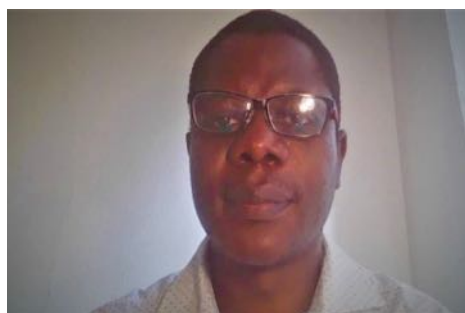


STAKEHOLDERS' IMPEDIMENTS IN PROMOTING SCHOOL NUTRITION EDUCATION IN SOUTH AFRICA: IMPLICATIONS ON YOUTH DIETARY KNOWLEDGE OF EXCESS FATS AND CARBOHYDRATES

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ABSTRACT

There is prevalence of overweight and obesity in South Africa. Evidence of nutrition knowledge and challenges affecting the promotion of nutrition interventions is needed to produce more effective strategies to prevent nutrition problems in school children. The study sought to explore challenges encountered by stakeholders of the school nutrition programme in promoting nutrition education. Furthermore, the study aimed to assess the implications of the stakeholders 'challenges on learners' dietary knowledge of excess fats and carbohydrates. The study took place in eight secondary schools in the Pinetown District, KwaZulu-Natal, South Africa. The qualitative data from nine interviewees who were stakeholders of the school nutrition programme were analysed using thematic content analysis. Quantitative data were collected from 108 grade 12 learners using self-administered questionnaires. The quantitative data was coded, collated and analysed using SPSS. Independent sample t-test was used to evaluate if there was significant difference between gender and the mean values. One-way ANOVA was used to establish if there was any significant difference between the mean values of learners' knowledge on various nutrition principles. Learners displayed inadequate knowledge of a healthy diet (34%), the importance of vegetables in the diet (71%), the health risks of excess fats (64.8%) and excess carbohydrates (77.8%), and nutritious food to be eaten daily (40.7%). Comparison of group means of various nutrition principles using one way ANOVA indicated significant difference at $p < 0.05$ level [$F(4, 528) = 43.3, P < 0.001$]. The 44 male respondents had significantly higher scores for the awareness of health risks of excess fats $t(103) = 2.6, p = 0.01$ and excess carbohydrates $t(103) = 2.7, p = 0.01$ compared to 61 females. Each food group could be listed only by less than 22% of the participants. Challenges encountered in promoting nutrition education included time constraints, lack of training on nutrition principles, lack of supporting documents and lack of nutrition principles in the curriculum. The inadequate knowledge displayed by learners and lack of training and supporting documents in promoting nutrition education indicate areas that can be targeted by intervention programmes to improve nutrition knowledge of learners and stakeholders.

Key words: nutrition knowledge, youth nutrition, nutrition interventions, mixed methods research



INTRODUCTION

Nutrition education involves various educational strategies and environmental support aimed at acquiring the knowledge, skills, attitudes and behaviour that facilitate the adoption of healthful food choices and regular physical activity [1,2]. It involves nutrient functions, food groups, how the diet should be constituted, and what happens if inappropriate quantities are consumed [3]. Furthermore, nutrition education also involves the provision of gardening knowledge and skills as learners are imparted knowledge on the dietary significance of vegetables and fruits, which they grow [4]. It includes planning meals, making food budgets, reading food labels, following a healthy diet, hand washing, food safety, healthy snacks, healthy beverages, food preparation, and kitchen safety [5,6].

The School Nutrition programme is a cheap intervention for poor resourced countries where schools and teachers are more readily available to provide nutrition education than health-care workers [7,8]. Fernandes *et al.* [9] highlight that nutrition education in the Ghana School Feeding Programme was done using posters and songs promoting healthy diets. According to Fernandes *et al.* [9], the meal planner tool in the Ghana School Feeding Programme enabled participants to learn about the nutrition value of locally available foods and to determine the quantities of foodstuffs to procure [9]. Lacey [4] claims that nutrition education can be provided through school curriculum and media campaigns. The distribution of resource materials like charts, pamphlets and posters should deliver messages on good nutrition. Furthermore, Lacey highlights that nutrition education also involves the provision of gardening knowledge and skills [4].

