very positive	Positive	Fair	Not much	Nothing at all
Natural Science	31	10	15	6		
Social Science	14	5	5		4	
Life Orientation	36	11	10	10	5	
Agricultural Science	3	1			2	
Civil Technology	1				1	
Electrical Technology	1				1	
Mechanical Technology	1				1	
Information Technology	3				3	
Life Science	15	8	7			
Physical Science	5	2	1		2	
Consumer Studies	5	2	3			
Hospitality Studies	12	10	2			
Other educators who taught nutrition that was not included in their curriculum.	7				3	4
Total	134	49	43	16	22	4
Percentage	100	36.6%	32.1%	11.9%	16.4%	3.0%

Table 4.21 Educators' opinion on the impact of specific learning areas on nutrition knowledge

4.5.7 Educator Questionnaire – learning areas that contain nutrition content

The data presented in Table 4.21 indicates the learning areas that contain nutrition content and the extent to which individual learning areas impact the nutrition knowledge of learners. In the sample group of 134 educators, 36.6% (n=49) of the educators indicated that the learning areas had a very positive influence on the learners' nutrition knowledge. Educators who indicated the positive influence of the learning area on the nutrition knowledge of the learners they teach was 32.1% (n=43). In the sample group 11.9% (n=16) of the educators indicated that the nutrition content in the learning area they teach, had a fair influence on learners.

The data from the study revealed that 16.4%(n=22) of the educators indicated that the learning area that they teach did not educate learners on nutrition education, whereas 3.0% (n=4) of the educators that teach nutritional content that is not part of the curriculum content, revealed that the learning area they taught did not contribute to the nutritional knowledge of the learners.

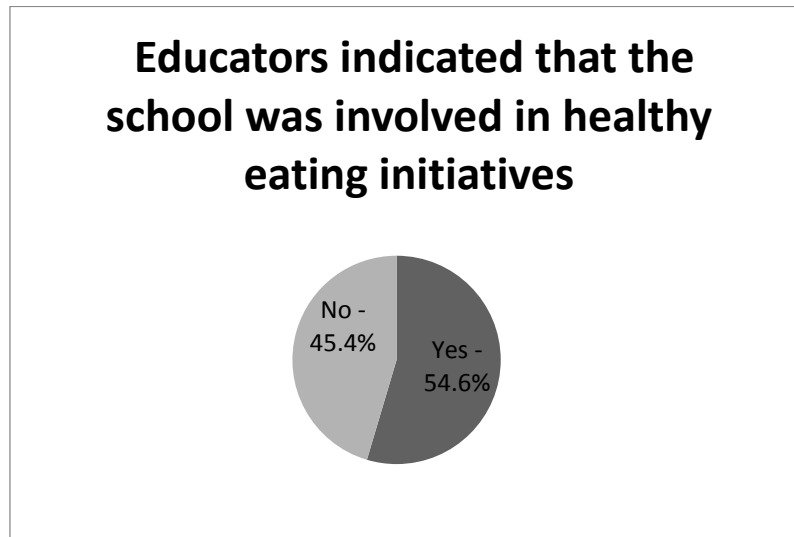


Figure 4. 3 Educators indicated that the school was involved in healthy eating initiatives

4.5.8 Educator Questionnaire – school involvement in healthy eating initiatives

According to Figure 4.3, data showed that 54.6% (n=73) of the educators indicated that the school was involved in healthy eating initiatives and 45.4% (n=61) indicated that the school does not have any healthy initiatives in place.

4.5.9 Discussion of the Educator questionnaires

In a separate study, In-Iw, Saetae, Manaboriboon (2012) state that an interactive nutrition programme focusing on food choices, food energy calculated, and food exchanges showed changed BMI amongst 537 students diagnosed with overweight and obesity. The researchers state that the implementation of an interactive nutrition programme at school will assist learners to overcome health related diseases.

The analysis of the data from the educator questionnaire indicates that 52.2% (n=70) of the educators think that nutrition knowledge is extremely important and 43.4% (n=58) of the educators indicated that nutrition knowledge is important. The results from the educator questionnaire is supported by the FAO (2006) who reported that schools are generally

acknowledged as critical settings for promoting health and lifelong healthy eating amongst children. The results of this research indicate that educators realise that nutrition knowledge is important in the secondary school phase. This is a key point for curriculum developers to note because it has a major impact on future generations.

According to the FAO (2005), nutrition education involves a combination of activities including providing information, increasing people's knowledge, helping people to develop personal skills and motivating and supporting people to adopt healthy eating practices. The FAO (2005) report further reinforced the fact that nutrition education involves influencing public policy and promoting access to a variety of foods that are rich in macro- and micronutrients.

The methodology used to teach the nutrition content varied amongst educators. The methods chosen by educators depended on the resources available at the school. Educators can choose more than one tool to teach content, based on the context, which supports the findings of Hinrichs, Maccoll and Vliegenk (2001). They reported that nutrition education will be more effective if reinforced by different channels along with the adaptation of the messages for different target groups.

The educators' opinion of the curriculum adequacy shows that 53% of the educators indicated that the content in the curriculum equips learners with adequate nutrition knowledge by the end of Grade 12. However, 47% of the educators shared a view that the curriculum does not prepare the learners adequately with nutrition education when they leave school at the end of Grade 12.

Mbhenyane, Makuse, Ntuli, Mbhatsani and Sayed (2008) report that it is important that nutrition educators are aware of the cultural characteristics of typical eating patterns of different groups of the population. In addition, the researchers emphasise the point that nutrition educators should assist people to make healthy choices, promote healthy cultural eating patterns and advise on the adverse effects of both traditional and modern food choices.

In the sample group of 134 educators, 36.6% of the educators indicated that the learning areas had a very positive influence on the learners. The statistics show that 32.1% of the educators

indicated a positive influence on the learners. However, 11.9% of the educators indicated that the learning area that they taught only had a fair influence on the nutrition knowledge of the learners. The data from the study also revealed that 16.4% of the educators indicated that the learning area that they taught did not educate learners on nutrition. However, 3.0% of the educators that teach nutrition that is not part of the curriculum content, revealed that the learning area they taught did not contribute to the nutrition knowledge of the learners.

The findings of a study by Kann *et al.* (2007) support this research study that evaluated the National Curriculum for Grades 8–12 in KwaZulu-Natal with special reference to the value of nutrition education and agree that nutrition education appears to be common in schools. However, the quantity of nutrition knowledge is limited. In addition, Kann *et al.* (2007) reported that the median hours per year for nutrition instruction were 3.4 hours for elementary schools and 5 hours for middle and high schools. Kann *et al.* (2007) stated that teachers ranked nutrition and dietary behaviour as the areas that required most staff development and training. The current study and the study by Kann *et al.* (2007) also suggest that teachers who impart nutrition education should have an interest in nutrition.

According to the FAO (2006) schools are generally acknowledged as critical settings for promoting health and lifelong healthy eating habits amongst children. With reference to the question on the school engaging in healthy eating initiatives, the response was that 54.6% of the educators in the sample group indicated that the school was responsible for health initiatives. The activities included in this view were the school feeding scheme, garden project, fruit sale and guidance on food sold at the tuck-shop. The data also revealed that 45.4% of the schools involved in the research in the Durban Central area did not participate in any healthy eating initiatives to reinforce better eating habits and good nutrition.

