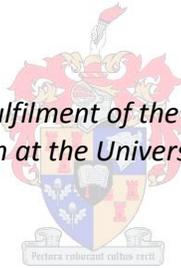


**Assessing the value of a South African-developed
educational nutrition board game in selected Grade
4 primary school learners and their Life Orientation
educators in the City of Cape Town district**

by
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*Thesis presented in partial fulfilment of the requirements for the degree
Master of Nutrition at the University of Stellenbosch*



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December 2014

DECLARATION

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Anna Jacomina Carolina Turner

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ABSTRACT

ASSESSING THE VALUE OF A SOUTH AFRICAN-DEVELOPED EDUCATIONAL NUTRITION BOARD GAME FOR SELECTED GRADE 4 LEARNERS AND EDUCATORS IN THE CITY OF CAPE TOWN DISTRICT

Objectives: To measure the impact on nutrition knowledge; to ascertain the opinions and practices related to nutrition and physical activity, tuck shop visits, and dietary quality of Grade 4 learners; as well as the perceptions on and acceptability of the 'Fun Food Game' (FFG) as nutrition education tool as evaluated in selected Grade 4 learners and educators.

Design: A before-after, experimental study with analytical components.

Setting: A purposive sample of four schools in the City of Cape Town district of the Western Cape province. Schools A and B in a higher socio-economic area served as intervention school (HIS) and control school (HCS), whereas schools C and D were in a lower socio-economic area and served as intervention school (LIS) and control school (LCS).

Subjects: Grade 4 English-speaking boys (n=85), girls (n=90) and Life Orientation educators (n=10).

Methods: Pre-tested questionnaires were used to determine change in nutrition knowledge, opinions and practices, both related to nutrition and physical activities in a pre-and post-setting, as well as the perceptions on and acceptability of FFG as a nutrition education (NE) tool for Grade 4 learners and educators. A 'Dietary Diversity Questionnaire' was used to establish the 'Dietary Diversity Score' (DDS), and to note tuck shop visits. Questionnaires were pre-tested in a pilot study.

Results: Increased nutrition knowledge and improved opinion on nutrition and physical activities were measured in all schools, but practices related to nutrition and physical activities as well as visits to the tuck shop showed mixed results. In the pre- and post-setting, a DDS of 5 was measured in the HIS and HCS, with a DDS of 5 in the pre- and 6 in the post-setting in the LIS and LCS. Fewer learners had a DDS<4 in the post-setting. Consumption of most food

groups and eating breakfast were higher in the post-setting. Bringing lunch boxes to school scored lower in the intervention schools. More tuck shop visits were reported in the LIS and LCS. Most (80% n=8) educators indicated a strong need for NE for themselves. All educators indicated self-learning as a means of familiarising themselves with the content of NE. Sources of nutrition advice included magazines (90% n=9), the Internet (80% n=8) and textbooks (70% n=7). A strong need for NE was expressed by all educators; however, they stated that it should not increase their work load. Educators 'strongly agreed' that the educational nutrition board game FFG can be classified as 'Health Promotion'. Overall, learners indicated that playing FFG was a positive experience.

Conclusion: Playing FFG and/or having an increased awareness regarding nutrition and physical activities at schools could have had a positive impact on nutrition knowledge and behaviour that could have resulted in positive behaviour, but no definite conclusion can be made in this regard. Nutrition behaviour was more positively influenced in the lower socio-economic schools. Implementing the Health Promoting Schools concept, where Nutrition Education Programmes form part of a multi-component strategy, is recommended.

OPSOMMING

WAARDEBEPALING VAN 'N SUID-AFRIKAANS-ONTWIKKELDE OPVOEDKUNDIGE BORDSPELETJIE OOR VOEDING VIR GESELEKTEERDE GRAAD 4 LEERDERS EN ONDERWYSERS IN DIE STAD KAAPSTAD DISTRIK

Doel: Om die impak van voedingskennis, opinies en praktyke verwant aan voeding en fisiese aktiwiteite, snoepiebesoeke asook dieetkwaliteit van Graad 4 leerders te bepaal, sowel as die persepsie en aanvaarbaarheid van 'Fun Food Game' (FFG) as hulpmiddel in voedingsopleiding soos geëvalueer deur geselekteerde Graad 4 leerders en -onderwysers.

Ontwerp: 'n Voor-na, eksperimentele studie met analitiese komponente

Omgewing: 'n Doelbewuste groepskeuse van vier skole. Skole A en B in 'n meer gegoede area het as intervensie skool (HIS) en kontrole skool (HCS) gedien, terwyl skole C en D in 'n minder gegoede area as intervensie skool (LIS) en kontrole skool (LCS) gedien het in die Stad Kaapstad distrik van die Westelike Provinsie.

Deelnemers: Graad 4 Engelssprekende seuns (n=85), dogters (n=95) en Lewensoriënteringsonderwysers (n=10)

Metodes: Voorafgetoetsde vraelyste is gebruik om te bepaal of voedingskennis, opinies en praktyke beide verwant aan voeding en fisiese aktiwiteite, voor en na die studie verander het, asook die persepsie en aanvaarbaarheid van FFG as 'n hulpmiddel in voedingsopleiding vir geselekteerde Graad 4 leerders en onderwysers. 'n Dieetdiversiteit Vraelys ('Dietary Diversity Questionnaire' – DDQ) is gebruik om 'n Dieetdiversiteit Telling ('Dietary Diversity Score' – DDS), sowel as snoepiebesoeke te bepaal. 'n Loodsstudie is uitgevoer om die vraelyste te toets.

Resultate: 'n Toename in voedingkennis en verbeterde opinies oor voeding en fisiese aktiwiteite is in alle skole gevind, maar praktyke oor voeding en fisiese aktiwiteite, asook snoepiebesoeke het gemengde resultate getoon. In die voor- en na-toetsing is 'n DDS van 5 in HIS en HCS bepaal, met 'n DDS van 5 in die voor- en 6 in die na-toetsing in LIS en LCS.

Minder leerders het 'n DDS<4 in die na-toetsing gehad. Inname van die meeste voedselgroepe sowel as ontbyt het in die skole toegeneem. Die bring van kosblikke het in die intervensie skole verminder. Die hoogste frekwensie snoepiebesoeke kom voor by die LIS en LCS. Meeste (80% n=8) onderwysers het 'n sterk behoefte aan voedingsopleiding vir hulself aangedui. Alle onderwysers dui aan dat die inhoud van voedingskennis deur selfleer verhoog word. Tydskrifte (90%, n=9), Internet (80%, n=8) en handboeke (70%, n=7) word as bronne van voedingsadvies beskryf. 'n Sterk behoefte vir opvoedkundige voedingsopleiding is deur al die onderwysers aangedui, maar sonder dat dit hul werkslading moet verhoog. Die onderwysers is "sterk oortuig" daarvan dat die opvoedkundige voedingsbordspeletjie FFG, as "Gesondheidsbevordering" geklassifiseer kan word. In die algemeen het leerders dit baie positief ervaar om FFG te speel.

Samevatting: Die speel van FFG en/of 'n groter bewusmaking van voeding en fisiese aktiwiteit wat by die skole plaasgevind het, kon 'n positiewe impak op voedingskennis en -gedrag gehad het, wat kon lei tot positiewe gedrag, maar geen definitiewe gevolgtrekking kan gemaak word in die verband nie. Voedingsgedrag in die mindergegoede skole is meer positief beïnvloed. Implimentering van die Gesondheidsbevorderende Skole konsep, waar Voedingsopleidingsprogramme deel vorm van 'n multi-komponent strategie, word aanbeveel.

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CONTRIBUTIONS BY PRINCIPAL RESEARCHER AND FELLOW RESEARCHERS

This principal researcher, Anna Jacomina Carolina Turner, developed the idea and protocol. The principal researcher planned the study, undertook data collection without a research assistant, captured the data for analysis, analysed the data with the assistance of a statistician, Prof. DG Nel, interpreted the data and drafted the thesis. Ms Lisanne du Plessis and Prof. Wilna Oldewage-Theron provided input at all stages and revised the protocol and thesis.

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LIST OF ACRONYMS AND ABBREVIATIONS

CS – Control School

DDQ – Dietary Diversity Questionnaire

DDS – Dietary Diversity Score

DoBE – Department of Basic Education

DoH – Department of Health

ENBG – Educational Nutrition Board Game

FBDG – Food-Based Dietary Guidelines

FFG – Fun Food Game

GDP – Gross Domestic Product

Gr – Grade

HCS – Control School in a Higher Socio-Economic Area

HIS – Intervention School in a Higher Socio-Economic Area

HKQ – The HealthKick Questionnaire for Learners

HPS – Health-Promoting Schools

HPP – Health-Promotion Programmes

HSA – Higher Socio-Economic Area

INP – Integrated Nutrition Programme

IS – Intervention School

ISHP – Integrated School Health Programmes

KPA – Key Performance Area

LCS – Control School in a Lower Socio-Economic Area

LIS – Intervention School in a Lower Socio-Economic Area

LO – Life Orientation

LSA – Lower Socio-Economic Area

NCD – Non-Communicable Diseases

NE – Nutrition Education

NEP – Nutrition Education Programme

NEPs – Nutrition Education Programmes

NFCS – National Food Consumption Survey

NS – Non-Significant

PHC – Primary Health Care

PQE – Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

PQL – The Perception Quantitative Questionnaire for English-speaking Grade 4 Learners

PQLs – The Perception Quantitative Questionnaires for English-speaking Grade 4 Learners

SA – South Africa

SADHS – National South African Demographic and Health Survey

SANHANES-1 – South African National Health And Nutrition Examination Survey

SHE – School Health Education

T2DM – Type 2 Diabetes Mellitus

WC – Western Cape

WCDBE – Western Cape Department of Basic Education

WHO – World Health Organization

LIST OF DEFINITIONS

Health-Promoting School: a school where a healthy environment is being promoted¹ and where the school is constantly strengthening its capacity as a healthy setting for living, learning and working.¹

Nutrition transition: a condition that leads to modified diets with a higher risk of developing lifestyle diseases. This phenomenon includes an increased intake of sweetened carbonated beverages, micronutrient-poor, energy-dense types of food, fast food high in salt, animal products high in total and saturated fat, and less consumption of vegetables, legumes, starchy staple foods and low dietary fibre. The study indicated that both fruit and meat intake were high, but not sufficient for micronutrient requirements.²

Edutainment: It is described as a combination of education and entertainment that was recommended as a method to encourage higher engagement of Grade 3 and 4 learners.³

Settings-approach: HPS: an approach where access to a significant number of learners for considerable periods of time in different developmental stages, such as childhood and the teenage years, could result in high coverage for health-promoting activities.⁴

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Chapter 1

General introduction

1.1 PROBLEM STATEMENT

The World Health Organization (WHO) stated in 2008: “Health is a key determinant of development and a precursor of economic growth.”¹ Good nutrition practices have been undisputedly linked to health, survival and performance, but malnutrition remains a worldwide public health concern, classified as either undernutrition (stunting, underweight and wasting), or overnutrition (overweight and obesity).² The World Bank has made the claim that it is more cost effective to fight malnutrition through nutrition programmes rather than investing more money in the health budget, resulting in a lower Gross Domestic Product (GDP).³ A secondary analysis of the National Food Consumption Survey (NFCS) (2005) in South Africa (SA) showed a higher national prevalence for both stunting (>20%), and overweight and obesity (>30%), than previous calculations. Figures for both underweight and overweight in SA are high and a reason for concern; however the prevalence of overweight and obesity surpasses the prevalence of stunting.⁴ The NFCS showed that some children consumed a diet that was both low in energy and essential micronutrients,⁵ with a DDS of 3.6⁶ indicating a possibility of undernutrition.⁷ According to the NFCS, the overweight prevalence in the Western Cape (WC) province was 5%.⁴

Developing countries need to develop and evaluate their own programmes to promote healthy living,^{1,8} for example, Nutrition Education Programmes (NEPs), according to an SA study (2011).⁹ Schools are one of the settings where health promotion (HP) can influence health beliefs and behaviour. It is recommended that nutrition education (NE) should start in primary school.¹

The proposed project investigated the value of the Fun Food Game (FFG), a SA-developed educational nutrition board game for Grade 4 Life Orientation (LO) educators as a possible NE tool. The FFG can potentially assist in the education of NE and the promotion of activity in Grade 4 learners in the City of Cape Town district, thereby contributing to the development of much needed South African specific NEPs in schools. Learning through playing the FFG, thereby having fun, could potentially contribute as another NEP resource in the South African context for this specific age group. The study also aimed to determine if playing the FFG at

school had an influence on selected Grade 4 learners' nutritional knowledge, opinions and practices related to nutrition and physical activities, frequency of their tuck shop visits, as well as the quality of the diets in selected Grade 4 learners, which might contribute towards positive health beliefs and behaviour.

1.2 STUDY AIM AND OBJECTIVES

To measure the before and after effects of playing the FFG, an SA-developed educational nutrition game in selected Grade 4 learners in the City of Cape Town district were tested. Impact was measured in terms of nutrition knowledge and change in opinions and practices, both related to nutrition and physical activities in a pre-and post-setting at home and at school in all selected Grade 4 learners. Dietary adequacy and tuck shop visits were also determined in the before-after setting in selected Grade 4 learners, whereas the acceptability and feasibility of the FFG as a (NE) tool were assessed by selected Grade 4 learners and selected Grade 4 Life Orientation (LO) educators post-intervention.

Specific Objectives

- To measure baseline nutritional knowledge of all selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To measure post-intervention nutritional knowledge of all selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To determine baseline opinion (related to nutrition and physical activities) of all selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To determine post-intervention opinion (related to nutrition and physical activities) of all selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To determine baseline practices (related to nutrition and physical activities) of all selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To determine post-intervention practices (related to nutrition and physical activities) of all selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To determine baseline tuck shop visits by selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To determine post-intervention tuck shop visits by selected Grade 4 learners in the City of Cape Town district. (Chapter 4)

- To determine baseline dietary adequacy of selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To determine post-intervention dietary adequacy of selected Grade 4 learners in the City of Cape Town district. (Chapter 4)
- To determine the perception and acceptability of the FFG as a possible nutrition education tool in nutrition education post-intervention as assessed by selected Grade 4 learners (Chapter 5)
- To determine the perception and acceptability of the FFG as a possible nutrition education tool in nutrition education post-intervention as assessed by selected Grade 4 Life Orientation (LO) educators (Chapter 5)

1.3 THESIS OUTLINE

In Chapter 2, a review of the literature related to malnutrition is discussed, as well as the South African Department of Health's (DoH's) Integrated Nutrition Programme (INP), the "Re-engineering of Primary Health Care", as well as the Strategic Plan of the National DoH (2012–2016) with a focus on the Integrated School Health Policy (ISHP). Different models and theories to develop NEPs are discussed, as well as the Food-Based Dietary Guidelines (FBDG) for South Africa, edutainment, and specifically games as edutainment. The study population and selection of schools is discussed in Chapter 3. Results are reported in Chapters 4 and 5, and both are written with a view to being stand-alone, publishable papers. Chapter 4 describes nutritional knowledge, opinions and practices related to nutrition and being active, tuck shop visits and gauging dietary adequacy at school and home in a pre-and post-setting in selected Grade 4 learners in the City of Cape Town district before and after playing the FFG, an educational nutrition board game, and whether change in nutrition and physical behaviour were affected. The acceptability and feasibility of the FFG as a possible tool for NE and as an added resource in a South African NEP context in selected Grade 4 learners and selected Grade 4 educators are discussed in Chapter 5. Chapter 6 deliberates the overall research outcome, including a summary and recommendations.

Disclaimer: Since 2009, an educational board game, Foodle© - The Fun Food Game (for ages 12 and older) was developed by the researcher (Funkey Health CC) and is commercially available in SA (www.foodle.co.za). In 2010, a company based in the United States of America, "Simply Fun" (www.simplyfun.com) acquired a licence to develop their own version

of Foodle©. For the purposes of this study, the researcher developed a completely new local educational version of the game, with different rules and play mechanics, including card collection. The local new educational board game was called 'Fun Food Game (FFG).' It was only made available as a black and white prototype without any designs or labels to ensure objectivity and non-bias. The original Foodle© question cards were used. (Please refer to Addendum N and P.)

1.4 CONCEPTUAL FRAMEWORK

A conceptual framework was developed for this research study and gives a synopsis of the research in terms of inputs, the influential factor and hypothesised outcomes (Figure 1.1).

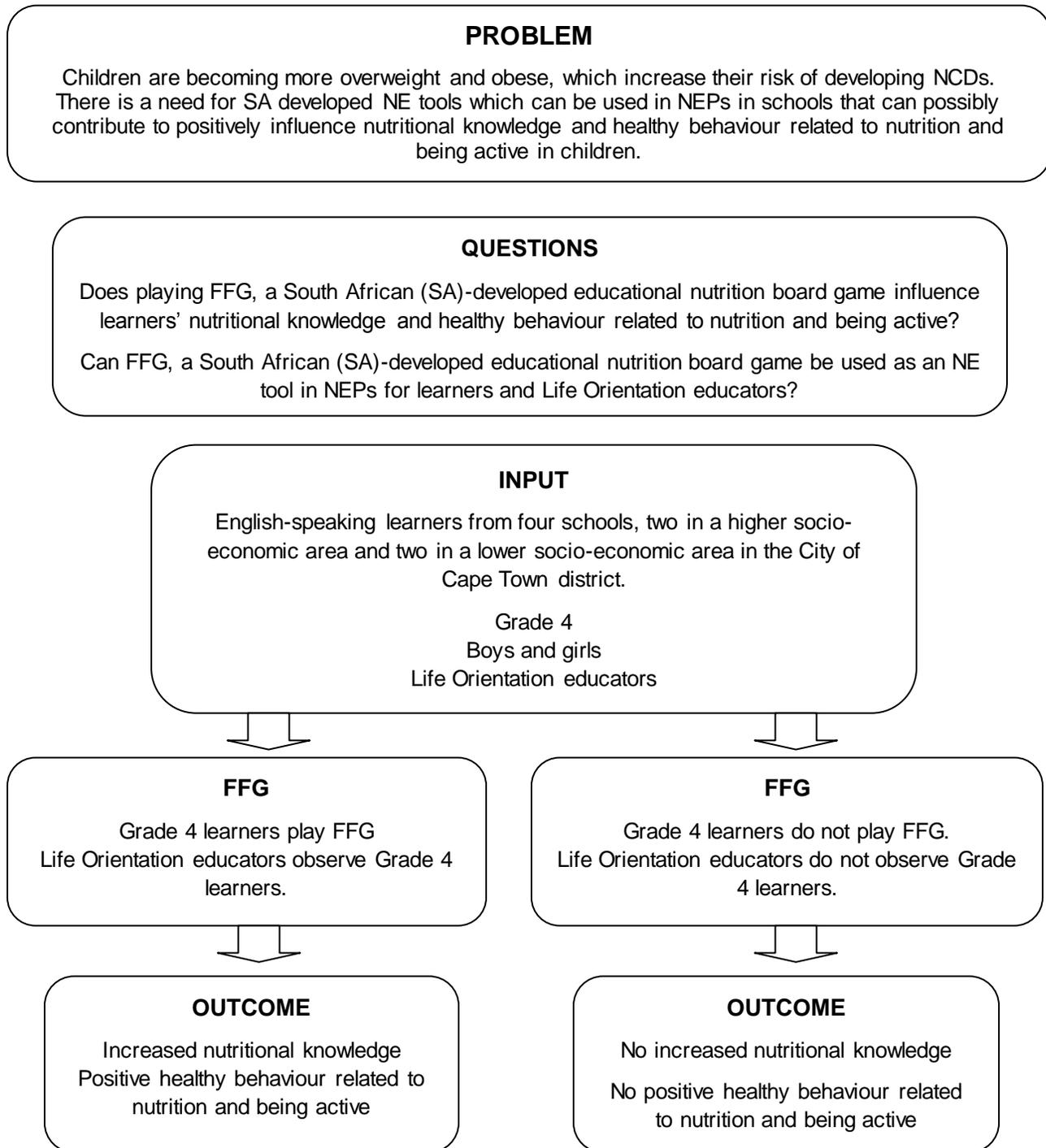


Figure 1.1: Conceptual Framework of the Study

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Chapter 2

Review of the literature

In this review, the prevalence, general burden and risk factors of malnutrition are discussed. There is a particular emphasis on SA children, together with a discussion related to the SA DoH's INP, the “Re-engineering of Primary Health Care”, as well as the Strategic Plan of the National DoH (2012–2016) with a focus on the ISHP. NE and different models and theories will be discussed, as well as NEPs, the FBDG, edutainment (entertainment *cum* education), and lastly games as edutainment.

2.1 MALNUTRITION

2.1.1 Definition

Malnutrition is a worldwide public health occurrence, which can be classified as either undernutrition (stunting, underweight and wasting), or overnutrition (overweight and obesity).¹ Developing countries, especially in southern Asia and sub-Saharan Africa, are challenged with malnutrition which continues to be a huge public health concern.^{2,3,4,5,6}

2.1.2 Prevalence of Stunting, Underweight and Wasting: Global

Globally, about 226 million children were stunted in 1998, about 182 million children in 2000 and 171 million in 2010. These numbers indicate a descending inclination in the prevalence of stunting worldwide.^{7,8} Africa and Asia are reported to have the highest prevalence (90%) of stunted children worldwide.⁹

2.1.3 Prevalence of Stunting, Underweight and Wasting: South Africa and Western Cape Province

A national prevalence of stunting (18%), underweight (9.3%) and wasting (4.5%) in 1–9-year-old SA children was recorded in the 1999 SA NFHCS.¹⁰ A secondary analysis of the NFCS showed a higher national prevalence of stunting (>20%) versus previous calculations.³ The Health of the Nation study conducted in primary school children (6–13-years olds)¹¹, and the South African National Health and Nutrition Examination Survey (SANHANES-1, 2012) conducted in 10–14 year-old children did not include measurement of stunting, wasting or underweight for the 10–14 year age group.¹² From the available data, SA can be classified as “medium” for stunting, “low” for underweight and “low” for wasting, according to the WHO classification of assessing severity of malnutrition in a country or group^{1,13,14} (Table 2.1).

Table 2.1: Classification for assessing severity of malnutrition by prevalence ranges among children under 5 years of age

Indicator	Severity of malnutrition by prevalence ranges (%)			
	Low	Medium	High	Very high
Stunting	<20	20-29	30-39	>=40
Underweight	<10	10-19	20-29	>=30
Wasting	< 5	5-9	10-14	

Source: <http://www.who.int/nutgrowthdb/about/introduction/en/index5.html>¹

2.1.4 Prevalence of Non-Communicable Diseases, Overweight and Obesity: Global

Non-communicable diseases (NCDs), for example, type 2 Diabetes Mellitus (T2DM),¹⁵ cardiovascular disease¹⁶ and certain cancers, are on the increase in both developed and developing countries,¹⁷ and in both urban¹⁸ and rural¹⁹ communities. NCDs cause disability and premature death worldwide,^{9,20,21} and the burden of unhealthy behaviour results in even further economic and social inequalities in poorer countries and communities.^{17,22,23} Research in developing countries has shown an increase in the prevalence of children becoming overweight, and obese,²⁴ and being diagnosed with T2DM.^{16,17,20,21} Not only adults, but also children are becoming overweight and obese.^{24,25,26,27} It is estimated that about 155 million children worldwide are either overweight or obese.¹⁶ T2DM is prevalent in about 75–80% of youth who are also overweight and obese.^{28,29} An estimated forty percent of girls and thirty percent of boys who were born in 2000 will develop diabetes mellitus 2, even with no further increase in obesity levels.^{30,31} Obesity is preventable and therefore the risk of diabetes can be reduced.^{31,32,33}

2.1.5 Prevalence of Non-Communicable Diseases, Overweight and Obesity: South Africa and Western Cape Province

NCDs are on the increase in both developed and developing countries,¹⁷ including SA,³⁴ in both urban¹⁸ and rural¹⁹ communities. According to the NFCS (1999), 10% of 1–9-year-old SAs were overweight and obese, with an overweight prevalence in the WC province of 5%.¹⁰ According to a secondary analysis of the NFCS, a higher national prevalence was measured for overweight and obesity (>30%) than in previous calculations.³ The Health of the Nation study (2008) conducted in primary school children (6–13 years old) confirmed these trends

with a prevalence of overweight and obesity in 28,4% and 7,2% children respectively.¹¹ According to SANHANES-1 (2012), overweight and obesity were 10% in boys and 22% in girls among 10–14-year-old children.¹²

2.2 IMPACT OF HEALTH COSTS

The following statement was made by the WHO in 2008: “Health is a key determinant of development and a precursor of economic growth.”¹⁷ Non-communicable diseases increase the health and overall costs to countries and can therefore impact negatively on both the quality of life and economic prosperity of a country.¹⁷

Childhood obesity could potentially have a negative health impact in terms of co-morbid conditions.³⁵ Obesity in adolescent women indicates a negative effect on future economic and socio-cultural features, for example level of education, marriage, sense of self-worth, and household revenue, possibly owing to prejudice against overweight persons.²⁵ Evidence shows that an obese child has an increased risk of developing metabolic syndrome, vs. developing metabolic syndrome due to obesity as an adult.^{25,37,38}

Psychological issues are another consequence of being overweight, because these children often encounter psychological trauma due to the psychological impact of being overweight and may experience low self-esteem, rejection by peers and dissatisfaction with their bodies when they grow up.^{39,40,41}

2.3 POSSIBLE RISK FACTORS FOR NON-COMMUNICABLE DISEASES IN CHILDREN

Various potential risk factors for NCDs in children are low birth weight, level of parental education, and universal risk factors.

2.3.1 Low Birth Weight

A contradiction exists in some families in developing countries where adults are overweight but the children are underweight. A possible reason could be reduced intrauterine growth with a consequential low birth weight, resulting in a tendency to a fast increase in childhood weight gain that makes these children prone to obesity later in life.³⁸

2.3.2 Level of Education and Overweight and Obesity

There might be a correlation between the level of education and overweight and obesity. Kruger et al. (2006) found a higher tendency to overweight in children with well-educated

mothers,⁴² whereas Labadarios et al. (2000) found that greater under-nutrition was present in children of less educated mothers.¹⁰ However, the National South African Demographic and Health Survey (SADHS) (2002) found a higher correlation between the development of obesity in SA and lower levels of education in mothers.⁴³ A study conducted by Lazzeri et al. (Italy) (2011) reported a similar tendency to overweight and obesity in children of lower educated mothers and fathers.⁴⁴ Childhood overweight and obesity, as seen in the case of adults, thus affect all spheres of society.

2.3.3 Universal Risk Factors

Universal factors in both developed and developing countries that cause non-communicable diseases have been identified. It includes consumption of low-quality foods (energy-dense, nutrient-poor foods high in sugar, fat and salt), less physical activity^{34,45} (at school, home, recreation and work), tobacco use¹⁵ and urbanisation.^{15,25} A study (2011) conducted in SA confirmed that urbanisation, economic growth and modernisation are linked to the so-called 'nutrition transition', a condition that leads to modified diets with a higher risk of developing lifestyle diseases.⁴⁶

2.4 INTERACTION OF RISK FACTORS

Risk factors that influence non-communicable diseases interact with one another and should be addressed simultaneously in various ways. Strategies should be multi-sectoral, multi-, inter- and trans-disciplinary, long term, culturally acceptable and take into account the diversity of population groups. Even modest interventions accumulate the possibility of reducing the incidence and prevalence of non-communicable diseases in the long term.¹⁷

2.5 INTERVENTION FROM THE SOUTH AFRICAN DEPARTMENT OF HEALTH

2.5.1 Integrated Nutrition Programme

The SA Department of Health (DoH) developed the Integrated Nutrition Programme (INP) in 1994 in response to the country's nutritional problems. One of the eight key performance areas of the INP (Table 2.2) included "NE, promotion, and advocacy" to improve SA citizens' nutritional knowledge, practices and attitudes.^{47,48}

Table 2.2: Key Performance Areas of the Integrated Nutrition Programme⁴⁹

- Maternal nutrition
- Infant and young child feeding
- Youth and adolescent nutrition
- Micronutrient malnutrition control
- Disease-specific nutrition support, treatment and counselling
- NE, promotion and advocacy
- Food service management
- Community-based nutrition interventions

These KPAs have recently been replaced by five key strategic approaches, as stipulated in the Roadmap for Nutrition in SA 2012–2016. The goals set by the Nutrition Roadmap include, amongst others: “To empower families and communities to make informed nutrition-related decisions, through advocacy regarding household food security, multi-sectoral collaboration and effective NE.”⁴⁹

NE is prominently listed as part of the ‘Comprehensive Package of Key Nutritional Interventions in the Nutrition Roadmap’ document. Under ‘Strategic Approaches’, NE features as follows: “Advocate for the integration of NE (including education on infant feeding, maternal nutrition, and healthy eating to prevent overweight and obesity) into comprehensive health education” in pre-schools, schools and communities. ⁴⁹

2.6 PRIMARY HEALTH CARE

2.6.1 Re-Engineering Primary Health Care

The National Department of Health (DoH) has embarked on a process of “Re-engineering Primary Health Care” with a focus that includes preventive programmes and actions and not merely a curative approach. This ‘Re-engineering Primary Health Care’ document acknowledges the neglect of health promotion over a long period of time and sets out to change the current approach of primary health care (PHC) to include a focus on prevention of ill-health and promotion of wellbeing. ⁵⁰

2.7 INTERVENTION FROM THE NATIONAL DEPARTMENT OF HEALTH

The Strategic Plan of the National Department of Health (2012–2016) includes, amongst others, a focus on school health initiatives⁴⁹, while the corresponding new, and more holistic, Integrated School Health Policy was launched by President Zuma in 2012.⁵¹

The Integrated School Health Policy (ISHP) embraces a focus on health education and promotion with nutrition as one of the issues that will be covered, including nutritional evaluation and detection of learners who are at risk of malnutrition. Prevalence of malnutrition (i.e. underweight, overweight and obesity) should be detected and community programmes implemented to address and correct these health challenges, which are a component of primary health care.⁵¹

2.8 HEALTH-PROMOTING SCHOOLS

2.8.1 Nutrition Education Programme Development: Globally

According to the WHO, key instruments to address and prevent nutrition-related problems throughout the population are the development of programmes to promote healthy diets and physical activity.¹⁷ In 1999, the WHO endorsed Health-Promoting Schools (HPS) as a whole-school method to promote a healthy environment which includes good nutrition in schools.⁵² An HPS is a WHO concept defined as ‘a school that is constantly strengthening its capacity as a healthy setting for living, learning and working’.⁵³

Schools are one of the settings where health promotion can influence health beliefs and behaviour. It is recommended that NE should start at primary school level.¹⁷ A considerable amount of food is consumed at school and therefore the school environment can have a major impact on both the quality of food as well as food selection and nutrient intake of children.⁵⁴ Studies found that learners received information via different means; for example, educators, peers, parents and mass media have shown enhanced attainment of health-related behaviour.^{55,56}

Educating educators through in-service and pre-service training can help them develop health promotion skills. Knowledgeable educators can act as role models and disseminate knowledge to students.⁵⁶ This will improve the execution of health- and nutrition-promoting courses.⁵⁷ Early teacher education is important, but for HPS to be effectual, continued in-

service training as part of career advancement should be put in place.⁵⁸ One example is school health education (SHE), which entails educators to teach curriculum-based modules. This can lead to better-informed opinions, knowledge, beliefs and abilities in terms of healthier food choices and possible changes towards healthier activities by the learners. These issues should address learners' needs, be attainable, practicable, and incorporated in various parts of the syllabus.⁵⁷⁻⁵⁹

2.8.2 Nutrition Education Programme Development: Developing Countries

A study conducted in Zambia to develop a nutrition and health education programme for primary schools, recommended that well-developed educational material and teacher training are important. Furthermore, more specific skills-based training is needed for curriculum developers, for example, teachers and departmental heads, especially if it is not part of a recognised educational training programme.⁶⁰

Two systematic reviews supporting evidence regarding the positive effects of the HPS emerged and a shift from an individual to a multiple approach was implemented.⁶¹ Although the WHO published instructions on information gathering of all the elements of HPS,⁵⁹ there is no common agreement on assessing HPS interventions.⁶²

2.8.3 Nutrition Education Programme Development: South Africa

In SA, HPS had already been recommended in 1995 as an ideal settings approach, where access to a significant number of learners for considerable periods of time in different developmental stages, such as childhood and the teenage years, could result in high coverage for health promotion activities.¹⁷ An SA study by Coulson et al. (1998) recommended NE for both learners and parents.⁶³ Recommendations derived from a limited number of studies in the SA context are to improve the nutritional status through NE in the SA context and to develop NEPs, appropriate to a developing country like SA, that are cost effective and culturally sensitive.⁶⁴ Limited studies in poorer socio-economic areas have been conducted worldwide⁶⁵ and in SA⁶⁶ to assess the effect of an NE curriculum.⁶⁶ Any health-promoting tool used in interventions should be evaluated in terms of method, results, effect and effectiveness, and adjusted if needed. Targeting lifestyle diseases related to nutrition is a national priority.⁶⁴

2.8.4 School Policies Related Specifically to Foods in Schools

Although a multi-component strategy is recommended to address childhood obesity,^{67,68} a recent meta-analysis also recommended the isolation and investigation of effective components of interventions.⁶⁹ An SA study by Bekker (2012) found that the provision of healthy food only in a school tuck shop did not influence the selected learners' perceptions of, attitudes to and behaviour towards healthy eating.⁷⁰ Results show that schools can encourage better health by implementing suitable food policies.^{71,72} The aim would be to promote a healthy school setting to decrease the prevalence of childhood overweight and obesity,^{73,74} by providing healthy food options, thereby increasing the possibility of learners' choosing healthier food.⁷⁴ Bekker (2012) recommended a multi-level approach, such as the HPS model.⁷⁰ At present, there are, for example, no tuck shop policies in SA, although the SA DoH has embarked on establishing such a policy.²⁴

2.9 TRANSLATING THEORY OF NUTRITION EDUCATION PROGRAMMES INTO PRACTICE

2.9.1 Development of Nutrition Education Programmes for Primary School Children

Children between 6–11 years, experience important cognitive growth as well as significant improvement of social, cognitive and physical abilities.⁵⁴ Learners in Grades 3 and 4 can already make food choices and have a general knowledge of body functions.⁷⁵ They are enthusiastic to learn more about the world and its surroundings. As children grow older, their information-processing capabilities expand. They will immediately and specifically select food options based on certain criteria. To classify health, they will use real, behavioural and exact signals. Peers are becoming more important and they will start spending more time with them during middle and late childhood.⁵⁴ NE should address person-related determinants (for example, perceptions, attitudes, beliefs, values, personal meanings, emotions, families and social networks), personal experience and biology (for example, individuals' food acceptance patterns, preference for specific foods and sense of fullness) and social or environmental determinants (for example, the physical environment, cultural practices, social structures and policy, economic and information determinants). For behaviour to be effective, one should focus on both knowledge as well as these determinants of behaviour⁵⁴ (Figure 2.1⁷⁶).