Several studies [4,10,11,12] have highlighted challenges in the school nutrition programme such as an unavailability of the required infrastructure, delays in the delivery of food, non-delivery of food, lack of vegetable gardens and poor monitoring. However, none of the studies known to the researcher focused on challenges of the school nutrition stakeholders in promoting nutrition education. Lack of health promoting programmes in poor-resourced countries results in many learners in these countries being affected by preventable illnesses [7,8]. Learners' ill health can lead to poor cognitive development, reduced concentration in learning, and low academic achievements [13,14].

Furthermore, a lack of nutritional education results in excess or inadequate intake of nutrients and consequently, various problems such as overweight, obesity, underweight and micronutrient deficiency. Overweight and obesity result from the excess intake of cheap, high energy, non-nutrient dense foods, and an increased consumption of sugary carbonated drinks in both high- and low-income countries [15]. Weight gain may also be a result of genetic diseases such as Prader-Willi Syndrome, which is caused by a malfunction in the part of the brain that controls feelings of fullness and hunger [5]. A lack of knowledge regarding healthy eating and physical activity among children in Mississippi Delta resulted in a number of them being obese [16]. In addition, what and how parents cook can either facilitate, or be a barrier to healthy eating [16]. This concurs with observations of Haidar *et al.* [17] of a study where an increase in parental support was positively associated with healthier dietary behaviours. Therefore, it is important for learners and nutrition education stakeholders to understand the principles of nutrition. This can be achieved through nutrition education in a school nutrition programme.



The food guide pyramid is a tool that provides standard nutrition information in the form of food groups and servings. This is a comprehensive and practical tool, useful to the general public with no training in nutrition [18]. The general food guide emphasises a variety of foods in each food group to promote a balanced diet. Health education programs can make use of the food guide to address specific nutritional problems identified to promote a healthy lifestyle among individuals.

There is a prevalence of both macronutrient and micronutrient deficiencies in developing countries including South Africa [3,19,20,21], partly due to a lack of nutritional knowledge about the food guide pyramid and healthy diet, and health risks associated with excess or inadequate intake of nutrients. In South Africa, nutrition education is one of the objectives of the national school nutrition programme aimed at addressing issues of malnutrition in poor communities [6]. However, there is a gap in evaluating the effectiveness of the programme in promoting nutrition education. In addition, relatively little research has evaluated in detail the learners' nutritional knowledge, related differences between male and female adolescents, and challenges faced by stakeholders in promoting nutrition education in schools. The gap justifies the forgoing nutrition studies in KwaZulu-Natal province's high schools. The few previous studies were localised in selected provinces and due to cultural differences, the results cannot be generalised to all provinces. The study sought to assist in finding the detail and approach by which nutrition education can be delivered. Findings can be useful to community health workers and policy makers who may want to come up with community intervention strategies that promote healthy lifestyles. The following research questions were asked: What are the stakeholders' challenges in promoting nutrition education? What are the implications of the stakeholders' challenges on learners' dietary knowledge of excess fats and carbohydrates?

MATERIALS AND METHODS

The research adopted a pragmatic research paradigm, which allowed the researcher to be free of mental and practical constraints imposed by post-positivism and interpretivism [22]. Hence, there was no restriction to a method or technique. The research was underpinned by a mixed methods research approach and a cross-sectional concurrent triangulation design. The rationale for this design was that one data collection form would supply strengths to offset the weaknesses of the other form, resulting in a holistic understanding of learners' knowledge of nutrition education. Figure 1 presents the flow diagram that summarises the methodology of the study.

Participants and Sampling Techniques

The qualitative population consisted of eight school nutrition programme (SNP) teacher coordinators, eight principals, eight service providers, and 30 food handlers in the eight secondary schools in one circuit in the Pinetown District. The qualitative sample consisted of three school nutrition programme (SNP) teacher coordinators, three principals, one service provider and one food handler who were purposively selected in terms of their duration of service in the school nutrition programme, and proximity of the school to the researcher.