The California Department of Education (2012) provides guidelines to develop curriculum instructional strategies for health education programmes and nutrition specific curricula. The curriculum is designed to enable students to learn about good nutrition and to practise physical activities. The focus is on a skills-based curriculum that encourages students to use personal experience to solve problems to reason and to think critically in the process of learning about nutrition and physical activity.

The resources are curriculum specific in learning areas where nutrition education is taught and these resources are important teaching tools. The practical ideas are to link the classroom with the school nutrition programmes so that guided tours of the cafeteria can take place, invited guests can address the class and artwork can be displayed. Family nights are also a focus where school nutrition personnel impart valuable nutrition knowledge. This process also involves students and guardians sharing ideas, recipes and knowledge (California Department of Education, 2012).

4.6 Conclusion

The research findings based on the data from the three investigations conducted in the study revealed that the National Curriculum contains nutrition knowledge in a variety of learning areas. However, in Grades 10, 11 and 12, learners will not necessarily choose a learning area that contains nutrition content, thereby limiting their exposure to nutrition content.

The Nutrition Knowledge Questionnaire (NKQ) revealed that in many learning areas there was lack of nutrition education and knowledge for learners from Grades 8 to 12. The results from the Educator Questionnaire (EQ) reinforce the point that the learners' choice of learning areas in the Further Education Training band is limited because many schools in the Durban Central area are unable to offer all the learning areas in the school curriculum. This impacts adversely on the learners' exposure to nutrition education of any real substance. Life Orientation, a compulsory learning area, contains sections of nutrition content in the curriculum across all the grades but the results of the Nutrition Knowledge Questionnaire show that learners have limited knowledge in several areas of nutrition.

Educators view the curriculum as inadequate to enable them to meaningfully teach nutrition education. This highlights the inadequacy of the curriculum. The lack of appropriate nutrition knowledge in secondary school causes learners to live unhealthy lifestyles as reflected in the results of the Nutrition Knowledge Questionnaire (Tables 4.5 to 4.16).

These results from the three investigations have implications for schools and curriculum developers because the majority of stakeholders in the education system consider nutrition knowledge to be extremely important. Evidence from the Nutrition Knowledge Questionnaire completed by the learners indicated gaps in the learners' nutrition knowledge that would

prevent them from maintaining a healthy lifestyle. Studies from South Africa and other countries on nutrition education recommend a more comprehensive nutrition education programme and the implementation of healthy eating initiatives as adopted by other schools as a means of making a contribution to addressing the current limitations in the curriculum with regard to teaching nutrition.

Chapter 5: Conclusion and Recommendations

5.1 Introduction

This chapter summarises the research findings as discussed in Chapter 4 and recommendations for future research are made. This study provides important data on the nutrition content contained in the Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) and the consequent nutrition knowledge acquired by adolescents. The study reports on the extent to which educators in Durban Central secondary schools teach the content in their respective learning areas and promote nutrition education in these learning areas.

5.2 Purpose of the study

This study intends to analyse the critical and developmental outcomes of the Revised National Curriculum Statement Grades R–nine School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) in South Africa with regard to educating learners in Grades eight to 12 on nutrition as a preventative measure against diseases caused by poor eating patterns. The sample consisted of girls and boys in two schools in the Central Durban area.

The specific objectives for the research were as follows:

- To evaluate the National Curriculum for Grades eight to 12 to determine the learning areas that include nutrition as part of the content.
- To determine the nutrition knowledge of the learners in Grades eight to 12 by means of a Nutrition Knowledge Questionnaire (NKQ).
- To investigate the extent to which educators teach the nutrition content in each grade according to learning area by means of an Educator Questionnaire (EQ).
- To draw a comparison between the nutrition content of the curriculum and the learners' acquired nutrition knowledge.

5.3 Limitations of the study

The following limitations impacted on the study.

- The union strikes that affected teaching and learning in 2010 lasted for about five months and this delayed the process of data collection. The data collection took place in 2011.
- The Educator Questionnaires did not reach all the schools in the Durban Central area and as a result only 15 schools were selected for the study.
- The literature available with regard to nutrition knowledge in secondary schools is limited.
- The Nutrition Knowledge Questionnaire was completed by boys and girls in the Durban Central area of KwaZulu-Natal and therefore cannot be generalised for all learners in KwaZulu-Natal.
- The Revised National Curriculum Statement Grades R–9 School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003) was revised and became the Curriculum Assessment Policy Statement (CAPS) during the course of this study. However, not much change to the content was noted in the relevant learning areas.
- The Food Based Dietary Guidelines also changed during the course of the study.

5.4 Main findings

Good nutrition is an essential part of health care and is elementary for the growth and development of children as reported by most research studies on health and nutrition. Malnutrition is a persistent global dilemma amongst adolescents and impacts on adolescents in South Africa as well. The risk factors for malnutrition in South Africa include food insecurity, poverty, urbanisation, family unity and cohesion, the physical environment, teenage pregnancy, education, ignorance, prevalence of disease, psychological factors and alcohol and drug abuse .

Available literature indicates that obesity and overweight are prevalent amongst adolescents around the world. Studies have revealed that a high fat and sugar intake, coupled with a sedentary lifestyle, are major contributing factors to overweight and obesity. Consequently, in

reports on lifestyle disease, most studies draw attention to the need for nutrition education at school level with all the role players actively involved in health promotion.

In contrasting studies poverty and food insecurity is also a huge concern. In sub-Saharan Africa food scarcity results in low nutritious food intake. Studies conducted in the South African rural and urban areas show a large percentage of people with inadequate dietary intake as a result of poverty and food insecurity.

Various studies also stress that schools have the potential to contribute to health promotion and can encourage and support healthy eating habits. Literature on school tuck-shops around the world shows that introducing healthier food and encouraging fruit consumption results in improved concentration and behaviour amongst children. Studies have also proven that exposing children to nutrition education increases the children's awareness of nutrition and results in more nutritious food being consumed.

Studies also highlight that parental factors such as low income and low level of education affect children in areas of support and mentoring. Educating families on food types suitable for their children and the nutrition needs of their children needs to be addressed to improve the health of children.

To encourage a healthy lifestyle the Food Based Dietary Guidelines should be followed. Amongst other interventions, fruit consumption as a method of improving the diet of adolescents and limiting the consumption of sugar is strongly recommended. Community involvement to assist low-income households become food secure is further recommended. Studies conducted further emphasize that schools alone cannot meet the need for increased nutrition information and that a collaboration of community and quality teacher training is critical for nutrition education. The low mean scores attained by learners in this study are an indication that interventions are necessary at school level.

5.4.1 Curriculum content

The analysis of the Revised National Curriculum Statement Grades R–9 School Policy (2002) revealed that the nutrition knowledge and health content in the Foundation Phase was included

in Natural Science at Grade R as part of the basic needs of humans. In Grade one some nutrition knowledge was included in Natural Science as part of basic needs of humans. Social Science contained nutrition content on personal health and safety that was open-ended. Life Skills contained content on nutritious food choices, environmental health and communicable diseases. Grades two and three contain the same topic that is basic human needs in Natural Science. There is no nutrition knowledge in Social Science in both Grades two and three. Grade two has nutrition content on water, healthy school environment and communicable diseases in Life Skills. In Grade three Life Skills includes poor dietary habits, and the effects of such habits on personal health and communicable diseases. The initial years at school should have nutrition information embedded in the curriculum and it should be reinforced throughout the foundation phase so that learners remember the value of healthy eating and a healthy lifestyle.