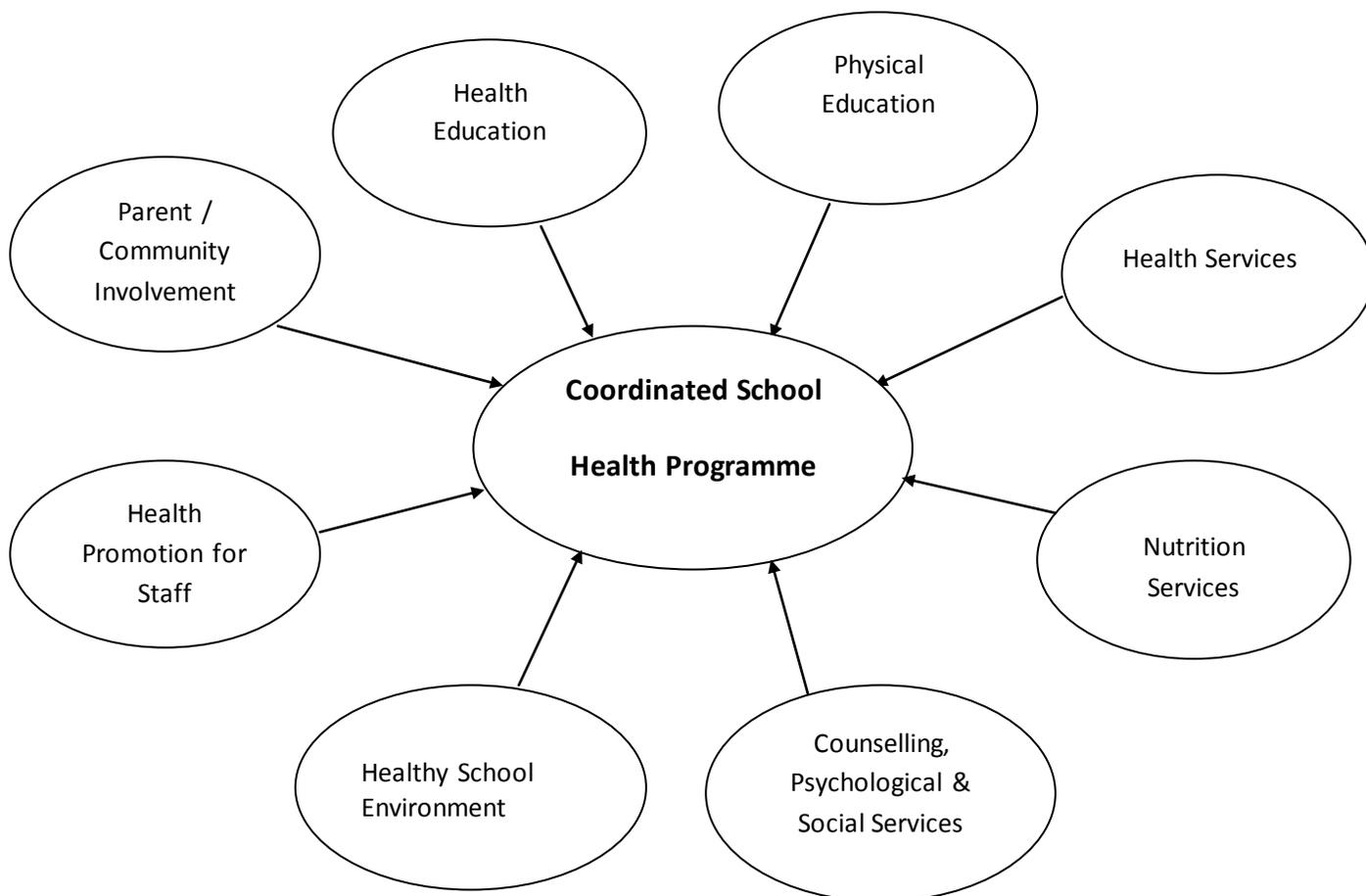


Figure 2.1: A strategy to address physical activity and nutrition in schools through a Coordinated School Health Programme (adapted from reference 76)

2.9.2 Selecting Components for Nutrition Education Programmes

It is necessary to select the components and channels to achieve possible change in behaviour with NEPs in HPS. Resources and time frames are important considerations, for example, available personnel, skills, time, money and existing programmes or tools and facilities, such as school curricula, and participatory activities for learners.⁵⁴ Activities for NEPs should be culturally suitable, fun,⁷⁷ age appropriate, and one could consider giving incentives and rewards. Where possible, use existing resources and work with other people and companies. Educational objectives should ideally include cognitive (knowledge or beliefs), affective (feelings) and psychomotor (physical skills) domains.⁵⁴

2.10 INTENSITY AND SUFFICIENT PERIODS OF NUTRITION EDUCATION PROGRAMMES

Dedicated periods to and adequate focus on NE in NEPs appear to have better health behaviour outcomes. However, learners seem to have short attention spans, and for practical

reasons the length of education programmes is usually short.⁵⁴ In a recent systematic review, the intervention period of school-based nutrition promotion programmes was reported to range between one week and two years, with an average intervention period of about nine months.⁷⁸ The impact of the NEPs as part of HPS showed positive results on a range of nutrition behaviours such as an increase in drinking of milk and water,^{36,79-83} a higher intake of healthy snacks and high-fibre foods^{80,84} as well as of fruit and vegetables,^{36,79-85} a reduction in skipping breakfast,^{85,86} reduced consumption of non-nutritious foods^{36,80,85,87} and sweetened drinks,^{83,88} as well as increased food safety actions and hygienic behaviours.⁸⁵ Furthermore, a lower incidence of eating disorders was recorded.⁸⁵

Studies conducted in SA have not been able to change behaviour successfully in school children where high levels of unemployment, food insecurity and poverty exist.⁸⁷ However, one study outside the school setting did show positive results in improving nutrition knowledge as well as increasing the level of fruit and vegetable intake.⁸⁷ A small study conducted in SA primary school children showed positive results where nutrition intervention, as part of a multi-component behaviour health intervention, indicated an improvement in learners' health behaviour.⁸⁹

To overcome these challenges, a systematic and coordinated process of NE delivered through various channels should be considered to ensure adequate duration and awareness are conveyed to people.⁵⁴ Results from a pilot study conducted in SA confirmed that a multi-component behavioural health intervention, which included curriculum training workshops, availability of healthy products in tuck-shops, and change in school policy, increased physical activity involvement and enhanced learners' health behaviour.⁸⁹

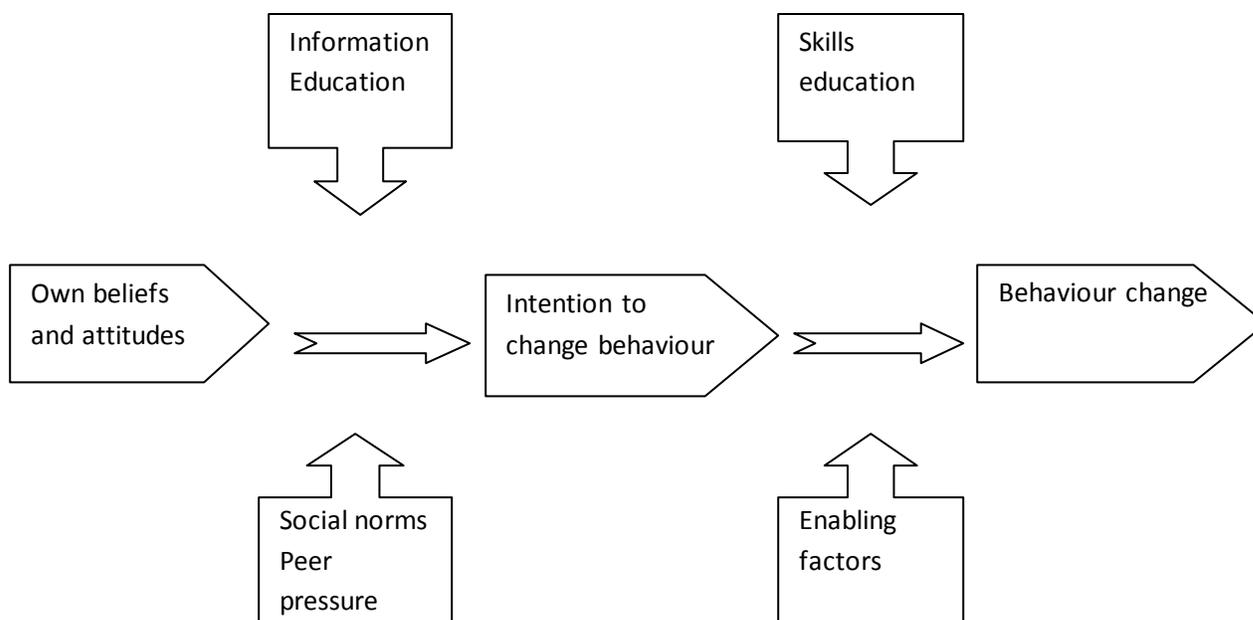


Figure 2.2: Various factors influencing behaviour and the willingness to put change into practice (adapted from reference 90)

2.10.1 The Role of the Educator in Nutrition Education Programmes

NEPs can be regarded as part of Health Promotion Programmes (HPP).⁹¹ Educators play a key role in school-based NEPs,^{60,92} where they can act as role models for learners in terms of healthy behaviour.⁹² Pre- and in-service training can help educators to obtain knowledge of health promotion and therefore NE, which can assist in enhancing their own health, as well as promulgating it to learners.⁹² Training and development of educators in HPP such as NE, seem to enhance the implementation of HPP to learners.⁹² This can be accomplished by disseminating health promotion information such as NE to educators when they are still in training to become educators, but should also form part of continuous in-service career development training.^{56,92} Health promotion in schools should include teaching a nutrition-based curriculum by trained teachers.⁶⁸⁻⁶⁹ An SA pilot study indicated that educators' nutrition knowledge was not optimal but that it improved significantly after receiving NE training from an NEP.⁹³

2.11 FOOD-BASED DIETARY GUIDELINES

Generally speaking, for effective NE, one should focus on particular food preferences and behaviour and on educational nutrition programmes developed from theory and evidence-

based research.⁵⁴ The statement that “people eat foods and not nutrients”, led to the development of local food-based dietary guidelines (FBDG).⁹⁵⁻⁹⁸

2.11.1 The South African Food-Based Dietary Guidelines

SA is a developing country experiencing fast urbanisation, modernisation and economic growth linked to nutrition transition. These factors lead to a change in diet with a higher risk of developing lifestyle diseases.⁴⁶ FBDG were developed to prevent the increased prevalence of NCDs while encouraging a diet which would fulfil specific nutritional and energy needs.⁹⁹ Specific FBDG were developed for the SA population⁹⁹ in 2003 and reviewed and revised in 2012 with the recommendation of frequent evaluation and adjustments.⁹⁹ Most of the nutritional risk factors are connected and have an associated pathway. Therefore one or more FBDG will address one or more risk factors, for example, decreasing the intake of total and saturated fat could lead to a reduction in obesity and high blood cholesterol levels, whereas eating a variety of food might lead to adequate dietary quality.⁹⁹

The revised 2012 general FBDG, listed below, are aimed at all South Africans and children five years and older:

1. Enjoy a variety of foods.
2. Be active!
3. Make starchy foods part of most meals.
4. Eat plenty of vegetables and fruit every day.
5. Eat dry beans, split peas, lentils and soya regularly.
6. Have milk, *maas* or yoghurt every day.
7. Fish, chicken, lean meat or eggs can be eaten daily.
8. Drink lots of clean, safe water.
9. Use fats sparingly. Choose vegetable oils, rather than hard fats.
10. Use sugar, and foods and drinks high in sugar, sparingly.⁹⁹

Countries need to convert evidence-based nutrition into suitable educational and marketing tools using the FBDG, to implement, observe and assess these strategies.⁹⁹ The recommendation from Vorster et al. (2013) is to develop SA educational tools that are feasible and practicable for specific age groups.⁹⁹

2.11.2 Development of Nutrition Education Programmes Using South African Food-Based Dietary Guidelines

The WHO recognises the link between NCDs and over-nutrition and proposes interventions that target these lifestyle diseases.¹⁰⁰ In one's use of the FBDG while giving nutrition information, or developing an SA-based school NE curriculum, interventions, or tools for health promotion, one should consider the barrier aspects.⁹⁹ These can include the complicated nature of consumers such as Grade 4 learners, different sources of and rationale for nutrition communication, and emerging evidence which might contradict present recommendations.¹⁰⁰ However, the FBDG should form the foundation of transferring nutrition messages from various sources to encourage consumers such as Grade 4 learners to make better food choices.¹⁰⁰ Development of SA nutritional educational tools that are feasible and practicable for specific age groups, are recommended. These SA nutritional educational tools should also be understandable within different socio-economic contexts, taking into account factors such as culture, gender, customs, beliefs and peer pressure for that specific target group.⁹⁹

2.12 EDUTAINMENT

Edutainment is described as a combination of education and entertainment recommended as a method to encourage higher engagement of Grade 3 and 4 learners.³⁰

2.13 GAMES AS EDUTAINMENT

2.13.1 Cognitive and Emotional Development in Middle Childhood

Games are an active means of higher-order learning. Nutrition- and food-associated knowledge, as well as cognitive, affective and behavioural abilities, is connected. Examples include guided exercise, teaching of 'how-to' facts, skill building, conversations, and facilitated discussions.⁵⁴ Depending on the type of traditional game, playing can also assist, for example, with cause and effect relationships, reason by initiation, concepts of time and space, and the basic concepts of physics. Although these concepts can also be obtained through modern games,¹ they will be limited to auditory and visual experiences, whereas traditional games² allow for multisensory learning.¹⁰¹

¹ Technology-based games, e.g. video or computer games, are limited to auditory and visual learning.¹⁰¹

² Games, e.g. chess, marbles and board games, are activities where knowledge and skills are consolidated, a more orderly style of thinking is developed and a position within the peer group is established.¹⁰¹

Contemporary cognitive development theorists like Piaget and Inhelder (1969) believe that prior learning is consolidated at ages 7–10 years. Prior learning also allows new learning in a peaceful environment with peers to establish a certain position in this age group.¹⁰² Group activities are engaging and can have different challenging levels. They can include the following: games, quizzes, play, contests, puzzles, computer games and fantasy play. Intrinsic motivation can be stimulated if interest, challenge and imagination can follow on children's attraction in the exploration of a significant goal which forms part of the competition or game.⁵⁴ Children need to cooperate with other members and socialise,¹⁰³⁻¹⁰⁶ however, games are also considered important as ego boosters.¹⁰⁷⁻¹⁰⁸ Emotional growth is essential to participate and develop the required skills in game playing. Required skills include the capability to agree, follow the rules, postpone completion and achievement¹⁰⁹ control urges such as loss, aggression, anxiety, frustration,¹⁰³ the desire to win and to achieve rationality, and an optimistic, steady self-worth.¹⁰⁹

2.13.2 Games as Edutainment Tool

Different theories exist why children in their middle childhood should play.¹⁰¹ It seems as if games are part of the lives of children between the ages of 6 to 12. They enjoy games, and these appear to be significant in their growth.¹⁰⁹ Games as edutainment include board, video and card games, which realise different educational goals that can all be used in an educational environment. Edutainment games can be used to help children to acquire skills, educate them on subjects, reinforce knowledge, and increase beliefs.¹¹⁰

According to Piaget (1962), games with rules have two sets of criteria, namely previously agreed-upon regulations and a competition between players. No one is allowed to change the rules, unless agreed upon by all the players. Common acceptance between players prevents instant satisfaction and can result in an increased amount of collaboration.¹¹¹

2.13.3 Added Benefits of Gaming

Peer rejection and discrimination among learners are still prevalent today, despite the emphasis on children's rights.¹¹²⁻¹¹⁴ Peer rejection and discrimination can have a detrimental effect on their learning ability, self-worth and performance for the rest of their lives.¹¹⁴⁻¹¹⁷ Different reasons for such bullying exist and some reasons can extend beyond the classroom.¹¹⁸

As stated by the Rights of the Child by the UN Convention, educators need to offer a caring setting in terms of children's own wellbeing as well as their learning environment where they can experience complete acceptance by all people.¹¹⁹ It means that apart from creating a safe learning environment, educators should facilitate the development of children's emotional and social skills through activities that will encourage a better understanding and acceptance of their class mates, ultimately also impacting positively on their academic achievement.¹²⁰⁻¹²¹ This is confirmed by the theory of Maslow's hierarchy of needs,¹²² where basic needs such as acceptance need to be satisfied before more advanced needs, for example, academic realisation, can be accomplished.¹²³

Often, education is guided by the educator,^{124,125} and learners will work independently rather than in a group.¹²⁴ Because of time constraints due to reaching curricula goals, little time is available to focus on establishing positive peer relationships. However, studies show that by dealing with the emotional and social learning milieu, it will have a positive impact on learning and reduce the teaching time in future.¹²⁶⁻¹²⁸ In a study in France (2012), the educator acknowledged the benefits of sitting in a group. Learners were more enthusiastic in helping one another and interacted in a positive manner which would most possibly continue in the future.¹²⁹

Listening and skills to conduct conversations can be done with games in groups^{130,131} and group discussions^{132,133} through focusing on the feelings, thoughts and actions of children and by expanding understanding and collaboration with improved knowledge and the collaboration of their friends. This can comprise constructive peer interaction in the class setting^{130,131,134} and include role play, games, conversations and other prearranged activities.^{131,134} It appears that sitting in a group increases peer approval and reduces peer dismissal.¹²⁹ Therefore, creating an environment to foster peer connections, seems vital.¹³⁵ Research thus shows the achievement of group work and supportive activities in a variety of learning circumstances.^{128,130,131}

2.13.4 Gaming: Board Game Interventions Aimed at Changing Nutrition Behaviour

A pilot study by Amaro et al. (2006) tested the efficacy of modifying nutrition awareness and dietary activities with a board game, 'Kaledo'. The study design included 128 learners from 3 middle schools in Italy in a pre- and post-setting with an intervention and control group. The design was similar to that of the 'Fun Food Game' (refer to Chapter 3); however, they played

for 15–30 minutes once per week with a total of 24 play sessions, where 31 cards were related to nutrition knowledge, 34 cards measured dietary intake and 8 questions were activity related. Results showed that nutrition knowledge increased significantly ($p < 0.05$), as well as vegetable intake ($p < 0.01$). The authors speculated that the increase in vegetable intake was not necessarily attributed to an increase in knowledge, but rather the behaviour-related questions. They concluded that the game could be useful as a health promotion tool for healthy eating in school children. Longer studies are needed to ascertain any impact on behaviour.¹³⁶

An SA-developed board game, called ‘Slides & Ladders’, consisting of 24 cards and ‘good for you’ and ‘not so good for you’ messages, was tested on 9–13-year-old learners in a peri-urban area (2011). The aim was to improve dietary eating patterns and the variety of food selection. Results showed an improvement in nutrition knowledge of daily requirements, but no behavioural change was measured, possibly owing to limited control in terms of food preparation and options, poverty levels and cultural requirements.⁶⁶

2.13.5 The Role of Educators in Gaming

Today, educators should be able to teach high-quality nutrition promotion programmes, and be role models which necessitate more guidance and support to educators to achieve knowledge of these nutrition facts and assessment methods.¹³⁷ This is necessary to promote behaviour change in children and can be challenging without good knowledge, or because of a lack of nutrition investigative techniques or health promotion practices.¹³⁸ Evidence shows that to implement these programmes successfully, continuous professional development for educators is necessary.¹³⁰

2.14 SUMMARY

NCDs are on the increase in both developed and developing countries,¹⁷ including SA,^{25,34} in both urban¹⁸ and rural¹⁹ communities. Although a multi-component strategy is recommended to address childhood obesity, a recent meta-analysis also recommended the isolation and investigation of effective components of interventions, as well as changes in environment and policy.^{68,71} This can include, for example, a tuck shop policy, since no national policy exists at the moment in SA schools.²⁴ This would provide healthier food alternatives, thereby increasing the possibility of better food choices.⁷⁵ The goal would be to lower the rate of childhood overweight and obesity and promote a healthier school environment.^{74,75}

Recommendations from limited studies in the SA context are to improve the nutritional status through NE in the SA context and to develop NEPs, appropriate for a developing country like SA, that are cost-effective and culturally sensitive.⁶⁶ Any health-promoting tool used in interventions should be evaluated in terms of method, results, effect and effectiveness, and adjusted if needed.⁶⁴ Targeting lifestyle diseases related to nutrition is a national priority.⁶⁴ Schools are one of the settings where health promotion can influence health beliefs and behaviour and it is recommended that NE should commence in primary school.¹⁷ Evidence-based nutrition should be converted into suitable nutrition education and nutrition marketing tools using the FBDG, to implement, observe and assess these strategies.⁹⁸

The recommendation from Vorster et al. (2011) is to develop SA nutritional educational tools which are understandable and workable for a specific age group.⁹⁹ Throughout childhood and adolescence, it seems as if gaming could be successfully used to attain healthier dietary behaviour^{139,140} and that games as part of NE can indeed alter behaviour if they are designed as such, rather than to just increase knowledge.¹⁴¹ To address these recommendations, the value of the FFG, an SA-developed educational nutrition board game was assessed for selected Grade 4 learners and selected Grade 4 LO educators in the City of Cape Town district.

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Chapter 3

Methods

3.1 INTRODUCTION

In this chapter, the study population, sampling, methods, research intervention, analysis and statistics, ethical considerations, and pilot study are described.

3.2 STUDY POPULATION

The study population consisted of Grade 4 learners and Grade 4 LO educators from schools in the City of Cape Town district of the WC province.

The Department of Basic Education (DoBE) was contacted by the researcher regarding details of all the primary schools within the City of Cape Town area and permission was obtained from the Western Cape Education Department (WCED) to conduct the study (Addendum A). The list of all primary schools in the City of Cape Town area was assessed and it was decided by the researcher and supervisors to conduct the study in primary schools in the Northern Metropolis (Central, North and East) because of logistical considerations (i.e. distance, cost, safety and time constraints). The researcher resides in the Northern Metropolis and is familiar with the different socio-economic areas. Four purposively selected primary schools, two in a higher socio-economic area and two in a lower socio-economic area, were conveniently chosen and contacted to participate. Two schools from the higher socio-economic area declined to participate in the study due to the high workload experienced by educators and limited time available for extra activities for Grade 4 learners. Two other schools were therefore conveniently selected. One additional school from the higher socio-economic area was conveniently selected for the pilot study.

After permission was obtained from the WCED, all the selected primary schools were contacted and appointments were made with the primary school principals to obtain their signed consent (Addendum B). A meeting was then conducted with the LO educators and their written informed consent was obtained (Addendum C). The LO educators assisted the researcher by explaining the study to the Grade 4 learners and assent was obtained from learners (Addendum D). The schools that obtained permission in class, namely school A (HIS) and C (LIS), had higher participation rates versus the schools that sent the assent and consent form home before permission was obtained, namely schools B (HCS) and D (LCS).

The learners took the consent form for parents home and were asked to return the form to school (Addendum E).

3.2.1 Sample Size

One school from the higher socio-economic area was conveniently selected as intervention school, namely school A (HIS), with three participating classes ($n=61$), and the other school was conveniently selected as the control school, namely school B (LIS), with two participating classes ($n=22$). One school from the lower socio-economic area was conveniently selected as intervention school, namely school C (LIS), with two participating classes ($n=55$) and the other school was conveniently selected as the control school, namely school D (LIS), with three participating classes ($n=42$). It was expected that selecting all classes in one school could serve as intervention school and all classes in one school could serve as control school for both the higher and lower socio-economic areas (Addendum F) to prevent confounding of results through knowledge being shared by children from the same school. A power calculation by the statistician determined the number of learners needed in each group at an effect size of 0.6 and confidence interval of 90% to be 30 learners. A total of 120 learners were needed. According to the protocol and to be representative of the study population group, a class list should have been requested to randomise a sample group from each of the classes. However, owing to a low response rate and for practical reasons, all the learners from school B (HCS) were selected ($n=22$), one class from school A (HIS) ($n=25$) and C (LIS) ($n=28$), and two classes from school D ($n=23$), thus having $n=53$ as intervention group and $n=45$ as control group. It was expected that these selections should provide a sufficient sample size.

3.2.2 Inclusion and Exclusion Criteria

Inclusion criteria included all Grade 4 English-speaking learners of both genders in the purposive selected schools who were invited to participate in the study, as well as all Grade 4 LO educators. Exclusion criteria were effective when one or more of the following were not received: Written informed consent provided by the school principals, the Grade 4 LO educators, and Grade 4 parents/legal guardians, as well as written informed assent from the English-speaking Grade 4 learners. Exclusion criteria were also effective if any of the above-mentioned participants at any given time refused further participation in the study. If for any reason, consent or assent had not been received from the parents or learners, the learners

from the IS were allowed to play the educational nutrition board game but no further involvement was required from them.

3.2.3 Different research instruments were used to conduct the study.

3.2.3.1 The HealthKick Questionnaire for Learners

The original self-administered HKQ was used in all Grade 4 English-speaking learners from the purposive sample of four selected primary schools that were invited to participate (Addendum F). The HKQ is a validated tool and was previously used with primary school children,¹ including Grade 4 learners.² This was intended to measure if learning (retention) took place, as well as whether nutrition knowledge and healthier nutrition and activity practices increased in the IS compared with the CS. The HKQ comprised 163 questions related to learners' family, food in general, fruit and vegetables, healthy options, eating breakfast and lunch, as well as activities during the day.² These questions were grouped as follows:

- a. Socio-demographic questions: 9
- b. Open-ended questions: 1 (How much money do you bring to school?)
- c. Nutrition knowledge questions: 79
- d. Opinion (on nutrition and physical activities) questions: 45
- e. Practices questions (related to nutrition and physical activities): 29¹

3.2.3.2 The Dietary Diversity Questionnaire and Dietary Diversity Score

The DDQ is a 24-hour recall of foods eaten by Grade 4 learners the previous day and recorded as one of sixteen food groups, namely, 1) cereals, 2) white roots and tubers, 3) vitamin-rich vegetables and tubers, 4) dark-green leafy vegetables, 5) other vegetables, 6) vitamin-rich fruits, 7) other fruits, 8) organ meats, 9) flesh meats, 10) eggs, 11) fish and shellfish, 12) legumes, nuts and seeds, 13) milk and milk products, 14) oils and fats, 15) sweets, and 16) spices, condiments and beverages.³ Foods can only be recorded into one of the sixteen food groups, once (Addendum G).

The DDS was compiled from the DDQ. It was expected that these selections from the DDQ would provide a sufficient sample size. After all foods had been grouped into one of the sixteen food groups; these were then aggregated to nine food groups to create an individual dietary diversity score (DDS), namely, starchy staples (Group 1 and 2), dark-green leafy

vegetables (Group 4), other vitamin A-rich fruits and vegetables (Group 3, 6 and red palm oil if applicable), other fruit and vegetables (Group 5 and 7), organ meat (Group 8), meat and fish (Group 9 and 11), eggs (Group 10), legumes, nuts and seeds (Group 12) and milk and milk products (Group 13)³ (Addendum H).

A DDQ can be used in children as an instrument for surveys,⁴ as well as for assessment of future progress of diets.⁵ It is a quick and economical method to estimate a diet's nutrient sufficiency, for example, micronutrient adequacy. A DDS score of less than 6 (out of 9) could indicate undernutrition.⁶ Limitations include: there is no indication of the quantity of food eaten, different food can be eaten in different time periods, and variety is more likely to be consumed in an urban versus a rural area.⁷ Nevertheless, this questionnaire was deemed appropriate for the requirements of this study since it was a quick method to determine dietary adequacy of selected Grade 4 learners where limited time was available to complete the pre- and post-DDQ for all the selected Grade 4 learners during school hours. It is a proxy for nutrient adequacy of selected Grade 4 learners and can be used to detect possible changes in dietary adequacy from the pre- to the post-setting³ after playing the FFG as a possible NE tool in NEPs.

3.2.3.3 Tuck Shop Visits by Selected Grade 4 Learners

Sweets are not included in the assessment of the DDS. There is no official tuck shop school policy in SA, although the SA DoH has embarked on establishing such a policy.⁸ Tuck shop visits (i.e. sweets eaten) were noted on the DDQ and reported in the thesis as spending money at the tuck shop. This was done to assess if the FFG had an impact on dietary behaviour in Grade 4 learners.

3.2.3.4 Perception Quantitative Questionnaire for English-Speaking Grade 4 Learners

The self-administered Perception Quantitative Questionnaire for English-speaking Grade 4 learners (PQL) was completed in the post-setting by all Grade 4 learners from intervention schools A (HIS) and C (LIS) who played the FFG. The PQL was pre-tested for face and content validity during the pilot study in a conveniently selected school in a higher socio-economic area. It was not deemed necessary to repeat the validation of these questionnaires in a lower socio-economic area because results from the pilot study indicated that learners consistently gave the same answers in the repeated questionnaires (Addendum I). Comments

received from the selected Grade 4 learners are displayed in Addendum J. It was expected that all learners who played the FFG would provide a sufficient sample size.

3.2.3.5 A Self-Administered Questionnaire for Grade 4 Life Orientation Educators

A general structured self-administered questionnaire with 19 questions was completed once by all ten Grade 4 LO educators from all four schools. It was necessary to determine when formal NE took place during the school year to ensure no NE took place before the study with the FFG was conducted to prevent possible bias. It was not deemed necessary to pre-test the questionnaire during the pilot study, because the self-administered questionnaire was adapted from a previous validated questionnaire (Addendum K). Although the total sample group of Grade 4 LO educators is small, it reflected the situation experienced by Grade 4 LO educators in the study and should be reported. This was done by describing the characteristics of all the selected educators, for example, gender, experience (years) in teaching NE, time spent on NE, tools to assist learning, and sources of nutrition advice.

3.2.3.6 Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

Grade 4 children were selected for the study, because research shows that children between 6–11 years, experience important cognitive growth as well as significant improvement of social, cognitive and physical abilities.⁹ Learners in Grade 3 and 4 can make food choices and have a general knowledge of bodily functions.⁹ They are enthusiastic to learn more about the world and its surroundings. As children grow older, their information-processing capabilities increase. They will immediately and specifically select food options based on certain criteria,⁹ making this group particularly suitable for the proposed intervention.

The self-administered Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators (PQE) contained twenty four questions and was completed in the post-setting (Addendum L). Questions were developed to test if the learners enjoyed playing FFG from an educator's perspective, if it could be used as a NE tool, if language should be considered in future development, if playing FFG seemed to have an impact on dietary behaviour, other skills development, possible work load implications and if FFG can be regarded as "Health Promotion." Although the total sample group of Grade 4 LO educators was small, it reflected their perceptions as well as their acceptance of the FFG as a possible NE tool in NEPs.

3.3 METHOD OF DATA COLLECTION

The study was conducted during 2013 over a total of four months. The study commenced in school A (HIS), and after the three-week study period, the study was conducted in school B (HCS) over a three-week period. During the first and third week, the HKQ was completed by all learners. The actual intervention took place during week two when learners played FFG for a week. No contact was made with the control schools during week two. The study was completed after it had been conducted in the same manner in school C (LIS) and school D (LCS). After completion of the study, it was arranged with the schools to allow the participating learners from schools B (HCS) and D (LCS) to play the FFG for an hour.

3.3.1 Fun Food Game[®]

3.3.1.1 How the Fun Food Game was Developed

The advancement of emotional and cognitive development in middle childhood, in examining consequences for nutrition education programmes (NEPs), recommends the use of stories and fantasy characters which form part of their world.⁷ Three images representing three 'Super Heroes' were used to build a collection of three cards each in the FFG. The name 'Super Heroes' was selected to reflect the learners' world of entertainment. They represent three types of food, namely, food that gives you energy ('Speedy'), food that protects your body ('Shield'), and food that builds your body ('Muscle Man'). Only three super cards were selected to make the mechanical side of the game work (i.e. card collections). The term 'Super Heroes' was chosen because it is culturally suitable, fun¹¹ and age appropriate.⁷ The FFG was designed for players eight years and older. It was designed as a combination of a food trivia game (questions and answers), as well as a card collection game (collect three packs of each of the three Super Heroes).

Each team started the game with three 'Super Hero' cards, randomly picked from extra Super Hero cards that were placed upside down and called the 'booster card pack'. If a team landed on the '?' block, a '?' card (Foodle[®] card) was drawn from the 'booster card pack' by the player to his/her left who would read the nutrition or health-related question on the card. If the answer was correct, a Super Hero card was collected, otherwise, the card contained a message for the player to move forwards (Funkey card) or backwards (Monkey card). The majority of the 85 cards have multiple options to choose from, as well as an explanation of the question. If a team landed on the '↔' block, the Super Hero card(s) were swapped with the

team to the left or the right, for example, the block with 'All ↔ R' meant that the player gave all his/her Super Hero cards to the team on his/her right and received all their cards in return. The block with '1 ↔ L' meant that the player gave one Super Hero card to the team on his/her left and received one Super Hero card in return. If a team landed on the '—' block, one Super Hero card was placed on the booster square in the middle of the board game and when a team landed on the 'booster block', all the Super Hero cards in the middle of the board game were collected by that team. There were two options with the 'H₂O' (water) block, namely, the team members had each to drink a glass of water and collect one Super Hero card. Each team member had to drink a glass of water. If a team member chose not to drink water, the team could not collect a Super Hero card. If a team landed on the '5-a-day' block, two Super Hero cards were collected. If a team landed on the 'Skip 1 turn' block, the team had to sit out during the next round. A team could collect one Super Hero card when the team passed the 'start block'. As soon as a team collected three identical Super Hero cards, these cards could be banked by placing them on the table next to the game board. These cards could not be lost to opponents when this team landed on the '↔' block, but if those cards were not placed on the board, they had to be passed to the other team if they landed on such a block.

The FFG was designed for players eight years and older. It was designed as a combination of a food trivia game (questions and answers) as well as a card collection game (collect three packs of each of the three Super Heroes). It was explained to the learners of control schools B (HCS) and D (LCS) that they would play an educational nutrition board game after week 3 (at the end of the study).

The researcher explained the rules of the FFG (Addendum M), dynamics and different cards, such as the question cards (Addendum N and Addendum O), Monkey and Funkey cards (Addendum P and Addendum Q) and the three Super Hero cards (Addendum R) of the game to the learners every day in the presence of the LO educators, before learners started to play. For the duration of the study, both the researcher and the LO educator were present but did not actively participate during the period the educational nutrition board game was played. Both observed the learners and only assisted at their request. The researcher completed the study at one IS before commencing with the second IS.

Teams consisting of one to two learners were formed. A group of two to four teams (with a maximum of eight learners) played the FFG. The majority of teams consisted of only boys or only girls, with a few mixed teams. Every table had a full set of the FFG to allow the whole class to play at the same time. The object of the game is to be the first player to collect three of each of the three Super Hero cards, therefore constituting nine cards in total.

The intervention schools played the educational nutrition board game (FFG) during school hours on Monday, Tuesday, Thursday and Friday. On Wednesday, the learners took a break to prevent possible irritation and 'player fatigue', to keep the 'fun' element central. Learners were supposed to play only for half an hour per session for the reasons above and to reflect a 'real life' school setting (week 2), but all schools spontaneously allowed for an hour per session (including the pilot school). As time went by and a better understanding of the rules set in, the first team would finish the game within 15–20 minutes and everyone would start playing again. School A (HIS) was very organised and a separate hall was prepared with tables and chairs, whereas in school C (LIS), children had to sit on the floor in the staff room because the general hall had been booked for other activities. Learners from schools B (HCS) and D (LCS) understood that they would have an opportunity to play an educational nutrition board game, after completion of the study.

3.3.2 HealthKick Questionnaire for Learners

The HKQ, a previously validated nutrition knowledge questionnaire,¹ was used to quantitatively measure, during school hours, all selected Grade 4 learners' (in all four schools in the pre- and post-setting) nutrition knowledge, opinions (on nutrition and physical activity), and practices related to nutrition and being active at school and home after giving written assent. This was intended to measure if learning (retention) took place, as well as whether nutrition knowledge and healthier nutrition and activity practices increased in the IS compared with the CS

All selected Grade 4 learners completed the pre- and post-HKQ in the pre- and post-setting during week 1 and 3 of the study at each school. Questions were checked for completeness, coded and captured in coded sheets. The data was analysed by the statistician to compare the two schools from the HSA between each of them in the pre-and post-setting and between the two schools in the pre-and post-setting in terms of nutritional knowledge and opinions (related to nutrition and physical activity) and practices (related to nutrition and physical

activities). The same analysis was conducted in the two schools from the LSA. (Refer to section 3.5.1)

3.3.3 Dietary Diversity Questionnaire and Dietary Diversity Score

Selected Grade 4 learners from all four schools completed the previously validated 24-hour recall DDQ in the pre- and post-setting during week 1 and 3 of the study at each school with the researcher. The tuck shop visits were noted on the DDQ. Statistical analysis was done. (Please refer to 3.5.2.)

3.3.4 Tuck Shop Visits from Selected Grade 4 Learners

Selected Grade 4 learners from all four schools completed the previously validated 24-hour recall pre- and post- DDQ³ in the pre- and post-setting during week 1 and 3 of the study with the assistance of the researcher. All tuck shop visits were noted on the pre- and post-DDQ and recorded as “Money.” Pre- and post-tuck shop visits could give an indication of change in dietary behaviour after playing the FFG as a possible NE tool in an NEP in the City of Cape Town district.

3.3.5 Perception Quantitative Questionnaire for English-speaking Grade 4 Learners

The self-administered PQLs were completed on the last Friday of the study at the end of week 3 by all the selected Grade 4 learners to determine the perception and acceptability of the FFG as a possible NE tool in an NEP. Descriptive summary statistics were used to describe the perception and acceptability of all the selected Grade 4 learners. Relationships and possible associations between variables were determined by using appropriate inferential statistics. Refer to statistical section.

3.3.6 A Self-Administered Questionnaire for Grade 4 Life Orientation Educators

A general structured self-administered questionnaire was completed once by all Grade 4 LO educators from all four schools before the study commenced. It was necessary to determine when formal NE took place during the school year to ensure no NE took place before the study with the FFG was conducted to prevent possible bias. It was not deemed necessary to pre-test the questionnaire during the pilot study, because the self-administrated questionnaire was adapted from a previous validated questionnaire (Addendum K). Although the total sample group of Grade 4 LO educators was small, it reflected the situation experienced by Grade 4 LO educators in the study and should be reported. This was done by describing the characteristics of all the selected educators, for example, gender, experience (years) in teaching NE, time spent on NE, tools to assist learning, and sources of nutrition advice.

3.3.7 The Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

The self-administered PQE for English-speaking Grade 4 educators was also pre-tested and validated (face and content) in the same conveniently selected high-income school, as previously indicated, before commencing with the study. It was deemed sufficient to pre-test the PQE once, since no amendments to the questionnaire were necessary. The PQE was completed on the last Friday of the study at the end of week 3 by all five selected Grade 4 educators from intervention schools A (HIS) and C (LIS) after the selected Grade 4 learners played the FFG. The PQE was checked for completeness and kept safe until data analysis.

3.4 DATA ANALYSIS AND STATISTICS

Data from all the different research tools, namely the HKQ, DDQ and DDS, tuck shop visits, PQL, Self-Administered Questionnaire for Educators and PQE was captured electronically in Microsoft Excel[®] spreadsheets with regular cross-referencing to ensure precision of data transfer. The objectives of the study were discussed by using descriptive statistics. Data was analysed with the assistance of the Centre for Statistical Consultation using Statsoft Inc. (2011) STATISTICA (data analysis software), version 10.0. (www.statsoft.com).¹¹

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perception and acceptability of the FFG in all the selected Grade 4 educators, for example, whether they regarded the FFG as HP, if the FFG could be a valuable tool in NE, and whether the children enjoyed playing an educational nutrition board game. Relationships and associations between variables were determined by using appropriate inferential statistics

3.4.1 HealthKick Questionnaire for Learners

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners, for example, age, gender, language, number of household members, and who assisted them with homework. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like Spearman rank correlations and Pearson correlations) was used when continuous variables were compared with other continuous

variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required, and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. A non-parametric method like the Bonferroni test was used if the residuals were not normally distributed.