The quantitative population consisted of 685 learners in grade 12 who were above 15 years of age from eight schools in a circuit in Pinetown District of South Africa. Class registers that had separate lists for male and female students in science, humanities, and commerce, were used to select the first student; thereafter, every fifth student was selected from each cluster in each school. The first student in each group was selected using random numbers by using a “Casio fx 82 ZA plus” calculator. A total of 137 participants were selected using class registers. However, some learners were not willing to participate while others did not return the parent consent forms. A total sample size of 108 learners (more than 10% of the population size) was obtained from seven of the eight schools and consisted of all the learners who returned consent forms signed by their parents.

Data collection

A semi-structured questionnaire, which was checked for ambiguity by an experienced expert was used to collect data. The instrument contained mainly simple multiple-choice questions. The instrument was pilot-tested with ten participants in a secondary school within the same location and with a similar setting to those of the target schools. The pilot test was to observe factors such as time and comprehension of questions, and was modified following the findings of the pilot test. The test-retest procedure, where sections of the research instrument were tested by being subjected to the same subjects twice to check the consistency of data, ensured reliability. The principal introduced the research to the participating learners who were assembled in one classroom at a time that was deemed to be convenient for the school. With regard to nutrition knowledge, learners were asked to rank their knowledge of healthy diet, value of vegetables, and risks of excess fats and carbohydrates on a scale of one to five, where one was the least familiar and five the most familiar. Furthermore, they had to indicate whether they had learnt about nutrition at any stage during their school career, the grade and subject in which they were taught, and list down the food groups which they knew. Regarding strategies to improve their nutrition knowledge, learners were asked to rank their level of agreement to the suggested strategy on a scale of one to five, where one was strongly disagree and five, strongly disagree.

The data were collected between June and September 2017. For qualitative data collection, face-to-face in-depth interviews were conducted using a semi-structured interview guide. The principal introduced the researcher to participants. The researcher introduced them to the study and obtained permission to record audio from each interviewee. Interviews were conducted in closed offices within the schools to maintain confidentiality of participants' responses. The time for the interview was variable for different participants due to their different time schedules. An interview guide with standardised questions was used to ensure that all questions based on each objective were completely answered and that time was not wasted on irrelevant questions. Member checking was done for the qualitative data by presenting the data and findings of the data analysis to the original participants. They were invited to give their input concerning accuracy, completeness and interpretation of the data.



Data analysis

The qualitative data from interviews was analysed using thematic content analysis. This involved transcribing and reading the data to identify and categorise data into themes and sub-themes, identifying patterns and interpreting such. Results were then presented in narrative texts. The quantitative data on the questionnaire was coded, entered into SPSS and analysed. This produced descriptive statistics: mean, standard deviations, frequencies and percentages, which were presented in texts and tables. The Shapiro Wilk test was performed to test for the normality of distribution of data. In order to evaluate if there was a significant difference between gender and the mean values, an independent sample t-test accompanied by the Levene's test for equality of variance followed. One-way ANOVA was used to establish if there was any significant difference between the mean values of learners' knowledge on various nutrition principles.

Ethical Considerations

This study was carried out in accordance with the recommendations- and with the permission of the KwaZulu-Natal Department of Education (Ref: 2/4/8/1189) after obtaining ethical approval from the Research Ethics Committee of the University of Fort Hare (Ref: MAP111SMAF01). The school principals provided suitably private venues for conducting face-to-face interviews as well as agreeable time and venues for learners to complete the questionnaire. Learners' parents were given consent forms and only learners with signed parent consent forms were allowed to participate in the study. All participants also provided written informed consent and assent in accordance with the Helsinki Declaration.