Analysis of the Intermediate Phase that includes Grades four–six, revealed some nutrition knowledge in Natural Science, Technology, Social Science and Life Orientation. Natural Science includes the topics life process and healthy living which is one aspect of nutrition knowledge. Technology in Grades four and six includes topics on properties of food and preservation respectively but here, too, the topic lacks any real substance. Social Science in Grade four covers food production and access to food, but in Grade five only disease is included in the curriculum. Life Orientation in Grades four–six includes one topic in each grade on aspects of nutrition knowledge but the topics do not give specific guidelines. The analysis of the document revealed that content on nutrition are not reinforced throughout the year in any grade.

In the curriculum for the Senior Phase that includes Grades seven–nine, Natural Science, Social Science and Life Orientation offer content that includes topics on nutrition and health that will enrich the learners' nutrition knowledge.

In the National Curriculum Statement for Grades 10–12 (2003), Life Orientation, that is a compulsory subject for all three grades, contains content on nutrition and health-related knowledge. The other subjects that contain nutrition knowledge (Table 4.17) are not compulsory for all learners. In addition, as mentioned previously, all the subjects are not offered at all schools as a result of limited funds and resources and the availability of suitably skilled educators.

5.4.2 Nutrition Knowledge Questionnaire

The findings in the study indicate that all learners in the sample group of boys and girls from Grade 8 to 12 displayed a limited knowledge in certain areas of nutrition and healthy food choices. The data indicates gaps in nutrition knowledge related to sources and functions of nutrients. The results also indicated that learners were unaware of the implication of nutrient deficiencies and an excess of nutrients in the body. They also had limited knowledge on the value of foods such as fruit, vegetables, beans, peas and lentils. Learners also had limited knowledge regarding portion sizes of food required to be consumed on a daily basis.

The findings of the research indicated that the learners had a limited understanding of the skills and knowledge required for healthy food preparation, and the necessary conditions for the hygienic storage of food. This suggests that boys and girls in Grades 8 to 12 had not acquired adequate nutrition knowledge in respect of healthy food choices in everyday life.

The results of this study in respect of the South African Dietary Food Guideline ‘Enjoy a variety of foods’, showed that learners displayed below average nutrition knowledge in certain areas. The lack of correct responses to the question on healthy sources of food indicated substantial gaps in their nutrition knowledge. The responses to choices of healthy snacks revealed a lack of nutrition knowledge across the grades and confirmed that the curriculum does not intend to supplement the nutrition knowledge of learners. The lowest score attained was 11.1%, attained by the Grade eight girls in Question 16. Other questions where learners obtained scores below 20% were Questions 17 and 18.

The findings on the sources of calcium in the research study indicated a low percentage of correct responses. The evidence indicates that the majority of the learners in the study group showed a low level of nutrition knowledge. The responses to identifying foods for weight loss also showed a low percentage of correct answers. The responses to questions related to correct food choices for pregnant women also revealed a low percentage of correct responses from learners. The results also indicated a low percentage of correct responses in respect of knowledge regarding the activities and health of pregnant women. The statistics revealed limited nutrition knowledge amongst learners across the grades regardless of gender.

The study also highlighted that in questions related to the benefits and importance of physical activity and healthy eating, a high percentage of correct responses was recorded which indicated that learners were aware of the need to be physically active and understood the benefits of healthy eating.

The results on drinking water indicated that many learners did not know how much water to consume although they are in high school. The results in respect of drinking boiled water to reduce weight shows that the learners were under the impression that drinking boiled water causes weight loss. The results also show that the majority of the learners know that drinking water in the Durban Central area, where the study was undertaken, was safe. The responses to the question on whether starchy foods should be avoided when one is trying to lose weight, showed that learners lack adequate nutrition knowledge to make correct food choices for a healthy diet.

The results of this study based on the South African Food Based Dietary Guideline related to eating plenty of fruit and vegetables, indicated a low score in respect of correct responses to the question on portions of cooked vegetables. These statistics suggest that learner's knowledge on portion sizes and nutrient content are limited. The findings of this research suggest that the curriculum be reviewed to include the necessary content that has been overlooked in the development of the curriculum.

The statistics that are a cause for concern include the results based on the South African Food Based Dietary Guideline: 'Eat dry beans, peas, lentils and soya on a regular basis'. The responses to this question revealed that most learners in the study group were unaware of the benefits of soya in the diet. The low responses in respect of the value of beans, peas and lentils in the diet indicate that learners did not have adequate knowledge. The results illustrate that there is a need for a structured nutrition education programme to enable learners to make correct and healthy food choices.

The responses to the questions on the South African Food Based Dietary Guideline that recommends that chicken, fish, meat, milk and eggs should be eaten daily showed that learners displayed a lack of knowledge on portion size of dairy products as reflected in the low score of

9.2% in Question 33. The results show that intervention is necessary to educate learners on correct portion sizes which is an essential part of a healthy eating plan.

With reference to the South African Food Based Dietary Guideline: 'Eat fats sparingly': learners were aware of the potentially harmful effects of chicken that was prepared on the street. Learners were able to correctly identify snacks low in fat content. However, they found some difficulty in identifying menus that were low in fat.

It is recommended that curriculum developers should address the shortcomings in nutrition and health care knowledge in the curriculum. The learners' responses to the questions related to food spoilage and storage of meat, fish and chicken, indicate that hygienic food preparation and storage, together with identifying prepared food that is low in fat, is not fully understood by most learners. This corroborates the contention that the reason for learners' poor response to healthy food choices can be attributed to inadequate nutrition knowledge.

In respect of the South African Food Based Dietary Guideline: 'Use salt sparingly', learners were aware of the effects of added salt. However, a low percentage of correct responses in respect of foods that contain iodine was noted.

It was interesting to note that learners' responses to questions on the South African Food Based Dietary Guideline, 'If you drink alcohol, drink sensibly', showed that the majority of learners were aware of the negative effects of alcohol consumption. The issue of excessive drinking of alcohol is not addressed in the curriculum.

Learners' responses to the Nutrition Knowledge Questionnaire indicate to the researcher that the learners have a limited knowledge of nutrition. The findings of the study suggest that the existing curriculum needs to be restructured to incorporate meaningful and important nutrition content that is presently lacking.

5.4.3 Educator Questionnaire

The results from the Educator questionnaire answered by educators at schools in the Durban Central area of KwaZulu-Natal indicated that the Life Orientation learning area contains the greatest percentage of nutrition knowledge in the curriculum.

The extent to which educators covered curriculum content on nutrition knowledge in each learning area depended on the number of learning areas an educator teaches. The results on the percentage of nutrition content covered in each learning area according to the curriculum, indicate that educators who taught more than one learning area tended to teach less nutrition content. Educators who were teaching more than one learning area indicated that in the second or third learning area that they teach, content on nutrition knowledge was inadequately covered.

The majority of the educators in the study reported that nutrition education is valuable to the learners at school. This indicates that educators support the inclusion of valuable nutrition education in the curriculum. It is thus recommended that the curriculum developers include sufficient nutrition content in the curriculum to equip learners for a healthy lifestyle.

