

**DEVELOPMENT OF A NUTRITIOUS, ACCEPTABLE AND AFFORDABLE  
SNACK FOOD TO PREVENT OBESITY IN CHILDREN**

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**BTech Food and Beverage Management**



Dissertation submitted in fulfilment of the requirements for the degree of Magister Technologiae in the Department of Hospitality, Tourism and PR Management, Faculty of Human Sciences, Vaal University of Technology.

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## **ABSTRACT**

**Background:** Approximately 45% of South Africans are overweight, including 20% of children under six years of age. Snack foods are now targeted in the food industry, globally, as an obesity prevention initiative, focusing on children to ensure the adoption of a healthy lifestyle from an early age.

**Objectives:** The purpose of this study was to determine the nutritional status and snack consumption patterns of children (n=290) nine to 13 years old in the Vaal Region at two purposively selected primary schools in order to develop a healthy snack food item that will address obesity in children from a very young age.

**Methods:** A baseline survey included a pre-tested questionnaire, administered by trained fieldworkers to determine snack food consumption patterns. Anthropometric measurements included weight and height. A snack food item was developed to meet certain criteria identified from the literature and baseline survey. The methods included: snack food development and preparation, chemical analyses to determine actual nutrient content, microbiological tests to determine shelf life and sensory analyses to determine acceptability.

**Study design:** Cross-sectional analytical study.

**Data analyses:** Data of the questionnaires were captured and analysed for descriptive statistics (frequencies, means and standard deviations). The anthropometric data were captured and analysed using the World Health Organisation (WHO) standards for 2007.

**Results:** The results showed that the children in the sample knew the meaning of healthy snacks, although the majority (66.8%) consumed unhealthy snacks, especially from school tuck shops. The top ten snack foods most commonly consumed daily were: coffee (48.3%), tea (46.1%), crispy chips (39.1%), fruit juice (38.0%), chicken (35.1%), fried potato chips (33.6%), carbonated drinks (26.9%),

biscuits (26.2%), toffees (26.2%) and yoghurt (25.8%). The majority (56.8%) of the respondents indicated that they receive between R2 and R5 per week for tuck shop money, besides their monthly pocket money (64.6%). Most of the respondents (45.4%) spend their pocket money on snack food items and these are mainly consumed while watching television (36.9%) and when bored (29.5%).

The anthropometric results indicated that 11.7% of the group were underweight, 12.1% of the group were stunted; in addition, 20% were at risk of underweight, and 23.4% at risk of being stunted. A significantly higher percentage of girls (16.81) were stunted compares with the boys (5.0%). Also 7.6% of the group were overweight, with 9.7% being at risk of overweight. More girls were overweight compared with boys.

A snack food item was developed to address obesity in this region. The criteria met were that it was affordable, at cost of R0.55 per 30g portion, was low in fat and had high-density nutritional value, with at least 20% of the DRI for protein and iron, had a shelf life of 28 days and was generally acceptable to the majority of the respondents.

**Conclusion and recommendations:** This study showed that obesity is becoming a problem amongst children in the Vaal Region. Although primary school children knew healthy snack foods, their behaviour indicated a large consumption of unhealthy snack foods. A low-fat, low-energy, low-cost and acceptable snack food item was successfully developed to address the obesity problem in the region. Further research is recommended where this snack food item is implemented in an intervention study to measure its impact on the nutritional status of obese primary school children.

Keywords: obesity, snacking patterns, snack food item, primary school children, tuck shops

## TABLE OF CONTENTS

<b>INDEX</b>	<b>Page</b>
ABSTRACT	iv
TABLE OF CONTENT	vi
LIST OF TABLES	xiii
LIST OF FIGURES	xv
LIST OF ANNEXURES	xvi
GLOSSARY OF TERMS	xvii
LIST OF SYMBOLS	xxi
<b>Chapter 1 The problem, its setting and overview of the study</b>	<b>1</b>
<b>1.1 Introduction and setting of the problem</b>	<b>1-4</b>
<b>1.2 Rationale and motivation</b>	<b>4-5</b>
<b>1.3 Research aims</b>	<b>5-6</b>
<b>1.4 Conceptual framework</b>	<b>6</b>
<b>1.5 Organisation of the report</b>	<b>7</b>
<b>Chapter 2 Literature synthesis: Obesity in children</b>	<b>8</b>
<b>2.1 Introduction</b>	<b>8</b>
<b>2.2 Definition of obesity</b>	<b>9</b>
<b>2.3 Measuring overweight and obesity</b>	<b>9-10</b>
2.3.1 BMI for age nine to thirteen years old	10-11
2.3.2 Growth velocity	11
<b>2.4 Prevalence of overweight and obesity in children globally</b>	<b>11-13</b>
2.4.1 Obesity in lower-income communities in the United States	13
2.4.2 Obesity in South Africa	13-16
<b>2.5 Under- and over-nutrition in South Africa</b>	<b>16</b>
2.5.1 Measuring malnutrition, underweight, stunting and wasting in children	16-17
<b>2.6 Risks associated with obesity</b>	<b>17</b>