RESULTS AND DISCUSSION

Demographic data

Learners' biographic characteristics surveyed were gender, age and the number of years spent by the learner in the same school. Of the total number of participants, 45 were male and 63 were female, giving a total sample size of 108. The majority (96) were in the 15-20 age group, while eight were in the 21-25 age group. Many respondents (28) were in the same school for three or four years. A large proportion of learners (76, making up 70.4% of the sample) had been in the same school for at least three years. The data indicates that most learners were in the same school for at least three years, giving a higher probability of more valid responses based on observations made over a long time period.

Results from the questionnaire on learners' exposure and familiarity to nutrition education issues

Of the sample, a relatively large proportion of learners 52 (48.1%) indicated that they had learnt about nutrition previously, while a smaller proportion 21 (19.4%) indicated that they had not previously learnt about nutrition (Table 1).

Most respondents 56 (51.7%) were taught nutrition education at primary school, while similar numbers 22 (20.4%) were taught in grades eight and nine. There was an indication that nutrition is not being taught in grades 11 and 12 [≤ 2 (1.9%)]. Some respondents 69 (63.9%) and 35 (32.4%) indicated that they were taught nutrition education in Life



Orientation and Life Sciences, respectively. It was also quite surprising that most respondents in grade twelve were not able to mention the food groups of the food guide pyramid. Only a small proportion of the sample, 21 (19.4%), was able to mention protein as one of the food groups and 19 (17.6%) were able to mention the bread, cereal and pasta groups. A very small proportion of the respondents were able to mention fruit, 5 (4.6%), vegetables, 8 (7.4%), milk, 1 (0.9%) and fat, 10 (9.3%) as the other food groups that are important to provide important nutrients to the body. Generally, learners had inadequate nutrition education knowledge.

Table 2 indicates that learners were least familiar with the principle of the value of vegetables in the diet (Mean=1.5, SD=1.6). The results, however, single out a healthy diet (Mean=3.6, SD=1.4) and health risks of consuming excess fats (Mean=3.3, SD=1.5), and carbohydrates (Mean=3.5, SD=1.3) as principles with which, relative to other principles, most learners were familiar. The overall mean of 2.6 indicates that most of the learners lacked adequate knowledge of the nutrition principles. This finding further supports the results obtained in Table 1 presented in the previous paragraph. Comparisons of the mean values of learners' knowledge of various nutrition principles using SPSS revealed that there was a significant statistical difference between the group means as determined by one-way ANOVA at $p < 0.05$ level [$F(4, 528) = 43.3, P < 0.001$].

Assumption of normality was evaluated using Shapiro-Wilk Test on SPSS and was found tenable for all groups ($p > 0.05$), hence the parametric test (Independent Sample-t-test) was used to conduct the test for the difference between mean values of awareness to various nutrition education principles for males and females. Levene's test for equality of variance was also found to be tenable for all groups ($p > 0.05$) except the group that assessed the learners awareness of the importance of vegetables in the diet ($p = 0.01$) where unequal variance was assumed (Table 3).

The t-test results (Table 3) indicate that there was no significant effect for sex, $t(104) = 1.4, p = 0.15$ despite males ($M = 3.9, SD = 1.4$) attaining higher scores for awareness of balanced diet than females ($M = 3.5, SD = 1.5$). The independent sample t-test also revealed no significant effect for sex, $t(104) = 1.3, p = 0.21$ where the scores of the food nutritional value awareness by males ($M = 3.3, SD = 1.2$) appeared to be higher than females ($M = 3.0, SD = 1.3$). A similar conclusion is true for the variable about the learners' awareness of the importance of vegetables in the diet.

On the contrary, the 44 male respondents ($M = 3.7, SD = 1.5$) compared to 61 female respondents ($M = 2.9, SD = 1.5$) had significantly higher scores for the awareness of the health risks of fats, $t(103) = 2.6, p = 0.01$. The same group of male respondents 44 ($M = 3.9, SD = 1.3$) compared to the group of female respondents 61 ($M = 3.2, SD = 1.3$) also had significantly better scores for the awareness of the health risks of excess carbohydrates, $t(103) = 2.7, p = 0.01$.