According to the results from the research, educators used a variety of teaching methods to teach nutrition content in the curriculum. However, the overall results indicate that procedures need to put be in place to encourage and assist educators to use more innovative strategies to communicate the message of good nutrition.

The results related to the various methods of assessment used by educators to assess nutrition knowledge indicate that formal testing was the most popular method used to assess the nutrition knowledge of learners. The results also show that there is no standardisation by the Department of Education on the methods used to test nutrition knowledge. Some of the methods that schools use do not require the learners to recall the nutrition knowledge. An example of this is an assignment where research findings are generally presented as a collection of information used to assess the nutrition knowledge of the learners.

The research conducted also revealed that 53% of the educators indicated that the learning areas that they were teaching equip learners adequately with sufficient nutrition knowledge to enable them to live a healthy life after Grade 12. The results indicated that educators identified gaps in the curriculum in respect of healthy eating initiatives at school and this impacted negatively on the learners' nutrition knowledge. Moreover, in cases where educators themselves did not adequately equip learners with nutrition knowledge, learners were disadvantaged and did not have sufficient nutrition knowledge to allow them to pursue a

healthy lifestyle. This lack of nutrition knowledge manifests in lifestyle diseases that are prevalent in their communities.

The results on health initiatives reported by educators revealed that the majority of the schools are involved in healthy eating initiatives. The majority of schools indicated that, as part of the healthy eating initiatives programme, schools included the government lunch programme and vegetable garden project. A few schools had tuck-shops which sold healthy food and also gave talks at assembly on the importance of healthy eating. These activities are, however, insufficient to change a mind-set of incorrect eating habits.

The process of changing eating habits to embrace a healthy life style must involve all stakeholders in the education system, including the education department (representing the government), the community and parents. The programmes in place must be evident in the curriculum, funded, and supported by all the stakeholders in order to bring about a behaviour change that will change the eating habits of the learners, the community, the country, the continent and the world.

This study revealed that there is a substantial gap in the nutrition knowledge of learners in secondary schools. The study also revealed that learners' knowledge about sources of food rich in nutrients, the function of nutrients found in food, as well as portion sizes of food was limited.

The analysis of the curriculum indicated that there is insufficient and inconsistent nutrition content from Grades R to 12. Even though learners in Grades 10 to 12 were exposed to the compulsory subject of Life Orientation that contained nutrition content, they leave school with inadequate nutrition knowledge to enable them to live a healthy lifestyle.

Educators who were part of the study also shared the opinion that the school curriculum was inadequate in preparing learners for a healthy lifestyle. Only 54.6% of the educators reported that the schools where they teach are involved in healthy eating initiatives. In the view of the researcher, the high percentage of educators who believe that learners are inadequately prepared for a healthy lifestyle, is a cause for great concern.

5.5. Recommendations

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5.5.1 Recommendations to the DoE with regard to nutrition education in primary and high schools

The nutrition education of learners according to a school policy on nutrition and nutrition education based on a curriculum with the objective of improving the nutrition-related behaviour and attitudes of learners towards nutrition and healthy eating, should include:

- Commitment from the educators to support the nutrition policy and deliver on the curriculum requirements.
- Skills development for all educators so that all educators are equipped to teach nutrition within their respective learning areas and workshops should be organised by the Department of Education.
- Education on eating healthily and healthy food choices so that informed choices on correct food choice are made at all times must be part of the school curriculum from grade R to grade 12.
- Provision of healthy options of fruit, vegetables and protein-rich food to learners must be part of the school curriculum from grade R to grade 12.
- Provision of one nutritious meal a day for all learners at all schools must be part of the school curriculum from grade R to grade 12.
- Provision of knowledge and skills for healthy living which includes: healthy eating, hygienic and healthy food preparation and storage methods must be part of the school curriculum from grade R to grade 12.
- The Food Based Dietary Guidelines should form the core of nutrition education in the school curriculum in primary to secondary.
- Portion sizes for each meal and snack should be part of teaching correct nutrition must be part of the school curriculum from grade R to grade 12.

These research findings should be used in future research and curriculum development so that learners' knowledge of nutrition and educators' application of nutrition education can be more effective in achieving a healthy and efficient workforce that makes a positive contribution to the economy.

5.5.2 Recommendations for the education of parents on nutrition by community organizations and health facilities:

Parents are seen as the primary educators of their children and in the context of nutrition education, they need to be adequately educated themselves if they are to make a meaningful contribution to the improved nutrition of their families. The following initiatives should be considered.

- Parental involvement in discussions on providing better nutrition to families.
- Community and business involvement so that all stakeholders are committed to better eating and better living which is fundamental to improved intellectual and physical development.
- Educating parents on nutrition contributes to human capital. Human capital can be defined as well-nourished, healthy, educated, skilled and alert individuals, making for an improved human condition resulting in a labour force that could be any country's most productive asset.
- Investments in health, nutrition and formal education.
- Job creation and poverty alleviation has potential to make a community food-secure. This should be the greatest priority of community organisations and the Government.

5.5.3 Recommendations from an educational perspective to improve the nutrition knowledge of adolescents in order to promote a healthy lifestyle

Improved nutrition knowledge can only be accumulated if nutrition issues are adequately covered in the school curriculum. The following recommendations are worthy of consideration.

- The National School Curriculum must contain appropriate nutrition education from Grade R to Grade 12.
- Nutrition education must be presented progressively across the grades so that learners buy into the concept of developing and following a healthy lifestyle.
- The curriculum developers must work together with the Department of Health and the Department of Education so that appropriate resources (teaching aids) are provided to teach nutrition content.

- Skills development for educators in the field of nutrition should be relevant and understood by educators so that educators are equipped to teach the content and buy into this aspect of the curriculum.
- The education curriculum in South Africa prior to 1994 included subjects such as Right Living, Physical Education and Health Education which were part of compulsory subjects at school. These subjects formed part of the core subjects in school and since they addressed good nutrition and physical activity, they should be reintroduced to the school curriculum so that learners can follow a healthy lifestyle.
- The Curriculum Assessment Policy Statement (CAPS) replaced Outcomes Based Education in the Revised National Curriculum Statement Grades R–9 School Policy (2002) and the National Curriculum Statement Grades 10–12 (2003). However, curriculum changes made to individual learning areas or subjects in the Curriculum Assessment Policy Statement (CAPS) have excluded any significant changes in respect of nutrition education .

5.5.4 Recommendation for further studies:

The study revealed that the Department of Education must include more nutrition education into the school curriculum from Grades R–12. The following recommendation are suggested to improve health of children at schools.

- Investigate the prevalence of malnutrition amongst school learners in secondary schools in the eThekweni area to determine the nutrition status of learners in urban areas.
- Tuck-shops in schools should be researched to determine whether healthy food and snack choices are available to learners.

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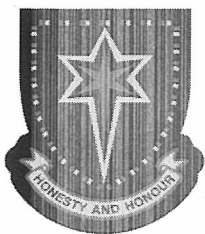
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Annexure A

Ridge Park College

Honesty & Honour

Aim for Excellence

*Celebrating 20 years of
educating young women
for the future*

2 February 2010

To Whom It May Concern:

I Thilavathy Naidoo an educator at Ridge Park College would like to complete my post graduate study at schools in Durban Central. My topic "Nutrition content in OBE Curriculum in grade 8-12 in the Durban Central area, involves investigation of the National curriculum and research questions to be completed by educators and learners on nutrition at school's in the Durban Central area.