A non-parametric method was used (Bonferroni test) where ordinal were compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. No categorical data analysis was used. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

3.4.2 Dietary Diversity Questionnaire and Dietary Diversity Score

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners per school in the pre- vs. the post-setting, for example, did they have breakfast, did they bring a lunch box to school, did they visit the tuck shop, did they consume fast food, eggs, fish and shellfish, legumes, nuts and seeds, and milk and milk products. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like rank correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required, and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. Non-parametric methods like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot were used if the residuals were not normally distributed, and histograms were used if variables could not be analysed because of no or too little variation.

Non-parametric methods were used (like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot) where ordinal was compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. Histograms were used if no or too few variables were reported. Categorical data analysis (chi-square tests), for example, maximum-likelihood (M-L) chi-square test, Pearson's chi-square test, Yates's chi-square test, Fisher's exact, one-tailed, Fisher's exact, two-tailed,

and McNemar's chi-square (A/D) was used. Cross-tabulation results were done with the McNemar test. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

3.4.3 Tuck Shop Visits by Selected Grade 4 Learners

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners per school, for example, tuck shop visits in the pre- and post-setting. Relationships and associations between variables were determined by using appropriate inferential statistics.

The tuck shop visits were reported on the DDQ. Regression or multiple regression analysis (like rank correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required, and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. Non-parametric methods like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot were used if the residuals were not normally distributed, and histograms were used if variables could not be analysed because of no or too little variation.

Non-parametric methods were used (like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot), where ordinal was compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. Histograms were used if no or too few variables were reported. Categorical data analysis (chi-square tests), for example, maximum-likelihood (M-L) chi-square test, Pearson's chi-square test, Yates's chi-square test, Fisher's exact, one-tailed, Fisher's exact, two-tailed, and McNemar's chi-square (A/D) was used. Cross-tabulation results were done with the McNemar test. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

3.4.3 Dietary Diversity Questionnaire and Dietary Diversity Score.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perception and acceptability of all the selected Grade 4 learners, for example, learners thought more about what they ate, they liked to learn about food, they learned to play the game easily, they would play again, it was fun, the time it took for learners to play the FFG once, and whether they thought they could play the FFG independently.

Relationships and possible associations between variables were determined by using appropriate inferential statistics.

3.4.4 The Perception Quantitative Questionnaire for English-speaking Grade 4 learners

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perception and acceptability of all the selected Grade 4 learners, for example, learners thought more about what they ate, they liked to learn about food, they learned to play the game easily, they would play again, it was fun, the time it took for learners to play FFG once, and whether they thought they could play the FFG independently. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

3.4.5 Self-Administered Questionnaire for Grade 4 Educators

Descriptive summary statistics such as means, medians, frequencies and standard deviations were also used to describe the characteristics of all the selected Grade 4 LO educators, for example, gender, qualifications, experience (years) in teaching NE, time spent on NE, tools to assist learning, and sources of nutrition advice. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

3.4.6 The Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perception and acceptability of the FFG in all the selected Grade 4 educators, for example, do you regard the FFG as HP, the FFG could be a valuable tool in NE, and children enjoyed playing an educational nutrition board game. Relationships and associations between variables were determined by using appropriate inferential statistics.

3.5 ETHICAL CONSIDERATIONS

3.5.1 Ethics Approval and Permissions

Ethics approval was obtained from the Human Research Ethics Committee, Faculty of Medicine and Health Sciences, Stellenbosch University (Ref. no. S12/11/303), and the Western Cape Department of Basic Education's Research Office (Ref. no. 20130124-0004) (Addendum A). Voluntary written consent was obtained from all participating subjects, namely, school principals, LO educators, and parents/legal guardians, as well as voluntary written assent from English-speaking Grade 4 learners (Addenda B–E).

3.5.2 Informed Consent

The researcher explained to the school principals and LO educators that participation in the study was voluntary and that the information collected would be treated as confidential. Only the researcher involved in the study would have access to all the information and the identities of the participants would remain anonymous. No individual would be identified and the results would be presented collectively, for example, school A (HIS) vs. school B (HCS), and school C (LIS) vs. school D (LCS). The LO educators were requested to discuss possible participation in the study with the Grade 4 learners and to ask the Grade 4 learners to assent. The LO educators were also requested to send the parent/legal guardian consent form home with the Grade 4 learners, after explaining the study to the Grade 4 learners. It was accepted that consent was implied when both the consent form from the parent/legal guardian and assent form from the Grade 4 learner were completed and received.

3.5.3 Patient Confidentiality

Throughout the study and thereafter, all study participants' names, information, and questionnaires were confidential. Confidentiality was conveyed to the participants by means of the informed consent leaflet. Information collected by the researcher would not be shared for any other purposes or projects and would be used only for the specified study.

3.6 PILOT STUDY

Some questions from FFG that were not appropriate for this age group were removed, for example, alcohol-related questions. At first it was thought that more cards should be added, but it was decided after the pilot study to suffice with the remaining cards to increase the potential of repetition and therefore potentially increase the retention of nutrition knowledge. The rationale behind this was that the FFG is a fast-paced participatory game and more cards would be drawn during one game.

A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic Education. A pilot study was conducted in a conveniently selected high-income school from the list. This was done to pre-test the internal validity (face and content) of ten Grade 4 learners, randomly chosen by the LO educator, who played the FFG for half an hour for four weeks, while the LO educator and researcher observed them. The LO educator was requested to complete the PQE after each session. Based on this deduction, the PQE was considered to be understood and valid to be used in the main study. Results from the

pilot study indicated that the selected Grade 4 learners and selected Grade 4 LO educators consistently gave the same answers in the repeated questionnaires. It was therefore not appropriate or necessary to measure Cronbach's alfa as initially anticipated, since no statistical differences could be detected (not measured). Added comments and general suggestions were encouraged and included in the results.

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Chapter 4

NUTRITIONAL KNOWLEDGE, OPINION AND PRACTICES RELATED TO NUTRITION AND PHYSICAL ACTIVITIES, TUCK SHOP VISITS AND DIETARY QUALITY OF ALL SELECTED GRADE 4 LEARNERS IN THE CITY OF CAPE TOWN DISTRICT BEFORE AND AFTER PLAYING AN EDUCATIONAL NUTRITION BOARD GAME

4.1 ABSTRACT

Objective: To measure baseline and post-intervention nutritional knowledge, opinion and practices related to nutrition and physical activities, tuck shop visits and dietary quality in Grade 4 learners in the City of Cape Town district before and after playing the FFG.

Design: A before-after, experimental study with analytical components.

Setting: Two schools in a high socio-economic area (HSA) and two schools in a low socio-economic area (LSA) in the City of Cape Town district, Western Cape Province.

Subjects: Grade 4 English-speaking boys (n=85) and girls (n=90).

Methods: The 'HealthKick Questionnaire for Learners' (HKQ) was used to determine if learning (an increase in nutrition knowledge) took place, as well as measurements of opinions (on nutrition and physical activities) and practices related to nutrition and being active at school and home in a pre- and post-setting after playing the FFG. A Dietary Diversity Questionnaire (DDQ) was used in the pre- and post-setting to measure the nutritional quality of the diets indicated by food group choices or ingestion with tuck shop visits noted on the DDQ.

Results: An increase in nutrition knowledge and changes in opinions regarding nutrition and physical activity were measured in all four schools, but actual practices related to nutrition, being active and number of visits to tuck shops showed mixed results. A statistically significant difference ($p=0.04$) existed between the pre-DDS in school A (HIS) (DDS=5.2) vs. school B (HCS) (DDS=4.5) in the higher socio-economic area. In the post-setting, school A

(HIS) had a higher DDS=5.4 vs. school B (HCS) DDS=4.8, but it was not statistically significant. Schools C (LIS) and D (LCS) in the lower socio-economic area showed a pre-DDS=5.3 vs. pre-DDS=4.8 which was not statistically significant, and both schools had the same DDS=5.8 in the post-setting. Some learners had a DDS<4. Consumption of most food groups and eating breakfast were higher in the post-setting in all four schools but the differences were non-significant. The majority of learners brought lunch boxes to school, but in the post setting it was lower in the intervention schools although the values were non-significant. There were more tuck shop visits by learners in both schools in the lower socio-economic area.

Discussion: Playing the FFG and/or an increased awareness of nutrition could have had an impact on nutrition knowledge, opinions and practices on nutrition and physical activities, tuck shop visits and dietary quality of Grade 4 learners. Nutrition behaviour was more positively influenced in schools in the lower socio-economic area.

Conclusion: No conclusion can be reached that the FFG positively influenced knowledge of, or opinion and behaviour on nutrition and physical activities in Grade 4 learners.

4.2 INTRODUCTION

Urbanisation, economic growth and modernisation in South Africa have been linked to the so-called 'nutrition transition', which is characterised by a quadruple burden of disease including communicable, NCD, maternal and perinatal diseases, as well as trauma-related disorders.¹ It is a condition that leads to modified diets with a higher risk of developing lifestyle diseases.² According to the NFCS (1999), 10% of 1–9-year-old SAs were overweight and obese, with an overweight prevalence in the WC province of 5%.³ According to a secondary analysis of the NFCS, a higher national prevalence was measured for overweight and obesity (>30%) than in previous calculations.⁴ The Health of the Nation study (2008) conducted in primary school children (6–13 years) confirmed these trends with a prevalence of overweight and obesity in 28,4% and 7,2% children respectively.⁵ According to SANHANES-1 (2012), overweight and obesity were prevalent in 10% of boys and 22% of girls among 10–14-year-old children.⁶

A South African study conducted in Cape Town (Temple et al., 2006) showed that 70% of learners make unhealthy food choices, such as the purchase of crisps, fizzy drinks, doughnuts and cheese curls from tuck shops, while fruit and vegetables were eaten less than three times per week by urban primary school children.⁷ According to the South African National Health And Nutrition Examination Survey (SANHANES-1, 2012), 19% (n=2 408) of 10–14-year-olds did not eat breakfast and 51% (n=2 406) did not take a lunch box to school.⁶ Faber et al. (2013) showed that more than 20% of South African learners in poorly resourced areas did not eat breakfast. They would bring a lunchbox to school, often containing bread, with the majority (57%) bringing money for the tuck shop.⁸ It appears as if both younger,⁹ as well as older South African children have a diet with little dietary variety.¹⁰

Intervention, described in SA studies, has not been proved to change behaviour successfully in school children living in areas where high levels of unemployment, food insecurity and poverty exist.¹¹ However, some studies outside the school setting did show positive results in improving nutrition knowledge, as well as increasing the level of fruit and vegetable intake.¹²

According to the World Health Organization (WHO), developing countries need to establish and evaluate their own programmes to promote healthy living.^{13,14} Investing in the future generation could potentially reduce the nutrition-related chronic disease burden later on in life.

National development programmes should be seen as a developmental need to promote healthy diets and physical activity.^{13,15,16} Schools are one of the settings where health promotion can influence health beliefs and behaviour. It is therefore recommended that nutrition education should start in primary school.¹³ A significant amount of food is consumed at school and therefore the school environment can have an influence on the quality as well as the food selection and intake of children.¹⁷ A systematic review by Williams et al. (2013) found inadequate confirmation to focus on single interventions, concentrating on either diet or physical activity associated policies and at only a particular intervention level such as a school. Recommendations suggest a more comprehensive intervention programme but more evidence is needed to evaluate intervention programmes.¹⁸

School health education (SHE) entails curriculum-based learning actions that can lead to opinions, knowledge, beliefs and abilities to make educated choices and possible changes towards healthy activities. These issues should address learners' needs, be attainable, practical and incorporated in various parts of the syllabus.¹⁹⁻²¹ Other small studies conducted in South African primary school children showed positive results where nutrition intervention, as part of a multi-component behaviour health intervention, indicated results indicative of improving learners' health behaviour.²² Although a multi-component strategy is recommended to address childhood obesity, a recent meta-analysis also recommended the isolation and investigation of effective components of interventions, as well as changes in environment and policy.²³⁻²⁵ The SA DoH is currently constructing an SA school tuck shop policy.²⁶ The aim is to create a healthier school environment and reduce the overweight and obesity prevalence of school children^{27,28} by providing better options for food choices.²⁸

Throughout childhood and adolescence, it seems as if playing games could be successfully used to attain better dietary behaviour^{29,30} and that nutrition education games can indeed alter behaviour if they are designed as such, rather than to just increase knowledge³¹ as shown in a previous attempt in the pilot study of Gillis (2003).³²

The South African Department of Health (DoH) introduced five key strategic approaches, which include, amongst others, to “empower families and communities to make informed nutrition-related decisions, through advocacy regarding household food security, multi-sectoral collaboration and effective NE”,³³ and which are documented in the Roadmap for

Nutrition in South Africa 2012–2016. Nutrition education is an important part of the ‘Comprehensive Package of Key Nutritional Interventions’ where nutrition education is presented as an “advocate for the integration of nutrition education including education on infant feeding, maternal nutrition, and healthy eating to prevent overweight and obesity into comprehensive health education” in pre-schools, schools and communities.³⁴ This commitment displayed now has to filter to implementation level and the necessary capacity needs to be built and put in place to affect action on these national level plans.

The aim and objectives of this article are to measure baseline and post-intervention nutritional knowledge, opinion and practices related to nutrition and physical activities, tuck shop visits and dietary quality in all Grade 4 learners in the City of Cape Town district before and after playing the FFG, an educational nutrition board game.

4.3 STUDY POPULATION

The study population consisted of Grade 4 learners and Grade 4 LO educators from schools in the City of Cape Town district of the WC province.

The Department of Basic Education (DoBE) was contacted by the researcher regarding details of all the primary schools within the City of Cape Town area and permission was obtained from the Western Cape Education Department (WCED) to conduct the study (Addendum A). The list of all primary schools in the City of Cape Town area was assessed and it was decided by the researcher to conduct the study in primary schools in the Northern Metropolis (Central, North and East) because of distance, cost and time constraints. The researcher resides in the Northern Metropolis and is familiar with the various socio-economic areas. Four purposively selected primary schools, two in a higher socio-economic area and two in a lower socio-economic area were conveniently selected. Two schools from the higher socio-economic area declined participating in the study due to an already high workload experienced by educators and limited time available for extra activities for Grade 4 learners. One additional school from the higher socio-economic area was conveniently selected for the pilot study.

After permission had been obtained from the WCED, all the selected primary schools were contacted and appointments were made with the selected primary school principals to obtain signed consent from the selected school principals (Addendum B). A meeting was then

conducted with the LO educators and consent was obtained (Addendum C). The LO educators assisted the researcher by explaining the study to the Grade 4 learners and assent was obtained (Addendum D). The intervention schools that obtained assent in class, namely school A (HIS), from a higher socio-economic area and C (LIS), from a lower socio-economic area, had higher participation rates versus the schools sending the assent form home before assent was obtained, namely control schools B (HCS), from a higher socio-economic area and D (LCS), from a lower socio-economic area. The learners took the consent form for parents home and were asked to return the form to school (Addendum E).

4.3.1 Sampling Size

Different research instruments were used to conduct the study

4.3.1.1 The HealthKick Questionnaire for Learners

The self-administered HKQ was used in all Grade 4 English speaking learners ($n=180$) from the purposive sample of four selected primary schools that were invited to participate. One school from the higher socio-economic area was conveniently selected as intervention school, namely school A (HIS), with three participating classes ($n=61$), and the other school was conveniently selected as the control school, namely school B (LIS), with two participating classes ($n=22$). One school from the lower socio-economic area was conveniently selected as intervention school, namely school C (LIS), with two participating classes ($n=55$), and the other school was conveniently selected as the control school, namely school D (LIS), with three participating classes ($n=42$). It was expected that selecting all classes in one school could serve as intervention school and all classes in one school could serve as control school for both the higher and lower socio-economic areas (Addendum F).

4.3.1.2 The Dietary Diversity Questionnaire and Dietary Diversity Score

According to the protocol and to be representative of the study population group, a class list should have been requested to randomise a sample group from each of the classes. A power calculation by the statistician determined the number of learners needed in each group at an effect size of 0.6 and confidence interval of 90% to be 30 learners. A total of 120 learners were needed. However, owing to a low response rate and for practical reasons, all the learners from school B (HCS) were selected ($n=22$), one class from school A (HIS) ($n=25$), and C (LIS) ($n=28$), and two classes from school D ($n=23$), thus having $n=53$ as intervention group and $n=45$ as control group. It was expected that these selections would provide a

sufficient sample size (Addendum G). The DDS was compiled from the DDQ. It was expected that these selections from the DDQ would provide a sufficient sample size. (Addendum H)

4.3.1.3 Tuck Shop Visits by Selected Grade 4 Learners

Tuck shop visits were noted on the DDQ and reported in the thesis. According to the protocol and to be representative of the study population group, a class list should have been requested to randomise a sample group from each of the classes. A power calculation by the statistician determined the number of learners needed in each group at an effect size of 0.6 and confidence interval of 90% to be 30 learners. A total of 120 learners were needed. However, owing to a low response rate and for practical reasons, all the learners from school B (HCS) were selected (n=22), one class from school A (HIS) (n=25), and C (LIS) (n=28), and two classes from school D (n=23), thus having n=53 as intervention group and n=45 as control group. It was expected that these selections would provide a sufficient sample size. It was expected that these selections, as determined from the DDQ, would provide a sufficient sample size.

4.3.2 Inclusion and Exclusion Criteria

Inclusion criteria included all Grade 4 English-speaking learners of both genders in the purposive selected schools who were invited to participate in the study. Exclusion criteria were effective when one or more of the following were not received: written informed consent provided by the school principals, the Grade 4 LO educators, and Grade 4 parents/legal guardians, as well as written informed assent from the English-speaking Grade 4 learners. Exclusion criteria were also effective if any of the above-mentioned participants at any given time refused further participation in the study. If for any reason, consent or assent had not been received from the parents or learners, the learners from the IS were allowed to play the educational nutrition board game but no further involvement was required from them.

4.4 METHOD OF DATA COLLECTION

The study was conducted during 2013 over a total of four months. The study commenced in school A (HIS), and after the three-week study period, the study was conducted in school B (HCS) over a three-week period. The study was completed after it had been conducted in the same manner in school C (LIS) and school D (LCS). After completion of the study it was arranged with the schools to allow the participating learners from schools B (HCS) and D (LCS) to play the FFG for an hour each.

4.4.1 Fun Food Game[®]

The FFG[®] was designed for players eight years and older. It was designed as a combination of a food trivia game (questions and answers) as well as a card collection game (collect three packs of each of the three Super Heroes). It was explained to the learners of control schools B (HCS) and D (LCS) that they would play an educational nutrition board game after week 3 (at the end of the study).

The researcher explained the rules of the FFG (Addendum M), dynamics and different cards, such as the question cards (Addendum N and Addendum O), Monkey and Funkey cards (Addendum P and Addendum Q) and the three Super Hero cards (Addendum R) of the game to the learners every day in the presence of the LO educators, before learners started to play. For the duration of the study, both the researcher and the LO educators were present, but did not actively participate during the period the educational nutrition board game was played. Both observed the learners and only assisted at the request of learners. The researcher completed the study at one IS before commencing with the second IS.

Teams consisting of one to two learners were formed. A group of two to four teams (with a maximum of eight learners) played the FFG. The majority of teams consisted either of only boys or only girls, with a few mixed teams to constitute a team. Every table had a full set of the FFG to allow the whole class to play at the same time. The object of the game is to be the first player to collect three of each of the three Super Hero cards, therefore nine cards in total.

The intervention schools (n=98) played the educational nutrition board game (FFG) during school hours on Monday, Tuesday, Thursday and Friday. On Wednesdays, the learners took a break to prevent possible irritation and 'player fatigue', to keep the 'fun' element central. Learners were supposed to play only for half an hour per session for the reasons above and to reflect a 'real-life' school setting (week 2), but all schools spontaneously allowed for an hour per session (including the pilot school). As time went by and a better understanding of the rules emerged, the first team would finish the game within 15–20 minutes and everyone would start playing again. School A (HIS) was very organised and a separate hall was prepared with tables and chairs, whereas in school C (LIS), children had to sit on the floor in the staff room because the general hall had been booked for other activities. Learners from schools B (HCS) and D (LCS) understood that they would have an opportunity to play an educational nutrition board game, after completion of the study.

4.4.2 HealthKick Questionnaire for Learners

The previously validated HKQ was used to quantitatively measure during school hours, all selected Grade 4 learners in all four schools in the pre- and post-setting, nutrition knowledge, opinions (on nutrition and physical activity) and practices related to nutrition and being active at school and home after giving written assent. This was intended to measure if learning (retention) took place, as well as whether nutrition knowledge and healthier nutrition and activity practices increased in the IS compared with the CS. The HKQ comprised 163 questions related to learners' family, food in general, fruit and vegetables, healthy options, eating breakfast and lunch, as well as activities during the day.² These questions were grouped as follows:

- a. Socio-demographic questions: 9
- b. Open ended questions: 1 (How much money do you bring to school?)
- c. Nutrition knowledge questions: 79
- d. Opinion (on nutrition and physical activities) questions: 45
- e. Practices questions (related to nutrition and physical activities): 29

All selected Grade 4 learners (n=175) completed the pre- and post-HKQ in the pre- and post-setting during week 1 and 3 of the study. All questions were coded and captured in coded sheets. The data was analysed by the statistician to compare the two schools from the HSA between each of them in the pre-and post-setting and between the two schools in the pre-and post-setting in terms of nutritional knowledge and opinions (related to nutrition and physical activity) and practices (related to nutrition and physical activities). The same analysis was conducted in the two schools from the LSA.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners, for example, age, gender, language, number of household members and who assisted them with homework. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like Spearman rank correlations and Pearson correlations) was used when continuous variables were compared with other continuous

variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. A non-parametric method like the Bonferroni test was used if the residuals were not normally distributed.

A non-parametric method was used (Bonferroni test) where ordinal were compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. No categorical data analysis was used. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

4.4.3 Dietary Diversity Questionnaire and Dietary Diversity Score

Selected Grade 4 learners from all four schools ($n=98$) completed the 24-hour recall pre- and post- DDQ³⁵ in the pre- and post-setting during week 1 and 3 of the study with the assistance of the researcher. The tuck shop visits were noted on the DDQ. According to the protocol and to be representative of the study population group, a class list should have been requested to randomise a sample group from each of the classes. A power calculation by the statistician determined the number of learners needed in each group at an effect size of 0.6 and confidence interval of 90% to be 30 learners. A total of 120 learners were needed. However, owing to a low response rate and for practical reasons, all the learners from school B (HCS) were selected ($n=22$), one class from school A (HIS) ($n=25$), and C (LIS) ($n=28$), and two classes from school D ($n=23$), thus having $n=53$ as intervention group and $n=45$ as control group.

The DDQ is a 24-hour recall of foods eaten by Grade 4 learners the previous day (Addendum G) and recorded as one of sixteen food groups, namely: 1) cereals, 2) white roots and tubers, 3) vitamin-rich vegetables and tubers, 4) dark-green leafy vegetables, 5) other vegetables, 6) vitamin rich fruits, 7) other fruits, 8) organ meats, 9) flesh meats, 10) eggs, 11) fish and shellfish, 12) legumes, nuts and seeds, 13) milk and milk products, 14) oils and fats, 15) sweets, and 16) spices, condiments and beverages.³⁵ Foods can only be recorded into one of the sixteen food groups, once.

After all foods had been grouped into one of the sixteen food groups, these were then aggregated to nine food groups to create an individual dietary diversity score (DDS), namely, starchy staples (Group 1 and 2), dark-green leafy vegetables (Group 4), other vitamin A-rich fruits and vegetables (Group 3, 6) and red palm oil if applicable, other fruit and vegetables (Group 5 and 7), organ meats (Group 8), meat and fish (Group 9 and 11), eggs (Group 10), legumes, nuts and seeds (Group 12) and milk and milk products (Group 13).³⁵ (Addendum H)

A DDQ can be used in children as a gauge for surveys,³⁶ as well as for future progress of diets.³⁷ It is a quick and economical method to estimate a diet's nutrient sufficiency, for example, micronutrient adequacy. A DDS score of less than 6 (out of 9) could indicate undernutrition.³⁸ Limitations include that there is no indication of the quantity of food eaten, different food can be eaten in different time periods and variety is more likely to be consumed in an urban versus a rural area.³⁹ Nevertheless, this questionnaire was deemed appropriate for the requirements of this study since it is a quick method to determine dietary adequacy of selected Grade 4 learners where limited time is available to complete the pre- and post-DDQ for all the selected Grade 4 learners during school hours. It is a proxy for nutrient adequacy of selected Grade 4 learners and can be used to detect possible changes in dietary adequacy from the pre- to the post-setting³⁵ after playing the FFG as a possible NE tool in an NEP.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners per school in the pre- vs. the post-setting, for example, did they have breakfast, did they bring a lunch box to school, did they visit the tuck shop, did they consume fast food, eggs, fish and shellfish, legumes, nuts and seeds, and milk and milk products. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like rank correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. Non-parametric methods like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot were used if the residuals

were not normally distributed, and histograms were used if variables could not be analysed because of no or too little variation.

Non-parametric methods were used (like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot) where ordinal were compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. Histograms were used if no or too few variables were reported. Categorical data analysis (chi-square tests), for example, maximum-likelihood (M-L) chi-square test, Pearson's chi-square test, Yates's chi-square test, Fisher's exact, one-tailed, Fisher's exact, two-tailed, and McNemar's chi-square (A/D) was used. Cross-tabulation results were done with the McNemar test. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

4.4.4 Tuck Shop Visits from Selected Grade 4 Learners

Selected Grade 4 learners from all four schools ($n=98$) completed the 24-hour recall pre- and post- DDQ³⁵ in the pre- and post-setting during week 1 and 3 of the study with the assistance of the researcher. All tuck shop visits were noted on the pre- and post-DDQ. According to the protocol and to be representative of the study population group, a class list should have been requested to randomise a sample group from each of the classes. A power calculation by the statistician determined the number of learners needed in each group at an effect size of 0.6 and confidence interval of 90% to be 30 learners. A total of 120 learners were needed. However, owing to a low response rate and for practical reasons, all the learners from school B (HCS) were selected ($n=22$), one class from school A (HIS) ($n=25$), and C (LIS) ($n=28$), and two classes from school D ($n=23$), thus having $n=53$ as intervention group and $n=45$ as control group. Pre- and post-tuck shop visits could give an indication of change in dietary behaviour after playing the FFG as a possible NE tool in an NEP in the City of Cape Town district.

Tuck shop visits were noted on the DDQ and reported in the thesis. Therefore the research instrument for tuck shop visits in this study is the same as that of the DDQ. The DDQ is a 24-hour recall of foods eaten by Grade 4 Learners the previous day (Addendum G)³⁵ and recorded as one of sixteen food groups, namely: 1) cereals, 2) white roots and tubers, 3) vitamin-rich vegetables and tubers, 4) dark-green leafy vegetables, 5) other vegetables, 6) vitamin-rich fruits, 7) other fruits, 8) organ meats, 9) flesh meats, 10) eggs, 11) fish and shellfish, 12) legumes, nuts and seeds, 13) milk and milk products, 14) oils and fats, 15)

sweets, and 16) spices, condiments and beverages.³⁵ Foods can only be recorded into one of the sixteen food groups, once.

After all foods had been grouped into one of the sixteen food groups, these were then aggregated to nine food groups to create an individual dietary diversity score (DDS), namely, starchy staples (Group 1 and 2), dark-green leafy vegetables (Group 4), other vitamin A-rich fruits and vegetables (Group 3, 6 and red palm oil if applicable), other fruit and vegetables (Group 5 and 7), organ meats (Group 8), meat and fish (Group 9 and 11), eggs (Group 10), legumes, nuts and seeds (Group 12) and milk and milk products (Group 13).³⁵ (Addendum H)

A DDQ can be used in children as a gauge for surveys,³⁶ as well as for future progress of diets.³⁷ It is a quick and economical method to estimate a diet's nutrient sufficiency, for example, micronutrient adequacy. A DDS score of less than 6 (out of 9) could indicate undernutrition.³⁸ Limitations include that there is no indication of the quantity of food eaten, different food can be eaten in different time periods and variety is more likely to be consumed in an urban versus a rural area.³⁹ Nevertheless, this questionnaire was deemed appropriate for the requirements of this study since it is a proxy for nutrient adequacy of Grade 4 learners in the pre- and post-setting and limited time is available to complete the DDQ for all the selected Grade 4 learners during school hours.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners per school in the pre- vs. the post-setting, for example, did they have breakfast, did they bring a lunch box to school, did they visit the tuck shop, did they consume fast food, eggs, fish and shellfish, legumes, nuts and seeds, and milk and milk products. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like rank correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. Non-parametric methods like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot were used if the residuals

were not normally distributed, and histograms were used if variables could not be analysed because of no or too little variation.

Non-parametric methods were used (like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot) where ordinal were compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. Histograms were used if no or too few variables were reported. Categorical data analysis (chi-square tests), for example maximum-likelihood (M-L) chi-square test, Pearson's chi-square test, Yates's chi-square test, Fisher's exact, one-tailed, Fisher's exact, two-tailed, and McNemar's chi-square (A/D) was used. Cross-tabulation results were done with the McNemar test. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

4.5 DESCRIPTION OF THE RESEARCH TOOLS

4.5.1 Fun Food Game[®]

4.5.1.1 How the Fun Food Game was Developed

The advancement of emotional and cognitive development in middle childhood, in examining consequences of nutrition education programmes (NEPs), recommends the use of stories and fantasy characters that form part of their world.¹ Three images representing three 'Super Heroes' were used to build a collection of three cards each in the FFG. The name 'Super Heroes' was selected to reflect the learners' world of entertainment. They represent three types of food, namely food that gives you energy ('Speedy'), food that protects your body ('Shield') and food that builds your body ('Muscle Man'). Only three super cards were selected to make the mechanical side of the game work (i.e. card collections). The term 'Super Heroes' was chosen because it is culturally suitable, fun¹⁰ and age appropriate.¹ The FFG was designed for players eight years and older. It was designed as a combination of a food trivia game (questions and answers) as well as a card collection game (collect three packs of each of the three Super Heroes).

4.5.1.2 What Fun Food Game Consists of and How It is Played

The FFG was designed for players eight years and older. It was designed as a combination of a food trivia game as well as a card collection game. The '?' cards are Foodle[®] cards (please see disclaimer) consisting of questions and answers. The accuracy of the '?' cards was previously checked by independent registered dietitians. At least one or more of the SA

FBDG statements were part of the ‘?’ cards, as well as a card collection game (collect three packs of each of the three Super Heroes). It was explained to the learners of control schools B (HCS) and D (LCS) that they would play an educational nutrition board game after week 3 (at the end of the study). Please see Addenda M–Q for FFG rules and the different FFG cards.

4.5.2 The HealthKick Questionnaire for Learners

The HKQ is a learner-centred research tool, previously tested and validated for face and content validity on Grade 4–6 SA learners.¹¹ The goal of the HKQ is to test learners’ knowledge, attitudes (self-efficacy) and practices related to nutrition and physical activity at home and school, as well as the interval time. Topics that are explored are the following: the family, food in general, vegetables and fruit, healthy options, breakfast before school, lunch at school, and activities. Recommendations by the researchers from the HKQ suggested evaluations of intervention programmes in schools in a pre- and post-design that should include nutrition and physical activity.⁴⁰

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners, for example, age, gender, language, number of household members, and who assisted them with homework. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like Spearman rank correlations and Pearson correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. A non-parametric method like the Bonferroni test was used if the residuals were not normally distributed.

A non-parametric method was used (Bonferroni test) where ordinal was compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. No categorical data analysis was used. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

4.5.3 The Dietary Diversity Questionnaire and Dietary Diversity Score

The DDQ is a 24-hour recall of foods eaten by Grade 4 learners the previous day (Addendum G)³⁵ and recorded as one of sixteen food groups, namely: 1) cereals, 2) white roots and tubers, 3) vitamin-rich vegetables and tubers, 4) dark-green leafy vegetables, 5) other vegetables, 6) vitamin-rich fruits, 7) other fruits, 8) organ meats, 9) flesh meats, 10) eggs, 11) fish and shellfish, 12) legumes, nuts and seeds, 13) milk and milk products, 14) oils and fats, 15) sweets, and 16) spices, condiments and beverages.³⁵ Foods can only be recorded into one of the sixteen food groups, once.

After all foods had been grouped into one of the sixteen food groups, these were then aggregated to nine food groups to create an individual dietary diversity score (DDS), namely starchy staples (Group 1 and 2), dark-green leafy vegetables (Group 4), other vitamin A-rich fruits and vegetables (Group 3, 6 and red palm oil if applicable), other fruit and vegetables (Group 5 and 7), organ meats (Group 8), meat and fish (Group 9 and 11), eggs (Group 10), legumes, nuts and seeds (Group 12), and milk and milk products (Group 13).³⁵ (Addendum H)

A DDQ can be used in children as a gauge for surveys,³⁶ as well as for future progress of diets.³⁷ It is a quick and economical method to estimate a diet's nutrient sufficiency, for example, micronutrient adequacy. A DDS score of less than 6 (out of 9) could indicate undernutrition.³⁸ Limitations include that there is no indication of the quantity of food eaten, different food can be eaten in different time periods and variety is more likely to be consumed in an urban versus a rural area.³⁹ Nevertheless, this questionnaire was deemed appropriate for the requirements of this study since it is a proxy for nutrient adequacy of Grade 4 learners in the pre- and post-setting and limited time is available to complete the DDQ for all the selected Grade 4 learners during school hours.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners per school in the pre- vs. the post-setting, for example, did they have breakfast, did they bring a lunch box to school, did they visit the tuck shop, did they consume fast food, eggs, fish and shellfish, legumes, nuts and seeds, and milk and milk products. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like rank correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. Non-parametric methods like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot were used if the residuals were not normally distributed and histograms were used if variables could not be analysed because of no or too little variation.

Non-parametric methods were used (like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot) where ordinal was compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. Histograms were used if no or too few variables were reported. Categorical data analysis (chi-square tests), for example, maximum-likelihood (M-L) chi-square test, Pearson's chi-square test, Yates's chi-square test, Fisher's exact, one-tailed, Fisher's exact, two-tailed, and McNemar's chi-square (A/D) was used. Cross-tabulation results were done with the McNemar test. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

4.5.4 Tuck Shop Visits by Grade 4 Learners

Tuck shop visits were noted on the DDQ and reported in the thesis. Therefore the research instrument for tuck shop visits in this study is the same as that of the DDQ. The DDQ is a validated 24-hour recall of foods eaten³⁵ by Grade 4 learners the previous day (Addendum G) and recorded as one of sixteen food groups, namely: 1) cereals, 2) white roots and tubers, 3) vitamin-rich vegetables and tubers, 4) dark-green leafy vegetables, 5) other vegetables, 6) vitamin-rich fruits, 7) other fruits, 8) organ meats, 9) flesh meats, 10) eggs, 11) fish and seafood, 12) legumes, nuts and seeds, 13) milk and milk products, 14) oils and fats, 15) sweets, and 16) spices, condiments and beverages.³⁵ Foods can only be recorded into one of the sixteen food groups, once.

After all foods had been grouped into one of the sixteen food groups, these were then aggregated to nine food groups to create an individual dietary diversity score (DDS), namely starchy staples (Group 1 and 2), dark-green leafy vegetables (Group 4), other vitamin A-rich fruits and vegetables (Group 3, 6 and red palm oil if applicable), other fruit and vegetables

(Group 5 and 7), organ meats (Group 8), meat and fish (Group 9 and 11), eggs (Group 10), legumes, nuts and seeds (Group 12) and milk and milk products (Group 13).³⁵ (Addendum H)

A DDQ can be used in children as a gauge for surveys,³⁶ as well as for future progress of diets.³⁷ It is a quick and economical method to estimate a diet's nutrient sufficiency, for example, micronutrient adequacy. A DDS score of less than 6 (out of 9) could indicate undernutrition.³⁸ Limitations include that there is no indication of the quantity of food eaten, different food can be eaten in different time periods and variety is more likely to be consumed in an urban versus a rural area.³⁹ Nevertheless, this questionnaire was deemed appropriate for the requirements of this study since it is a proxy for nutrient adequacy of Grade 4 learners in the pre- and post-setting and limited time is available to complete the DDQ for all the selected Grade 4 learners during school hours.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners per school in the pre- vs. the post-setting, for example, did they have breakfast, did they bring a lunch box to school, did they visit the tuck shop, did they consume fast food, eggs, fish and shellfish, legumes, nuts and seeds, and milk and milk products. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like rank correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. Non-parametric methods like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot were used if the residuals were not normally distributed and histograms were used if variables could not be analysed because of no or too little variation.