This study is one of the few studies that examined the nutritional knowledge and challenges encountered in promoting nutrition education in KwaZulu-Natal, South Africa. The study findings revealed the learners' lack of nutritional knowledge evidenced by very low percentages of respondents who could list the basic food groups of the food

guide pyramid. This is consistent with a study conducted by Saribay and Kirbas [23] in Sanliurfa, where 65% of the adolescent learners had a low level of nutritional knowledge with only 35% having an adequate level of nutritional knowledge. Furthermore, the studies among primary school children in Tshwane Metropole, South Africa, in Slovenia, as well as secondary school children in Nigeria, displayed similar results [24,25,26]. This validates the need for adequate nutrition education at both the secondary and primary school levels. In fact, few studies [27, 28] revealed that adolescent learners had adequate knowledge about a balanced diet, mainly due to the curriculum that included nutrition education not being taught to learners [27, 28]. In instances where most of the principles are only taught at primary school, it is possible that learners may not remember most of the concepts by the time they leave high school. Observations in China affirm that teaching nutrition knowledge to adolescents improves their knowledge and attitude towards food [29].

This study showed that males were significantly more aware of the health risks of excess fats and carbohydrates than their female counterparts. The studies on adolescents in Turkey [30] and Nigeria [26] revealed that the nutritional knowledge scores of female students were significantly higher than their male counterparts. This contradicts the current study's findings. In some cultures, females are mostly involved in deciding what food to purchase and prepare for the family hence, their lack of adequate knowledge on some nutrition principles may put the whole family at risk. It is imperative to improve the knowledge of adolescents in South Africa, where studies conducted in various rural and urban settings indicate an overall increase in the prevalence of overweight and obesity [31].

Challenges faced by stakeholders in promoting Nutrition Education

(The following abbreviations will be used in this section-KEY: PC, PD, PE=Principal of School C, D & E; TB, TC, TD = Teacher coordinators of Schools B, C & D; FD = Food handler of School D; SG = Food supplier of school G.)

Findings from interviews reflected different challenges faced by the stakeholders of the school nutrition programme in promoting nutrition education. The data from participants indicated that teachers were too busy to teach nutrition education that was not part of the curriculum in most grades. One of the teacher coordinators expressed:

There is a challenge of time in terms of promoting nutrition education amongst the learners because educators wouldn't get much time to train learners on nutrition education because they have other work to do (PC).

It is crucial for stakeholders to have the knowledge of nutrition education. In instances where stakeholders lack such information, it will be difficult to convince learners to eat food items like soya mince, which are not common in their homes. One of the participants highlighted the lack of nutrition knowledge among key role players in the programme. He bemoaned:

The coordinators themselves were not trained and do not know about nutrition education, so nutrition education is not being taught to learners (SG).



Teaching of nutrition education must be accompanied by supporting materials such as charts and relevant books or videos to assist teachers in imparting nutrition knowledge to learners. Such supporting materials were not available in most of the schools. One of the participants noted:

There are no materials or documents available to support nutrition education among learners. There is no school-based support to promote good eating habits (TD).

The unavailability of materials on nutrition education was also echoed by another participant who indicated that learners' food choice was sometimes determined by the weather conditions.

For learners to willingly eat a particular type of food, they need to be familiar with that food. Alternatively, knowing the value of a food item may be important if one has to eat a type of food that is not common in one's diet. Due to absence of nutrition education to most learners, they were unlikely to be familiar with the importance of different food types. One of the participants had this to share:

In GET and FET, there are theories of other issues not nutrition education principles (TC).

With regards to challenges encountered in promoting nutrition education, the study's participants revealed that nutrition education coordinators were not trained on nutrition education, making it difficult for them to guide learners on nutrition issues. This is inconsistent with a study conducted by Ottoni *et al.* [32] in Brazil where most towns and cities trained employees in good cooking practices and in healthy eating. A number of teachers and school staff were also trained in nutrition education. Additional to time constraints among teachers, materials and documents were not available to support nutrition education in the schools [32]. This is consistent with the results in Bronkhorstspuit in South Africa, where time constraints among teachers and lack of resources for teaching nutrition education was observed [28]. Providing learning support is consistent with theories of motivation and learning in terms of insight offered into the psychological traits of learners that foster greater academic engagement in learning the nutrition principles [33]. However, effective support can only be obtained by incorporating nutrition education into the curriculum [34]. This has the effect of reducing the prevalence of malnutrition in South Africa [5,19,20].