The purpose of my study is to

1. identify the learning areas that include content nutrition
2. To investigate the extent to which educators teach the content in each grade and learning area.
3. Test the basic knowledge of learners on nutrition in grades 8-12 by means of a questioner
4. Drawing relationships between educators investigation and learners knowledge

I request permission to carryout my studies at your institution. Please can I have in your response in writing.

Your co-operation with this venture will be greatly appreciated.



T. NAIDOO

399 Peter Mokaba Ridge,
Durban

4067

Telephone : 031-2073337 Fax : 031-2086947

Private Bag Durban
Overport X003

E-mail: rpcadmin@mweb.co.za

KWAZULU-NATAL DEPARTMENT OF EDUCATION ETHUSINI CIRCUIT

6 Acton Road
Umbilo
4000

Tel: 0312741900
Call Centre: +270860569363
Web: www.kznedeucation.gov.za

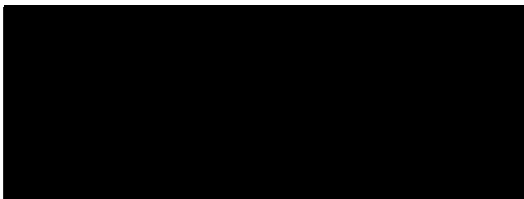
Dear Mrs Naidoo
7-24th Avenue
Umhlatuzana Township
4051

This letter serves to confirm that permission was granted for the following studies at Ridge Park College and Durban Boys High School.

The purpose of the study was to

1. identify the learning areas that include content nutrition
2. To investigate the extent to which educators teach the content in each grade and learning area.
3. Test the basic knowledge of learners on nutrition in grades 8-12 by means of a questionnaire
4. Drawing relationships between educators' investigation and learners' knowledge

Kind Regards



Mr TT. Mthembu
Circuit Manager



Ridge Park College

**Honesty & Honour
Aim for Excellence**

*Celebrating 20 years of
educating young women
for the future*

9 March 2010

The Headmaster
Mr. D. Magner
Durban High School
St Thomas Road
Durban
4001

As part of the Masters programme in the field of "Food and Nutrition," I would like to conduct research at schools in Durban Central on the topic "The extent to which Nutrition forms part of the OBE Curriculum in grades 8-12 in the Durban Central area."

This study involves investigation of the National curriculum and research questions to be completed by educators and learners on nutrition at schools in the Durban Central area.

The purpose of my study is to:

1. identify the learning areas that include content on nutrition
2. investigate the extent to which educators teach the content in each grade and learning area.
3. Test the basic knowledge of learners on nutrition in grades 8-12 by means of a questionnaire
4. draw relationships between the educator's investigation and the learners' knowledge

I request permission to conduct my research at your institution during the Life Orientation lessons. Please may I have your response in writing.

Your co-operation in this research will be greatly appreciated.


T. NAIDOO
Hospitality/Consumer Educator

399 Peter Mokaba Ridge,
Durban
4067
Telephone : 031-2073337 Fax : 031-2086947

Private Bag Durban
Overport X003

E-mail: rpcadmin@mweb.co.za



Ridge Park College

Honesty & Honour

Aim for Excellence

Annexure D

*Celebrating 20 years of
educating young women*

for the future

399 Peter Mokaba Ridge,
Durban, 4067

Telephone: 031-2073337

Fax: 031-2086947

Private Bag Durban
Overport X003

E-mail: rpcadmin@mweb.co.za

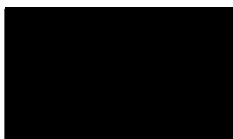
Dear Mrs Naidoo
7-24th Avenue
Umhlatuzana Township
4051

This letter serves to confirm that permission was granted for the following studies at Ridge Park College.

The purpose of the study was to

1. identify the learning areas that include content nutrition
2. To investigate the extent to which educators teach the content in each grade and learning area.
3. Test the basic knowledge of learners on nutrition in grades 8-12 by means of a questionnaire
4. Drawing relationships between educators' investigation and learners' knowledge

Kind Regards



Mrs T Reddy

Principal



Ridge Park College

Honesty & Honour
Aim for Excellence

*Celebrating 20 years of
educating young women
for the future*

15 October 2013

The Headmaster

Dear Sir

PERMISSION TO CONDUCT RESEARCH

As part of the Masters programme in the field of "Food and Nutrition," I would like to conduct research at schools in Durban Central on the topic "The extent to which Nutrition forms part of the OBE Curriculum in grades 8-12 in the Durban Central area."

This study involves investigation of the National curriculum and research questions to be completed by educators on nutrition at schools in the Durban Central area.

The purpose of my study is to:

1. identify the learning areas that include content on nutrition
2. investigate the extent to which educators teach the content in each grade and learning area.
3. test the basic knowledge of learners on nutrition in grades 8-12 by means of a questionnaire
4. draw relationships between the educators' investigation and the learners' knowledge

I request permission to conduct my research at your institution if all educators who taught the learning areas could please complete the questionnaire.

Learning area
Natural science
Social science
Life orientation
Agricultural science
Agricultural technology
Dance studies
Design
Civil technology
Electrical technology
Mechanical technology
Information technology
Life science
Physical science
Consumer science
Hospitality studies
Other....

Your co-operation in this research will be greatly appreciated.

T. NAIDOO
Hospitality/Consumer Educator

399 Peter Mokaba Ridge,
Durban

4067
Telephone : 031-2073337 Fax : 031-2086947

Private Bag Durban
Overport X003

E-mail: rpcadmin@mweb.co.za

Questionnaire

Extent to which educators taught content on nutrition knowledge in each grade and learning area in the OBE/FET curriculum.

Name of school _____ (Optional)

Question 1

Please indicate which learning area you teach and on what grade level

Code	Learning area	Please indicate with a X	Grade
1	Natural science		
2	Social science		
3	Life orientation		
4	Agricultural science		
5	Agricultural technology		
6	Dance studies		
7	Design		
8	Civil technology		
9	Electrical technology		
10	Mechanical technology		
11	Information technology		
12	Life science		
13	Physical science		
14	Consumer science		
15	Hospitality studies		
16	Other....		

Question 2

Please read through the OBE curriculum content indicated below and indicate in the question after the table the extent to which the content was covered in the learning area that you as an educator taught. If you teach more than one learning area please indicate each one in a separate block.