2.6.1 Obesity and disease	18
2.6.2 Effect of obesity on self-esteem	18
2.7 Causes of childhood obesity	18-20
2.7.1 Family factors	20-21
2.7.2 Genetic factors	21
2.7.3 Health factors and behaviour	21
2.7.4 Nutritional and physical habits	22
<b>2.8 Obesity prevention and treatment</b>	<b>22-24</b>
2.8.1 Therapeutic obesity diets	24
2.8.1.1 The National Food Consumption Survey of South Africa (NFCS)	24
2.8.1.2 Food-Based Dietary Guidelines of South Africa (SAFBDG)	24-25
2.8.1.3 Integrated Nutrition Programme (INP)	25-26
2.8.1.4 Government intervention	26-27
2.8.1.5 Achievements of DoH in South Africa to promote healthy lifestyles	27-28
2.8.1.6 Parental intervention	28-29
2.8.2.7 Private sector intervention	29-30
<b>2.9 Conclusion</b>	<b>30</b>
<b>Chapter 3 Literature synthesis: Product development</b>	<b>31</b>
<b>3.1 Factors to consider in product development</b>	<b>31</b>
<b>3.2 Product development for children</b>	<b>31</b>
3.2.1 Food choices and preferences of children	31-32
3.2.2 Children's snacking patterns	32-34
3.2.2.1 Snack food types	34
3.2.2.2 Deep fat fried	34
3.2.2.3 Quick fried	34
3.2.2.4 Extrusion cooked	34
3.2.2.5 Roasted	34
3.2.2.6 Baked	35
<b>3.3 Snacking in South Africa</b>	<b>35</b>
3.3.1 Most popular snacks eaten by children	35-36

3.3.1.1 Nutritional value of snacks available on the South African market	37-38
3.3.1.2 Type of ingredients used in the development of healthy food	38-39
<b>3.4 Soy flour</b>	<b>39</b>
3.4.1 Why soy is healthy	40
<b>3.5 Quality control in product development</b>	<b>40</b>
3.5.1 Quality specifications in product development	40-41
3.5.2 Control points in product development	41
3.5.3 Good Manufacturing Practice (GMP) in product development	41
3.5.4 Hazard Analysis Critical Control Points (HACCP) in product development	41-42
3.5.5 Consumer satisfaction	42
<b>3.6 Sensory analyses</b>	<b>42</b>
3.6.1 Definition	42-43
<b>3.7 Sensory evaluation</b>	<b>43</b>
<b>3.8 The hedonic scale</b>	<b>44-45</b>
<b>3.9 Shelf life of a product</b>	<b>45-47</b>
3.9.1 Testing the shelf life of a product	48
3.9.1.1 Spoilage susceptibility	48-49
3.9.1.2 Safety concerns in bakery products	49
3.9.2 Factors influencing shelf life	49
3.9.2.1 Microbiological changes	49-50
3.9.2.2 Moisture and water vapour transfer	50
3.9.2.3 Chemical or biochemical changes	50-51
<b>3.10 Chemical analyses of food products</b>	<b>51</b>
<b>3.11 Conclusion</b>	<b>52-53</b>
<b>Chapter 4 Methodology</b>	<b>54</b>
<b>4.1 Introduction</b>	<b>54</b>
<b>4.2 Study design</b>	<b>54</b>
<b>4.3 Phase 1: Planning study design</b>	<b>55</b>
4.3.1 Initial planning and administration	55
4.3.2 Sampling strategy	55-56