Respondents' and Participants' views on how to improve learners' nutrition awareness

The results in Table 4 indicate that 81, a large proportion of the respondents (75%), were convinced that nutrition education can be improved by incorporating the nutrition principles into the curriculum. The results concurred with the participants' views, indicating further that Life Orientation teachers – stakeholders of the school nutrition programme – must be involved in promoting healthy eating by teaching various principles to curb a number of nutrition-related chronic infections. The results from both participants and respondents (more than 80%) indicate that the health promotion can be



done at school-, cluster-, or district level- where nutritionists may join the community to promote healthy eating.

In this study, respondents and participants observed that nutrition education principles are not adequately included in the high school curriculum, especially in grades 11 and 12. A study by Ottoni *et al.*[32] revealed that nutrition education was included in the school curricula in most schools in Brazil and some had cooking workshops in preparation of fruit and fruit salad, food from the school garden and traditional regional meals, contradict to our findings in this aspect. Due to the lack of adequate nutrition knowledge by students, and an unavailability of these principles in the curriculum, study participants and respondents were of the view that nutrition education principles should be incorporated across the curriculum. This view is supported by the study observations by Kivrak and Altin in Turkey where nutritional knowledge and attitudes of students who received elective nutrition classes were found to be significantly higher than those who did not have nutrition classes [30].

With regards to support in nutrition-related practices, the study found that participants and respondents supported the involvement of parents in promoting nutrition education. Of great interest, however, are the results of the study with regard to strategies of improving nutrition knowledge, where the majority, 95 of learners (87.9%) and participants had a common view that nutrition education competitions among learners facilitated by teachers and community members, were important in enhancing learners' nutrition knowledge. Several studies indicate that nutrition intervention programmes that involve parents are effective because parents influence family members' food preferences and food availability at home [28,35,36]. Furthermore, previous studies revealed that school teachers play an important role in improving the effectiveness of school-based intervention programmes by positively influencing eating patterns through social interactions [37].

Children who learn about healthy nutrition in school can be change agents that influence the purchase and consumption of healthy foods by their parents [38]. The school nutrition education has the potential to reduce nutrition related diseases like diabetes that can undermine prospects of sustained economic growth in the emerging economies like that of South Africa [28].

CONCLUSION

Findings from the study revealed that learners lacked the basic knowledge of balanced diet, health risks of excess carbohydrate and fats intake, and the importance of vegetables in the diet. With regard to challenges in promoting nutrition education, stakeholders of the school nutrition programme did not have adequate training and knowledge of nutrition education, teachers did not have time to teach nutrition education to learners and there were no resources to support nutrition education which was not in the school curriculum. These results highlight the need to incorporate nutrition education into the high school policy documents and to ensure that preservice teachers are adequately equipped with the necessary nutrition knowledge relevant for the high school learners. More so, there is a need to provide nutrition education supporting materials that will



assist both stakeholders and learners. Efficacy studies to gain insights into the content of nutrition education in the high school curriculum, to whom and how the content is taught, are essential to clearly understand the knowledge deficiency among learners. Nutrition education intervention programmes in South Africa should be based on South African food-based dietary guidelines and should address issues of the variety of foods in each food group, hygiene and sanitation, starchy foods as the bases of meals, and eating plenty of vegetables and fruits every day.

Ensuring that all students have the necessary nutrition knowledge requires comprehensive examination of the curricula in both primary and high school. Future research can examine nutrition content in both primary and high schools, and how teachers teach the concepts. There is a need to explore whether teacher training institutions are imparting the relevant and adequate nutrition knowledge skills to teachers that will enable them to transmit their knowledge onto learners. The approach used in this study could be replicated in different provinces, in schools with various socio-economic profiles.