SENIOR PHASE, GRADE:7 -9NATIONAL CURRICULUM IN 2003

<u>NUTRITION CONTENT IN THE FOLLOWING SUBJECTS</u>		
<u>SUBJECT</u>	<u>GRADE:7</u>	<u>GRADE:8</u>
NATURAL SCIENCE	<p>Living processes and healthy living: Animals including humans require protein, fat, vitamin and water. Food taken in is absorbed into the body via the intestine. Surplus food is stored as fat or carbohydrate.</p> <p>Animals, including humans have a circulatory system which includes the heart, veins, arteries and capillaries and which carries nutrients and oxygen to all parts of the body and removes waste products. Oxygen, which is provided by the breathing system, reacts with food substances to release energy.</p>	<p>Living processes and healthy living: Animals including humans require protein, fat, vitamin and water. Food taken in is absorbed into the body via the intestine. Surplus food is stored as fat or carbohydrate.</p> <p>Animals, including humans have a circulatory system which includes the heart, veins, arteries and capillaries and which carries nutrients and oxygen to all parts of the body and removes waste products. Oxygen, which is provided by the breathing system, reacts with food substances to release energy.</p>
SOCIAL SCIENCE	<p>Population growth and change: Disease and poverty. Impact of HIV/AIDS.</p>	
LIFE ORIENTATION	<p>Proposes ways to improve the nutritional value of own personal diets.</p> <p>Evaluates actions to address an environmental health problem.</p> <p>Describes strategies for living with disease, including HIV/AIDS.</p>	<p>Plans an action in which laws and or policies for the protecting environmental health are applied to address an environmental health issue.</p> <p>Critically analyses the cause of common disease in relation to socio-economic and environmental factors.</p> <p>Illustrates and evaluates the influence of ecological, social, economic, cultural and political factors on own personal choice of diet.</p> <p>Develops and implements an environmental health programme.</p> <p>Investigates personal and social factors that contribute to substance abuse and suggests</p>

		Describes what a healthy lifestyle is in own personal situation, as a way to prevent disease. Demonstrates informed, responsible decision-making about health and safety. Examines a healthy and safety issue related to violence, and proposes alternatives to violence as well as counter-strategies.	appropriate responses and rehabilitation options. Critically evaluates resources on health information, health services and a range of treatment options, including HIV/AIDS. Discusses ways to apply insights gained from participating in an activity related to national health or safety promotion programme.
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DOE,2001

GRADE: 10-12 NATIONAL CURRICULUM IN 2003

NUTRITION CONTENT IN THE FOLLOWING SUBJECTS

SUBJECT	GRADE:10	GRADE:11	GRADE:12
LIFE ORIENTATION	–	Characteristics of a healthy and balanced lifestyle, factors influencing responsible choices and behavior in the promotion of health, and the impact of unsafe practices on self and others.	Investigate the human and environmental factors that cause ill health. Investigate how unequal power relations between the sexes are constructed and how they influence health and well being and apply this understanding to work, cultural and social context.
AGRICULTURAL SCIENCE	Analyse and describe the value of a healthy environment and ecosystem for the healthy functioning of a democratic, productive society.	Recognise and analyse the impact of malnutrition on the health of people and describe the importance of sustainable agricultural production in combating under-nourishment. Understand and analyse the impact global agriculture on local production.	Investigate and analyse the importance of continual development of agricultural commodities to meet the increasing food demands of a growing population.
AGRICULTURAL TECHNOLOGY	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV/AIDS.	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV/AIDS.	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV/AIDS.

DANCE STUDIES	Demonstrate knowledge and understanding of the human skeleton, by naming major bones and joints and how they move; effective nutrition,(importance of food and water, balanced diets, need for protein, carbohydrates, fats, minerals and vitamins. eating disorders, health care and a positive body image for the dancer.	Demonstrate knowledge and understanding of health care, (e.g. cardiovascular fitness, strength, flexibility and lifestyle choices)(substance abuse- drugs, dieting pills, cigarettes and alcohol, diet and HIV/AIDS.	Demonstrate knowledge and understanding of the application of practical strategies for injury prevention and care, how to increase physical fitness.
DESIGN	Health and safety issues with specific reference to HIV/AIDS.	Health and safety issues with specific reference to HIV/AIDS.	Health and safety issues with specific reference to HIV/AIDS.
CIVIL TECHNOLOGY	Responding to basic emergencies in context, taking cognizance of health issues such as HIV/AIDS.	Responding to basic emergencies in context, taking cognizance of health issues such as HIV/AIDS.	Responding to basic emergencies in context, taking cognizance of health issues such as HIV/AIDS.
ELECTRICAL TECHNOLOGY	Responding to basic emergencies in context, taking cognizance of health issues such as HIV/AIDS.	Responding to basic emergencies in context, taking cognizance of health issues such as HIV/AIDS.	Responding to basic emergencies in context, taking cognizance of health issues such as HIV/AIDS.
MECHANICAL TECHNOLOGY	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV/AIDS.	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV/AIDS.	Describing, explaining and responding to basic medical emergencies in context, taking cognizance of health issues such as HIV/AIDS.
INFORMATION TECHNOLOGY	Discuss health and ergonomic issues related to frequent computer use.	–	–
LIFE SCIENCE	Identifies structures and processes as food passes through the digestive system. Describes causes of various digestive problems(e.g. heartburn, gastric ulcers, irritable bowel syndrome, colon cancer and piles) Explains the cause of nutrition problems (e.g. bulimia, anorexia, obesity, kwashiorkor, rickets and gout) Investigates various home remedies for nutritional disorders.	Writes reports on the impact of HIV/AIDS on the health and lifestyle of peers.	
PHYSICAL SCIENCE	Human nutrition- chemical change	–	–

CONSUMER SCIENCE	<p>When discussing the daily food intake of young adults, consider the food practices of various groups of people as influenced by culture, religion and socio-economic status, as well as the influence of knowledge, attitudes and education on food habits and patterns.</p> <p>Compare the food-based dietary guidelines with the daily food intake of young adults in terms of foods, portions and portion sizes. The information obtained can then be used to describe the impact of food choices on own health.</p> <p>When explaining food choices in terms of resources available to the household, include the human and material resources needed for obtaining and preparing food and how this relates to food choices made by young consumers.</p> <p>In describing safe food-handling practices, focus on hazards to food(bacteria, moulds, parasites, natural toxicants, storage procedure).</p>	<p>Compare a young adults daily food intake with the recommended nutritional requirements so that suggestions for improvements can be made.</p> <p>Use nutrients and other components of food and their function as a point of departure.</p> <p>Use the Recommended Daily Allowances (RDAs) for different stages in the life cycle and for the people with different nutritional requirements (e.g. pregnancy, illness, physical requirements such as work and sport) when explaining the nutrient needs of consumers from different age groups and with differing energy requirements.</p> <p>Apply the criteria for food buying(safety, quality, pricing) to evaluate food outlets in the local community.</p> <p>Discuss the pathogenic organisms related to food spoilage and food safety.</p>	<p>When suggesting guidelines for the prevention or management of nutritional and food-related health conditions, including one or more health problems(e.g. HIV/AIDS, obesity, osteoporosis, high cholesterol or high blood pressure) as well as food related to allergies and eating disorders.</p> <p>Investigate any consumer issue related to the impact of the selection and use of food on the natural or economic environment.</p>
HOSPITALITY STUDIES	<p>Produce and present a range of breakfast and light meals incorporating rules for menu planning using commodities cereals, egg, fruit, salads and salad dressing, scones and muffins, pasta, mincemeat, sausage, dairy products teas and coffee.</p>	<p>Plan menus for teas and light meals using the following commodities- poultry, fish, rice, soups, sauces, stocks, vegetables, yeast products, cakes and biscuits.</p>	<p>Describe the origin and symptoms of infection disease, including HIV/AIDS, in the food and beverage industry.</p> <p>Plan menus for special dietary requirements(e.g. diabetic, low fat, low sodium, HIV/AIDS, vegetarian, Hindu, halaal and kosher.</p> <p>Plan and prepare a range of dishes for formal dinners.</p>

Please indicate your learning area and place a cross in the box that applies to you **(If you teach more than one of these learning areas please use a separate block for each learning area)**