4.3.3 Inclusion and exclusion criteria	56
<b>4.4 Phase 2: Baseline survey</b>	<b>56-58</b>
4.4.1 Fieldworkers	58-59
4.4.2 Measuring instruments	59
4.4.2.1 Food consumption questionnaires	59-60
4.4.2.2 Sensory evaluation	60-61
4.4.2.3 Anthropometric measurements	61
4.4.2.3.1 Weight	61-62
4.4.2.3.2 Height	62
4.4.3 Data analyses	62
4.4.3.1 Questionnaires	63
4.4.3.2 Anthropometric measurements	63
<b>4.5 Phase 3: Development of snack food item</b>	<b>63-64</b>
4.5.1 Criteria for snack food item formulation	64-65
4.5.2 Ingredients	65-66
4.5.3 Estimation of Food Composition Data Bases	66-67
4.5.4 Snack food item formulation	67
4.5.5 Experimental analyses	67-68
4.5.6 Optimisation process	68
4.5.7 Sensory evaluation	69-70
4.5.8 Shelf life testing of the snack food item	70
4.5.8.1 Microbiological analyses of the snack food item	70-72
<b>4.6 Packaging materials</b>	<b>72-73</b>
<b>4.7 Conclusion</b>	<b>73</b>
<b>Chapter 5 Results and findings</b>	<b>74</b>
<b>5.1 Introduction</b>	<b>74</b>
<b>5.2 Data analyses of results</b>	<b>74</b>
<b>5.3 Phase 1: Results of planning</b>	<b>74</b>
<b>5.4 Phase 2: Baseline survey</b>	<b>75</b>
5.4.1 Questionnaires and general information data	75
5.4.1.1 Section A: General information results	76-79

5.4.1.2 Section B: Eating and meal patterns results	79-83
5.4.1.3 Section C: Snack patterns results	83-92
5.4.1.4 Section D: Activity results	93-94
5.4.1.5 Section E: Snack food items results	94-101
5.4.1.6 Section F: Portion sizes results	101-103
<b>5.5 Money results</b>	<b>103</b>
<b>5.6 Tuck shop results</b>	<b>103-104</b>
<b>5.7 Activity results</b>	<b>104-105</b>
<b>5.8 General information results</b>	<b>105</b>
<b>5.9 Anthropometric results</b>	<b>106</b>
<b>5.10 BMI for age (wasting)</b>	<b>106-107</b>
<b>5.11 Risk of overweight</b>	<b>107</b>
<b>5.12 Height for age (stunting)</b>	<b>108-109</b>
<b>5.13 Phase 3: Results of the development of a snack food item, sensory and data analyses</b>	<b>109</b>
5.13.1 Introduction	109
5.13.1 Criteria for the snack food item	110
5.13.2 Identification of basic food ingredients and theoretical dietary content	110-111
<b>5.14 Preparation methods and changes of recipe</b>	<b>111</b>
5.14.1 Original recipe	111
5.14.1.1 Adjustment 1	112
5.14.1.2 Adjustment 2	112
5.14.1.3 Adjustment 3	112
5.14.1.4 Adjustment 4	112-113
5.14.1.5 Adjustment 5	113-114
<b>5.15 Experimental results</b>	<b>115</b>
5.15.1 Optimisation	115-119
<b>5.16 Sensory evaluation</b>	<b>119</b>
5.16.1 Sensory evaluation of the snack food item	119-120
5.16.2 Sensory evaluation of the retail product	120-121

<b>5.17 Shelf life analyses</b>	<b>121</b>
5.17.1 Shelf life results for the snack food item	121
<b>5.18 Methods</b>	<b>122-123</b>
<b>5.19 Results of shelf life analyses of the snack food item</b>	<b>123</b>
<b>5.20 Results of packaging materials</b>	<b>123-124</b>
5.20.1 Packaging material: Example 1	124
5.20.2 Packaging material: Example 2	124
5.20.3 Packaging material: Example 3	125
5.20.4 Packaging material: Example 4	125
5.20.5 Packaging material: Example 5	126
5.20.6 Packaging material: Example 6	126
5.20.7 Packaging material: Example 7	127
<b>5.21 Discussion</b>	<b>127-131</b>
<b>5.22 Findings concerning the criteria in previous studies of product development</b>	<b>131-133</b>
<b>5.23 Conclusion</b>	<b>133</b>
<b>Chapter 6 Discussion, Conclusions and Recommendations</b>	<b>134</b>
<b>6.1 Introduction</b>	<b>134</b>
<b>6.2 Implications of this study</b>	<b>134</b>
<b>6.3 Limitations of this study</b>	<b>135</b>
<b>6.4 Main findings</b>	<b>135</b>
6.4.1 Literature	135-136
6.4.2 Baseline survey	136-137
6.4.3 Product development	138
<b>6.5 Conclusions</b>	<b>138-139</b>
<b>6.6 Recommendations</b>	<b>139</b>
6.6.1 Food industry	139-140
6.6.2 Department of Health and Education	140
6.6.3 Parents of children	141
6.6.3.1 Physical activities	141-142
6.6.3.2 Tips for preparing lunch boxes	142-145