If further research confirms the lack of nutrition knowledge among high school learners, the high school Life Orientation curriculum may warrant re-evaluation. Including nutrition principles in the Life Orientation curriculum policy document may have a significant impact in improving learners' knowledge. Intervention programmes in schools and social media may also help to improve learners' understanding of the principles. Health promotion media such as videos, posters or songs should be made available in schools. Nutrition education in schools could contribute in increasing the country's gross domestic product due to the reduction of chronic diseases among the population.



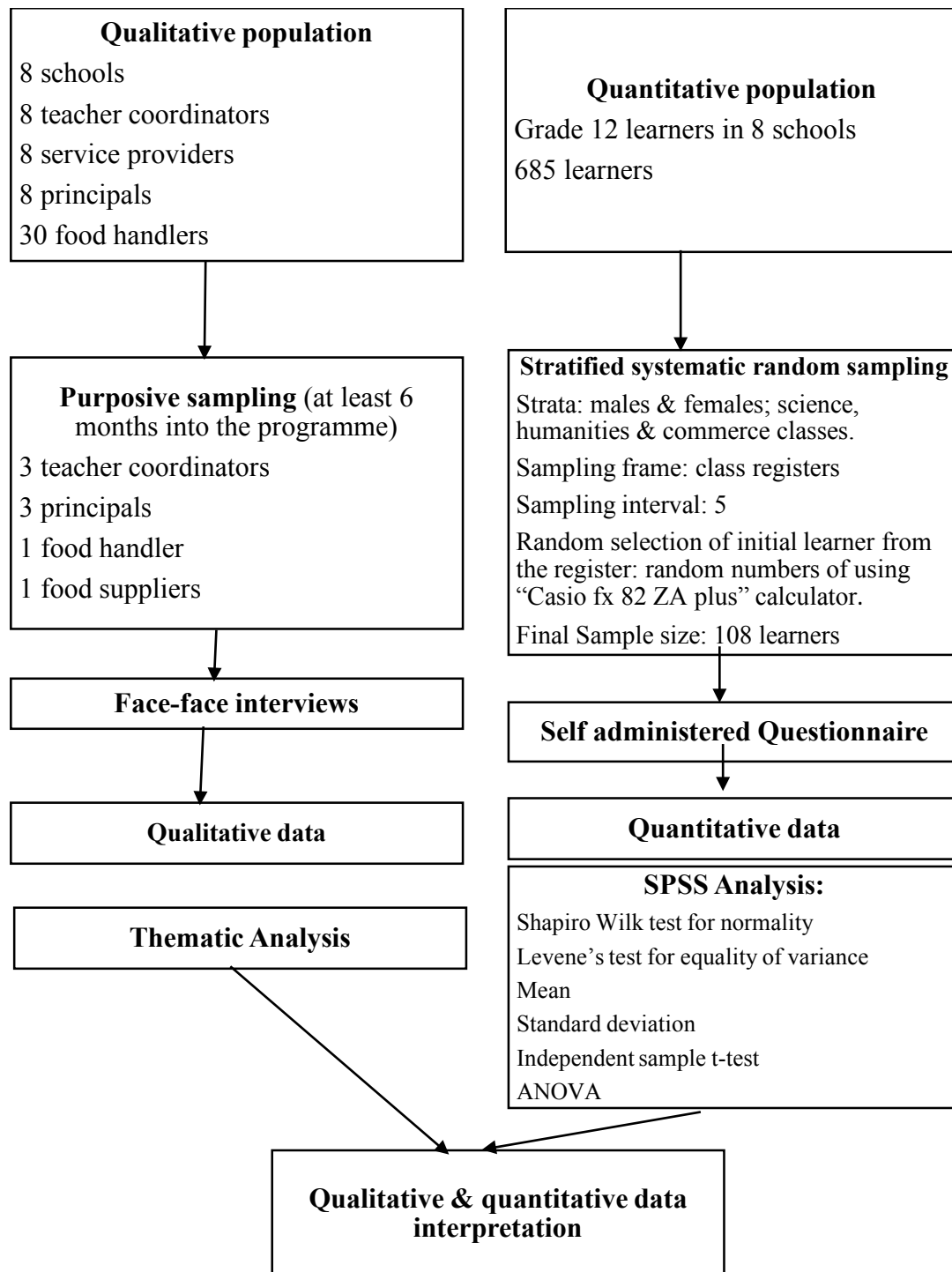


Figure 1: Flow Diagram Summarising the Research Methodology

Table 1: Learners' school exposure on nutritional education issues (percentages are in brackets)

Nutrition education principle	Learners' responses						
	Yes		No		not sure		No response
Learnt about nutrition	52 (48.1)		21 (19.4)		21 (19.4)		14 (13.0)
Grade in which learners were taught nutrition education issues	8	9	10	11	12	Primary school	
No. & % of learners taught	22 (20.4)	22 (20.4)	19 (17.6)	2 (1.9)	1 (0.9)	56 (51.7)	
Subjects that taught nutrition education	Life Orientation		Nutrition programme		Life Sciences		
No. & % of learners taught in that subject	69 (63.9)		1 (0.9)		35 (32.4)		
Food groups that learners were aware of	Protein	bread/cereals & pasta	Fruits	vegetables	Milk	Fats	No response
No. & % of learners aware of that food group	21 (19.4)	19 (17.6)	5 (4.6)	8 (7.4)	1 (0.9)	10 (9.3)	44 (40.7)

Table 2: Learners' familiarity with issues of nutrition

Nutrition issue	Learners' Familiarity to the nutrition issue							Mean	SDEV