2.1 Learning area: _____

1	2	3	4	5
Content taught to learners covered all aspects in the learning area as indicated in the document.	Content taught to learners covered 75% aspects in the learning area as indicated in the document.	Content taught to learners covered 50% aspects in the learning area as indicated in the document.	Content taught to learners covered 25% in the learning area as indicated in the document.	Content taught to learners covered none of the learning area as indicated in the document

2.2 Learning area: _____

1	2	3	4	5
Content taught to learners covered all aspects in the learning area as indicated in the document.	Content taught to learners covered 75% aspects in the learning area as indicated in the document.	Content taught to learners covered 50% aspects in the learning area as indicated in the document.	Content taught to learners covered 25% in the learning area as indicated in the document.	Content taught to learners covered none of the learning area as indicated in the document

2.2 Learning area: _____

1	2	3	4	5
Content taught to learners covered all aspects in the learning area as indicated in the document.	Content taught to learners covered 75% aspects in the learning area as indicated in the document.	Content taught to learners covered 50% aspects in the learning area as indicated in the document.	Content taught to learners covered 25% in the learning area as indicated in the document.	Content taught to learners covered none of the learning area as indicated in the document

					document
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Question 3

Please indicate with a cross in the space provided for the **method/methods** that you use to teach the nutrition component in your learning areas.

	Tool	Please X the one that applies
1	Textbooks	
2	Magazines	
3	Power points	
4	Charts	
5	Games	
6	Practical work	
7	Case studies	
8	Notes	
9	Other- please add...	

Question 4

Please indicate the **method/methods** that are used to test learner's knowledge on nutrition

	Method	Please X which were used
1	Tests/formal	
2	Tests /informal	
3	Tests/open book	
4	Assignment	
5	Project	
6	Presentation	

7	Debates	
8	Speeches	
9	Other-	

Question 5

In your opinion do you think nutrition knowledge is important for school level learners? Use a cross to indicate your choice.

	Importance	Please X your opinion
1	Extremely important	
2	Important	
3	Fairly important	
4	Not very important	
5	Not important at all	

Question 6

In your opinion does the learning area content cover adequate nutrition education for learners leaving school at grade twelve level?

Yes	No

Question 7

Please rate in your opinion what influence your learning area content has on the nutrition knowledge of the learners.

Learning area: _____

	Influence	Please X your choice
1	Very positive	
2	Positive	

3	Fair	
4	Not much	
5	Nothing at all	

Learning area: _____

	Influence	Please X your choice
1	Very positive	
2	Positive	
3	Fair	
4	Not much	
5	Nothing at all	

Learning area: _____

	Influence	Please X your choice
1	Very positive	
2	Positive	
3	Fair	
4	Not much	
5	Nothing at all	

Question 8

Does the school engage in any healthy eating initiatives?

Yes	No

Question 9

If yes, how often? _____

Question 10

If “yes: to question 6 please provide a list of the activities

Thank you for your time

Thila Naidoo

Contact number: 031 277 3337

ANNEXURE O

Office
Use
Only

NUTRITION KNOWLEDGE QUESTIONNAIRE

INSTRUCTIONS

THE FOLLOWING QUESTIONNAIRE CONTAINS TWO TYPES OF QUESTIONS,

MULTIPLE CHOICE AND TRUE/ FALSE

1. MULTIPLE CHOICE: CHOOSE **ONE** THAT YOU THINK IS THE CORRECT ANSWER AND TICK THE CORRESPONDING NUMBER THAT IS NEXT TO THE ANSWER

2. TRUE/ FALSE: CHOOSE THE **TRUE** OR THE **FALSE** AND TICK THE ONE THAT YOU THINK IS THE CORRECT ANSWER

THE QUESTIONS REFER TO A HEALTH PERSON WHO IS NOT ON ANY MEDICATION OR SPECIAL DIET

Please answer all the questions before moving on to the next ones.

Do not page back!

DATE	YY	MM	DD	
SUBJECT NUMBER				
AGE				
DATE OF BIRTH	YY	MM	DD	
GENDER	Male	Female		
SCHOOL/ INSTITUTION				
GRADE/ DEGREE				

- 1 You should eat a lot of sugar to have enough energy

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

 11A ☐
- 2 Cooked meat/ fish/ chicken sold on the street may not always be safe to
- | | |
|--|---|
| It may have been undercooked | 1 |
| The cook may not have used fresh meat | 2 |
| It may have been kept for a long time before being | 3 |
| All of the above | 4 |
- 6D
- ☐
- 3 What a pregnant woman eats during pregnancy has no effect on her health and the health of her unborn baby

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

 12 ☐
- 4 You should not have starches at most meals because
- | | |
|---|---|
| They are not important for your health | 1 |
| Even eating small amounts can cause weight gain | 2 |
| They cause diseases | 3 |
| None of the above | 4 |
- 3B
- ☐
- 5 How much water should you drink a day
- | | |
|--|---|
| You don't have to drink water everyday | 1 |
| 1 to 3 glasses | 2 |
| 4 to 6 glasses | 3 |
| 7 to 9 glasses | 4 |
- 9A
- ☐
- 6 You should add extra salt to your cooked food before you even eat it

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

 8A ☐
- 7 What is a portion of cooked vegetables?
- | | |
|--------------|---|
| 1 Tablespoon | 1 |
| Half a cup | 2 |
| 1 Cup | 3 |
| 2 Cups | 4 |
- 4A
- ☐
- 8 Which of the following is a low fat snack
- | | |
|---------------|---|
| "Simba" Chips | 1 |
| Popcorn | 2 |
| Fried chips | 3 |
| "Niknaks" | 4 |
- 7A
- ☐
- 9 From which group of foods should you eat the most every day?
- | | |
|-----------------------------------|---|
| Bread, samp, rice, porridge | 1 |
| Apples, bananas, spinach, carrots | 2 |
| Milk, yogurt, cheese | 3 |
| Chicken, fish, beans, eggs | 4 |
- 3A
- ☐
- 10 Drinking a lot of wine, beer, cider can cause weight gain

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

 10B ☐
- 11 Which one of the following is not healthy for a pregnant woman to do
- | | |
|------------------------------|---|
| Be physically active | 1 |
| Eat different kinds of foods | 2 |
| Sleep most of the day | 3 |
| Drink lots of water | 4 |
- 12
- ☐
- 12 Women must try not to gain weight when they are pregnant

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

 12 ☐
- 13 It is not healthy for a pregnant woman to eat foods like milk, cheese, yoghurt

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

 12 ☐
- 14 People who are overweight should not be physically active

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

 2B ☐
- 15 It is usually not necessary to wash vegetables before you cook them

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

 4D ☐
- 16 The key to a healthy way of eating is to
- | | |
|---|---|
| Eat many different kinds of foods | 1 |
| Eat some foods more than other foods | 2 |
| Eat certain kinds of foods in moderate or small amounts | 3 |
| All of the above | 4 |
- 1A
- ☐