Non-parametric methods were used (like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot) where ordinal was compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. Histograms were used if no or too few variables were reported. Categorical data analysis (chi-square tests), for example, maximum-likelihood (M-L) chi-square test, Pearson's

chi-square test, Yates's Chi-square test, Fisher's exact, one-tailed, Fisher's exact, two-tailed, and McNemar's chi-square (A/D) was used. Cross-tabulation results were done with the McNemar test. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

4.6 DATA ANALYSIS AND STATISTICS

Data from all the different research tools, namely the HKQ, DDQ and DDS and tuck shop visits was captured electronically in Microsoft Excel[®] spreadsheets with regular cross-referencing to ensure precision of data transfer. The objectives of the study were discussed by using descriptive statistics. Data was analysed with the assistance of the Centre for Statistical Consultation using Statsoft Inc. (2011) STATISTICA (data analysis software system), version 10.0. (www.statsoft.com).

4.6.1 HealthKick Questionnaire for Learners

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners, for example, age, gender, language, number of household members and who assisted them with homework. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like Spearman rank correlations and Pearson correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. A non-parametric method like the Bonferroni test was used if the residuals were not normally distributed.

A non-parametric method was used (Bonferroni test) where ordinal was compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. No categorical data analysis was used. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

4.6.2 Dietary Diversity Questionnaire and Dietary Diversity Score

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners per school in the pre- vs. the post-setting, for example, did they have breakfast, did they bring a lunch box to school, did they visit the tuck shop, did they consume fast food, eggs, fish and shellfish, legumes, nuts and seeds, and milk and milk products. Relationships and associations between variables were determined by using appropriate inferential statistics.

Regression or multiple regression analysis (like rank correlations) was used when continuous variables were compared with other continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. Non-parametric methods like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot were used if the residuals were not normally distributed, and histograms were used if variables could not be analysed because of no or too little variation.

Non-parametric methods were used (like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot) where ordinal was compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. Histograms were used if no or too few variables were reported. Categorical data analysis (chi-square tests), for example, maximum-likelihood (M-L) chi-square test, Pearson's chi-square test, Yates's chi-square test, Fisher's exact, one-tailed, Fisher's exact, two-tailed, and McNemar's chi-square (A/D) was used. Cross-tabulation results were done with the McNemar test. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable.

4.6.3 Tuck Shop Visits by Selected Grade 4 Learners

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the characteristics of all the selected Grade 4 learners per school, for example, tuck shop visits in the pre- and post-setting. Relationships and associations between variables were determined by using appropriate inferential statistics.

The tuck shop visits were reported on the DDQ. Regression or multiple regression analysis (like rank correlations) was used when continuous variables were compared with other

continuous variables. Normal probability plots were constructed to test for normality of residuals in the particular analysis where required and appropriate scatter plots of variables involved were given. Analysis of variance was used when continuous variables were compared vs. nominal variables. Non-parametric methods like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot were used if the residuals were not normally distributed and histograms were used if variables could not be analysed because of no or too little variation.

Non-parametric methods were used (like the Wilcoxon Matched-Pairs test and Box-and-Whisker plot) where ordinal was compared vs. nominal variables and appropriate contingency tables were constructed where nominal variables were compared with other nominal variables. Histograms were used if no or too few variables were reported. Categorical data analysis (chi-square tests), for example, maximum-likelihood (M-L) chi-square test, Pearson's chi-square test, Yates's chi-square test, Fisher's exact, one-tailed, Fisher's exact, two-tailed, and McNemar's chi-square (A/D) was used. Cross-tabulation results were done with the McNemar test. A p-value of <0.05 was used to indicate the significance of the results. Missing data was excluded per variable. 3.4.3 Dietary Diversity Questionnaire and Dietary Diversity Score.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perception and acceptability of all the selected Grade 4 learners, for example, learners thought more about what they ate, they liked to learn about food, they learned to play the game easily, they would play again, it was fun, the time it took for learners to play the FFG once and whether they thought they could play the FFG independently. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

4.7 ETHICAL CONSIDERATIONS

4.7.1 Ethics Approval and Permissions

Ethics approval was obtained from the Human Research Ethics Committee, Faculty of Medicine and Health Sciences, Stellenbosch University (Ref. no. S12/11/303) and the Western Cape Department of Basic Education's Research Office (Ref. no. 20130124-0004) (Addendum A). Voluntary written consent was obtained from all participating subjects, namely the school principals, LO educators, and parents/legal guardians, as well as voluntary written assent from English-speaking Grade 4 learners (Addenda B–E).

4.7.2 Informed Consent

It was explained by the researcher to the school principals and LO educators that participation in the study was voluntary and that the information collected would be treated as confidential. Only the researcher involved in the study would have access to all the information and the identities of the participants would remain anonymous. No individual would be identified and the results would be presented collectively, for example, school A (HIS) vs. school B (HCS), and school C (LIS) vs. school D (LCS). The LO educators were requested to discuss possible participation in the study with the Grade 4 learners and to ask the Grade 4 learners to assent. The LO educators were also requested to send the parent/legal guardian consent form home with the Grade 4 learners, after explaining the study to the Grade 4 learners. It was accepted that consent was implied when both the consent form from the parent/legal guardian and assent form from the Grade 4 learner were completed and received.

4.7.3 Patient Confidentiality

Throughout the study and thereafter, all study participants' names, information, and questionnaires were kept anonymous. Confidentiality was conveyed to the participants by means of the informed consent leaflet. Information collected by the researcher would not be shared for any other purposes or projects and would be used only for the specified study.

4.8 PILOT STUDY

Some questions that were not appropriate for this age group were removed, for example, alcohol-related questions. At first it was thought that more cards should be added, but it was decided after the pilot study to suffice with the remaining cards to increase the potential of repetition and therefore potentially increase the retention of nutrition knowledge. The rationale behind this was that the FFG is a fast-paced participatory game and more cards would be drawn during one game.

A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic Education. A pilot study was conducted in a conveniently selected high-income school from the list. This was done to pre-test the internal validity (face and content) of ten Grade 4 learners, randomly chosen by the LO educator, who played FFG for half an hour for four weeks, while the LO educator and researcher observed them. The LO educator was requested to complete the PQE after each session. Based on this deduction, the PQE

was considered to be understood and valid to be used in the main study. Results from the pilot study indicated that the selected Grade 4 learners and selected Grade 4 LO educator consistently gave the same answers in the repeated questionnaires. It was therefore not appropriate or necessary to measure Cronbach's alfa as initially anticipated, since no statistical differences could be detected (not measured). Added comments and general suggestions were encouraged and included in the results.

4.9 RESULTS

4.9.1 HealthKick Questionnaire for Learners

4.9.1.1 Socio-Demographic Results

School A (HIS) from a higher socio-economic area and school C (LIS) from a lower socio-economic area had a high total response rate of 69.32% (n=61) and 93.22% (n=55) respectively, whereas school B (HCS) from a higher socio-economic area and school D (LCS) from a lower socio-economic area had a lower response rate of 36.67% (n=22) and 47.19% (n=42) each. A total of 63.30% (n=186) parents gave consent and 69.23% (n=202) learners gave assent to participate in the study. A total of 180 learners (61.60%) were eligible for participation where both assent and consent forms from the same family were received. Finally, 175 learners (97.22%) completed the HKQ in both the pre- and post-study setting, of whom 48.57% were boys (n=85) and 51.43% were girls (n=90).

The average age distribution of the learners was 9 years (56.5%), 10 years (39.5%) and 11 years (4%) before commencing with the study. The majority of the learners belonged to households with 4 (35%) to 5 members (29%), followed by 3 (13%) to 6 (11%) members. The mother (56%) was primarily responsible for helping learners with homework, followed by aftercare (16%), the father (15%), grandmother (5%), a sister, brother or cousin (4%) and other (4%).

4.9.1.2 Measuring Baseline and Post-Intervention Nutritional Knowledge of All Selected Grade 4 Learners in the City of Cape Town District

Results indicated that schools A (HIS) and B (HCS) showed an upward trend in average nutrition knowledge in the pre- to the post-setting, with no statistically significant difference. School B (HCS) presented with a higher pre- and post-nutrition knowledge vs. school A (HIS) (Figure 4.1).

According to the data, school D (LCS) had a higher pre-knowledge of nutrition vs. school C (LIS), but it was not statistically significant. Both schools C (LIS) and D (LCS) showed an upward trend in nutrition knowledge in the pre- to the post-setting, with school C (LIS) showing a steeper gradient vs. school D (LCS); however, it was also not statistically significant. In the post-setting, their nutrition knowledge was equal (Figure 4.2).

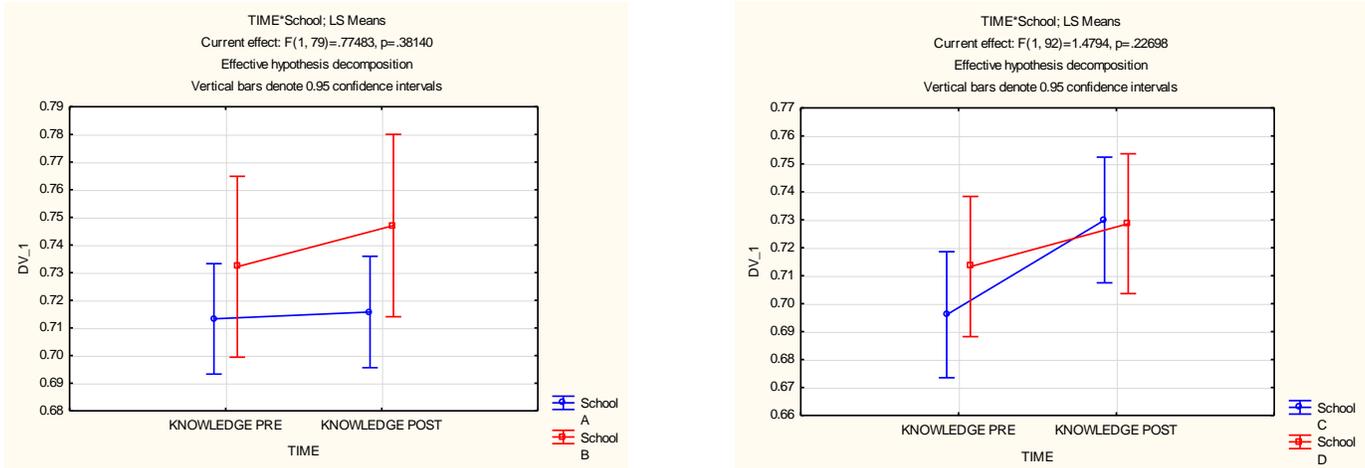


Figure 4.1: Comparing average nutrition knowledge of all selected Grade 4 learners in the pre- and post-setting in and between schools A (intervention school in a higher socio-economic area) and B (control school in a higher socio-economic area) (n=81), p=0.381.

Figure 4.2: Comparing average nutrition knowledge of all Grade 4 learners in the pre- and post-setting in and between schools C (intervention school in a lower socio-economic area) and D (control school in a lower socio-economic area) (n=94), p=0.227

4.9.1.3 Measuring Baseline and Post-Intervention Opinion (Related to Nutrition and Physical Activities) of All Selected Grade 4 Learners in the City of Cape Town District

A statistically significant difference (p=0.005) was measured in mean pre- to post-opinion on nutrition and physical activity in both schools, but no significant difference (p=0.372) was measured in mean opinion on nutrition and physical activity in comparing schools A (HIS) and B (HCS) in the pre- or post-setting, although both schools showed an upward trend. School A (HIS) had a higher total mean opinion on nutrition and physical activity vs. school B (HCS) (Figure 4.3).

Results indicated an upward trend in opinion on nutrition and physical activity in both schools C (LIS) and D (LCS) in the pre- and post-intervention setting. School D (LCS) had a higher pre- and post-opinion on nutrition and physical activity, but school C (LIS) showed a steeper gradient, although it was not statistically significant (Figure 4.4).

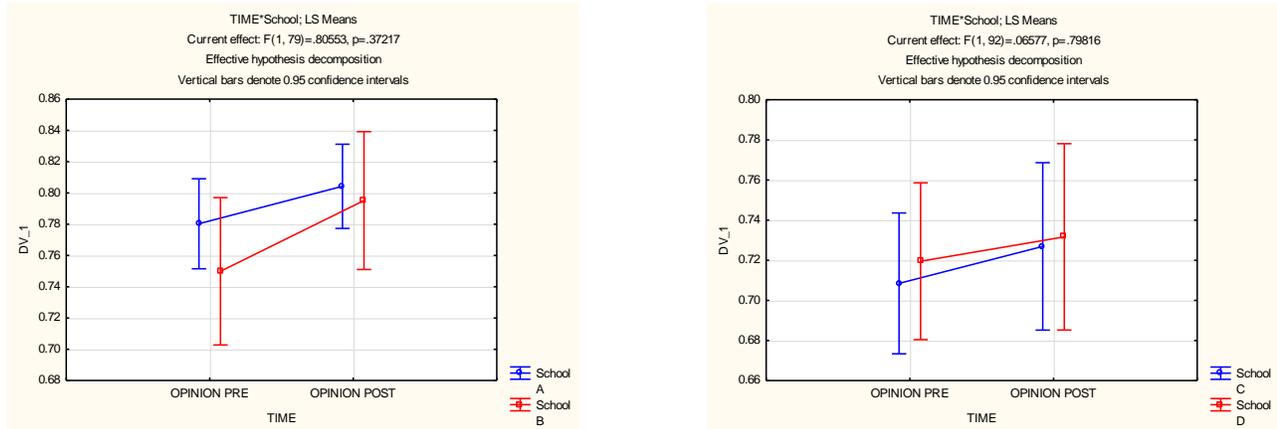


Figure 4.3: Change in average opinion on nutrition and physical activity in the pre- and post-setting in all selected Grade 4 learners in schools A (intervention school in a higher socio-economic area) and B (control school in a higher socio-economic area) ($n=81$), $p=0.372$.

Figure 4.4: Change in average opinion on nutrition and physical activity in the pre- and post-setting in all Grade 4 learners in schools C (intervention school in a lower socio-economic area) and D (control school in a lower socio-economic area) ($n=94$), $p=0.798$.

4.9.1.4 Measuring Baseline and Post-Intervention Practices (Related to Nutrition and Physical Activities) of All Selected Grade 4 Learners in the City of Cape Town District

Data analysis showed that school A (HIS) had a statistically significant higher mean pre-practice related to nutrition and being active vs. school B (HCS) ($p=0.003$). The mean post-practice related to nutrition and being active in school A (HIS) showed an upward trend, whereas school B (HCS) showed a steep increase in the post-setting (Figure 4.5).

School C (LIS) showed a downward trend and school D (LCS) an upward trend from pre- to post-practice related to nutrition and being active, although it was not statistically significant (Figure 4.6).

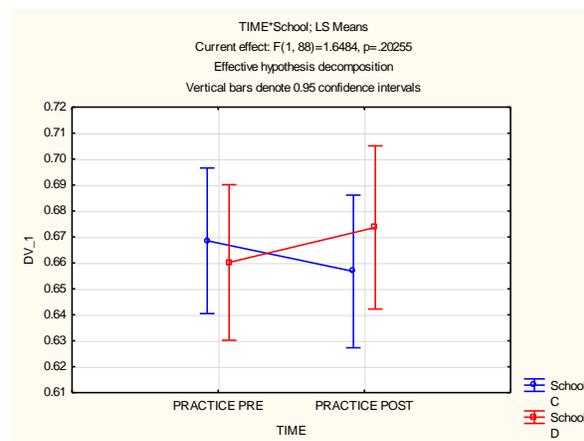
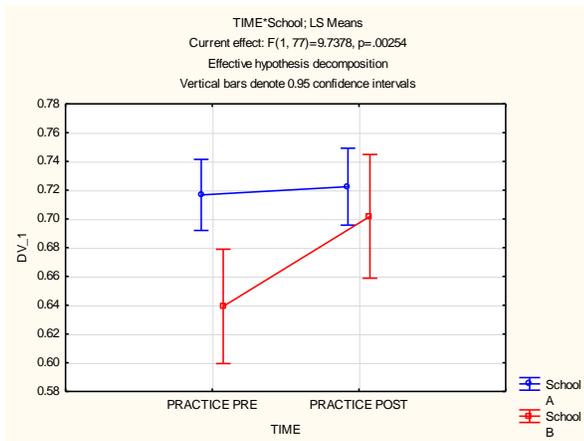


Figure 4.5: Average pre- and post-practices related to nutrition and being active in all selected Grade 4 learners in schools A (intervention school in a higher socio-economic area) and B (control school in a higher socio-economic area) (n=79), p=0.003.

Figure 4.6: Average pre- and post-practices related to nutrition and being active in all Grade 4 learners in schools C (intervention school in a lower socio-economic area) and D (control school in a lower socio-economic area) (n=90), p=0.203.

4.9.1.5 Measuring Baseline and Post-Intervention Tuck Shop Visits of All Selected Grade 4 Learners in the City of Cape Town District

On average, learners from school B (HCS) visited the tuck shop more compared with school A (HIS), but it was not statistically significant. Both schools showed a downward trend in the post-setting but it was also not statistically significant (Figure 4.7).

Results showed that school D (LCS) visited the tuck shop significantly more often in the pre-setting vs. school C (LIS) (p=0.006). School D (LCS) showed a downward trend and school C (LIS) an upward trend in the post-setting; however, school C (LIS) visited the tuck shop marginally more in the post-setting compared with school D (LCS), and visits to the tuck shop from the two schools were almost the same in the post-setting (Figure 4.8).

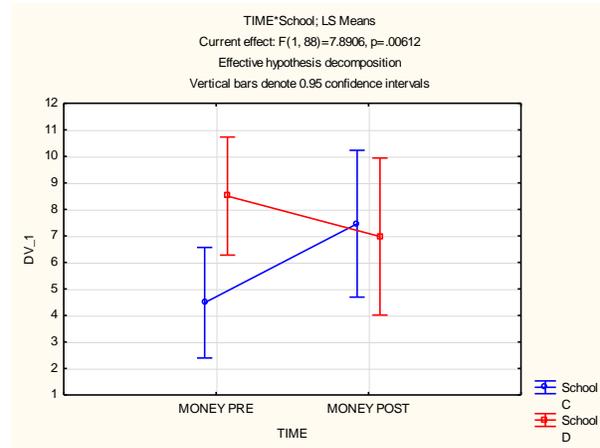
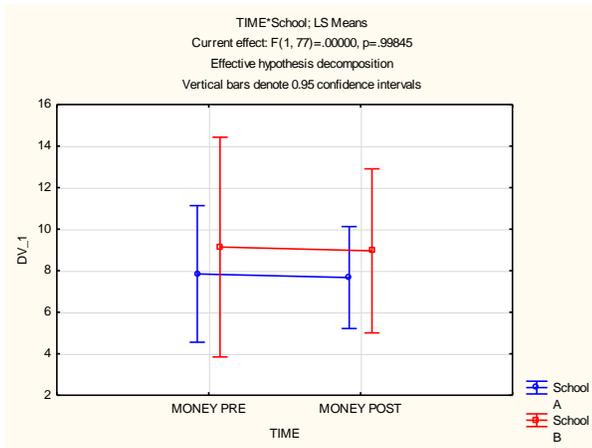


Figure 4.7: Average visits to the tuck shop by selected Grade 4 learners in the pre- and post-setting in schools A (intervention school in a higher socio-economic area) and B (control school in a higher socio-economic area) (n=79), p=0.998.

Figure 4.8: Average visits to the tuck shop by selected Grade 4 learners to the tuck shop in the pre- and post-setting in schools C (intervention school in a lower socio-economic area) and D (control school in a lower socio-economic area) (n=90), p=0.006.

4.9.1.6 Determining Baseline and Post-Intervention Dietary Adequacy of Selected Grade 4 Learners in the City of Cape Town District

Both schools A (HIS) and B (HCS) from the higher socio-economic area had an average DDS of 5 in the pre- and post-setting respectively (p=0.44) and (p=0.35), whereas schools C (LIS) and D (LCS) displayed a statistically significant higher average DDS from the pre- to post-setting, that is, from 5 to 6 (p=0.03) and (p=0.001) respectively. All the schools showed a higher DDS in the post-setting (Table 4.1). Both schools A (HIS) and B (CIS) showed an increase in four food groups and a decrease in one food group, whereas both schools C (LIS) and D (LCS) showed an increase in five food groups and a decrease in one food group. (Please refer to Table 4.4).

Table 4.1: Mean pre- and post-Dietary Diversity Score (DDS) of all selected Grade 4 learners (n=98)*

Schools	N (Pre)	Pre-DDS	N (Post)	Post-DDS	p-value**	Higher/Lower
School A (HIS)	25	5.2	25	5.4	0.44	↑
School B (HCS)	22	4.5	22	4.8	0.35	↑
School C (LIS)	28	5.3	28	5.8	0.03***	↑↑
School D (LCS)	23	4.8	23	5.8	0.001***	↑↑

*Nutrient intake according to the DDQ

T-test for dependent samples *significant difference $p < 0.05$

In the higher socio-economic area, school A (HIS) showed a higher pre-DDS (DDS=5.2) vs. school B (HCS) (DDS=4.5), which was statistically significant ($p=0.04$). Although school A (HIS) also displayed a higher post-DDS (DDS=5.4) vs. school B (HCS) (DDS=4.8), it was not statistically significant. In the lower socio-economic area school C (LIS) displayed a higher pre-DDS (DDS=5.3) vs. school D (LCS) (DDS=4.8), but it was not statistically significant, whereas both these schools had the same post-DDS (DDS=5.8) ($p=0.92$) (Table 4.2).

Table 4.2: Comparing mean pre- and post-Dietary Diversity Score (DDS) of the selected intervention vs. control Grade 4 learners (n=98) *

	School A (HIS)	School B (HCS)	<i>p-value</i>**
DDS (Pre)	5.2	4.5	<i>0.04</i> ***
DDS (Post)	5.4	4.8	<i>0.07</i>
	School C (LIS)	School D (LCS)	<i>p-value</i>
DDS (Pre)	5.3	4.8	<i>0.06</i>
DDS (Post)	5.8	5.8	<i>0.92</i>

*Nutrient intake according to the DDQ

T-test for independent samples (groups) * significant difference $p < 0.05$

A $DDS < 4$ was measured in some individuals in all the schools, except school C (LIS). In the higher socio-economic area, it stayed the same with one learner (4%) in school A (HIS) ($p = 0.48$), whereas in school B (HCS) it decreased from 13.6% ($n = 3$) to 4.5% ($n = 1$). The number of learners in the lower socio-economic area in school D (LCS) was too low and no difference could be detected. However, school D (LCS) did show a decline from 4.3% ($n = 1$) to 0% ($n = 0$). The number of learners with a total $DDS < 4$ of all the schools was 13.4% lower, from 21.9% ($n = 5$) to 8.5% ($n = 2$) from the pre- to post-setting (Table 4.3).

Table 4.3: Number of Grade 4 learners from all selected primary schools with a Dietary Diversity Score (DDS)<4 in the pre- (n=5) to the post-setting (n=2)*

	N (Pre)	Pre- Setting (%)	N (Post)	Post- Setting (%)	<i>p-value</i>**	Higher/Lower
School A (HIS)	1	4	1	4	<i>0.48</i>	Same
School B (HCS)	3	13.6	1	4.5	<i>0.48</i>	↓
School C (LIS)	0	0	0	0	<i>NS</i>	None
School D (LCS)	1	4.3	0	0	<i>NS</i>	↓
TOTAL (All schools)	5	21.9	2	8.5	<i>0.37</i>	↓ (13.4%)

*Nutrient intake according to the DDQ

McNemar test * significant difference $p < 0.05$

A statistically significant difference ($p=0.0003$) in the number of food groups was measured between total pre- to post-DDS (5.0 to 5.4) in all the schools ($n=98$). Further results from schools A (HIS), B (HCS), C (LIS) and D (LCS) showed that the majority of food groups remained the same or was higher in the post-setting for all schools. However, the differences were small and the p -values for the majority of few food groups could not be measured (Table 4.4).

Table 4.4: Food groups: Differences between the mean pre- to post-setting in all selected Grade 4 learners (n=98)* vs. national consumption (1-9 years)⁶

School A (HIS)	N	Pre-Setting (%)	N	Post-Setting (%)	<i>p</i> -value**	Higher/Lower	National (%)
Starchy staples	25	100	25	100	NS	Same	96
Other fruit & vegetables	24	96	24	96	0.48	Same	
Meat & fish	25	100	23	92	NS	↓	54
Milk & milk products	25	100	25	100	NS	Same	56
Other vit. A-rich fruit & vegetables	16	64	18	72	NS	↑↑	24
Organ meats	0	0	1	4	NS	↑	
Legumes, nuts & seeds	11	44	11	44	NS	Same	20
Dark-green leafy vegetables	3	12	6	24	NS	↑↑	
Eggs	0	0	3	12	NS	↑↑	13

School (HCS)	B	N	Pre-Setting (%)	N	Post-Setting (%)		Higher/Lower	National (%)
Starchy staples		22	100	22	100	NS	Same	96
Other fruit & vegetables		21	95.5	21	95.5	NS	Same	
Meat & fish		21	95.5	21	95.5	NS	Same	54
Milk & milk products		19	86.4	21	95.5	1.00	↑↑	56
Other vit. A-rich fruit & vegetables		11	50	12	54.5	0.75	↑	24
Legumes, nuts & seeds		6	27.3	4	18.2	0.68	↓↓	20
Dark-green leafy vegetables		0	0	2	9.1	NS	↑↑	
Eggs		0	0	2	9.1	NS	↑↑	13

School C (LIS)	N	Pre-Setting (%)	N	Post-Setting (%)		Higher/Lower	National (%)
Starchy staples	28	100	28	100	NS	Same	96
Other fruit & vegetables	26	92.9	27	96.4	1.00	↑	
Meat & fish	28	100	27	96.4	NS	↓	54
Milk & milk products	26	92.9	27	96.4	NS	↑	56
Other vit. A-rich fruit & vegetables	15	53.6	19	67.9	NS	↑↑	24
Legumes, nuts & seeds	17	60.7	18	64.3	NS	↑	20
Dark-green leafy vegetables	3	10.7	10	35.7	NS	↑↑↑	
Eggs	5	17.9	5	17.9	NS	Same	13

School (LCS)	D	N	Pre-Setting (%)	N	Post-Setting (%)		Higher/Lower	National (%)
Starchy staples		23	100	23	100	NS	Same	96
Other fruit & vegetables		21	91.3	22	95.65	1.00	↑	
Meat & fish		23	100	23	100	NS	Same	54
Milk & milk products		22	95.6	21	91.3	NS	↓	56
Other vit. A-rich fruit & vegetables		11	47.8	18	78.3	NS	↑↑↑	24
Legumes, nuts & seeds		5	21.7	12	52.2	NS	↑↑↑	20
Dark- green leafy vegetables		5	21.7	9	39.1	NS	↑↑↑	
Eggs		0	0	5	21.7	NS	↑↑↑	13

*Nutrient intake according to the DDQ

McNemar test * significant difference $p < 0.05$

Analysis of the results indicated that the majority (81.8 % to 96 %) of learners in all four schools ate breakfast in the pre-setting and all schools showed a higher breakfast intake (86.4 % to 100% %) in the post-setting; however the differences were non-significant (NS). Most of the children (87% to 100 %) brought a lunch box to school; however, in the post-setting, fewer lunch boxes (88% to 100 %) were brought in schools A (HIS) and C (LIS), but these differences were also NS (Table 4.5).

Table 4.5: Selected Grade 4 learners from all selected primary schools consuming breakfast (n=90) and bringing a lunch box to school (n=95) *

	N	Pre-Setting (%)	N	Post-Setting (%)	p-value**	Higher/Lower
School A (HIS)						
Breakfast	24	96	25	100	1.00	↑
Lunch box	25	100	22	88	NS	↓
School B (HCS)						
Breakfast	18	81.8	19	86.4	NS	↑
Lunch box	22	100	22	100	NS	Same
School C (LIS)						
Breakfast	26	92.9	27	96.4	1.00	↑
Lunch box	28	100	25	89.3	NS	↓
School D (LCS)						
Breakfast	22	95.7	23	100	NS	↑
Lunch box	20	87	21	91.3	NS	↑

*Nutrient intake according to the DDQ

McNemar test * significant difference $p < 0.05$

In the post-setting, more learners from the lower socio-economic area spent money at the tuck shop, namely schools C (LIS) with 42.9% (n=12) and D (LCS) 39.1% (n=9), respectively, compared with schools A (HIS) and B (HCS), with 28% (n=7) and 22.7% (n=5) each.

4.10 DISCUSSION

The article aimed to assess if playing an educational nutrition board game would increase nutritional knowledge and effect change in opinion and practices related to nutrition behaviour and physical activity at home and school in Grade 4 school learners in a higher socio-economic area and a lower socio-economic area in the City of Cape Town district, WC province. The HKQ was used to determine if learning (an increase in nutrition knowledge) took place, and whether change in opinions and practices (related to nutrition and physical activities) could be detected¹¹ in a pre-and post-setting after playing an educational nutrition board game. The DDQ was used to indicate the nutritional quality of the diet through food group choices and ingestion.³⁵ Tuck shop visits, and whether learners had breakfast and brought lunch boxes to school, were noted on the DDQ and reported. A study (2010) conducted in South African school children demonstrated that socio-economic factors such as food insecurity, as well as high levels of unemployment and poverty, prevented successful change in nutrition behaviour.¹¹ In this study, all the learners from the lower socio-economic area showed a higher DDS in the post-setting and more learners visited the tuck shop vs. learners from the higher socio-economic area. Therefore it seemed as if socio-economic factors play a lesser role in this study.

The intervention period of one week in this study showed a positive trend in nutrition knowledge, opinion (on nutrition and physical activities), practice (related to nutrition and being active) and a decreased trend in bringing money for the tuck shop from the pre- to the post-setting in schools A (HIS) and B (HCS) in a higher socio-economic area. Schools C (LIS) and D (LCS) were in a lower socio-economic area and both schools showed an increased trend in nutrition knowledge and opinion (related to nutrition and being active) from the pre- to post-setting. The intervention did not seem to have an impact on practice (related to nutrition and physical activities) or visits to the tuck shop in school C (LIS), although in school D (LCS) fewer visits to the tuck shop were reported. In a recent systematic review (2013), the intervention period of studies in schools was reported to range between one week and two years, with an average intervention period of about nine months.³⁶ Some studies outside the school setting did show positive results in improving nutrition knowledge as well as increasing the level of fruit and vegetable intake.¹² Small studies conducted in South African primary school children with nutrition intervention, as part of a multi-component behaviour health

intervention, showed results of improving learners' health behaviour.²² A longer intervention period seemed to have a more profound impact on healthy behaviour.

School B (HCS) was not part of the intervention group, but the study itself could have stimulated discussions on nutrition. Another possible reason might have been the anticipation of the 'reward' of playing a board game on food at the end of the study, which could also have stimulated awareness of nutrition, potentially leading to a bigger increase in post-nutrition knowledge, opinions on nutrition and physical activities, behaviour (related to nutrition and being active) and visiting the tuck shop less often. It seemed as if playing games could be successfully used to attain improved dietary behaviour,^{29,30} and that nutrition education games could indeed alter behaviour if designed as such, rather than to just increase nutrition knowledge³¹ as shown in a previous attempt in the pilot study of Gillis.³²

The response rate from school C (LIS) was much higher vs. school D (LCS). One can deduce once again that the learners from school D (LCS) already had an interest in nutrition and some nutritional knowledge and opinions on nutrition and physical activities at the beginning of the study, and/or discussions could have occurred on the topic, and/or that the incentive of playing a board game at the end of the study could have stimulated discussions and improved nutrition-related behaviour.

The DDQ was used in this study to assess the dietary quality of selected Grade 4 learners. A South African study in children 1–9 years confirmed that a DDQ can be used as an indicator of the micronutrient adequacy of the diet and that a strong relationship exists between dietary diversity and indicators of child growth. This measure can also be useful as an indicator to assess improvement in diets over time.³⁷ No data could be found where a DDQ had been used to assess nutritional quality of the diet and change in food group selection, or where ingestion was affected in 10-year-old primary school children in SA.

The diet of South African children (1–9 years) as measured in the NFCS in 1999 was found to have a mean DDS of 3.6.³⁷ In this study, the total DDS<4 was 21.9% (n=5) and it was lower at 12.5% (n=3) in the post-setting, compared with another study where 15.7% of participants in the WC (16 years to adult) and 38.3% nationally showed a DDS<4.³⁸ The lowering of DDS<4 in this study in the post-setting could be a reflection of increased variety consumption

by the selected Grade 4 learners, thereby increasing dietary adequacy from the pre- to the post-setting, which could indicate that a change in nutrition behaviour had occurred. The DDS in both pre- and post-setting of this study was lower than the national DDS³⁷; however, it was higher in the pre-setting compared with the WC study,³⁸ but lower in the post-setting. The DDS<4 lowered in both the CS and stayed the same in school A (HIS), with no DDS<4 measured in school C (LIS). One can estimate again that the low number of learners from the CS might have already been interested in nutrition and that increased awareness through the reward of playing the FFG could stimulate discussions leading to healthier behaviour.

All the schools showed an average DDS of 5 in the pre-setting, with a DDS of 6 in schools C (LIS) and D (LCS) in the post-setting. It seemed as if playing the educational nutrition board game, and/or the increased awareness of nutrition, could have had the highest impact in schools C (LIS) and D (LCS) in the lower socio-economic area. Primary school children from urban settings in South Africa were reported to eat vegetables and fruit less than three times per week, and the recommendations included a change of policy, for example, the implementation of a tuck shop policy in SA schools, which currently does not exist,²⁶ to promote healthy food options and therefore encourage healthier food choice.²⁸ This might lead to a lower prevalence of childhood obesity and overweight.²⁸ A South African study showed that children who have a DDS value less than 6 will most probably have weight-for-age and weight-for-height Z-scores less than zero and should be regarded as being at risk of undernutrition.³⁷ It is of concern that schools A (HIS) and B (HCS) in the higher socio-economic area had a DDS<6 in both the pre- and post-setting. Furthermore, none of the learners in school B (HCS) consumed green leafy vegetables in the pre-setting.

In this study, the majority of the food groups consumed stayed the same or was higher in all the schools between the pre- and post-setting. In all four schools, 100% of learners consumed starchy staples in the pre-and post-setting. This high percentage reflected a previous national South African study where 96% of children aged 1–9 years also consumed this food type.³⁷ Learners in all four schools consumed more of the food groups vs. comparative national data.³⁷ Only learners in school B (HCS) consumed more legumes, nuts and seeds in the pre-setting and less in the post-setting compared with national consumption,³⁷ while only egg consumption in two schools is reflective of national

consumption³⁷, namely 12% in school A (HIS) and 9% in school B (HCS), vs. 13% nationally.³⁷

Positive results from this study confirmed that playing FFG can possibly contribute as a NE tool which is supported by literature. The contribution of NEPs as part of health-promoting schools (HPS) showed positive results on a range of nutrition behaviours, such as an increase in drinking of milk and water.⁴⁰⁻⁴⁵

The impact of the NEPs can also be seen in a higher intake of healthy snacks and high-fibre foods,^{41,50} as well as fruit and vegetables,^{40-45,50} a reduced consumption of non-nutritious foods^{11,41,43} and sweetened drinks,^{12,45} and an incidence of fewer eating disorders, while increasing food safety actions and hygienic behaviours in HPSs.⁵¹

Up to a quarter of learners in this study in both the higher and lower socio-economic areas did not eat breakfast in the pre- and post-intervention, compared with a previous SA study done in poorly resourced areas where 22% of learners did not eat breakfast.⁸ Another study assessing the impact of NEPs, showed a reduction in skipping breakfast.⁵¹ Learners from All four schools in this study increased their breakfast consumption in the post-setting, which could be an indication that playing an educational nutrition board game and/or increased awareness of nutrition might lead to higher breakfast consumption.

In this study, the majority of learners brought lunch boxes to school with more lunch boxes being brought to school by the CS and fewer by the IS in the post-setting. This is still much lower compared with 24%,⁴ 31%,⁵³ and 41–56%³ of learners mentioned in previous SA studies. More learners visited the tuck shop in the post-setting from school C (LIS), which could account for fewer lunch boxes brought by learners at this school. A Western Cape study showed that about 70% of Cape Town learners made unhealthy food choices from the tuck shop.⁷ According to the DDQ, all learners in this study visited the tuck shop in the post-setting. It seemed as if more learners from the lower socio-economic schools visited the tuck shop. This correlates with a previous study done in the Western Cape where 49% of learners bought an item at the tuck shop.⁵³

4.11 CONCLUSION

The study was conducted with English-speaking learners in a higher and lower socio-economic urban area in the WC province, and results cannot be extrapolated to other provinces or rural areas in SA. It does, however, provide information on an SA-developed NE tool that could be used as a starting point to improve nutrition education and influence positive nutrition behaviour and physical activity in schools by playing an educational nutrition board game such as the FFG. Although a positive impact was measured in the short study of a week, literature shows that a longer nutrition intervention period will more likely have a long-term influence on nutrition knowledge and behaviour.

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Chapter 5

THE PERCEPTION AND ACCEPTABILITY OF AN EDUCATIONAL NUTRITION BOARD GAME AS A NUTRITION EDUCATION TOOL FOR NUTRITION EDUCATION IN SELECTED GRADE 4 LEARNERS AND SELECTED GRADE 4 EDUCATORS IN THE CITY OF CAPE TOWN DISTRICT

5.1 ABSTRACT

Objective: To determine, before and after playing the Fun Food Game (FFG), the perception and acceptability of this educational nutrition board game as a nutrition education (NE) tool in selected Grade 4 learners and selected Grade 4 educators in the City of Cape Town district

Design: A before-after, experimental study with analytical components.

Setting: Two schools in a higher socio-economic area (HSA), and two schools in a lower socio-economic area (LSA), were compared.