<b>6.7 Recommendations for further research</b>	<b>145-146</b>
<b>RESEARCH OUTPUTS</b>	<b>147</b>
<b>BIBLIOGRAPHY</b>	<b>148-165</b>
<b>ANNEXURES</b>	<b>166-173</b>

<b>LIST OF TABLES</b>		<b>Page</b>
Table 1	The components of shelf life	48
Table 2	Examples of methods that can be applied for the chemical analyses of the snack food item to determine the nutrient content	52
Table 3	Sample types and dates	68
Table 4	Test report 2008-s-404 methods used to do chemical analyses of the snack food item	68
Table 5	Reliability results	75
Table 6	Healthy food items and drinks, for both schools	76
Table 7	Living and travel conditions, for both schools	77
Table 8	Items available in the bedroom and sleeping habits, for both schools	78
Table 9	Portions of fruit and vegetables eaten per day, for both schools	79
Table 10	Breakfast patterns, for both schools	79
Table 11	School lunch information, for both schools	81
Table 12	Dinner patterns (family), for both schools	82
Table 13	Frequencies of different types of food eaten, for both schools	82
Table 14	Types of snack food items eaten in the afternoon, for both schools	83
Table 15	Availability of snack food items especially after school, for both schools	84
Table 16	Snack food items available at schools, for both schools	86
Table 17	Pocket money, for both schools	87
Table 18	Indicate when you eat the following items for both schools	88
Table 19	Snacking patterns of children and parents, for both schools	89-90
Table 20	Differences in meals, for both schools	91

Table 21	General question about other daily intakes, for both schools	92
Table 22	Activities of the sample group and their parents, for both schools	93
Table 23	Snack food item list – savoury snacks, for both schools	94
Table 24	Snack food item list – sweets, for both schools	95
Table 25	Snack food item list – cookies and biscuits, for both schools	96
Table 26	Snack food item list – dessert items, for both schools	97
Table 27	Snack food item list – convenience foods (Take-aways), for both schools	98
Table 28	Snack food item list – drinks, for both schools	99
Table 29	Snack food item list – sugar-free, low-fat and high-protein snacks, for both schools	100
Table 30	Portion eaten of certain snack food item at a time per meal, for both schools	102
Table 31	BMI for age of the whole sample group	106
Table 32	BMI for age cross tabulation according to gender	107
Table 33	Height for age (stunting) of the whole sample group	108
Table 34	Height for age (stunting) cross tabulation according to gender	109
Table 35	Recipes for the snack food item	111
Table 36	Theoretical calculations	114
Table 37	Experimental results	115
Table 38	Theoretical analyses	116
Table 39	Theoretical values for new improved recipe	117
Table 40	Final recipe of the snack food item and costing	118

<b>LIST OF FIGURES</b>		<b>Page</b>
Figure 1	Conceptual framework	6
Figure 2	DoH strategy	27
Figure 3	Map of Eatonside in the Vaal Region	57
Figure 4	Map of Vanderbijlpark in the Vaal Region	58
Figure 5	Respondents completing food consumption questionnaires	59
Figure 6	Weight measurements	62
Figure 7	Snack food item conceptual framework: phase 3	64
Figure 8	Snack food items available at school tuck shops	103
Figure 9	Top 20 snack food items consumed by children	104
Figure 10&11	Final ingredients used and final snack food item	119
Figure 12	Sensory evaluation results of the developed snack food item	120
Figure 13	Sensory evaluation results of the retailed snack food item	121
Figure 14	Paper canister	124
Figure 15	Dairy container	124
Figure 16	Acetate box	125
Figure 17	Acetate deli box	125
Figure 18	Zippered pouch	126
Figure 19	Multi-layer roll stock	126
Figure 20	Silver metal tin	127
Figure 21	Activity pyramid	142

<b>LIST OF ANNEXURES</b>	<b>Page</b>
Annexure A Questionnaires tested for reliability	166
Annexure B Questionnaires	167
Annexure C Hedonic scale for snack food item	168
Annexure D Hedonic scale for commercial snack food item	169
Annexure E ARC results	170
Annexure F Nutritional analyses results – FoodFinder®	171
Annexure G Invoice for statistical consultation	172
Annexure H Certificate for language editing	173