- 17 The following foods must not be eaten at all when one is trying to lose weight
- | | |
|-------------------|---|
| Bread and rice | 1 |
| Meat and fish | 2 |
| Margarine | 3 |
| None of the above | 4 |
- 1A
- 18 Which foods contain a lot of calcium?
- | | |
|------------------|---|
| Chicken and eggs | 1 |
| Milk, yoghurt | 2 |
| Pilchards | 3 |
| 2 and 3 | 4 |
- 6C
- 19 The healthiest snack is:
- | | |
|-----------------------------|---|
| A glass of milkshake | 1 |
| A tub of unbuttered popcorn | 2 |
| A slab of chocolate | 3 |
| 2 and 3 above | 4 |
- 7A
- 20 To which of the following foods has iodine been added?
- | | |
|---------------|---|
| Bread | 1 |
| Maize meal | 2 |
| Table salt | 3 |
| Powdered milk | 4 |
- 8C
- 21 If you were trying to increase the amount of fiber in your diet, which one of the following foods should you eat more of?
- | | |
|------------------------|---|
| Cakes and biscuits | 1 |
| Apples and carrots | 2 |
| Chips and pies | 3 |
| Chicken and fresh fish | 4 |
- 4C
- 22 Being physically active means
- | | |
|---------------------------------------|---|
| Going to the gym | 1 |
| Walking a lot | 2 |
| Playing sports like soccer or netball | 3 |
| All of the above | 4 |
- 2A
- 23 Which of the following choice of foods prevent certain diseases
- | | |
|--|---|
| Fish, Chicken without skin, and lean meat | 1 |
| Beef sausage, bacon, and lean mince | 2 |
| Fried fish, fried chicken, and regular mince | 3 |
| All of the above | 4 |
- 6A
- 24 Which foods contain a lot of fibre?
- | | |
|-----------------------|---|
| Oats, apples, beans | 1 |
| Milk, yogurt, cheese | 2 |
| Beef, chicken, mutton | 3 |
| Butter, margarine | 4 |
- 1C
- 25 How many fruits and vegetables should be eaten
- | | |
|--|---|
| 1 fruit and vegetable a day | 1 |
| 3-4 fruits and vegetables a day | 2 |
| 5 or more fruits and vegetables everyday | 3 |
| There is no need to eat fruits and | 4 |
- 4A
- 26 If you are eating a healthy diet there is no need for you to be physically active
- TRUE FALSE 2A
- 27 Drinking boiled water is a good way to lose weight
- TRUE FALSE 9B
- 28 Salt should be added to all foods except fruits
- TRUE FALSE 8A
- 29 If one wants to lose weight there is no need to be physically active, it is better that one simply diets
- TRUE FALSE 2B
- 30 All water is safe to drink
- TRUE FALSE 9A
- 31 You can drink as much wine, beer, ciders as you want provided you have eaten first
- TRUE FALSE 10A
- 32 A little sugar can be eaten when one is trying to lose weight
- TRUE FALSE 11B

33 How much milk or maas should you have a day?

None	1
Half a cup	2
One cup	3
Two cups	4

6A

34 Your body only needs a little bit of salt to be healthy

TRUE FALSE 8A

35 A well- balanced diet

Consists mostly of meat, with smaller amounts of starch, fruits, vegetables, and dairy products	1
Consists mostly of vegetables, and smaller amounts of meat and dairy products	2
Consists mostly of starches, vegetables and fruits, with smaller amounts of meat and dairy products	3
None of the above	4

3A

36 Sugar and foods that contain sugar should be eaten in small amounts

TRUE FALSE 11A

37 Eating a lot of different kinds of foods is healthier than eating only a few kinds foods

TRUE FALSE 1A

38 Overweight women should try to lose weight when they are pregnant

TRUE FALSE 12

39 Sugar contains a lot of vitamins and minerals

TRUE FALSE 11A

40 It is impossible to get all the vitamins and minerals you need from food, you need to a vitamin and mineral pill

TRUE FALSE 1A

41 It is not healthy for a pregnant woman to drink a lot of wine, beer, cider

TRUE FALSE 12

42 Which one of the following groups of nutrients are found in large amounts in fruits and vegetables?

Fibre, Vitamin A	1
Starches, fat, Vitamin D	2
Fats, Iron, Calcium	3
None of the above	4

4C

43 Which of the following breakfast menus contain little fat

Whole-wheat toast with thinly spread margarine	1
Weet-Bix with 2% fat milk	2
Bacon and egg	3
1 and 2	4

7A

44 It is important for a pregnant women to avoid eating different kinds of foods

TRUE FALSE 12

45 Which food has the most fibre?

White rolls	1
Brown bread	2
White bread	3
Whole wheat bread	4

3C

46 The best place to defrost meat from a frozen state is to

leave it at room temperature	1
leave it in the fridge	2
leave it in sunlight	3
Meat should never be defrosted	4

6D

47 Starchy foods should not be eaten when one is trying to lose weight

TRUE FALSE 3B

48 To make sure that you stay healthy you should eat

Lean meat, fruits and vegetables, low fat dairy products, and breads and cereals	1
Fruit and vegetables only	2
Bread, cereals, fruit and vegetables only	3
Low fat dairy products and lean meat only	4

7A

49 Eating bread always causes weight gain

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

 3B ☐

50 Which of the following foods are the lowest in fat:

Corn flakes and full cream milk	1
Grilled lean steak and boiled carrots	2
Pizza and milkshake	3
Fried lamb chops and creamed spinach	4

 7A ☐

51 To protect yourself from disease you should avoid eating many different kinds of foods

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

 1B ☐

52 It is healthy to snack on foods that contain a lot of sugar

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

 11B ☐

53 Which of the following should a pregnant woman eat more of?

Milk, cheese, maas	1
Meat, chicken, fish	2
Fruits and vegetables	3
All of the above	4

 12 ☐

54 Dry beans, peas, and lentils should be eaten often

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

 5A ☐

55 Soya mince is as healthy as meat

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

 5A ☐

56 You can eat as much meat as you want everyday

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

 5A ☐

57 Which group of foods has the most Vitamin A?

Oats, whole wheat bread, rice	1
Carrots, spinach, sweet potatoes	2
Pies, cakes, pudding	3
None of the above	4

 4C ☐

58 Dry beans, peas, lentils are a healthy choice to eat in place of meat

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

 5A ☐

59 Meat/ fish/ chicken will not spoil if you store them

In the cupboard for a few days	1
In the fridge for 2 days only	2
In the freezer for 3-4 months	3
In 2 and 3 above	4

 6D ☐

60 The reason why beans, peas and lentils are good for you is that

They contain only small amounts of fat	1
They contain a lot of fibre	2
They can protect you from some diseases	3
All of the above	4

 5B,C ☐

SELECT YES OR NO FOR ALL THE CHOICES

1. From where do you get your information about nutrition?

	YES	NO	
School	1	2	13F
Peers/ Friends	1	2	13F
Parents	1	2	13F
Radio/ TV/ Magazines	1	2	13F
Other (Specify)			
	1	2	13F

SELECT 1 OR 2 OR 3 OR 4 FOR ALL THE CHOICES THAT YOU CHOSE YES TO IN QUESTION 1

2. Of the choices you have selected above, how would you rate them as

1= very unreliable

2= unreliable

3= reliable

4= very reliable

	very unreliabl e	unreliabl e	reliable	very reliable	
School	1	2	3	4	13G
Peers/ Friends	1	2	3	4	13G
Parents	1	2	3	4	13G
Radio/ TV/ Magazines	1	2	3	4	13G
Other (Specify)					
	1	2	3	4	13G