Subjects: Grade 4 learners (n=25) and educators (n=3) from one school in an HSA and Grade 4 learners (n=28) and educators (n=2) from one school in an LSA, as well as all selected Life Orientation (LO) educators from two schools in an HSA and two schools in an LSA.

Methods: A self-administered questionnaire was completed once by all educators from all schools to determine when formal NE took place. During a pilot study, the Perception Quantitative Questionnaire for English-speaking Grade 4 learners, as well as the Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators, was pre-tested and validated before commencing with the study. The questionnaires were completed by the learners and the educators after learners played the 'Fun Food Game' (FFG).

Results: Learners indicated that playing the FFG was a very positive experience. The majority (80% n=8) of teachers indicated a strong need for NE but also stated that it should not increase their work load. Current tools for nutrition education included text books (100%

n=10) and posters (90% n=9). All educators indicated self-learning as means of receiving NE. sources for Nutrition advice included magazines (90%, n=9), the Internet (80%, n=8) and textbooks (70%, n=7). They 'strongly agreed' that the FFG could be regarded as a 'Health Promotion' tool.

Discussion: Learners and educators from two intervention schools, in different socio-economic areas, gave similar positive responses regarding the perception and acceptability of the FFG as an NE tool.

Conclusion: The FFG can be used as an SA 'Health Promotion' tool for nutrition education in Grade 4 learners in the City of Cape Town district.

5.2 INTRODUCTION

5.2.1 Cost of Non-Communicable Diseases

The following statement was made by the WHO in 2008: “Health is a key determinant of development and a precursor of economic growth.”¹ Non-communicable diseases increase the health and overall cost to countries. A study by Koplan et al. (1999) showed that about 60% of overweight five- to- ten-year-old children had at least one cardiovascular risk factor, whereas a quarter showed two or more risk factors.² Thus, childhood obesity could potentially have a negative health impact in terms of co-morbid conditions,³ such as an increased rate of hypertension, cardiovascular disease and diabetes, as well as psychological issues when children grow up.^{4,5} An overweight child is likely to become an overweight adult with possible associated co-morbid conditions.³ According to the World Bank, investment in nutrition will lead to increased productivity and economic growth. The World Bank further contends that it is more cost effective to invest in nutrition programmes and to combat malnutrition than to increase the health budget with a resultant lower GDP.⁶ Investing in the future generation could potentially reduce the burden of nutrition-related chronic disease later on in life. National development programmes should be seen as a developmental need to promote healthy diets and physical activity.^{1,7,8}

5.2.2 Health-Promoting Schools

According to the WHO, key instruments to address and prevent these problems throughout the population, are the development of programmes to promote healthy diets and physical activity.¹ Schools are one of the settings where health promotion can influence health beliefs and behaviour. It is recommended that NE should start in primary school.¹ In South Africa, HPS were already recommended in 1995 as an ideal-setting approach to health promotion. Children spend considerable periods of time in school. This scenario presents access to a significant number of learners during different developmental stages, such as childhood and adolescence. Schools are fairly protected settings where learning and teaching take place, but their influence extends beyond school boundaries with ripple effects on the wider society, including educators, families, and other community members.⁹

A study conducted in South Africa by Coopoo et al. (2010) showed that primary school children from urban settings were reported to eat vegetables and fruit less than three times per week and their recommendations included a change of policy, as well as NE for both

learners and parents.¹⁰ NE should include the promotion of healthier diets, warn against food fads and advise against deceptive dietary messages.^{1,7,8} Health promotion in schools should include the teaching of a nutrition-based curriculum by trained teachers, physical activities, parental or family involvement, providing healthy meals or tuck shop items, while promoting healthy behavioural change.¹¹⁻¹³

In a systematic review of the implementation and effectiveness of school-based nutrition promotion programmes, through the lens of HPS, the intervention period of studies was reported to range between one week and two years, with an average intervention period of about nine months.¹⁴ The impact of NE programmes (NEPs) shows positive results over a range of nutrition behaviours such as an increase in drinking of milk and water,¹⁵⁻²⁰ a higher intake of healthy snacks and high-fibre foods,^{16,21} as well as of fruit and vegetables,¹⁵⁻²⁰ a reduction in skipping breakfast,^{22,23} reduced consumption of non-nutritious foods,^{16,19,22,24} and sweetened drinks,²⁰ and a lower incidence of eating disorders, while increasing food safety actions and hygienic behaviours.²² Studies conducted in South Africa have not been able to successfully change behaviour in school children where high levels of unemployment, food insecurity and poverty exist.²⁵ However, some studies outside the school setting did show positive results in improving nutrition knowledge as well as increasing the level of fruit and vegetable intake.²⁶ Other small studies conducted on South African primary school children showed positive results where nutrition intervention, as part of a multi-component behaviour health intervention, showed evidence of improving learners' health behaviour.²⁷ Educators played a key role in these school-based programmes.^{27,28}

A study conducting in Zambia to develop a nutrition and health education programme for primary schools recommended that well-developed educational material and teacher training are important. Furthermore, more specific skills-based training is needed for curriculum developers, teachers, writers and head teachers, especially if it is not part of a recognised educational training.²⁸ Recommendations from limited studies in the South African context were to improve the nutritional status through NE in the South African context and to develop NEPs appropriate to a developing country like South Africa that are cost-effective and culturally sensitive.²⁹ Although a multi-component strategy is recommended to address childhood obesity, a recent meta-analysis also recommended the isolation and investigation of effective components of interventions, as well as changes in environment and policy.¹¹⁻¹³

The objective of this study was to determine the perception and acceptability of the FFG, a South African developed educational nutrition board game as an NE tool for NE in selected Grade 4 learners and selected Grade 4 educators in the City of Cape Town health district.

5.3 STUDY POPULATION

The study population consisted of Grade 4 learners and Grade 4 LO educators from schools in the City of Cape Town district of the WC province.

The Department of Basic Education (DoBE) was contacted by the researcher regarding details of all the primary schools within the City of Cape Town and permission was obtained from the Western Cape Education Department (WCED) to conduct the study (Addendum A). The list of all primary schools in the City of Cape Town area was assessed and it was decided by the researcher to conduct the study in primary schools in the Northern Metropolis (Central, North and East) because of distance, cost and time constraints. The researcher resides in the Northern Metropolis and is familiar with the various socio-economic areas. Four purposively selected primary schools, two in a higher socio-economic area and two in a lower socio-economic area were conveniently selected. Two schools from the higher socio-economic area declined participating in the study owing to an already high workload experienced by educators and limited time available for extra activities for Grade 4 learners. One additional school from the higher socio-economic area was conveniently selected for the pilot study

After permission had been obtained from the WCED, all the selected primary schools were contacted and appointments were made with the selected primary school principals to obtain signed consent from the selected school principals (Addendum B). A meeting was then conducted with the LO educators and consent was obtained (Addendum C). The LO educators assisted the researcher by explaining the study to the Grade 4 learners and assent was obtained (Addendum D). The schools that obtained assent in class, namely school A (HIS) and C (LIS) had higher participation rates versus the schools sending the assent form home before assent was obtained, namely schools B (HCS) and D (LCS). The learners took the consent form for parents home and were asked to return the form to school (Addendum E).

5.3.1 Sampling Size

Various research instruments were used to conduct the study.

5.3.1.1 Perception Quantitative Questionnaire for English-Speaking Grade 4 Learners

The self-administered Perception Quantitative Questionnaire for English-speaking Grade 4 learners (PQL) was completed in the post-setting by all Grade 4 learners (n=98) from intervention schools A (HIS) and C (LIS) who played the FFG. The PQL questionnaire was completed on Friday, the last day of the study, in week 3. A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic Education. The PQL was pre-tested for face and content validity during the pilot study in a conveniently selected school in a higher socio-economic area. It was not deemed necessary to repeat the validation of these questionnaires in a lower socio-economic area because results from the pilot study indicated that learners consistently gave the same answers in the repeated questionnaires (Addendum I). Comments received from the selected Grade 4 learners are displayed in Addendum J. It was expected that all learners who played the FFG should provide a sufficient sample size.

5.3.1.2 A Self-Administered Questionnaire for Grade 4 Life Orientation Educators

A general structured self-administered questionnaire was completed once by all ten Grade 4 LO educators from all four schools. It was necessary to determine when formal NE took place during the school year to ensure no NE took place before the study with the FFG was conducted to prevent possible bias. It was not deemed necessary to pre-test the questionnaire during the pilot study, because the self-administrated questionnaire was adapted from a previous validated questionnaire (Addendum K). Although the total sample group of Grade 4 LO educators was small, it reflected the situation experienced by Grade 4 LO educators in the study and should be reported. This was done by describing the characteristics of all the selected educators, for example, gender, experience (years) in teaching NE, time spent on NE, tools to assist learning, and sources of nutrition advice.

5.3.1.3 Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

The self-administered Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators (PQE) was completed in the post-setting on the last Friday of the study at the end of week 3 by all five selected Grade 4 educators from intervention schools A (HIS) and C (LIS), after the selected Grade 4 learners played the FFG. A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic

Education. A pilot study was conducted in a conveniently selected high-income school from the list to pre-test and validate (face and content) the PQE before commencing with the study. It was not deemed necessary to repeat the validation of these questionnaires in a lower socio-economic area because results from the pilot study indicated that learners consistently gave the same answers in the repeated questionnaires (Addendum L). Although the total sample group of Grade 4 LO educators was small, it reflected their perceptions as well as their acceptability of the FFG as a possible NE tool in NEPs.

5.3.2 Inclusion and Exclusion Criteria

Inclusion criteria included all Grade 4 English-speaking learners of both genders in the purposively selected schools who were invited to participate in the study, as well as all Grade 4 LO educators. Exclusion criteria were effective when one or more of the following were not received: written informed consent provided by the school principals, the Grade 4 LO educators, and Grade 4 parents/legal guardians, as well as written informed assent from the English-speaking Grade 4 learners. Exclusion criteria were also effective if any of the above-mentioned participants at any given time refused further participation in the study. If for any reason, consent or assent had not been received from the parents or learners, the learners from the IS were allowed to play the educational nutrition board game, but no further involvement was required from them.

5.4 METHOD OF DATA COLLECTION

The study was conducted during 2013 over a total of four months. The study commenced in school A (HIS) and after the three-week study period, the study was conducted in school B (HCS) over a three-week period. The study was completed after it had been conducted in the same manner in school C (LIS) and school D (LCS). After completion of the study it was arranged with the schools to allow the participating learners from schools B (HCS) and D (LCS) to play the FFG for an hour each.

5.4.1 Fun Food Game[®]

The FFG was designed for players eight years and older. It was designed as a combination of a food trivia game (questions and answers) as well as a card collection game (collect three packs of each of the three Super Heroes). It was explained to the learners of control schools B (HCS) and D (LCS) that they would play an educational nutrition board game after week 3 (at the end of the study).

The researcher explained the rules of the FFG (Addendum M), dynamics and different cards, such as the question cards (Addendum N and Addendum O), Monkey and Funkey cards (Addendum P and Addendum Q) and the three Super Hero cards (Addendum R) of the game to the learners every day in the presence of the LO educators, before learners started to play. For the duration of the study, both the researcher and the LO educators were present, but did not actively participate during the period the educational nutrition board game was played. Both observed the learners and only assisted at the request of the learners. The researcher completed the study at one IS before commencing with the second IS.

Teams consisting of one to two learners were formed. A group of two to four teams (with a maximum of eight learners) played the FFG. The majority of teams consisted of only boys or only girls, with a few mixed teams to constitute a team. Every table had a full set of the FFG to allow the whole class to play at the same time. The object of the game is to be the first player to collect three of each of the three Super Hero cards, therefore nine cards in total.

The intervention schools (n=98) played the educational nutrition board game (FFG) during school hours on Monday, Tuesday, Thursday and Friday. On Wednesdays, the learners took a break to prevent possible irritation and 'player fatigue', to keep the 'fun' element central. Learners were supposed to play for only half an hour per session for the reasons above and to reflect a 'real-life' school setting (week 2), but all schools spontaneously allowed for an hour per session (including the pilot school). As time went by and a better understanding of the rules emerged, the first team would finish the game within 15–20 minutes and everyone would start playing again. School A (HIS) was very organised and a separate hall was prepared with tables and chairs, whereas in school C (LIS), children had to sit on the floor in the staff room because the general hall had been booked for other activities. Learners from schools B (HCS) and D (LCS) understood that they would have an opportunity to play an educational nutrition board game, after completion of the study.

5.4.2 Perception Quantitative Questionnaire for English-speaking Grade 4 Learners

A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic Education. A pilot study was conducted in a conveniently selected high-income school from the list to pre-test and validate (face and content) the Perception Quantitative Questionnaire for English-speaking Grade 4 learners before commencing with the study. Grade 4 learners, randomly chosen by the educator, played the FFG for half an

hour for four weeks and the educator and researcher observed them. Based on this deduction, the post-learner questionnaire was considered to be understood and valid to be used in the main study. Results from the pilot study indicated that learners consistently gave the same answers in the repeated questionnaires. It was therefore not appropriate or necessary to measure Cronbach's alfa as initially anticipated, since no statistical differences could be detected (not measured). (Please refer to "Statistical analysis" for more information.) Added comments and general suggestions were encouraged and included in the results.

Grade 4 children were selected for the study, because research has shown that children between 6–11 years, experience important cognitive growth as well as significant improvement of social, cognitive and physical abilities.³⁰ Learners in Grade 3 and 4 can make food choices and have a general knowledge of body functions.¹ They are enthusiastic to learn more about the world and its surroundings. As children grow older, their information-processing capabilities increase. They will immediately and specifically select food options based on certain criteria,¹ making this group particularly suitable for the proposed intervention.

The self-administered PQLs were completed on the last Friday of the study at the end of week 3 by all the selected Grade 4 learners (n=98) to determine their perceptions and acceptability of the FFG as a possible NE tool in an NEP. Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perceptions and acceptability of all the selected Grade 4 learners, for example, learners thought more about what they ate, they liked to learn about food, they learned to play the game easily, they would play again, it was fun, the time it took for learners to play the FFG once, and whether they thought they could play the FFG independently. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

5.4.3 A Self-Administered Questionnaire for Grade 4 Life Orientation Educators

A general structured self-administered questionnaire was completed once by all ten Grade 4 LO educators from all four schools. It was necessary to determine when formal NE took place during the school year to ensure no NE took place before the study with FFG was conducted to prevent possible bias. It was not deemed necessary to pre-test the questionnaire during the pilot study, because the self-administrated questionnaire was adapted from a previous

validated questionnaire (Addendum K). Although the total sample group of Grade 4 LO educators was small, it reflected the situation experienced by Grade 4 LO educators in the study and should be reported. This was done by describing the characteristics of all the selected educators, for example gender, experience (years) in teaching NE, time spent on NE, tools to assist learning, and sources of nutrition advice.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were also used to describe the characteristics of all the selected Grade 4 LO educators, for example, gender, qualifications, experience (years) in teaching NE, time spent on NE, tools to assist learning, and sources of nutrition advice. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

5.4.4 Self-administered Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic Education. A pilot study was conducted in a conveniently selected high-income school from the list to pre-test and validate (face and content) the self-administered PQE for English-speaking Grade 4 educators before commencing with the study. It was deemed sufficient to pre-test the PQE once, since no amendments to the questionnaire were necessary.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perception and acceptability of the FFG in all the selected Grade 4 educators, for example, do you regard the FFG as HP, the FFG could be a valuable tool in NE, children enjoyed playing an educational nutrition board game. Relationships and associations between variables were determined by using appropriate inferential statistics

5.5 DESCRIPTION OF THE RESEARCH TOOLS

5.5.1 Fun Food Game[®]

5.5.1.1 How the Fun Food Game was Developed

The advancement of emotional and cognitive development in middle childhood, in examining consequences of nutrition education programmes (NEPs), recommends the use of stories and fantasy characters that form part of their world.¹ Three images representing three 'Super Heroes' were used to build a collection of three cards each in the FFG. The name 'Super

Heroes' was selected to reflect learners' world of entertainment. They represent three types of food, namely food that gives you energy ('Speedy'), food that protects your body ('Shield') and food that builds your body ('Muscle Man'). Only three super cards were selected to make the mechanical side of the game work (i.e. card collections). The term 'Super Heroes' was chosen because it was culturally suitable³⁰, fun³¹ and age appropriate.¹ The FFG was designed for players eight years and older. It was designed as a combination of a food trivia game (questions and answers) as well as a card collection game (collect three packs of each of the three Super Heroes).

5.5.1.2 What Does Fun Food Game Consist of and How It is Played

The FFG was designed for players eight years and older. It was designed as a combination of a food trivia game as well as a card collection game. The '?' cards are Foodle[®] cards (please see disclaimer) consisting of questions and answers. The accuracy of the '?' cards was previously checked by independent registered dietitians. At least one or more of the SA FBDG statements was part of the '?' cards, as well as a card collection game (collect three packs of each of the three Super Heroes). It was explained to the learners of control schools B (HCS) and D (LCS) that they would play an educational nutrition board game after week 3 (at the end of the study). Please see Addenda M–Q for FFG rules and the various FFG cards.

5.5.2 The Perception Quantitative Questionnaire for English-speaking Grade 4 Learners

A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic Education. A pilot study was conducted in a conveniently selected high-income school from the list. This was done to pre-test the internal validity (face and content) of ten Grade 4 learners, randomly chosen by the educator, who played FFG for half an hour for four weeks while the educator and researcher observed them. Based on this deduction, the PQL was considered to be understood and valid to be used in the main study. Results from the pilot study indicated that learners consistently gave the same answers in the repeated questionnaires. It was therefore not appropriate or necessary to measure Cronbach's alpha as initially anticipated, since no statistical differences could be detected (not measured). (Please refer to "Statistical analysis" for more information.) Added comments and general suggestion were encouraged and included in the results.

Grade 4 children were selected for the study, because research has shown that children between 6–11 years, experience important cognitive growth as well as significant

improvement of social, cognitive and physical abilities.³⁰ Learners in Grade 3 and 4 can make food choices and have a general knowledge of body functions.¹ They are enthusiastic to learn more about the world and its surroundings. As children grow older, their information-processing capabilities increase. They will immediately and specifically select food options based on certain criteria,¹ making this group particularly suitable for the proposed intervention.

The self-administered PQLs were completed on the last Friday of the study at the end of week 3 by all the selected Grade 4 learners (n=98) to determine their perceptions and acceptability of the FFG as a possible NE tool in an NEP. Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perceptions and acceptability of all the selected Grade 4 learners, for example, learners thought more about what they ate, they liked to learn about food, they learned to play the game easily, they would play it again, it was fun, the time it took for learners to play the FFG once, and whether they thought they could play the FFG independently. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

5.5.3 A Self-Administered Questionnaire for Grade 4 Life Orientation Educators

A general structured self-administered questionnaire was completed once by all ten Grade 4 LO educators from all four schools. It was necessary to determine when formal NE took place during the school year to ensure no NE took place before the study with the FFG was conducted to prevent possible bias. It was not deemed necessary to pre-test the questionnaire during the pilot study, because the self-administrated questionnaire was adapted from a previous validated questionnaire (Addendum K). Although the total sample group of Grade 4 LO educators was small, it reflected the situation experienced by Grade 4 LO educators in the study and should be reported. This was done by describing the characteristics of all the selected educators, for example, gender, experience (years) in teaching NE, time spent on NE, tools to assist learning and sources of nutrition advice.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were also used to describe the characteristics of all the selected Grade 4 LO educators, for example, gender, qualifications, experience (years) in teaching NE, time spent on NE, tools to

assist learning and sources of nutrition advice. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

5.5.4 The Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic Education. A pilot study was conducted in a conveniently selected high-income school from the list. This was done to pre-test the internal validity (face and content) of ten Grade 4 learners, randomly chosen by the educator, who played the FFG for half an hour for four weeks, while the educator and researcher observed them. The educator was requested to complete the PQE after each session. Based on this deduction, the PQE was considered to be understood and valid to be used in the main study. Results from the pilot study indicated that the educator consistently gave the same answers in the repeated questionnaires. It was therefore not appropriate or necessary to measure Cronbach's alfa as initially anticipated, since no statistical differences could be detected (not measured).

Grade 4 children were selected for the study, because research has shown that children between 6–11 years, experience important cognitive growth as well as significant improvement of social, cognitive and physical abilities.³⁰ Learners in Grade 3 and 4 can make food choices and have a general knowledge of body functions.¹ They are enthusiastic to learn more about the world and its surroundings. As children grow older, their information-processing capabilities increase. They will immediately and specifically select food options based on certain criteria,¹ making this group particularly suitable for the proposed intervention.

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perception and acceptability of the FFG in all the selected Grade 4 educators, for example, do you regard the FFG as HP, the FFG could be a valuable tool in NE, children enjoyed playing an educational nutrition board game. Relationships and associations between variables were determined by using appropriate inferential statistics.

5.6 DATA ANALYSIS AND STATISTICS

Data from all the different research tools, namely the PQL, Self-Administered Questionnaire for Educators, and PQE were captured electronically in Microsoft Excel[®] spreadsheets with

regular cross-referencing to ensure precision of data transfer. The objectives of the study were discussed by using descriptive statistics. Data was analysed with the assistance of the Centre for Statistical Consultation at Stellenbosch University, using Statsoft Inc. (2011) STATISTICA (data analysis software system), version 10.0. (www.statsoft.com).

5.6.1 The Perception Quantitative Questionnaire for English-speaking Grade 4 Learners

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perceptions and acceptability of all the selected Grade 4 learners, for example, learners thought more about what they ate, they liked to learn about food, they learned to play the game easily, they would play again, it was fun, the time it took for learners to play the FFG once, and whether they thought they could play the FFG independently. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

5.6.2 Self-Administered Questionnaire for Grade 4 Educators

Descriptive summary statistics such as means, medians, frequencies and standard deviations were also used to describe the characteristics of all the selected Grade 4 LO educators, for example, gender, qualifications, experience (years) in teaching NE, time spent on NE, tools to assist learning, and sources of nutrition advice. Relationships and possible associations between variables were determined by using appropriate inferential statistics.

5.6.3 The Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

Descriptive summary statistics such as means, medians, frequencies and standard deviations were used to describe the perceptions and acceptability of FFG in all the selected Grade 4 educators, for example, “do you regard the FFG as HP”, “the FFG could be a valuable tool in NE”, “children enjoyed playing an educational nutrition board game”. Relationships and associations between variables were determined by using appropriate inferential statistics.

5.7 ETHICAL CONSIDERATIONS

5.7.1 Ethics Approval and Permissions

Ethics approval was obtained from the Human Research Ethics Committee, Faculty of Medicine and Health Sciences, Stellenbosch University (Ref. no. S12/11/303) and the Western Cape Department of Basic Education’s Research Office (Ref. no. 20130124-0004) (Addendum A). Voluntary written consent was obtained from all participating subjects, namely

the school principals, LO educators, and the parents/legal guardians, as well as voluntary written assent from English-speaking Grade 4 learners (Addenda B–E).

5.7.2 Informed Consent

It was explained by the researcher to the school principals and LO educators that participation in the study was voluntary and that the information collected would be treated as confidential. Only the researcher involved in the study would have access to all the information and the identities of the participants would remain anonymous. No individual would be identified and the results would be presented collectively, for example, school A (HIS) vs. school B (HCS), and school C (LIS) vs. school D (LCS). The LO educators were requested to discuss possible participation in the study with the Grade 4 learners and to ask the Grade 4 learners to assent. The LO educators were also requested to send the parent/legal guardian consent form home with the Grade 4 learners, after explaining the study to the Grade 4 learners. It was accepted that consent was implied when both the consent form from the parent/legal guardian and assent form from the Grade 4 learner were completed and received.

5.7.3 Patient Confidentiality

Throughout the study and thereafter, all study participants' names, information and questionnaires were kept anonymous. Confidentiality was conveyed to the participant by means of the informed consent leaflet. Information collected by the researcher would not be shared for any other purposes or projects and would only be used for the specified study.

5.8 PILOT STUDY

Some questions that were not appropriate to this age group were removed, for example, alcohol-related questions. At first it was thought that more cards should be added, but it was decided after the pilot study to suffice with the remaining cards to increase the potential of repetition and therefore potentially increase the retention of nutrition knowledge. The rationale behind this was that the FFG is a fast-paced participatory game and more cards would be drawn during one game.

A list of primary schools in the City of Cape Town district was obtained from the WC Department of Basic Education. A pilot study was conducted in a conveniently selected high-income school from the list. This was done to pre-test the internal validity (face and content) of ten Grade 4 learners, randomly chosen by the LO educator, who played FFG for half an

hour for four weeks, while the LO educator and researcher observed them. The LO educator was requested to complete the PQE after each session. Based on this deduction, the PQE was considered to be understood and valid to be used in the main study. Results from the pilot study indicated that the selected Grade 4 learners and selected Grade 4 LO educator consistently gave the same answers in the repeated questionnaires. It was therefore not appropriate or necessary to measure Cronbach's alfa as initially anticipated, since no statistical differences could be detected (not measured). Added comments and general suggestions were encouraged and included in the results.

5.9 RESULTS

Selected grade 4 English speaking learners, as well as their Life Orientation educators from schools in a higher and lower socio-economic area, completed different questionnaires.

5.9.1 The Perception Quantitative Questionnaire for English-speaking Grade 4 Learners

Figure 5.1 gives a summary of the learners' perceptions on playing the FFG in school. The overall perceptions of the learners (n=98) on playing the FFG at school were very positive. The areas that learners were less positive about were whether learners thought their friends would listen to the things they'd learned in the game (Not sure=23% and No=9%); if they had learned about food at school before Grade 4 (Not sure=11% and No=20%); if they thought their parents/care givers knew a lot about food (Not sure=19% and No=2%); if they had played games about food before (Not sure=7% and No=26%); and whether they would play this game at home (Not sure=25% and No=12%). Aspects learners felt very positive about after playing the FFG (more than 80% positive responses) were that they wanted to eat more fruit and vegetables; they thought parents/care givers would listen if they were told things they'd learned in the game; they thought more about what they ate; they liked to learn about food; they learned to play the game easily, playing games should be part of school; they would tell their parents about the FFG; they learned about food and health; they would play again; and it was fun.

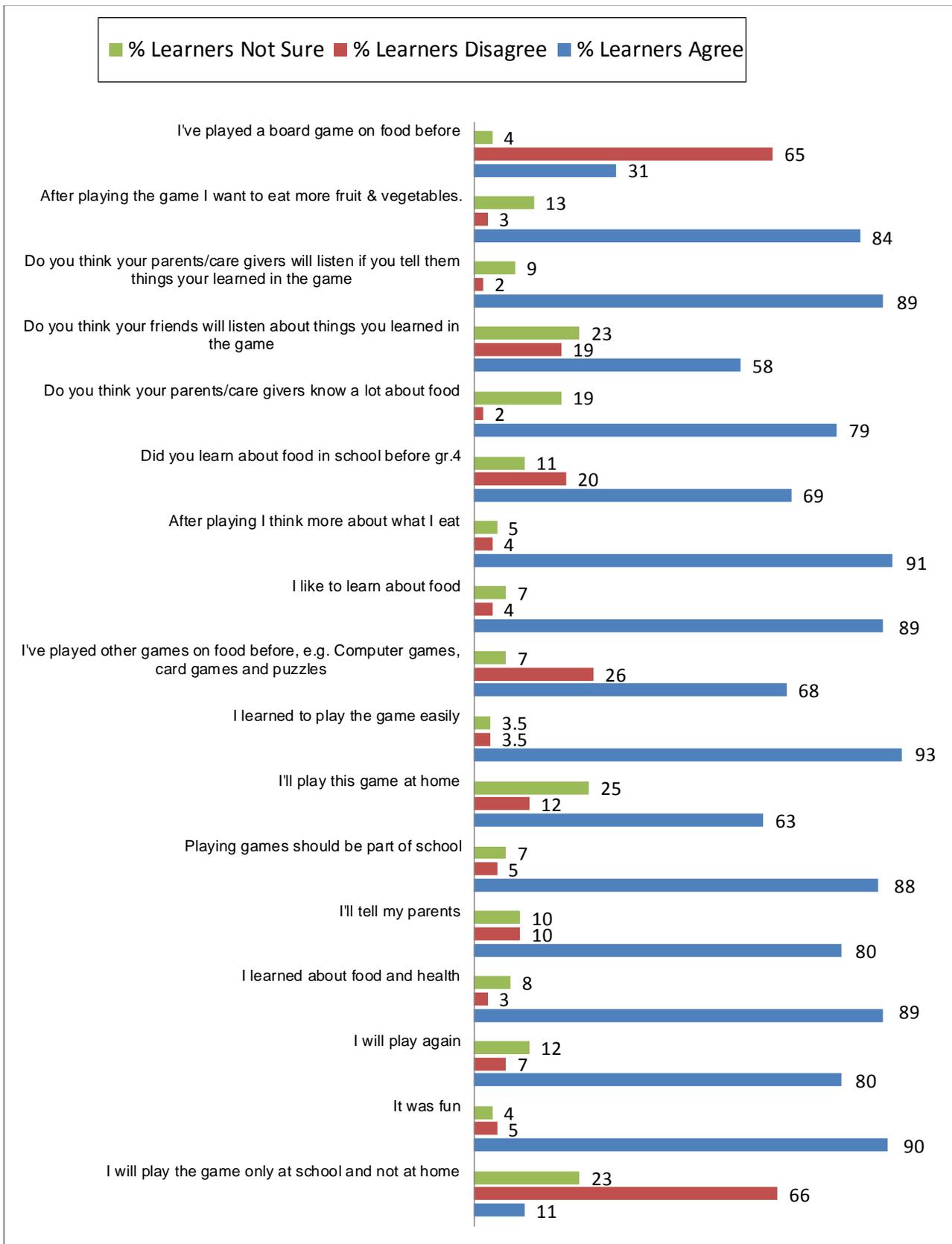


Figure 5.1: All selected Grade 4 learners' perceptions of the Fun Food Game after playing the game (n=98)

As indicated in Figure 5.2, the majority of learners (85%) felt that the FFG was too short, 4% thought it was too long, and 11% were not sure (n=98).

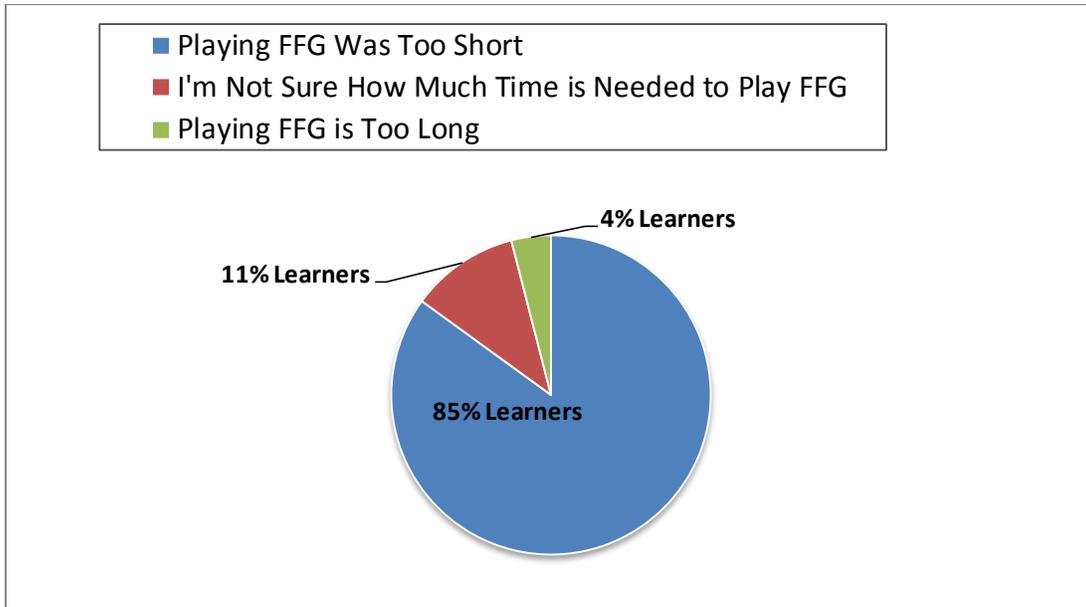


Figure 5.2: All selected Grade 4 learners’ perceptions on the time necessary to finish playing the Fun Food Game once (n=98)

5.9.2 Self-Administrative Questionnaire for Selected Grade 4 Life Orientation Educators

All ten educators participating in the study were women and taught NE as part of Life Orientation to one Grade 4 English-speaking class. All the classes had a maximum of 30 learners per class, except one class that had 40 learners. Two schools (one from a higher socio-economic area and one from a lower socio-economic area) had three educators and the two remaining schools (one from a higher socio-economic area and one from a lower socio-economic area) had two educators. The majority of educators had a Higher Diploma in Education (HDE) qualification and two educators had further specialisations. Two BEd Honours degrees were the highest qualifications. All the schools had a tuck shop and none had a vegetable garden. Experience in teaching NE ranged from 1 year (20%; n=2), to more than 5 years (60%; n=6), with an average of 4.5 years teaching experience (Figure 5.3).

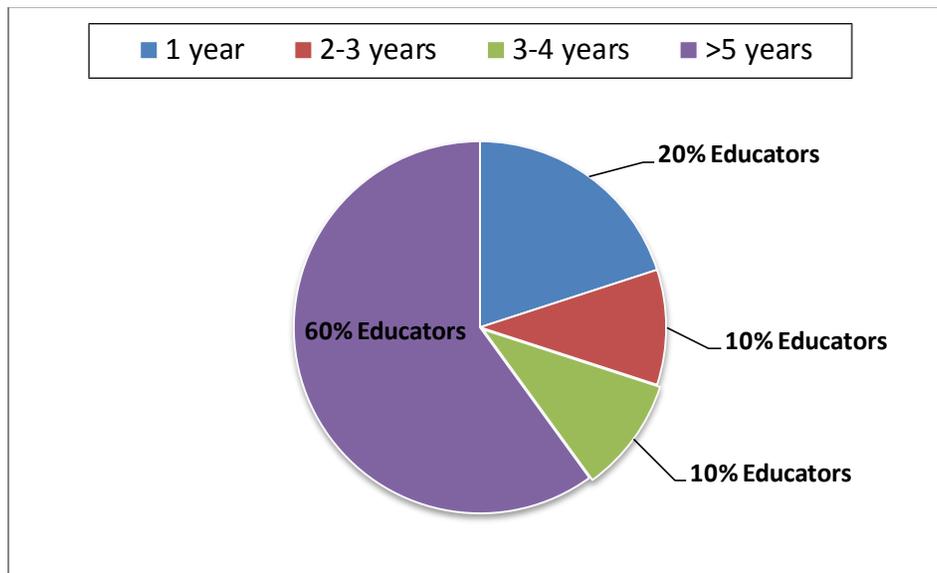


Figure 5.3: The number of years all Grade 4 educators have been teaching nutrition education (NE) (n=10)

Half of the educators (n=5) would spend six hours per year on NE, but it could be less, according to other educators (3–4 hours) with an average of 5 hours per year. Duration of lessons could range from 30 to 45 minutes, with a mean of 39 minutes (SD 7.746) per lesson.

Half of the educators (n=5) presented six NE lessons per year, but one educator (10%, n=1) indicated she would only present two NE lessons per year. The average was five NE lessons per year.

The majority of educators (80%, n=8) expressed a strong need for NE for themselves, and the rest also responded positively (standard deviation (SD) of 0.675) (Figure 5.4). Most of the educators (80%, n=8) were certain NE was taught in other subjects (for example, Maths, Social Sciences, etc.); however one educator (10%, n=1) did not think NE was taught in other subjects and one educator (10%, n=1) was not sure.

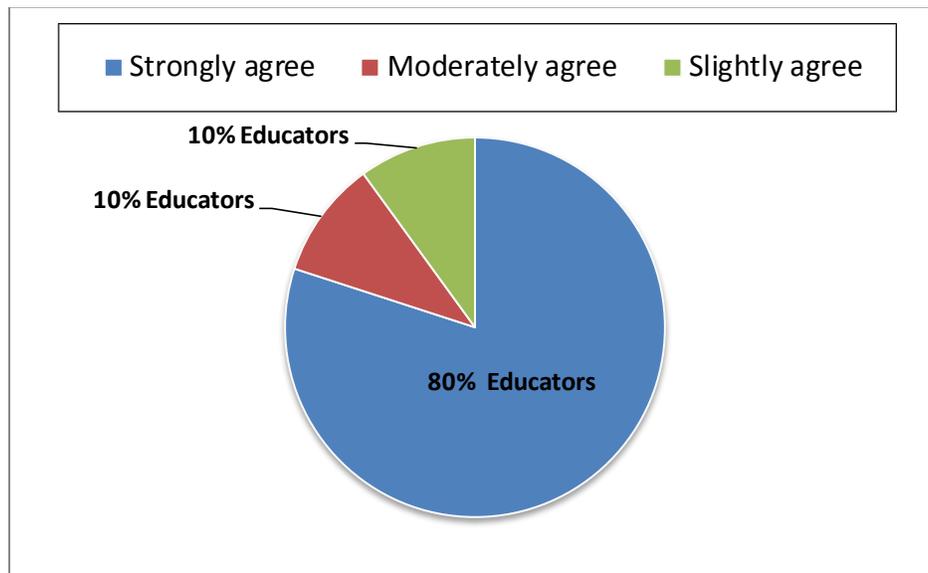


Figure 5.4: The need for receiving nutrition education themselves as perceived by all Grade 4 educators (n=10)

All the educators (n=10) used tools to assist in the education of NE. The various tools are displayed in Figure 5.5. All used textbooks (n=10), followed by posters (90%, n=9), other tools (40%, n=4), which included PowerPoint presentations and interactive games on the Internet (described by the higher socio-economic schools respectively), brochures (30%, n=3); however, none were using games (0%, n=0). The majority (80%, n=8) felt that the availability of NE material in the classroom would enhance nutrition learning and that children, parents and educators should all receive NE. Other possible target groups were described as “everyone in the community” and caregivers (Figure 5.5).