## GLOSSARY OF TERMS

AI	Adequate Intake
ARC	Agricultural Research Council
ASM	Association for System Management
ASTM	American Society for Testing and Materials
aw	water activity
<i>B. cereus</i>	<i>Bacillus cereus</i>
BDR	Burden of Disease Research
BMI	Body Mass Index
BTech	<i>Baccalaureus Technologiae</i>
Bt20	Birth to twenty
Ca	Calcium
CDCP	Centres of Disease Control and Prevention
CDL	Chronic Diseases of Lifestyle
Cfu/g	Colony-forming units per gram of sample
CMP	cytidine monophosphate
DKH	Diabetic Ketoacidosis
DNA	Deoxyribonucleic Acid
DoE	Department of Education
DoH	Department of Health
DRI	Dietary Reference Intake
DVD	Digital Versatile Disc
E	energy
EC	European Community
<i>E. coli</i>	<i>Escherichia coli</i>
<i>et al.</i>	<i>et alii</i> (meaning “and others”)
Eur	Europe
FBDG	Food-Based Dietary Guidelines
FBM	Food and Beverage Management
FDC	Food Development Centre
Fe	Iron

FGPG	Food Guide Pyramid Groups
FRNFM	Food Resource Nutrition and Food Management
g	gram
GB	Great Britain
GCAHS	German Children and Adolescent Health Survey
GM	Genetically Modified
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis Critical Control Point
HEN	Health Evidence Network
HIV	Human Immunodeficiency Virus
IASO	International Association for the Study of Obesity
IDF	International Dairy Federation
IFST	Institute of Food Science and Technology
INP	Integrated Nutrition Programmes
IP	Identity Preserved
IRI	Information Resources Incorporated
ISL	Institute of Sustainable Livelihoods
kcal	kilocalories
kg	kilogram
KIGGS	The German Interview and Examination Survey for Children and Adolescents
kJ	kilojoule
kJ/day	kilojoules per day
LED	Low energy diets
m <sup>2</sup>	square metres
Mg	Magnesium
mg	milligram
ml	millilitres
MRC	Medical Research Council
MSG	Monosodium Glutamate
n	number of respondents used for specific study
NCHS	National Centre of Health Statistics

NDEP	National Diabetes Education Program
NFCS	The National Food Consumption Survey
NFCS-FB-1	National Food Consumption Survey – Fortification Baseline
NHANES	National Health and Nutrition Examination Survey
NOHS	The National Centre for Health Organisation
NRC	Nutrition Research Centre
NW	North West Province
NYC	New York City
PC	Personal Computer
p/day	per day
PSNP	Primary School Nutrition Programme
Pty Ltd	Proprietary Limited
QC	Quality Control
QFFQ	Quantitative Food Frequency Questionnaire
QSR's	Quick Service Restaurant's
R	Rand
Re	Retinal equivalent
RVS	Respiratory Syncytial Virus
SA	South Africa
SADHS	The South African Demographic and Health Survey
SADS	The South African Demographic Survey
SAFBDG	The South African Food-Based Dietary Guidelines
SAFCD	The South African Food Consumption Database
SAFOODS	South African Food Data System
SAJCN	The South African Journal of Clinical Nutrition
SAMC	South African Medical Council
SAMRC	South African Medical Research Council
SANAS	South African National Accreditation Service
SASSO	South African Society for the Study of Obesity
<i>S. aureaus</i>	<i>Staphylococcus aureaus</i>
SAVACG	South African Vitamin A Consultancy Group Survey
SAYRAS	The South African Youth Risk Assessment Survey

SD	Standard Deviations
SES	Socio-Economic Status
SFP	School Feeding Programme
SSISA	Sports Science Institute of South Africa
THUSA	Transition and Health during Urbanisation in South Africa
‘tr’	trace
TV	television
UK	United Kingdom
UNICEF	United Nations Children’s Fund
USA	United States of America
Vit	Vitamin
Vit B	Folic acid
Vit C	Ascorbic acid
VLED	Very low energy diets
VUT	Vaal University of Technology
WC	Western Cape
WDD	World Diabetes Day
WHO	World Health Organisation
WISHH	World Initiative for Soy in Human Health
XLD (agar)	Xylose Lysine Deoxycholate (agar)
YRBS	Youth Risk Behaviour Survey
Zn	Zinc

## LIST OF SYMBOLS

$\leq$	less than and equals to
$\geq$	greater than and equals to
$\&$	and
$\%$	percentage
$\pm$	plus or minus
$^{\circ}\text{C}$	degrees Celsius
$\mu$	microgram
$>$	more than
$<$	less than