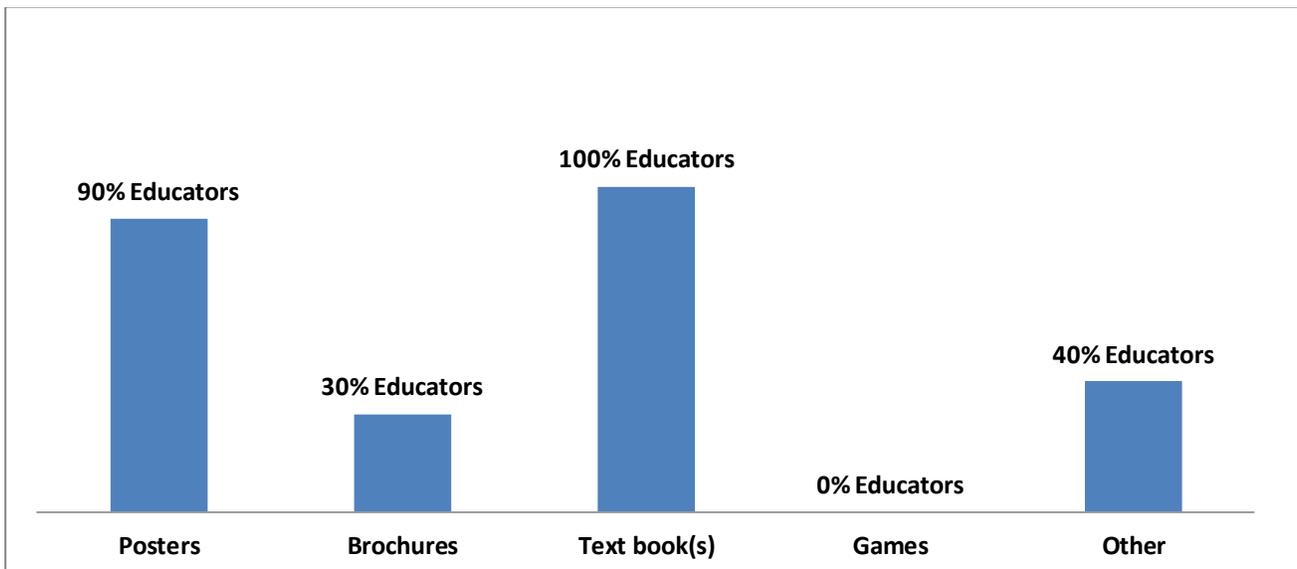


Figure 5.5: Current nutrition education tools available for teaching nutrition education according to all Grade 4 educators (n=10)

The following need for tools was identified by the educators (Figure 5.6), namely, posters (90%, n=9), DVDs (80%, n=8), activity/colouring-in books and outings (70%, n=7), board games, puzzles and an expert on nutrition (60%, n=6), role play (50%, n=5), with a lesser need for brochures (30%, n=3) and card games (20%, n=2). Other tools that were identified were PowerPoint presentations, interactive lessons and visuals from the Internet, for example, skin disorders as a result of poor nutrition.

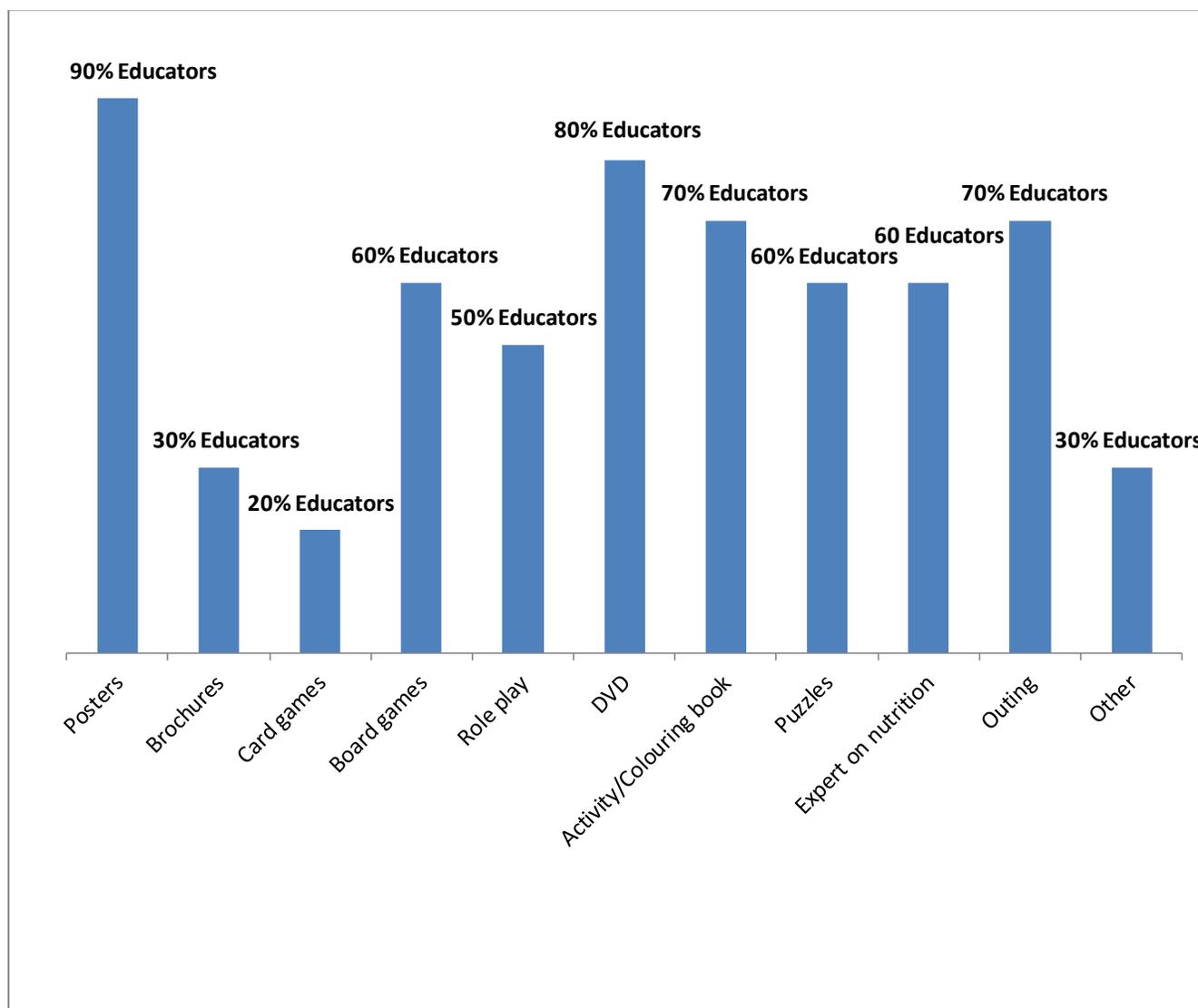


Figure 5.6: Identified need for nutrition education tools necessary to teaching nutrition education by all Grade 4 educators (n=10)

All educators practised self-study to teach NE (Figure 5.7). Almost all had received NE as learners themselves (90%, n=9), and the majority had received NE during their training (70%, n=7). Limited opportunities exist for NE in in-service training and during seminars/workshops (20%, n=2). Other means of receiving NE were described by one school in a lower socio-economic area as attending workshops by a retail company as well as a retail company's providing magazines and DVDs.

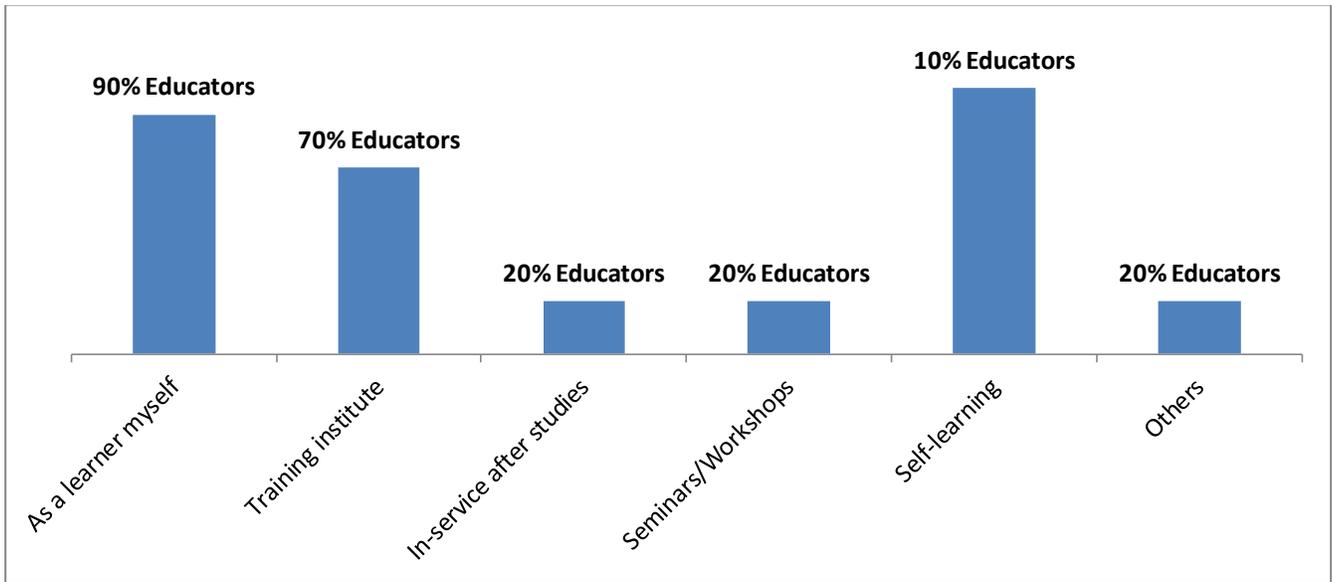


Figure 5.7: Current means of receiving nutrition education for teaching nutrition education by all Grade 4 educators (n=10)

Educators sourced nutrition advice from different sources, namely, magazines (90%, n=9), the Internet (80%, n=8), textbooks (70%, n=7), colleagues (50%, n=5), and to a lesser extent the television (40%, n=4), doctor (30%, n=3), pharmacy (20%, n=2), and the library (10%, n=1). None indicated receiving advice from the clinic sister and school parents. The other source of information mentioned as “other” (10%, n=1) was the trainer at the gym (Figure 5.8).

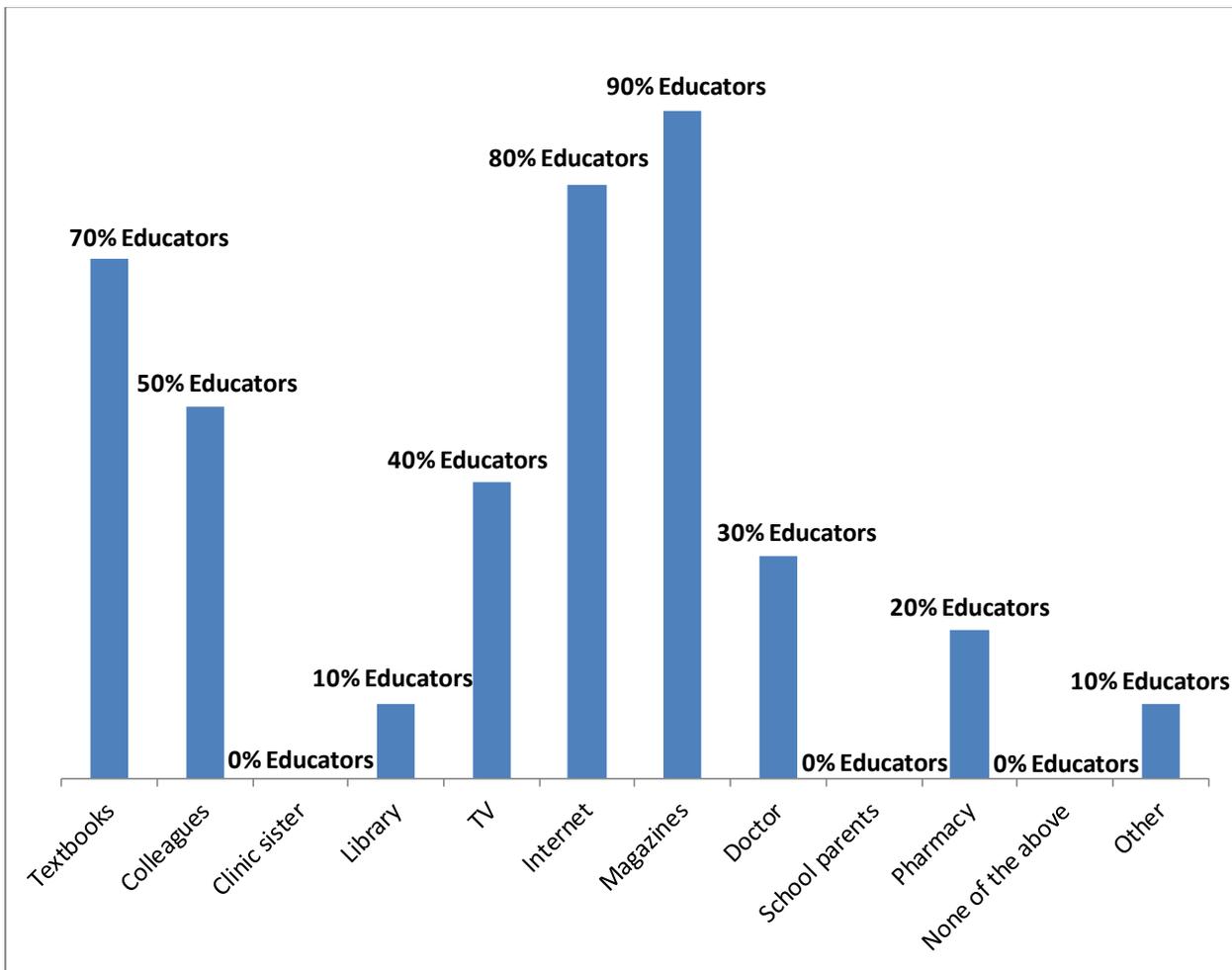


Figure 5.8: Current available sources of nutrition information to teach nutrition education by all Grade 4 educators (n=10)

5.9.3 The Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

Figure 5.9 indicates that the educators from the intervention schools felt that playing the FFG was moderately too short (25%, n=1), slightly too long (25%, n=1), or slightly too short (50%, n=2). One educator (n=1) did not complete the question.

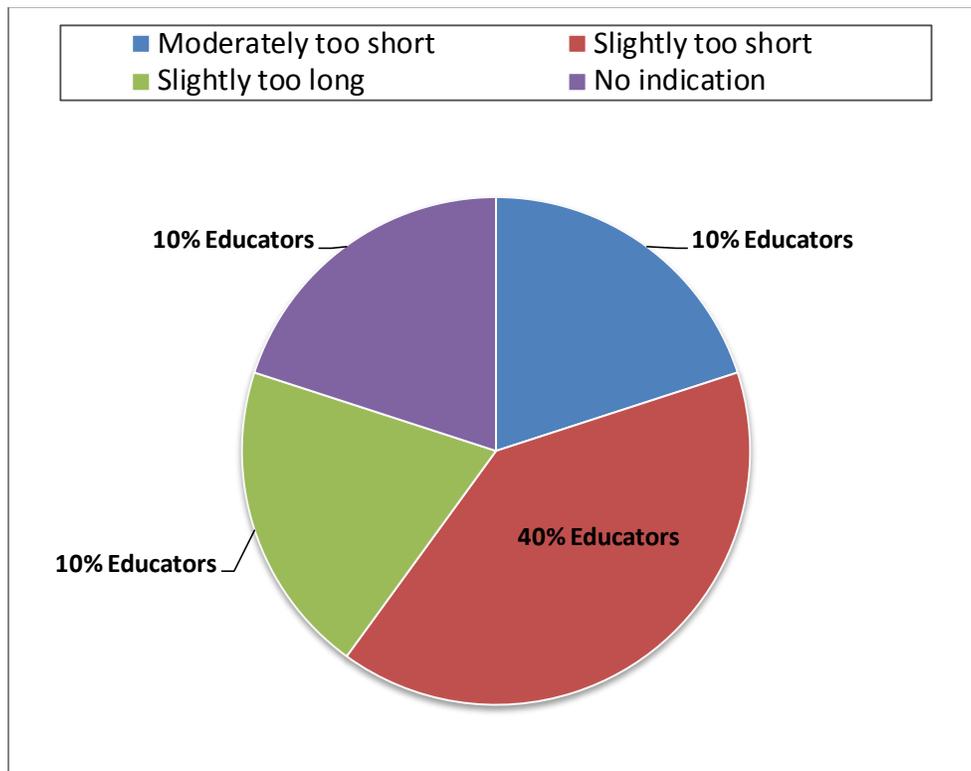


Figure 5.9: The acceptability of time necessary to complete the Fun Food Game once by all selected Grade 4 learners as perceived by all selected Grade 4 educators (n=5)

Figure 5.10 displays the perception of all the selected educators (100%, n=5) on how frequently the FFG should be played for effective NE learning in Grade 4 learners. The majority (80%, n=4) felt it should be played once per week, and one educator felt once every second week would be effective for NE learning.

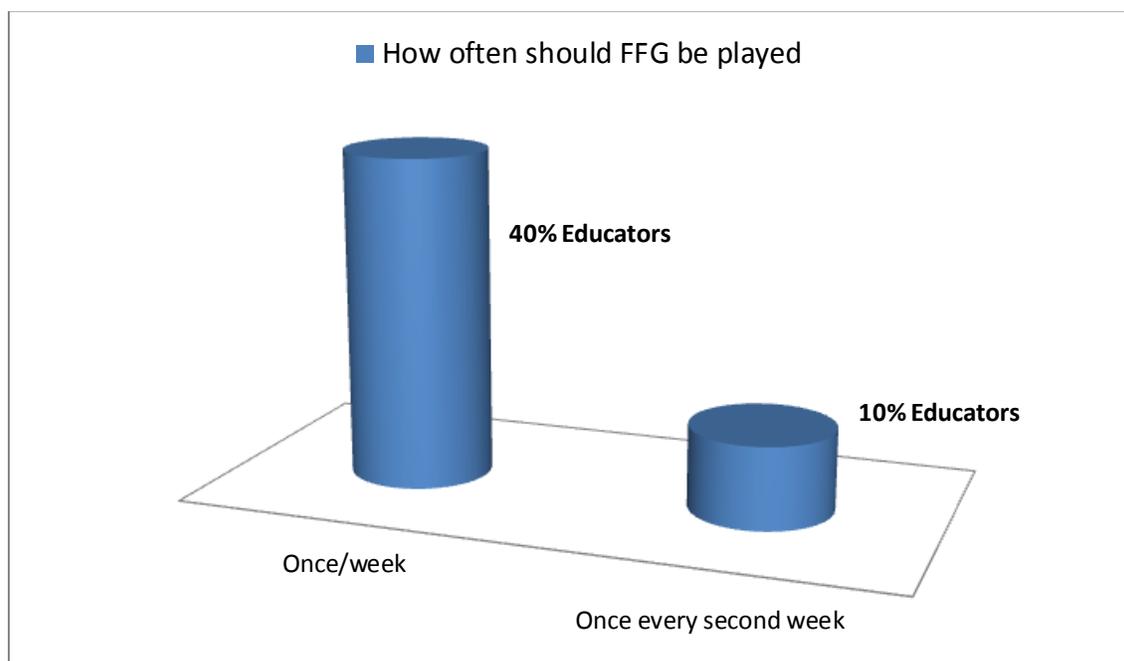


Figure 5.10: The frequency necessary to play the Fun Food Game for effective nutrition education learning as perceived by all selected Grade 4 educators (n=5)

Figure 5.11 displays the perceptions of all the selected educators (n=5) in relation to playing the FFG, an educational nutrition board game, with Grade 4 English-speaking learners.

All Grade 4 educators from schools A (HIS) (n=3) and C (LIS) (n=2) indicated “strongly agree” to the following statements:

- The FFG game can be regarded as ‘Health Promotion’.
- A board game can be played in either a home language or in English.
- The FFG can be regarded as a valuable tool in educating learners.
- Educators will tell their colleagues about the FFG.
- The FFG should be used more often in the classroom.
- The children enjoyed playing the FFG.

Only in school A (HIS) (n=3), did all Grade 4 educators indicate ‘strongly agree’, with the following statements:

- They will play the FFG themselves.
- They will motivate for FFG as a way to educate learners.
- The children could play independently.

- The children developed other skills while playing the FFG.
- The educator regarded the FFG as a useful tool in the classroom.

None of the schools indicated 'strongly agree' to the following:

- The FFG will not increase their work load.

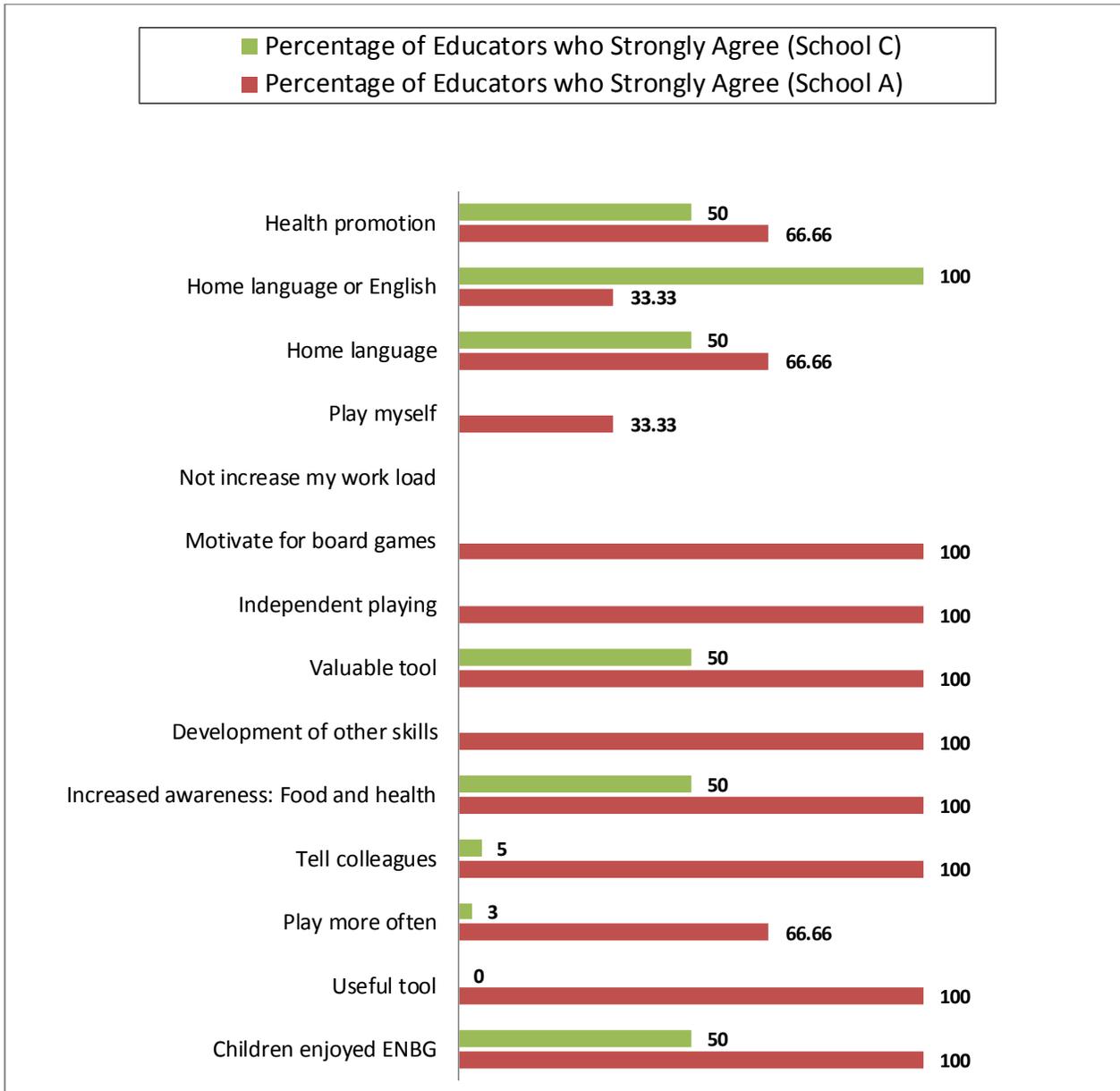


Figure 5.11: All selected Grade 4 educators' perceptions of the Fun Food Game after all selected Grade 4 learners had played the game (n=5)

All the intervention educators (100%, n=10) felt that learners could play the FFG independently (Strongly agree=60%, n=6, and Moderately agree=40%, n=4), while most learners also felt the same. (Yes=85%, Not sure=5% and No=10%, n=98) (Figure 5.12).

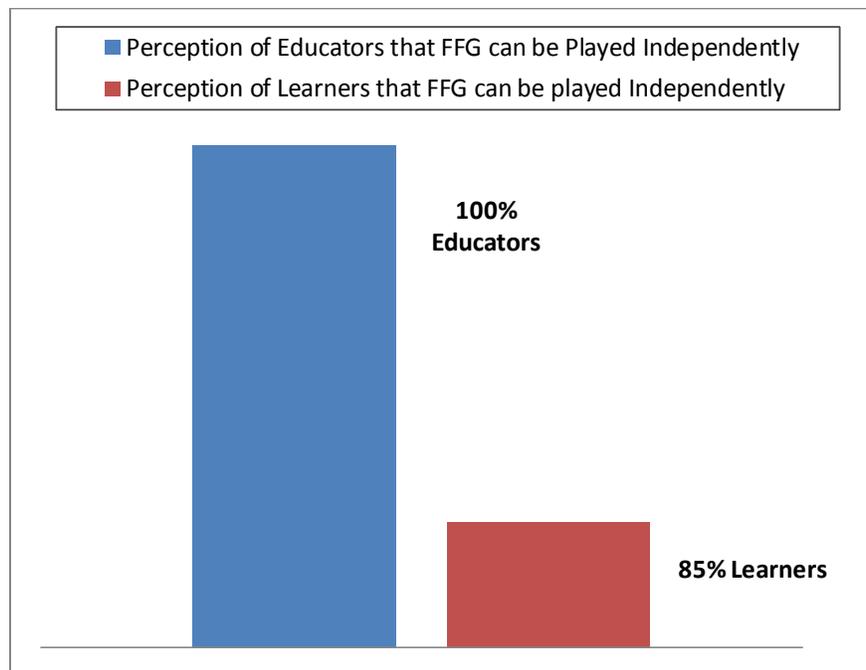


Figure 5.12: All selected Grade 4 educators' and selected Grade 4 learners' perceptions that the Fun Food Game can be played independently by Grade 4 learners without the help of Grade 4 educators (Educators n=10, learners n=98)

5.10 DISCUSSION

Research shows that about 155 million children worldwide are either overweight or obese.³² Type 2 diabetes mellitus (T2DM) is prevalent in about 75–80% of youth who are also overweight and obese.^{33,34} It is calculated that 40% of girls and 30% of boys born in 2000 will become diabetic, even with no further increase in obesity levels.^{35,36} The South African National Health and Nutrition Examination Survey (SANHANES-1) (2012) conducted in 10–14 year-old children indicated that 10% of boys (n=2 123) and 22% of girls (n=2 155) were overweight or obese.³⁷

The new CAPS (Curriculum Assessment Policy Statements) system was implemented in 2013 and all primary schools in South Africa will follow the same curriculum. The total time allocated for Life Orientation in Grade 4 is 60 hours per year and 27.5 hours per week of

which 1.5 hours per week should be dedicated to personal and social wellbeing, which includes eating habits.³⁸

Countries need to invest in capacity building to convert evidence-based nutrition into suitable educational and marketing tools using the FBDG to implement, observe and assess these strategies.³⁹ At least one question in the FFG addresses each one of the ten FBDG statements.

In this study, all the educators expressed a need to receive NE themselves (ranging from 'slightly agree' to 'strongly agree'). Teaching staff involved in NE should be developed and trained in evidence-based nutrition.⁴⁰ Early teacher education is important, but for HPS to be effective, in-service training as part of career advancement should be put in place.⁴¹ According to this study, limited tools and posters are available to serve this purpose at present. Possible tools that were mentioned included posters DVDs, activity/colouring-in books and outings, board games, puzzles and an expert on nutrition, that is, someone educators feel can assist them with correct nutritional advice.⁴¹ The recommendation from Vorster et al. (2011) is to develop South African educational tools such as health promotion messages for specific groups which are understandable and workable and which should also take the following aspects into account: age, education, gender, culture, customs and beliefs, peer pressure, trends, and socioeconomic status.⁴²

The workload of teachers is challenging and whatever means of NE is implemented, this should not increase it further as shown in this study. All the teachers felt that learners could play the FFG independently, and the majority of learners thought they could play it on their own. Furthermore, a large group of learners indicated that they had learned to play the game easily, that playing games should be part of school, and they would play the FFG again. They also indicated it was fun. All educators in both ISSs strongly agreed that the FFG could be regarded as a valuable tool in educating learners; they would tell their colleagues about the FFG; it should be used more often in the classroom; that the children enjoyed playing the FFG and that the FFG could be regarded as 'Health Promotion'.

It is recommended that NE should start in primary school.^{4,25} Results from this study showed that the majority of learners responded positively to the question if they thought parents/care

givers would listen if they were told things they had learned in the game. A large group indicated that they thought their parents/care givers knew a lot about food already; however, most learners would still tell their parents about the FFG. These results confirm data where schools are shown to be one of the settings where health promotion can influence health beliefs and behaviour in communities.^{4,25}

Participants should be actively engaged, and sufficient intensity and time are required for possible change in behaviour; small groups are more effective; and culturally sensitive programmes with behavioural theory have been shown to be more successful.³⁰

Contemporary cognitive development theorists like Piaget and Inhelder (1969) believe that middle childhood (ages 7–10 years) is when prior learning is consolidated, but it also allows new learning in a peaceful environment with peers, to ascertain a certain position in this group.⁴³ They need to cooperate with other members and to socialise,⁴⁴⁻⁴⁷ but it also seems as if games are important for ego purposes.^{48,49} Furthermore, emotional growth is essential to participate and develop skills in game playing. This will include the capability to agree, follow the rules, postpone completion and achievement,⁵⁰ control urges such as loss, aggression, anxiety, and frustration,⁴⁴ the desire to win and to achieve rationality, and an optimistic, steady self-worth.⁵⁰ Modern games (for example, computer games) are limited to auditory and visual experiences, whereas traditional games allow for multisensory learning.⁵¹ Listening and skills to conduct conversations can be enhanced with games in groups.^{52,53} Because of time constraints due to reaching curricula goals, little time is available to focus on establishing positive peer relationships. However, studies show that by dealing with the emotional and social learning milieu, it will have a positive impact on learning and reduce the teaching time in future.⁵³⁻⁵⁵ In a study by Long et al. (2006) in Grade 3 and 4 learners, edutainment, as a combination of education and entertainment, was recommended as a method to attain higher engagement of learners.³⁵ Throughout childhood and adolescence, it seems as if gaming could be successfully used to attain better dietary behaviour⁵⁶⁻⁵⁷ and that well-designed NE games could increase more than merely knowledge, but also influence behaviour.^{58,59} It seems as if the FFG as NE tool could fulfil these criteria, based on the positive feedback from educators as well as learners.

People are more likely to be motivated to change their behaviour if they are involved cognitively (thought, understanding and cognitive skills), affectively (attitude, feeling and

emotion) and on a psychomotor level (physical or manipulative skills). Depending on the objectives one selects, an educational plan for groups can involve activities that are either mainly motivational, or mainly skill-building, or both.³⁰ In the study, the majority of learners indicated that they wanted to eat more fruit and vegetables, said they thought more about what they ate after playing the FFG, liked to learn about food, and said they had learned more about food and health after playing the game. Creating NEPs that are factual, creative and practical, but also able to motivate and assist in behaviour change, remains a challenge,³⁰ but it seems as if the FFG fulfils both requirements of being factual, as well as fun.

Today, mostly electronic games are played at home, for example, computer games, and they are most probably played on one's own. Learners (and educators) responded extremely positively to the FFG and to learning about food and health; and responded with a 'no/not sure' whether they would play the game only at school and not at home. However, just over half of the children were positive about playing the board game at home vs. the question that playing games should be part of school. Therefore it seems more likely that a traditional game, such as a board game, should be part of an organised milieu, including a school environment, as part of educational nutrition programmes and health promotion.

Research has shown that NE tools, for example, worksheets, posters, plays, games, classroom dialogues and computer-based items, are available and can be used as interaction tools which form elements of different ways of teaching.⁶⁰ Computers are part of learners' lives today and are used in the learning setting.⁶¹ However, there is not a significant differentiation between the computer- or classroom-based approach.⁶² The aim of both traditional games (such as card games and board games), or computer games, is to have fun while learning.⁶³ Therefore, an educational nutrition board game, like the FFG can be used in a classroom to reinforce nutrition education.

5.11 CONCLUSION

The majority of Grade 4 English-speaking learners and the educators in the study were very positive about the Fun Food Game, a South African-developed educational nutrition board game and educators regarded it as 'Health Promotion'. The Fun Food Game appears to be suitable for this age group. Testing the FFG as an educational activity showed that the occurrence, length and design were suitable for these learners. Playing had an impact on

achieving educational aims, namely, a positive acceptability and feasibility of a nutrition board game as a tool for NE in primary schools. It has been shown to have an influence on these learners' motivation, as seen from the high scores reflecting their perceptions to think more about their health, what they eat, and to eat more fruit and vegetables, which could possibly lead to behavioural change. There is a strong need for NE and tools for educators and learners in both high and low socio-economic areas, and it appears that the FFG might be able to address part of that need.

Limitations of the study include a small study population, short intervention period, and a specific district in the Western Cape, and therefore these results cannot be extrapolated to the rest of the province and the country. However, taking these limitations into consideration, it may be concluded that it is acceptable and feasible to use a board game, such as the Fun Food Game, as a tool for NE in primary schools.

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Chapter 6

General discussion and conclusion

6.1 GENERAL DISCUSSION

This study was conducted to assess the value of the 'Fun Food Game' (FFG), a South African developed educational nutrition board game, for selected Grade 4 learners and selected Grade 4 Life Orientation educators in the City of Cape Town district.

The impact was measured by nutrition knowledge, opinions and practices related to nutrition and physical activity, tuck shop visits, dietary quality of Grade 4 learners, as well as the perceptions and acceptability of the FFG as a possible NE tool as evaluated in selected Grade 4 learners and selected Grade 4 LO educators before and after playing the FFG. A purposive sample of four schools was conveniently selected, of which two schools in a higher socio-economic area served as intervention school (IS) and control school (CS), whereas the other two (IS and CS) were in a lower socio-economic area in the City of Cape Town district of the WC province.

'Nutrition transition' is linked to urbanisation, economic growth and modernisation in SA, where this condition leads to modified diets with an increased risk of developing lifestyle diseases.¹ Promotion of healthy diets and physical activity should be seen as a developmental need and national development programmes should be developed. Investing in the future generation could potentially reduce the nutrition-related chronic disease burden in years to come.²⁻⁴ The WHO recommended that developing countries need to design and evaluate their own programmes for promoting healthy living.^{2,5}

The SA DoH introduced the 'Comprehensive Package of Key Nutritional Interventions' where nutrition education is presented as an "advocate for the integration of nutrition education including education on infant feeding, maternal nutrition, and healthy eating to prevent overweight and obesity into comprehensive health education" in pre-schools, schools and communities.⁶ The commitment now has to filter to implementation level and the necessary capacity needs to be built and put in place to affect action on these national plans. The school environment can have an influence on learners regarding the quality and selection, as well as the intake of food, as a significant amount of food is consumed at school.⁷ Playing an

educational nutrition board game has been shown to have an influence on these learners' motivation as seen from the high scores reflecting their perceptions to think more about their health, what they eat, and to eat more fruit and vegetables, which could possibly lead to behavioral change. NEPs as part of the HPS initiative are positively linked to nutrition behaviours such as an increase in drinking of milk and water⁸⁻¹³ and a reduction in skipping breakfast.^{14,15} Playing the FFG could have influenced the higher post-DDS and higher breakfast consumption, increased nutrition knowledge and opinion related to nutrition and physical activity, as well as an increase in the majority of food groups that were measured in the intervention schools. However, the same was also shown in the control schools.

Mixed results were also achieved when practices related to nutrition and physical activities were measured. Fewer learners from all the schools visited the tuck shop in the post-setting, except school C (LIS) in a lower socio-economic area, which showed a decreased tendency in practices related to nutrition and physical activities and an increase in visiting the tuck shop. Most learners took lunch boxes to school, but fewer from the intervention schools took lunch boxes in the post-setting. Almost double the number of learners from a lower socio-economic area visited the tuck shop, compared with learners from a higher socio-economic area. It correlates with a previous study in the WC where almost half the learners bought items at the tuck shop¹⁶ and 70% of learners in another study chose unhealthy food items.¹⁷

Younger as well as older South African children have diets with little variety.^{18,19} A study showed that children who have a DDS value less than 6 will most probably have weight-for-age and weight-for-height Z-scores less than zero, and should be regarded as being at risk of undernutrition.¹⁸ All schools measured a DDS of 5, and the schools in the lower socio-economic area displayed a higher DDS of 6 in the post-setting. A DDS of <4 in some individuals was measured in all the schools. Therefore, it seemed as if the impact of playing an educational nutrition board game and/or an increase in nutrition awareness had the most impact in the lower socio-economic schools.

According to recommendations, nutrition education should start in primary school, because it is one of the settings where health beliefs and behaviour can be influenced by health promotion.² The majority of Grade 4 English-speaking learners and the educators in this study were very positive about the FFG and educators regarded it as 'Health Promotion'.

School Health Education (SHE) involves learning actions that comprise curriculum-based learning, where educated choices, and possible changes, can be used to guide knowledge, beliefs, opinions and abilities with regard to more healthy activities. It should be achievable, practicable, incorporated in various parts of the syllabus and address learners' needs.²⁰⁻²² Activities for NEP should be culturally suitable, fun,²³ age appropriate, and suitable, and one could consider giving incentives and rewards.²⁴ The FFG appears to be suitable for this age group, and as an educational activity, showed that the duration and design were suitable for these learners. Playing had an impact on achieving educational aims, namely a positive acceptability and feasibility of a nutrition board game as a tool for nutrition education in primary schools.

Limitations of the study include a small study population and a specific district in the Western Cape, and therefore these results cannot be extrapolated to the rest of the province and the country. However, it provides information on an SA-developed NE tool that could be used in future research to advance education and impact positive nutrition behaviour and encourage physical activity in schools by learners' playing an educational nutrition board game such as the FFG. Although a positive impact was measured in the short study of a week, literature shows that a longer nutrition intervention period will more likely have a long-term influence on nutrition knowledge and behaviour. Ideally, the model of Health-Promoting Schools should be implemented where nutrition knowledge and behaviour form part of a multi-component behavioural health intervention.

In conclusion it can be said that it is acceptable and feasible to use the 'Fun Food Game', an educational nutrition board game, as an NE tool for nutrition education for selected Grade 4 learners and selected Grade 4 educators.

6.2 GENERAL CONCLUSION

This study confirms that NE tools, such as an educational nutrition board game like the FFG, should be part of a multi-component strategy integral to the Health-Promoting School concept. There is a strong need for NE and tools for educators and learners in both high and low socio-economic areas, and it appears that the FFG might be able to address part of that need. Playing an educational nutrition board game could have an impact on nutrition

knowledge and behaviour and/or create an increased nutrition awareness that might result in positive behaviour, but no definite conclusion can be made in this regard.

6.3 RECOMMENDATIONS

1. The 'Fun Food Game' (FFG) could be incorporated in Nutrition Education Programmes (NEPs) in primary schools.
2. The FFG could be made available to schools from lower income areas as a priority.
3. The intervention period to play the FFG should be extended. The outcome could be evaluated to see if a higher impact in the intervention schools was measured as well as the long-term benefit (if any).
4. The FFG as an educational nutrition tool could be tested in more diverse schools, for example, in urban and rural areas, as well as in different provinces in SA to assess the acceptability amongst various population groups.
5. Measurements of participants' weight and height can be included in future studies to assess if there is a correlation between nutrition knowledge and a low DDS ($DDS < 6$), and possibly malnutrition in schools in both higher and lower socio-economic areas.

6.4 FUTURE RESEARCH

1. Future studies using the DDQ should be conducted in primary school children (10–14 years old) to assess their DDS and to ascertain if change in nutrition behaviour was achieved in combination with nutrition education (NE).
2. Learners in both higher and lower socio-economic areas should be included in studies that assess malnutrition.
3. More NE tools that are evidence-based in factual content, culturally acceptable, fun, and age appropriate should be developed, tested and implemented to assist educators in teaching nutrition without increasing their workload.

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ADDENDA

ADDENDUM A

Research Approval Letter: Western Cape Education Department



Directorate: Research

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REFERENCE: 20130124-0004

ENQUIRIES: Dr A T Wyngaard

Ms Annalien Turner
4 Savanna Close
Aurora
Durbanville

Dear Ms Annalien Turner

RESEARCH PROPOSAL: ASSESSING THE VALUE OF A SOUTH AFRICAN DEVELOPED EDUCATIONAL NUTRITION BOARD GAME FOR PRIMARY SCHOOL CHILDREN IN THE CAPE METROPOLE

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Approval for projects should be conveyed to the District Director of the schools where the project will be conducted.
5. Educators' programmes are not to be interrupted.
6. The Study is to be conducted from **28 January 2013 till 19 July 2013**
7. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
8. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
9. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
10. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
11. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.

12. The Department receives a copy of the completed report/dissertation/thesis addressed to:
The Director: Research Services
Western Cape Education Department
Private Bag X9114
CAPE TOWN
8000

We wish you success in your research.

Kind regards.

Signed: Dr Audrey T Wyngaard

for: **HEAD: EDUCATION**

DATE: 24 January 2013

ADDENDUM B

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM: School Principal

TITLE OF THE RESEARCH PROJECT: *“Assessing the value of a South African developed educational nutrition board game for primary school children in the Cape Metro-pole.”*

REFERENCE NUMBER: S12/11/303

PRINCIPAL INVESTIGATOR: *Annalien Turner*

ADDRESS: *4 Savanna Close, Aurora, Durbanville, 7550, RSA*

CONTACT NUMBER: *082-852 2320*

*Your school is being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the investigator (Annalien Turner) any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you (the school) could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.*

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about? Change after changes have been made to protocol.

- *The aim of the study is to measure the impact on nutrition knowledge and behaviour in primary school learners in the Western Cape Metro-pole before and after playing a South African developed educational nutrition game.*
- *Secondly, we want to determine from the perspective of both learners and educators the acceptability of playing an educational board game and if it could be part of the nutrition curriculum.*
- *The study is the research part of fulfilling the requirements towards a postgraduate degree in nutrition (M in Nutrition) at the University of Stellenbosch.*

Why has your school been invited to participate?

- *Four schools in the Cape Metro-pole have been selected to take part in this study. Two schools have been selected as intervention groups and two will act as control groups. The schools were selected from a list provided by the Western Cape Department of Education. The schools selected will be representative of a more affluent and a less affluent area that uses English as a teaching medium. All English speaking grade 4 learners in these selected schools are invited to participate in the study.*

- **The study must be completed either before or after nutrition education (as part of Life Orientation) is taught in all four schools, to prevent possible bias and influencing the results of the study.** The educator(s) of Life Orientation who will teach nutrition education to the grade 4 English speaking learners must be present during the full execution of the study.

What will your responsibilities be?

- As the principal of one of the selected schools, **your voluntary written consent will be required before the study commences, as well as the voluntary written consent of the educator(s) of Life Orientation, teaching nutrition education to the English speaking grade 4 learners. Voluntary written consent from parents and/or legal guardians, as well as voluntary written assent from the English speaking grade 4 learners must be obtained before the study commences.**
- Prior to the execution of the study, **educators** who teaches Life Orientation (and therefore nutrition education) to English speaking grade 4 learners will be requested to **complete a self-administrative questionnaire** in order to determine **when**, as per grade 4 curriculum and individual school, **formal nutrition education will take place. The study must be completed either before or after nutrition education (as part of Life Orientation) is being taught in all four school, to prevent possible bias and influencing the results of the study.**
- **The educator(s) of Life Orientation** who will teach nutrition education to the grade 4 English speaking learners **must be present during the full execution of the study.**
- During **week 1** of the study, a **nutrition knowledge questionnaire** will be completed **during school hours** by **all the English speaking grade 4 learners themselves** who wish to participate in the study, in **all four schools** (pre-testing of nutrition knowledge), after giving **written assent.**
- To get a statistically representative sample of these **four schools**, **certain participating learners** will also be asked to complete a **Dietary Diversity Questionnaire (DDQ)** at the **start and end of the study** (i.e. during week 1 and week 3) **with the study investigator, during school hours.** A **class list** will be requested in order to statistically select a sample group.
- One week after completion of the nutrition knowledge questionnaire, the **selected intervention schools will play an educational nutrition board game for half an hour on Monday and Tuesday, take a break Wednesday and play again on Thursday and Friday for one week during school hours** (week 2). The investigator will explain the dynamics of the game to the learners at the beginning of the study, in the presence of the Life Orientation Educator(s). For the duration of the study, both the investigator and the Life Orientation educator(s) will be present during the period the educational nutrition board game is being played, but without active participation. Both will observe the learners and only assist on request from the learners.
- Teams consisting of 1 to 2 learners will be formed. A group of **2-4 teams (with a maximum total of 8 learners)** will play at a nutrition board game. More than 1 nutrition board game will be available to allow the **whole class to play at the same time.**
- One week after playing the nutrition board game for the last time (week 3), a **nutrition knowledge questionnaire will again be completed** by all the English speaking grade 4 learners who participated in the study **during school hours** to see if their nutrition knowledge increased (post-testing of nutrition knowledge). Part of this questionnaire will be the measurement of the **perception** of these learners regarding the nutrition board game (e.g. did they have fun, will they play it again, etc.).The investigator will hand out this questionnaire.
- The **Life Orientation educator(s)** teaching English speaking grade 4 learners will also be **required to complete a questionnaire, assessing their perception** of the nutrition board game (e.g. did the learners

enjoyed the game, could the nutrition board game be used as a tool teaching nutrition education, etc.) during week 3.

- The English speaking grade 4 learners from the **control schools will not play the board game**, but will be required to **complete the pre- and post test of the nutrition knowledge questionnaire during school hours** to validate the results from the intervention schools. If required, the schools in the control group can play the nutrition board game after the completion of the study.

Will you or your school benefit from taking part in this research?

- The benefit of participating in the study is to explore if tools such as a nutrition board game could be used in teaching nutrition education in schools, both from a learner and an educator's perspective.
- The nutrition board game promotes team work as the learners will be participating in teams of one to two each with a total of 8 participants per board game.
- Although playing in a group, it will be a small group to ensure that some participants are not "lost" during the game.
- The board game is fast paced with continues activity to retain the attention of the learners.
- The nutrition board game can be finished in a reasonably time (about 15-20 minutes) with the opportunity to start a new round without becoming bored.
- Learners will learn to win or lose gracefully.
- Learners will most probably learn about food and healthy living while having fun.
- It can open an opportunity of creating different ways and means to teach primary school children in general.
- The results will be published (if accepted by journals) to inform other researchers about the benefits (if any) of playing a nutrition board game in a primary school setting.
- The study can possibly be used to do the same type of research on a bigger scale to be more representative of our developing country in Africa.

Are there in risks involved in you or your school taking part in this research?

- The study will take place during school hours. Therefore, it might be necessary to work a little harder & faster in other subjects, or having fewer and/or shorter breaks during the time the English speaking grade 4 learners participate in the study (week 1-3).
- Learners (and later the **educators teaching Life Orientation** to these English speaking grade 4 learners) need to **complete the questionnaires or to play the nutritional board game either before or after formal nutrition education in all four schools take place**. Our estimation is that completion of the questionnaires and playing the board game at least once, shouldn't take more than 30-45 minutes at a time. Certain learners who are selected for the completion of the Food Diversity Questionnaire (at the start and at the end of the study), should add another 30-45 minutes per questionnaire.
- Another risk could be withdrawal of participation, therefore getting inconclusive study results.

If you do not agree to take part, what alternatives do you have?

- If you as a school decide not to participate in the study, there will be no consequences for you. Another school will be selected to participate in the study. If specific learners (or their parents/caregivers) decide

not to participate in the study, they will not be discriminated against and alternative arrangements should be made for them.

Who will have access to the results?

- *The information collected will be treated as confidential and protected. Only the investigators involved in the study will have access to all the information. If it is used in a publication or thesis, the identity of the participants will remain anonymous. No individual will be identified, but the results will be presented collectively (e.g. Two out of 3 classes in one of the intervention schools showed a trend towards an increase in nutrition knowledge). We will also give collective feedback of the study results to the school after completion of the study.*

What will happen in the unlikely event of some form injury occurring as a direct result of your school taking part in this research study?

- *This is a very low risk research project. In the unlikely event of some form of injury occurring as a direct result of the school participating in this research study, no compensation will be available.*

Will you or your school be paid to take part in this study and are there any costs involved?

- *No, you or your school will not be paid to take part in the study. There will be no costs involved for you or your school, if you do take part.*

Is there anything else that you should know or do?

- *You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your investigator.*
- *You will receive a copy of this information and consent form for your own records.*

Declaration by participant

By signing below, I, on behalf of the school, agree to take part in a research study entitled: ***“Assessing the value of a South African developed educational nutrition board game for primary school children in the Cape Metro-pole.”***

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.

- The school participants (Life Orientation educators teaching English speaking grade 4 learners, as well as English speaking grade 4 learners) may be asked to leave the study before it has finished, if they do not follow the study plan, as agreed to.

Signed at (*place*) on (*date*) 2012.

.....
Signature of participant

.....
Signature of witness

Declaration by investigator

I (*name*) declare that:

- I explained the information in this document to (the school principal).
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did not use an interpreter.

Signed at (*place*) on (*date*) 2012.

.....
Signature of investigator

.....
Signature of witness

ADDENDUM C

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

(Life Orientation Educator teaching Nutrition Education to English speaking grade 4 learners)

TITLE OF THE RESEARCH PROJECT: *“Assessing the value of a South African developed educational nutrition board game for primary school children in the Cape Metro-pole.”*

REFERENCE NUMBER: S12/11/303

PRINCIPAL INVESTIGATOR: *Annalien Turner*

ADDRESS: *4 Savanna Close, Aurora, Durbanville, 7550, RSA*

CONTACT NUMBER: *082-852 2320*

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- *Secondly, we want to determine from the perspective of both learners and educators the acceptability of playing an educational board game and if it could be part of the nutrition curriculum.*
- *The study is the research part of fulfilling the requirements towards a postgraduate degree in nutrition (M in Nutrition) at the University of Stellenbosch.*

Why has your school been invited to participate?

- *Four schools in the Cape Metro-pole have been selected to take part in this study. Two schools have been selected as intervention groups and two will act as control groups. The schools were selected from a list provided by the Western Cape Department of Education. The schools selected will be representative of a more affluent and a less affluent area that uses English as a teaching medium. All English speaking grade 4 learners in these selected schools are invited to participate in the study.*

- **The study must be completed either before or after nutrition education (as part of Life Orientation) is taught in all four schools, to prevent possible bias and influencing the results of the study.** The educator(s) of Life Orientation who will teach nutrition education to the grade 4 English speaking learners must be present during the full execution of the study.

What will your responsibilities be?

- **Voluntary written consent of the educator(s) of Life Orientation**, teaching nutrition education to the English speaking grade 4 learners are required. **Voluntary written consent from the school principal, parents and/or legal guardians, as well as voluntary written assent from the English speaking grade 4 learners must be obtained before the study commences.**
- **The educator(s) of Life Orientation** who will teach nutrition education to the grade 4 English speaking learners **must at all times be present during the execution of the study (week 1-3).**
- During **week 1** of the study, a **nutrition knowledge questionnaire** will be completed **during school hours** by **all the English speaking grade 4 learners themselves** who wish to participate in the study, in **all four schools** (pre-testing of nutrition knowledge), after giving **written assent**. The investigator will be present to hand out the questionnaires.
- To get a statistically representative sample of these **four schools**, **certain participating learners** will also be asked to complete a **Dietary Diversity Questionnaire (DDQ)** **at the start and end of the study** (i.e. during week 1 and week 3) **with the study investigator, during school hours**. A **class list** will be requested in order to statistically select a sample group.
- One week after completion of the nutrition knowledge questionnaire, the **selected intervention schools will play an educational nutrition board game for half an hour on Monday and Tuesday, take a break Wednesday and play again on Thursday and Friday for one week during school hours** (week 2). The investigator will explain the dynamics of the game to the learners at the beginning of the study, in the presence of the Life Orientation Educator(s). For the duration of the study, both the investigator and the Life Orientation educator(s) will be present during the period the educational nutrition board game is being played, but without active participation. Both will observe the learners and only assist on request from the learners.
- Teams consisting of 1 to 2 learners will be formed. A group of **2-4 teams (with a maximum total of 8 learners)** will play a nutrition board game. More than 1 nutrition board game will be available to allow the **whole class to play at the same time**.
- One week after playing the nutrition board game for the last time (week 3), a **nutrition knowledge questionnaire will again be completed** by all the English speaking grade 4 learners who participated in the study **during school hours** to see if their nutrition knowledge increased (post-testing of nutrition knowledge). Part of this questionnaire will be the measurement of the **perception** of these learners regarding the nutrition board game (e.g. did they have fun, will they play it again, etc.)The investigator will hand out this questionnaire.
- **The Life Orientation educator(s)** teaching English speaking grade 4 learners will also be **required to complete a questionnaire**, assessing **their perception** of the nutrition board game (e.g. did the learners enjoyed the game, could the nutrition board game be used as a tool teaching nutrition education, etc.) during week 3.
- The English speaking grade 4 learners from the **control schools will not play the board game**, but will be required to **complete the pre- and post test of the nutrition knowledge questionnaire during school hours** to validate the results from the intervention schools. If required, the schools in the control group can play the nutrition board game after the completion of the study.

Will you or your school benefit from taking part in this research?

- *The benefit of participating in the study is to explore if tools such as a nutrition board game could be used in teaching nutrition education in schools, both from a learner and an educator's perspective.*
- *The nutrition board game promotes team work as the learners will be participating in teams of one to two each with a total of 8 participants per board game.*
- *Although playing in a group, it will be a small group to ensure that some participants are not "lost" during the game.*
- *The board game is fast paced with continues activity to retain the attention of the learners.*
- *The nutrition board game can be finished in a reasonable time (about 15-20 minutes) with the opportunity to start a new round without becoming bored.*
- *Learners will learn to win or lose gracefully.*
- *Learners will most probably learn about food and healthy living while having fun.*
- *It can open an opportunity of creating different ways and means to teach primary school children in general.*
- *The results will be published (if accepted by journals) to inform other researchers about the benefits (if any) of playing a nutrition board game in a primary school setting.*
- *The study can possibly be used to do the same type of research on a bigger scale to be more representative of our developing country in Africa.*

Are there in risks involved in you or your school taking part in this research?

- *The study will take place during school hours. Therefore, it might be necessary to work a little harder & faster in other subjects, or having fewer and/or shorter breaks during the time the English speaking grade 4 learners participate in the study (week 1-3).*
- *Learners (and later the **educators teaching Life Orientation** to these English speaking grade 4 learners) need to **complete the questionnaires or to play the nutritional board game either before or after formal nutrition education in all four schools take place.** Our estimation is that completion of the questionnaires and playing the board game at least once, shouldn't take more than 30-45 minutes at a time. Certain learners who are selected for the completion of the Food Diversity Questionnaire (at the start and at the end of the study), should add another 30-45 minutes per questionnaire.*
- *Another risk could be withdrawal of participation, therefore getting inconclusive study results.*

If you do not agree to take part, what alternatives do you have?

- *If the educators decide not to participate in the study, there will be no consequences for you. Another school will be selected to participate in the study. If specific learners (or their parents/caregivers) decide not to participate in the study, they will not be discriminated against and alternative arrangements should be made for them.*

Who will have access to the results?

- *The information collected will be treated as confidential and protected. Only the investigators involved in the study will have access to all the information. If it is used in a publication or thesis, the identity of the participants will remain anonymous. No individual will be identified, but the results will be presented collectively (e.g. Two out of 3 classes in one of the intervention schools showed a trend towards an increase in nutrition knowledge). We will also give collective feedback of the study results to the school after completion of the study.*

What will happen in the unlikely event of some form injury occurring as a direct result of your school taking part in this research study?

- This is a very low risk research project. In the unlikely event of some form of injury occurring as a direct result of the school participating in this research study, no compensation will be available.

Will you or your school be paid to take part in this study and are there any costs involved?

- No, you or your school will not be paid to take part in the study. There will be no costs involved for you or your school, if you do take part.

Is there anything else that you should know or do?

- You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your investigator.
- You will receive a copy of this information and consent form for your own records.

Declaration by participant

By signing below, I, agree to take part in a research study entitled: **“Assessing the value of a South African developed educational nutrition board game for primary school children in the Cape Metro-pole.”**

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- The school participants (Life Orientation educators teaching English speaking grade 4 learners, as well as English speaking grade 4 learners) may be asked to leave the study before it has finished, if they do not follow the study plan, as agreed to.

Signed at (place) on (date) 20.....

.....
Signature of participant

.....
Signature of witness

Declaration by investigator

I (*name*) declare that:

- I explained the information in this document to (the school principal).
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did not use an interpreter.

Signed at (*place*) on (*date*) 20.....

.....
Signature of investigator

.....
Signature of witness

ADDENDUM D

CHILD ASSENT TEMPLATE³

NB! DELETE THIS PAGE BEFORE ADAPTING THE TEMPLATE TO YOUR PROJECT!

Please note:

1. Children who are able to understand the basic concepts of research should be given the opportunity to assent to a research study. Generally children between the ages of 7 to 17 should assent to research. This is not a fixed rule and some children younger than 7 may well have sufficient insight and understanding to give assent for a study.
2. If they refuse assent then this refusal should be accepted, even if the parents have consented. There may be exceptional cases where this rule may not apply. The HREC should be consulted.
3. This template is specifically for 7-12 year olds and can be adapted to suit adolescents.
4. If you are including a wide range of children in your project you will need 2 different versions of assent, one for younger children and a more detailed one for adolescents.
5. You can adapt the template to suit the needs of your specific project including deleting sections which are seen as not applicable/appropriate.
6. This assent document must be used in conjunction with a parental Information Leaflet and Informed Consent form, which should obviously cover the project in more depth and detail.
7. Once your project has been approved and you have a reference number, you should replace the information in the 'footer' with your own information e.g. Project No..... Assent template Version 1.1; Date 10.08.09.

(This template will be available in Afrikaans and Xhosa by the end of June 2009)

³ With thanks to Anel Kirsten for graphics and layout.



PARTICIPANT INFORMATION LEAFLET AND ASSENT FORM



TITLE OF THE RESEARCH PROJECT: *“Assessing the value of a South African developed educational nutrition board game for primary school children in the Cape Metro-pole.”*

RESEARCHERS NAME(S):

***Annalien Turner
Lisanne du Plessis
Wilna Oldewage-Theron***

ADDRESS: 4 Savanna Close, Aurora, Durbanville, 7550, RSA

CONTACT NUMBER: 082-852 2320

What is RESEARCH?

- *Research is something we do to find new knowledge about the way things (and people) work. We can use research projects or studies for example, to help us find out how we can do things different or better.*

What is this research project all about?

- *Two schools have been selected to play a board game on food during the study. Another two schools will not play the board game on food during the study, but will have the opportunity to play it after the study. That way, we can see if learners learned more about food and healthy living by playing the board game on food.*
- *Secondly, we want to find out if you had fun while playing the board game on food. That could help us to see if other schools might also benefit playing such board games in future.*
- *We are also going to ask certain learners what they ate at the beginning and at the end of a study and write it down on a form called a Dietary Diversity Questionnaire (DDQ).*

Why have I been invited to take part in this research project?

- *After discussions with the Western Cape Department of Education, 4 schools in total have been selected to participate in the study. Your school is one of the 4 schools and we invite all the English speaking grade 4 learners from these schools to take part in this research project.*

Who is doing the research?

- *My name is Annalien Turner and I am a dietitian. I'm trying to find fun ways to teach children about food and healthy living. Furthermore, I'm doing this study or research project as part of further studies, also called a postgraduate degree (M-degree in Nutrition).*

What will happen to me in this study?

- *All the English speaking grade 4 learners from all 4 selected schools who want to be part of the study will complete one questionnaire before the study and two questionnaires after the study. The two schools that have been selected by the Western Cape Department of Education will play the board game on food for half an hour during one specific week on a Monday, Tuesday, (not the Wednesday) and again on the Thursday and Friday. Everything will happen during school hours and you will not be required to stay after school.*
- *The other 2 schools will only answer one questionnaire in the beginning and at the end of the study, but will not play the board game on food during the study. However, they will get the opportunity to play the board game on food after the end of study, should they wish to do so. Certain learners are going to be asked to remember what they ate when the study starts (week 1) and at the end (week 3).*

Can anything bad happen to me?

- *The study will take place during school hours. Therefore, it might be necessary to work a little harder in other subjects or having fewer and/or shorter breaks during the time you participate in the study, because we need a bit of time for you to complete the questionnaires and/or to play the board game on food.*

Can anything good happen to me?

- *We hope that you will have lots of fun playing the board game while you learn about food and healthy living. If we see that you did learn more on food while having fun, we might try to use it again in future and in other schools too.*

Will anyone know I am in the study?

- *Only we, who are part of the study, will know exactly how much each of you learned and if you had fun while playing the board game. We will not tell the Western Cape Department of Education, your principal, your educator(s), friends or even your parents/care givers specific results, but rather how much you as a class and/or school learned. We value your advice and most importantly, how one can improve the way you learn while having fun.*



Who can I talk to about the study?

Annalien Turner (082-852 2320) – info@foodle.co.za

Lisanne du Plessis (082-926 2434) - lmdup@sun.ac.za

Wilna Oldewage-Theron (016-950 9722) - wilna@vut.ac.za

What if I do not want to do this?

You can refuse to take part in the research project even if your principal, educator and/or parents have agreed to your participation. You can stop being in the study at any time without getting in trouble.

Please tick the box for your answer to the following questions:

Do you understand this research study and are you willing to take part in it?

 YES NO

Has the researcher answered all your questions?

 YES NO

Do you understand that you can pull out of the study at any time?

 YES NO

Name of child: _____ School: _____

Signature of Child: _____ Date: _____

ADDENDUM E

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR USE BY PARENTS/LEGAL GUARDIANS

TITLE OF THE RESEARCH PROJECT: *“Assessing the value of a South African developed educational nutrition board game for primary school children in the Cape Metro-pole.”*

REFERENCE NUMBER: S12/11/303

PRINCIPAL INVESTIGATOR: *Annalien Turner*

ADDRESS: *4 Savanna Close, Aurora, Durbanville, 7550, RSA*

CONTACT NUMBER: *082-852 2320*

Your child is being invited to participate in a study. Please take some time to read this letter, which will explain the details of the study. Please ask the study investigator any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research means and how your child could be involved. Also, your child’s participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you or your child negatively in any way whatsoever. You are also free to withdraw him/her from the study at any point, even if you do initially agree to let him/her take part.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this study all about?

- *The children will play a South African developed board game about food. We want to measure how much they know about food before playing the game as well as after the game and if it will change their food choices after playing the game.*
- *Secondly, we want to see if both learners and educators think it is fun to play an educational board game on food and if it could be part of the nutrition curriculum in schools.*
- *The study is necessary to receive a further degree in nutrition (M in Nutrition) at the University of Stellenbosch.*

Why has your child been invited to participate?

- *Four schools in the Cape Metro-pole have been selected to take part in this study. Two schools will play the food game (also called the intervention schools) and two will not play the game (and is called the control schools). The schools were selected from a list provided by the Western Cape Department of Education. Two schools, one playing the food game (the intervention school) and one not playing the food game (the control school) will be selected to be representative of a more affluent area that uses English as a teaching medium. Another two schools, one playing the food game (the intervention school) and one not playing the food game (the control school) will be selected to be representative of a*

less affluent area that uses English as a teaching medium. All English speaking grade 4 learners in these selected schools are invited to participate in the study.

- The study must be completed either before or after nutrition education (as part of Life Orientation) is taught in all four schools, to prevent possible bias and influencing the results of the study. The educator(s) of Life Orientation who will teach nutrition education to the grade 4 English speaking learners must be present during the full execution of the study.

What do we request from you?

- As the parent/legal guardian of your child, **your voluntary written consent is needed, as well as written assent from your child before allowing your child to participate in the study.**
- During **week 1** of the study, a **questionnaire testing the children's food knowledge** will be completed **during school hours** by **all the English speaking grade 4 learners themselves** who wish to participate in the study, in **all four schools** (to test their food knowledge before playing the food game), after giving **written assent**.
- Calculations will be done to select **some participating learners** to represent the rest of the group in these **four schools** who will be asked to complete a questionnaire, called a **Dietary Diversity Questionnaire (DDQ) at the start and end of the study** (i.e. during week 1 and week 3) **with the study investigator, during school hours**. A **class list** will be requested to statistically select this group.
- One week after the food knowledge questionnaire is completed, the two **selected intervention schools will play an educational board game on food for half an hour on Monday and Tuesday, take a break Wednesday and play again on Thursday and Friday for one week during school hours** (week 2). At the beginning of the study, the investigator will explain to the learners how the game works, in the presence of the Life Orientation Educator(s). Both the investigator and the Life Orientation educator(s) will be in the class when the food game is being played and both will observe the learners. They will only assist when asked by the learners.
- Teams of 1 to 2 learners will be formed. A group of **2-4 teams (with a maximum total of 8 learners)** will play at the food game. More than 1 food game will be available to allow the **whole class to play at the same time**.
- One week after playing the food game for the last time (week 3), a **food knowledge questionnaire will again be completed** by all the English speaking grade 4 learners who participated in the study **during school hours** to see if they learned more about food (after-testing of food knowledge). A part of this questionnaire will be to measure if the learners enjoyed playing the food game (e.g. did they have fun, will they play it again, etc.)The investigator will hand out this questionnaire.
- The **Life Orientation educator(s)** teaching English speaking grade 4 learners will also be **asked to complete a questionnaire**, to see if they think the learners enjoyed playing the food game and if the food game can be used as a tool to teach them about food, etc. during week 3.
- The English speaking grade 4 learners from the **control schools will not play the board game**, but are required to **complete the before and after test of the food knowledge questionnaire during school hours** to see how they compare against the intervention schools. If they want to, the schools in the control group can play the food game after the completion of the study.

Will it be good for your child to take part in this study?

- The benefit of taking part in the study is to see if both learners and educators think a board game on food could be used as a tool in teaching food education in schools.
- The food board game promotes team work as the learners will be participating in teams of one to two each with a total of 8 participants per board game.

- Although playing in a group, it will be a small group to ensure that some participants are not “lost” during the game.
- The board game is fast paced with continues activity to keep the attention of the learners.
- The food board game can be finished in a reasonable time (about 15-20 minutes) with the opportunity to start a new round without becoming bored.
- Learners will learn to win or lose gracefully.
- Learners will most probably learn about food and healthy living while having fun.
- It can open an opportunity of creating different ways and means to teach primary school children in general.
- The results will be published (if accepted by journals) to inform other researchers about the benefits (if any) of playing a nutrition board game in a primary school setting.
- The study can possibly be used to do the same type of research on a bigger scale to be more representative of our developing country in Africa.

Are there any risks involved in your child taking part in this study?

- The study will take place during school hours. Therefore, it might be necessary to work a little harder & faster in other subjects, or having fewer and/or shorter breaks during the time the English speaking grade 4 learners participate in the study (week 1-3).
- Learners (and later the **educators teaching Life Orientation** to these English speaking grade 4 learners) need to **complete the questionnaires or to play the food board game either before or after formal nutrition education in all four schools take place**. Our estimation is that completion of the questionnaires and playing the board game at least once, shouldn't take more than 30-45 minutes at a time. Certain learners who are selected for the completion of the Food Diversity Questionnaire (at the start and at the end of the study), should add another 30-45 minutes per questionnaire.
- Another risk could be that if learners (or other participants) withdraw during the study, one might not get enough results to definitely say that there is a benefit (or not) in playing a food board game.

If you do not agree to allow your child to take part, what alternatives does your child have?

- If you as the parent/legal guardian decide that your child will not be allowed to participate in the study, there will be no consequences and not you or your child will be discriminated against. Alternative arrangements will be made to accommodate your child.

Who will have access to your child's study records?

- The information collected will be treated as confidential and protected. Only the investigators involved in the study will have access to all the information. If it is used in a publication or thesis, the identity of the participants will remain anonymous. No individual will be identified, but the results will be presented generally (e.g. two out of 3 classes in one of the intervention schools showed a trend towards an increase in food knowledge). We will also give general feedback of the study results to the school after completion of the study.

What will happen in the unlikely event of your child getting injured in any way, as a direct result of taking part in this research study?

- This is a very low risk study project. In the unlikely event of some form of injury occurring as a direct result of the school participating in this research study, no compensation will be available.

Will you or your child be paid to take part in this study and are there any costs involved?

- *No, you or your child will not be paid to take part in the study. There will be no costs involved for you or your child, if you do take part.*

Is there anything else that you should know or do?

- *You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your investigator.*
- *You will receive a copy of this information and consent form for your own records.*

Assent: Children with an intellectual age of 7 and above must give assent to participate in research. (Please see the Children's Assent form.) Both the consent form from the parent/legal guardian, as well as the assent form from the child must be completed before participation in this research project will be allowed.

Declaration by parent/legal guardian

By signing below, I (name of parent/legal guardian) agree to allow

my child (name of child) who is years old, to take part in a research

study entitled: ***“Assessing the value of a South African developed educational nutrition board game for primary school children in the Cape Metro-pole.”***

I declare that:

- I have read or had read to me this information and consent form and that it is written in a language with which I am fluent and comfortable.
- If my child is older than 7 years, he/she must agree to take part in the study and his/her ASSENT must be recorded on this form.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to let my child take part.
- I may choose to withdraw my child from the study at any time and my child will not be penalised or prejudiced in any way.
- My child may be asked to leave the study before it has finished if my child does not follow the study plan as agreed to.

Signed at (place) on (date)20.....

.....
Signature of parent/legal guardian

.....
Signature of witness

Declaration by investigator

I (*name*) ...Annalien Turner..... declare that:

- I explained the information in this document to ...the parents/legal guardians of English speaking grade 4 learners during.....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understand all aspects of the research, as discussed above
- I did not use an interpreter (*if an interpreter is used, then the interpreter must sign the declaration below*).

Signed at (*place*) on (*date*) 20.....

.....
Signature of investigator

ADDENDUM F

HealthKick

Questionnaire for Learners

Learner code										
Date (day/month/year)								2	0	1
What is your name and surname?										
Gender: _____ (Male/Female)										
How old are you today?				Years old:						
In what grade and class are you? Gr. _____										
School: _____										

Tell us about yourself and your family!

1. How many people are there living in your home, including you? _____ People
2. Who helps you with your homework **MOST of the time**? (Tick next to the **ONE** answer you think is correct)
 - 1 Mother
 - 2 Father
 - 3 Grandmother
 - 4 Sister or brother / cousin
 - 5 Aunt
 - 6 Uncle
 - 7 Other: _____
3. How many rooms do you have in your home for sleeping? _____
4. Which of these do you have at home? (You can tick **MORE THAN ONE** answer)
 - 4.1 Television
 - 4.2 Computer
 - 4.3 Ordinary phone
 - 4.4 Radio
 - 4.5 Cell phone
5. Do you have a car at your home? Yes No
6. Which of these are used for cooking at your home? (You can tick **MORE THAN ONE** answer)
 - 6.1 Fridge
 - 6.2 Microwave
 - 6.3 Hot plate
 - 6.4 Open fire
 - 6.5 Paraffin stove
 - 6.6 Stove with oven
 - 6.7 Gas stove
7. Does your family ever grow vegetables at home? Yes No

8. Which language is spoken at home **MOST of the time**? (Tick next to the **ONE** answer you think is correct)

1 English

2 Xhosa

3 Afrikaans

4 Other: _____

9. How well do you understand your home language? (You can tick **MORE THAN ONE** answer)

9.1 I understand my home language

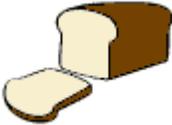
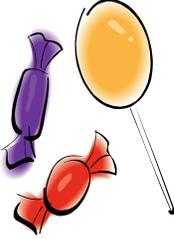
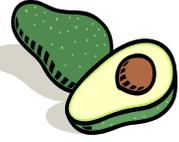
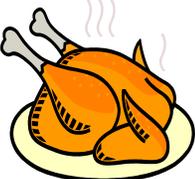
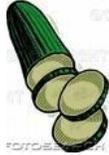
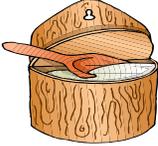
9.2 I can speak my home language

9.3 I can write my home language

9.4 I can read my home language

All about food

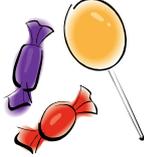
1. Look at the following pictures and fill in the LETTER (A, B, C, D, E, F or G) of the food group you think best fits the answer to the questions below (You can choose a group more than once)

Meat, Chicken, Fish, Eggs	Brown Bread, Rice, Samp, Mealie meal	Vegetables	Fruit	Sugar, Sweets	Fats, oils	Milk, Maas, Yoghurt, Cheese
<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>
						
						
						
						

- 1.1. Choose the food group that you should eat the **MOST** of every day
- 1.2. Choose the food group that you should eat the **LEAST** of every day
- 1.3. Choose a food group that contains foods with **LOTS OF FIBRE (roughage)**
- 1.4. Choose the food group that best provides the body with **ENERGY**
- 1.5. Choose the food group that best **BUILDS THE BODY'S MUSCLES**
- 1.6. Choose the food group that best **PROTECTS THE BODY AGAINST ILLNESSES**

2. In this question we are showing you two sets of pictures. Write the letter (A or B in the FIRST box) of the food item you LIKE BEST and the letter (A or B in the SECOND box) of the food item that is the HEALTHIEST (the best for you) [Box 1↓] [Box 2↓]

2.1	<p style="text-align: center;"><u>A</u></p>  <p style="text-align: center;">Milk</p>	or	<p style="text-align: center;"><u>B</u></p>  <p style="text-align: center;">Coffee creamer</p>	<p style="text-align: center;">LIKE BEST</p> <div style="text-align: center;"><input type="checkbox"/></div>	<p style="text-align: center;">HEALTHIEST</p> <div style="text-align: center;"><input type="checkbox"/></div>
2.2	<p style="text-align: center;"><u>A</u></p>  <p style="text-align: center;">Plain popcorn</p>	or	<p style="text-align: center;"><u>B</u></p>  <p style="text-align: center;">Packet of chips</p>	<p style="text-align: center;">LIKE BEST</p> <div style="text-align: center;"><input type="checkbox"/></div>	<p style="text-align: center;">HEALTHIEST</p> <div style="text-align: center;"><input type="checkbox"/></div>
2.3	<p style="text-align: center;"><u>A</u></p>  <p style="text-align: center;">Brown bread with a boiled egg</p>	or	<p style="text-align: center;"><u>B</u></p>  <p style="text-align: center;">Brown bread with a fried egg</p>	<p style="text-align: center;">LIKE BEST</p> <div style="text-align: center;"><input type="checkbox"/></div>	<p style="text-align: center;">HEALTHIEST</p> <div style="text-align: center;"><input type="checkbox"/></div>
2.4	<p style="text-align: center;"><u>A</u></p>  <p style="text-align: center;">Cool drink</p>	or	<p style="text-align: center;"><u>B</u></p>  <p style="text-align: center;">Water</p>	<p style="text-align: center;">LIKE BEST</p> <div style="text-align: center;"><input type="checkbox"/></div>	<p style="text-align: center;">HEALTHIEST</p> <div style="text-align: center;"><input type="checkbox"/></div>

2.5	<u>A</u>	or	<u>B</u>	LIKE BEST	HEALTHIEST
	 Sweets		 Peanuts & raisins		

2.6	<u>A</u>	or	<u>B</u>	LIKE BEST	HEALTHIEST
	 Banana		 Cookies / Biscuits		

2.7	<u>A</u>	or	<u>B</u>	LIKE BEST	HEALTHIEST
	 Bread & Jam		 Bread & Peanut butter		

For the following 3 questions, tick next to **ONE** answer only.

3. Are you allowed to choose what you want to eat at home? **Yes** **No** **Sometimes**

4. Do you only choose foods that you like?

5. Do you have lessons where you talk about healthy eating at school? **Yes** **No**

Fruits and “veggies”

1. **To keep your body healthy, how many helpings of fruit and vegetables should be eaten every day?** (Tick next to the **ONE** answer you think is correct)

- 1 At least 1
- 3 3 or 4
- 5 5 or more
- 9 It doesn't matter how many
-

2. **Why do you think eating fruit and vegetables every day is important?**

- | | Yes | No | Not sure |
|--|--------------------------|--------------------------|--------------------------|
| 2.1 Because they help our bodies to fight against illnesses like colds and flu | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.2 Because they help us see better | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.3 Because they help to protect our bodies against illness such as heart disease and diabetes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
-

	Yes	No	Sometimes
3. Do you eat vegetables?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. **Why do you eat vegetables?**

- | | Yes | No | Sometimes |
|---|--------------------------|--------------------------|--------------------------|
| 4.1 Because I like the taste | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.2 Because vegetables are healthy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.3 Because people at home eat vegetables | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4.4 Because I am told to | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
-

	Yes	No	Sometimes
5. Do you eat fruit?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Why do you eat fruit?

	Yes	No	Sometimes
6.1 Because I like the taste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2 Because fruit makes me healthy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.3 Because people at home eat fruit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4 Because I am told to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. When you feel like a snack, what do you eat?

	Yes	No	Sometimes
7.1 Chips	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.2 Sweets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.3 Fruit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.4 Sandwich or cereal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Healthy choices

1. Is it important to eat small amounts of healthy fats and oils...

	Yes	No	Don't know
1.1 Because fats give us energy and keep us warm?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Because fats help our body to build muscle?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 Because fats help us to absorb certain important nutrients?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. When you eat too much fat...

	Yes	No	Don't know
2.1 You can become fat (overweight)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 You can get high blood pressure when you are older	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 You can have a heart attack when you are older	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 You can develop diabetes as you get older	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

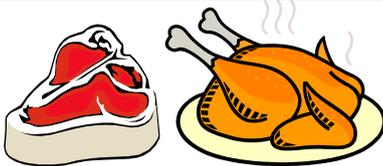
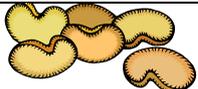
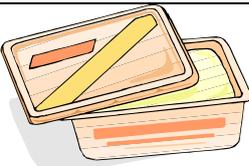
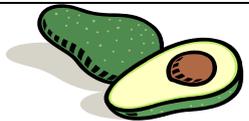
3. Eating a lot of sugar, sweets and sweet food...

	Yes	No	Don't know
3.1 Is good for health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2 Can make people fat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3 Is bad for teeth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4 Can cause diabetes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5 Does not matter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Is it important to eat enough fibre (roughage)...

	Yes	No	Don't know
4.1 Because fibre helps us go to the toilet regularly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2 Because fibre protects us against diseases like heart disease and diabetes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Which of the following foods contain HEALTHY fats?

		Yes	No	Don't know
Red meat and chicken with skin		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chips, crisps and papa bites		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nuts		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soft margarine in tub		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avocado pear		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Mayonnaise		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cookies/Biscuits		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vetkoek and doughnuts		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pilchards/Sardines		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Polony		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Can you make changes to your diet by...

	Yes	No	Not sure
6.1 putting less margarine on your bread?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2 eating fewer chips?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.3 buying fruit instead of chips?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4 putting less sugar in your tea or coffee?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.5 putting less sugar on your cereal/porridge?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.6 eating sweets less often?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.7 drinking cool drinks less often?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.8 eating brown bread instead of white bread?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- | | | | | |
|------|-------------------------|--------------------------|--------------------------|--------------------------|
| 6.9 | eating more vegetables? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6.10 | eating more fruit? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
-

7. Is it difficult for you to eat less fat because...

- | | Yes | No | Not sure |
|-----|--------------------------|--------------------------|--------------------------|
| 7.1 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7.2 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
-

8. Is it difficult for you to eat brown bread because...

- | | Yes | No | Not sure |
|-----|--------------------------|--------------------------|--------------------------|
| 8.1 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.2 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.3 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8.4 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
-

Healthy eating before and during school

- | | Yes | No | Sometimes |
|--|--------------------------|--------------------------|--------------------------|
| 1. Do you eat breakfast before school? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
-

2. Do you believe it is important for you to have breakfast...

- | | Yes | No | Sometimes |
|--|--------------------------|--------------------------|--------------------------|
| 2.1 Because it helps me to concentrate better at school? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.2 Because it gives me energy for the day? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
-

3. Can you do the following to have breakfast at home?

- | | Yes | No | Sometimes |
|---|--------------------------|--------------------------|--------------------------|
| 3.1 Make my own breakfast | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.2 Get up early enough to have breakfast at home | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

4. Will it be difficult for you to eat breakfast at home...

	Yes	No	Sometimes
4.1 Because the people at home do not eat breakfast?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2 Because you are not hungry early in the morning?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3 Because there is no food in the house to eat for breakfast?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. Do you bring a lunchbox to school?

Yes	No	Sometimes
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Will it be difficult for you to take a lunchbox to school...

	Yes	No	Sometimes
6.1 Because other children will want your food?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2 Because the food at school is enough for the whole day?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.3 Because there is nothing at home to put in your lunchbox?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4 Because no one at home can help you to make a lunchbox?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.5 Because you do not have a nice container to put it in?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. Do most of your friends bring lunchboxes?

Yes	No	Sometimes
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Do you bring money to school?

Yes	No	Sometimes
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8.1 IF YES, how many days per week?

Every day	2-3 times/wk
<input type="checkbox"/>	<input type="checkbox"/>

8.2 How much money do you bring at a time? R_____

Activities at school and home and in-between

	Yes	No	Not sure
1. Are you doing physical activity when you play sport, or going to the gym?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Are you doing physical activity when you play games, e.g. skipping, soccer?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Are you doing physical activity when you are walking, e.g. walking to school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Is it important to do physical activity every day in order to keep your body healthy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Is watching more than two hours of TV every day good for your body?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Can you do physical activity that makes you sweat and breath hard?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Do you have to stop doing physical activity because you get too tired?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Yes	No	Sometimes
8. Do you have fun when you are doing physical activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Do you like doing physical activity whenever you can?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Do your teachers encourage you to do physical activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Does your family encourage you to do physical activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Do you go with your family to physical activity events at your school or in your neighbourhood, e.g. a fun run / walk?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Do you take part in sport at school or for a club, e.g. soccer, netball?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. Do you do physical activity at home or in your neighbourhood after school and on weekends?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Yes	No	Don't know
15. There is organised sport at my school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. It is too expensive to buy sports gear (clothes) kit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. My friends do not do sport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. My parents do not allow me to do sport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. I do not like sport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I prefer to watch sport	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. I am not good enough to be on a sports team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Sport is too difficult for me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. There are no playgrounds or sports fields near my home to play outdoors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. It is not safe for children to play outdoors where I live	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. I can't do physical activity at home or in my neighbourhood because I have to look after my brothers and sisters or do chores	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. I can't do physical activity at home or in my neighbourhood because there is too much traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. I would rather watch TV or just sit and talk than do physical activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. I do not know how to play sports and games very well, I am sometimes chosen last for games	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

29. **Sometimes my friends make fun of me when I play sports and games outdoors with them**

30. **On a normal weekday, how long do you spend on the computer, watch TV or sit and listen to the radio?** (Tick next to the **one** answer you think is correct)

1 Less than 30 minutes per day

2 30-60 minutes per day

3 1-2 hours per day

4 More than 2 hours per day

31. **On a normal day on the weekend, how long do you spend on the computer, watch TV or sit and listen to the radio?** (Tick next to the **one** answer you think is correct)

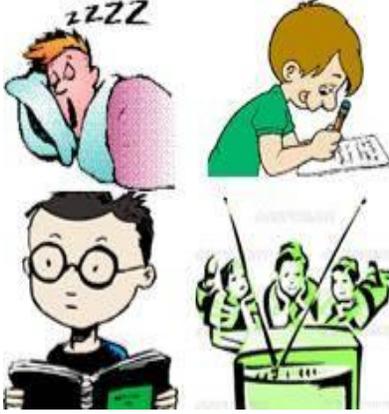
1 Less than 30 minutes per day

2 30-60 minutes per day

3 1-2 hours per day

4 More than 2 hours per day

32. Look at the pictures provided below, and fill in the LETTER (A, B, C or D) of the activities which BEST answers each question

TV watching, reading and computers	Eating with family and friends	Doing things outside e.g. playing games, gardening	Organised/team sports
<p style="text-align: center;"><u>A</u></p> 	<p style="text-align: center;"><u>B</u></p> 	<p style="text-align: center;"><u>C</u></p> 	<p style="text-align: center;"><u>D</u></p> 

32.1 Choose the activities that **YOU** like the most

32.2 Choose the activities that your **FRIENDS** like the most

32.3 Choose the activities that your Dad / Oupa /Uncle / Stepdad does **MOST in his free time**

32.4 Choose the activities that your Mom / Ouma, / Auntie / Stepmom does **MOST in her free time**

32.5 Choose the activities that are **BEST for your health**



Diabetes and my health

1. **The following questions are about diabetes**

	Yes	No	Don't know
1.1 Have you ever heard of diabetes or sugar disease?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Do you know anyone who has diabetes or sugar disease?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3 Does anyone in your family have diabetes or sugar disease?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. **Which of these things can cause diabetes?**

	Yes	No	Don't know
2.1 Eating lots of sugar and sweets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2 Being very fat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Eating fatty foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. **How does someone know if they have diabetes?**

	Yes	No	Don't know
3.1 They are very thirsty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2 They have to pee all the time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3 They vomit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4 They lose weight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5 They are often hungry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.6 They have sores/wounds that take a long time to heal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.7 They cannot see properly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.8 They get sick often	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. **Which of the following health problems are caused by diabetes?**

	Yes	No	Don't know
4.1 Bad eyesight or blindness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.2 Lung problems

4.3 Kidney problems

4.4 Foot problems

4.5 Heart disease

4.6 Stroke

	Yes	No	Don't know
5. Do you think diabetes can be treated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ADDENDUM G

Dietary Diversity Questionnaire

Dietary Diversity Questionnaire - 2013

Name & surname:

Gender:

School:

Instructions:

1. Please describe the foods (meals and snacks) that you ate or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink of the morning. (Freely recall what was eaten the previous day.)
2. Write down all foods and drinks mentioned. When composite dishes are mentioned, ask for the list of ingredients.
3. When the respondent has finished, probe for meals and snacks not mentioned, e.g. probe for food groups where no food was underlined (such as fruits, vegetables, etc.)
4. Probe for added foods, e.g. sugar in tea, oil in mixed dishes or fried foods.

BREAKFAST	SNACK	LUNCH	SNACK	DINNER	SNACK

5. When the respondent recall is complete, fill in the food groups based on the information recorded above. For any food groups not mentioned, ask the respondent if a food item from this group was consumed.

http://www.foodsec.org/web/publications/pubshome/pubsdetail/en/?dyna_fef%5Bbackuri%5D=%2Fweb%2F&dyna_fef%5Buid%5D=46732

Guidelines for Measuring Individual Dietary Diversity			
Question number	Food group	Examples	Yes = 1 No = 0
1	CEREALS	corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. Bread, noodles, porridge or other grain products) & insert local foods e.g. porridge or paste	
2	WHITE ROOTS AND TUBERS	white potatoes, white yam, white cassava, or other foods made from roots	
3	VITAMIN RICH VEGETABLES AND TUBERS	pumpkin, carrot, squash, or sweet potato that are orange inside & other locally available vitamin A rich vegetables (e.g. red sweet pepper)	
4	DARK GREEN LEAFY VEGETABLES	dark green leafy vegetables, including wild forms & locally available vitamin A rich leaves such as amaranth, cassava leaves, kale, spinach	
5	OTHER VEGETABLES	other vegetables (e.g. Tomato, onion, eggplant) & other locally available vegetables	
6	VITAMIN RICH FRUITS	ripe mango, cantaloupe, apricot (fresh or dried), ripe papaya, dried peach and 100% fruit juice made from these & other locally available vitamin A rich fruits	
7	OTHER FRUITS	other fruits, including wild fruits and 100% fruit juice made from these	
8	ORGAN MEAT	liver, kidney, heart or other organ meats or blood-based foods	
9	FLESH MEATS	beef, pork, lamb, goat, rabbit, game, chicken, duck, other birds, insects	
10	EGGS	eggs, from chicken, duck, guinea fowl or any other egg	
11	FISH AND SEAFOOD	fresh or dried fish or shellfish	
12	LEGUMES, NUTS AND SEEDS	dried beans, dried peas, lentils, nuts, seeds or foods made from these (e.g. hummus, peanut butter)	
13	MILK AND MILK PRODUCTS	milk, cheese, yogurt or other milk products	
14	OILS AND FATS	oil, fats or butter added to food or used for cooking	
15	SWEETS	sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies and cakes	

16	SPICES, CONDIMENTS, BEVERAGES	spices (black pepper, salt), condiments (soy sauce, hot sauce) coffee, tea, alcoholic beverages	
Individual level		Did you eat anything (meal or snack) OUTSIDE the home yesterday?	

http://www.foodsec.org/web/publications/pubshome/pubsdetail/en/?dyna_fef%5Bbackuri%5D=%2Fweb%2F&dyna_fef%5Buid%5D=46732

ADDENDUM H**Dietary Diversity Score****DDQ: Aggregation of Food Groups to create a DDS**

Question number(s)	Food group
1,2	Starchy staples*
4	Dark green leafy vegetables
3,6 and red palm oil if applicable	Other vitamin A rich fruits and vegetables**
5,7	Other fruits and vegetables***
8	Organ meat
9,11	Meat and fish#
10	Eggs
12	Legumes, nuts and seeds
13	Milk and milk products

*The starchy staples food group is a combination of Cereals and White roots and tubers.

**The other vitamin A rich fruit and vegetable group is a combination of vitamin A rich vegetables and tubers and vitamin A rich fruit.

***The other fruit and vegetable group is a combination of other fruit and other vegetables.

#The meat group is a combination of meat and fish.

FAO & European Union. Guidelines for Measuring Household and Individual Dietary Diversity: www.foodsec.org 2011.

www.foodsec.org 2011

ADDENDUM I

Post-Knowledge Quantitative Questionnaire: Grade 4 English Speaking Learner

Please put a **X** on the answer you feel **most comfortable with**.

Please answer ALL the questions.

1 Was it fun to play the Fun Food game? Admin

	Yes	<input type="checkbox"/>		Not sure	<input type="checkbox"/>		No	<input type="checkbox"/>	<input type="checkbox"/>
---	-----	--------------------------	---	----------	--------------------------	---	----	--------------------------	--------------------------

2 I will play the Fun Food Game again.

	Yes	<input type="checkbox"/>		Not sure	<input type="checkbox"/>		No	<input type="checkbox"/>	<input type="checkbox"/>
---	-----	--------------------------	---	----------	--------------------------	---	----	--------------------------	--------------------------

3 I learned something about food and health.

	Yes	<input type="checkbox"/>		Not sure	<input type="checkbox"/>		No	<input type="checkbox"/>	<input type="checkbox"/>
---	-----	--------------------------	---	----------	--------------------------	---	----	--------------------------	--------------------------

4 Playing the game was:

	Too short	<input type="checkbox"/>		Not sure	<input type="checkbox"/>		Too long	<input type="checkbox"/>	<input type="checkbox"/>
---	-----------	--------------------------	---	----------	--------------------------	---	----------	--------------------------	--------------------------

5 I'll tell my parents about the game.

	Yes	<input type="checkbox"/>		Not sure	<input type="checkbox"/>		No	<input type="checkbox"/>	<input type="checkbox"/>
---	-----	--------------------------	---	----------	--------------------------	---	----	--------------------------	--------------------------

6 Playing games like this should be part of school.

	Yes		Not sure		No	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

7 I'll play this game about food at home with my family or friends.

	Yes		Not sure		No	Admin
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

8 I learned to play the game easily.

	Yes		Not sure		No	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

9 Once I understood the game, I still needed the teacher to help me with the game.

	No		Not sure		Yes	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

10 I've played a **board game** on food before.

	Yes		Not sure		No	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

11 I've played other games on food before, e.g. computers games, card games and puzzles.

	Yes		Not sure		No	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

12 I like to learn about food.

	Yes		Not sure		No	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

13 After playing the game I think more about what I eat.

	Yes		Not sure		No	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

14 I will only play the game during school and not at home with family or friends.

	No		Not sure		Yes	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

15 Did you learn about food in school, before grade 4?

Admin

	Yes		Not sure		No	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

16 Do you think your parents/care givers know a lot about food?

	Yes		Not sure		No	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

17 How often do you eat fast food, e.g. McDonalds, Wimpy, KFC, etc.?

	Once per		2-3 times		More than 3	
	week.		per week.		times	
					per week.	
	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>

ADDENDUM J

Comments Made by the Learners from the Two Intervention Schools (IS1 and IS2)

Comments: IS1

- 1 I love the game. I learnt a lot of fruit and vegetables. thank you for teaching me fruit and vegetables.
- 2 Thank you it was a fun day for me.
- 3 I loved the game it was amazing how fun the Teacher explained so well. I understood it. I love
- 4 McDonalds/KFC But don't eat it often. THANK U Very Much
- 5 I loved the board-game. It was really fun. Thank you so much for doing it with us. From XXXX.
- 6 I liked the game ALOT. I learnt so much about food.
- 7 I really liked the game because I Learnd something like a man could drink 6 cups of water.
- 8 I love the game I learnt a lot.
- 9 I Love to eat butternut, carrots and chicken.
- 10 I Loved the monkey move.
- 11 Eat fastfood once/month.
- 12 I love this game.
- 13 Never eats fast food.
- 14 I loved playing this game. It was a great experience to learn more about food. I am definitely going to play this again. It was very risky! I want to add an apple a day so you can get 2 super cards!
- 15 Thank you for telling us about this game. I really like it. I hope I can play it again at school.
- 16 I love the game and love playing it and learn to play the game.
- 17 Thank you.
- 18 I normally have 4 narjies a day & don't have so many sweets at home.
- 19 Well the game itself is good but I think for Kids a little too many rules. And on the board there is so much things to remember. So next time not so many rules. Sincerely xxx
- 20 Well I liked the game and it was very nice.
- 21 It was very fun and I learnt a lot about food. I would love to play again.
- 22 I had a great time playing the game.
- 23 I enjoyed the game because my friend and I had lots of fun and writing was interesting. I had so much fun that my mom said when are you going to stop talking. Are you coming back because I want to do it again next year. From: xxx
- 24 thanks it was fun I learnt lots of new things thank you Love from xxxxx
- 25 The game was very nice and I hope I see the game again and my family will enjoy the game.
- 26 I like to play PSP and fun games. I also like sport.
- 27 I loved playing the game with my friends. Thank you very much. From: xxx
- 28 Thank you! I loved playing the game and I learnt a lot from the game From: xxx
- 29 I like to eat fruit and vegetables now.
- 30 I eat fast food every 2nd weekend. I do not eat fast food very much. I only get tuck every

- 31 Friday and mcdonalds for a special treat Thanx xxxx
- 32 I loved this game it was very intersting. I think it was awesome.
- 33 I really liked playing this game. Please come again soon. I really learned a lot but I learned so much that I can't say it in words!!! THANK YOU!!!
- 34 Thank you so much for letting me paly this game. I learned so much! I hope that you will come again.
- 35 Eat fast food 1 every 2 weeks. It was too much fun for words. I can't explain really how fun I had please come again soon and I love vegetables and fruit.
- 36 The game was a fun way of learning about what food you would need for your body.
- 37 Eat fast food once/month. Nothing els really! Thank you for leting me play this game. I had fun!
- 38 The game is very fun but it needs to be LONGER!!!!
- 39 I like it just the way it is!
- 40 I think it was awesome. I would like to play it again the teacher was awesome.
- 41 I learnt alot of stuff I didn't know.
- 42 To put a apple in instead of booster.
- 43 I learned more about food with this game!!
- 44 I learned quite alot!!! Could you please come and do it with us later in the year. I enjoyed playing :-)
- 45 Diary of the wimpi kid, and jugy muddy and other advenster book.
- 46 I don't eat veggies alot but the game was very fun. It also encouraged me to eat better and healthier.
- 47 I don't know yet.
- 48 I injoyed it very much.
- 49 It was lovely to play your game. It made me eat fruit and it was not boring.

Comments: IS2

- 1 I learnt that you must eat 5 diffrent fruit and vegetables everyday.
- 2 I would love to play this again. It was fun to do this. THANK YOU.
- 3 Thank you, you helped us. We learnt about fruit and about veges. Teacher can I ask you this question? Are we still going to play the game? Anyway thank you have a good day. You've all
- 4 way been a good teachr, anyway Good-bye xxx
- 5 Thank you for leting me play the game. I Injoy the game. I lerne to eat more fruit and vegetables. I loved The game so much. Xxxx
- 6 I liked the game very much but XXXX is being road and he cheets and thinks he is the boss of everything and XXXX is very hipe and stats to get lowd.
- 7 This game was very fun. I hope it will be sold in the shop.
- 8 The game was a lot of fun.
- 9 This game was very fun and I would want to play again.
- 10 I would love to play the game again. Xxxxx
- 11 Yes I do want to add, because eating your food is much healthier. Good xxx
- 12 Yes I want to read.
- 13 I learned alot about food and now I take healthy choices, thanks for teaching us. Enjoy the

rest of your day!

- 14 I enjoyed the game alot. Will we play it again?
- 15 The best game ever!
- 16 It's the best game ever.
- 17 I liked the game alot and I learnt more about food thank you for letting us play the game!! :-) I also like pup and vleis.
- 18 This was very easy! Thank you.
- 19 I really enjoyed this game it was very educational.
- 20 I did not like the game because xxxx answered all my anserws.
- 21 I think the game was very nice.
- 22 The game was not nice.
- 23 This game was very easy and I learned about all tipes of food.
- 24 Thank you for these fun games.
- 25 I liked this game vere much.
- 26 This was the best board game I ever played It is a very creative game
- 27 I loved The game.
- 28 Teacher you are a very nice teacher. I wish you could come again I will miss you very much.
Love xxxx
- 29 I love to eat my fruit & vegetable Like: carrots, apple & bananas.
- 30 Thanks the game was cool. From: x
- 31 My name is xxxx.
- 32 The game was the best.
- 33 It was very nice.
- 34 The teacher is lovelyly the game is fun
- 35 Thank you teacher for the game.
- 36 I really like this game!

ADDENDUM K

Structured-administered Post-Knowledge Quantitative and Qualitative Questionnaire for Grade 4 Life Orientation Educators

Stellenbosch University - Division of Human Nutrition
<i>Structured Questionnaire: Life Orientation Educators, Teaching Nutrition Education to English speaking Grade 4 Learners</i>

Name & Surname: _____
 School: _____
 Highest qualification: _____

Admin

Instructions: Please tick the correct answer. Please answer ALL the questions.

Your gender	Male	Female
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1. Do you teach nutrition education in Life Orientation to English speaking Grade 4 learners	Yes	No
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Please tick only one answer

2. When do you teach nutrition education to the grade 4 English learners?	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Throughout the year	
3. How many years have you taught English speaking Grade 4 learners nutrition education?	<1 year	1-2 years	2-3 years	3-4 years	4-5 years	>5 years
4. How many hours in total do you spend on the nutrition education module?	<1 hour	1-2 hours	2-3 hours	3-4 hours	4-5 hours	>5 hours

5. On average, how many minutes do you spend per lesson on nutrition education?	<15 minutes	15-30 min	30-45 min	45-60 min	>60 min	
6. How many lessons on nutrition education do you teach in a year?	1 lesson in a year	2 lessons in a year	3 lessons in a year	4 lessons in a year	5 lessons in a year	≥6 lessons in a year

Please tick only one answer

7. To how many grade 4 English speaking classes do you teach nutrition education?	1 class	2 classes	3 classes	4 classes	All classes	
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8. On average, how many grade 4 English speaking learners are in a life orientation class?	0-10	10-20	20-30	30-40	>40	
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9. Do you think there is a need for nutrition education in schools?

Strongly agree 		
Moderately agree		
Slightly agree		
Slightly disagree		
Moderately disagree		
Strongly disagree 		

10. Is nutrition education also taught in other subjects , e.g. Maths, Social Sciences, etc?	Yes	No	Don't know	
e.g. _____				

11. Do you use tools to help you with nutrition education?	Yes	No	
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12. If yes, what tools are available to help you teach nutrition education ?	
Posters	
Brochures	
Text book(s)	
Games	
Other, e.g.	_____

13. Do you think having nutrition education materials available in the classroom will enhance nutrition learning?	Yes	No
---	-----	----

14. **Who** should receive nutrition education? (Please tick all the relevant options.)

Children	
Parents	
Educators	
All of the above	
Other (specify)	e.g. _____

15. Please **tick** all the relevant tools and **rank** them according to importance with **1** being the **most important** tool.

	Yes	Importance
Posters		
Brochures		
Card games		
Board games		
Role play		
DVD		
Activity/Colouring book		
Puzzles		
An expert on nutrition		
An outing, e.g. visit a fruit & vegetable market		
Other - please specify:		

16. Is there a tuck shop at the school?	Yes	No
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17. Is there a vegetable garden at the school	Yes	No
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18. I have received nutrition education (Please tick all the options relevant to you):	
When I attended school as a learner	
When I trained as a teacher at the training institution	
In-service after completion of my studies	
Seminars/workshops	
Self-learning	
Others, please specify	

19. Where do you get your nutritional advice from? (Tick all the relevant options)	
Textbooks	
Colleagues	
Sister at clinic	
Library	
TV	
Internet	
Magazines	
Doctor	
School parents	
Pharmacy	
None of the above	
Other, specify:	

Thank you very much for your participation!

Annalien Turner

Reference: Vaal University of Technology. Faculty of Human Sciences. Research Institute of Sustainable Livelihoods. Department of Education - Nutrition Education. (Prof. W.H. Oldewage-Theron and dr. A.A. Egal, 2011).
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ADDENDUM L

Post-Knowledge Quantitative and Qualitative Questionnaire: Gr 4 Educator

Please put a **X** on the answer you feel **most comfortable with**. *Please answer **ALL** the questions.*

Admin

1. It seemed like the children enjoyed the board game.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 

2. Playing the board game is a useful tool in the class room.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 

3. Educational board games should be used more often in school

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 



4. I think the board game was:

Definitely too short 	Moderately too short	Slightly too short	Slightly too long	Moderately too long	Definitely too long 



5. In your opinion, how many times should learners play the board game for effective learning?

Everyday 	About 3-4 times per week	Once/week	Every second week	Once a month	Every 6 months or longer 



6. I will tell my colleagues about the value of an educational board game.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 



7. After playing the board game, the learners seemed more aware about food and their health.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 



8. By playing the game, learners developed other skills too.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 

9. If learners developed skills while playing the game, please give examples of these skills:



10. Board games could be a valuable tool in educating learners.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 



11. After the learners understood the board game, they could play it independently without my assistance.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 



12. If it was up to me, I would motivate for board games as a way to educate learners.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 



13. As an educator, playing games will not really increase my work load.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 

14. How can nutrition educational board games in the class room setting add value to the educator?

15. I will play the board game myself

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 

16. With an educational board game, grade 4 learners should preferable play it only in their home language.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 



17. With an educational board game, grade 4 learners could play it either in their home language or in English.

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 



18. Could playing an educational board game be regarded as “Health Promotion?”

Strongly agree 	Moderately agree	Slightly agree	Slightly disagree	Moderately disagree	Strongly disagree 

19. When will playing a nutrition educational board game **add value** in terms of an **educational environment**?

20. Could nutrition educational board games **increase nutritional knowledge** for both the **educator and the learners**? Please **motivate** your answer.

21. Do you think playing a nutrition educational board game will **change** the **perception of food and health**, for **grade 4 learners**, therefore influencing the **behaviour** toward food and health? Please **motivate** your answer.

22. Do you think the nutrition educational board games should be available only in a **school setting**, or in **both a school setting and publicly**. Please **motivate** your answer.

23. If the Fun Food Game was **always available** in your class, do you think the learners will play the game just for fun **during the year** after they have completed their class work? Please **motivate** your answer.

Thank you VERY MUCH for your cooperation!

ADDENDUM M

RULES: “FUN FOOD GAME”

Object of the game: The object of the game is to be the first player to collect three of each of the three super cards, therefore nine cards in total.

Note: There are three types of super cards in the game: “**Speedy, Shield and Muscle Man**”. Food does three “super things”. “**Shield**” represents food that protects against disease (mostly *fruit and vegetables*). “**Muscle Man**” represents food that builds your body (mostly *protein* type food). “**Speedy**” represents food that gives you energy (mostly *carbohydrate or starch* type food).

How to play the game

- Place the super cards face down on the game board at the earmarked space.
- Place the ? cards face down on the game board at the earmarked space.
- Each player selects a token.
- Place the token on the START block.
- Each player starts the game with three super cards. Don't show these cards to other players.
- Each player rolls the die once.
- The player with the highest score starts the game.
- The game is played clockwise.
- The first player rolls the die and advances with the token according to the number on the die. The die should be rolled again if a 6 is rolled.
- If a player lands on the ? block, a ? card should be drawn by the player to the left who should read it. If the answer is correct, a super card is collected. Otherwise, the card will contain a message for the player.
- If a player lands on the ↔ block, your super card(s) are swapped with the team to the left or the right, for example: the block with All ↔ R means that the player gives all his/her super cards to the team on his/her right and receives all their cards in return. The block with 1 ↔ L means that the player gives one super card to the team on his/her left and receives one card in return.
- If a player lands on the “—“ block, one super card is placed on the booster square in the middle of the board game.
- If a player lands on the Booster block, all the super cards in the middle of the board game are collected.
- If a player lands on the H₂O block, there are 2 options:
 - Drink a glass of water and collect one super card. **Note:** If teams are playing each other, each team member must drink a glass of water.
 - If a player chooses not to drink water, he/she cannot collect a super card.
- If a player lands on the 5-a-day block, 2 super cards are collected.
- If a player lands on the Skip 1 turn block, the player must sit out during the next round.
- A player collects 1 super card when he/she passes the Start block.
- Note: As soon as a player has collected three identical super cards, these cards can be banked by placing them on the table next to the game board. These cards can not be lost to opponents when this player lands on the ↔ block. If these cards are not placed on the board, they can be lost to other players.
- The winner is the first player with three “**Speedy**” cards, three “**Shield**” cards and three “**Muscle Man**” cards.

“FUN FOOD GAME – 2011”

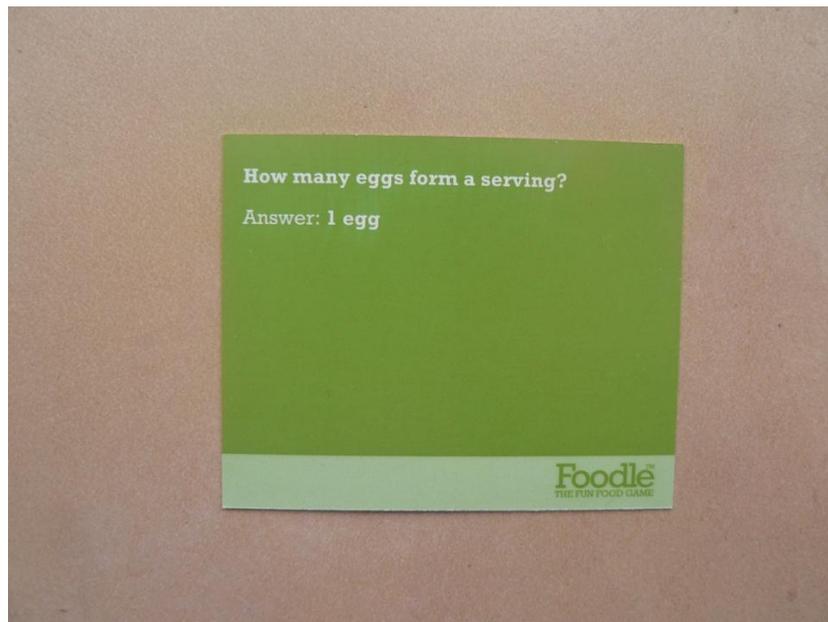
ADDENDUM N

Foodle© Cards

<p>True or false:</p> <p>Rye bread has double the amount of fiber than that of wholegrain bread.</p> <p>Answer: False</p>	<p>How many strands of spaghetti does a cup of cooked spaghetti (2 servings of carbohydrates) contain?</p> <p>A. 15 B. 32 C. 85</p> <p>Answer: B. 32</p>
<p>Which option is the best source of iron?</p> <p>A. Spinach B. Beef C. Fish</p> <p>Answer: B. Beef</p>	<p>Carrots belong to the same family as:</p> <p>A. Radish B. Parsley C. Potatoes</p> <p>Answer: B. Parsley</p>
<p>How many portions of grain products should you eat every day?</p> <p>A. 2-5 B. 6-8</p> <p>Answer: B. 6-8</p> <p>Six portions might be more than enough for a woman with a small skeletal frame. Eight portions should be the right amount for a male with a big skeletal frame.</p>	<p>True or false:</p> <p>Avocados are a good source of vitamin E.</p> <p>Answer: True</p> <p>Vitamin E is best absorbed with some fat, of which avocados are a good source.</p>

ADDENDUM O

Photo's: Foodle© Cards



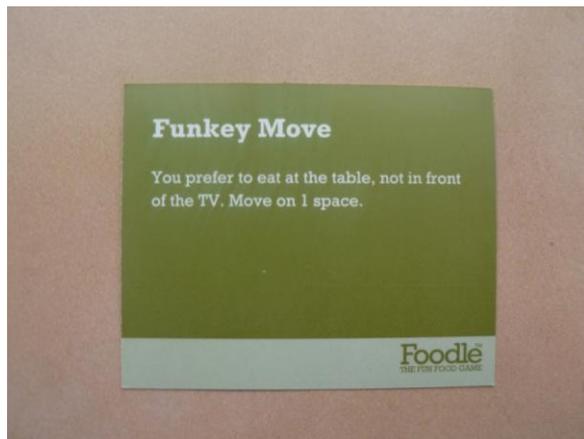
ADDENDUM P

Funkey and Monkey Cards

<p>Funkey Move</p> <p>You prefer water to soft drinks.</p> <p>Collect one super card.</p>	<p>Monkey Move</p> <p>You treat yourself to a soft drink every day.</p> <p>Place one of your super cards on the booster pack.</p>
<p>Funkey Move</p> <p>You climbed the stairs to the second floor, instead of taking the elevator.</p> <p>Collect one super card.</p>	<p>Monkey Move</p> <p>You took the elevator, instead of climbing the stairs.</p> <p>Place one of your super cards on the booster pack.</p>

ADDENDUM Q

Photo's: Funkey and Monkey Cards



ADDENDUM R

SUPERCARDS: “Speedy”, “Shield” & “Muscle Man”