	EF 5	MF 4	SWF 3	SLF 2	NF 1	No respo nse	Total		
A healthy diet	43 (39.8)	22 (20.4)	13 (12.0)	12 (11.1)	12 (11.1)	6 (5.6)	108 (100%)	3.6	1.4
Importance of vegetables in the diet	24 (22.2)	16 (14.8)	12 (11.1)	13 (12.0)	42 (38.9)	1 (0.9)	108 (100%)	1.5	1.6
Healthy risks of excess fats	23 (20.4)	12 (10.6)	16 (14.2)	23 (20.4)	31 (27.4)	3 (2.8)	108 (100%)	3.3	1.5
Healthy risks of excess carbohydrates	14 (12.4)	7 (6.4)	29 (27.6)	26 (24.8)	29 (27.6)	3 (2.8)	108 (100%)	3.5	1.3
Nutritious food to be eaten daily	36 (33.3)	22 (20.4)	15 (13.9)	12 (11.1)	21 (19.4)	2 (1.9)	108 (100%)	3.1	1.5
	Overall mean							2.6	

Key: EF=Extremely familiar; MF= Moderately familiar; SWF= Somewhat familiar; SLF=Slightly familiar; NF=Not familiar at all; SDEV= Standard deviation

Learners responded by ticking on a Likert scale: 1 Not familiar, 2 slightly familiar, 3 somewhat familiar, 4 moderately familiar and 5 extremely familiar. The data was entered on SPSS which computed the mean scores and standard deviations for all variables in Table 2

Table 3: Learners' awareness by gender of various nutritional issues and independent sample t-test for equality of means

	gender	N	Mean	Std. Deviation	Levene's test for equality of variance Sig.(2tailed)	Independent Sample-t-test Sig.(2tailed)
Awareness of balanced diet	male	45	3.9	1.4	0.39	0.15
	female	61	3.5	1.5		
Awareness of the importance of vegetables in the diet.	male	45	1.5	0.6	0.01	0.72
	female	61	1.6	1.3		
Awareness of risks of too much fat	male	44	3.7	1.5	0.82	0.01
	female	61	2.9	1.5		
Awareness of the risks of too much carbohydrates	Male	44	3.9	1.3	0.85	0.01
	Female	61	3.2	1.3		
Awareness of the nutritional value of food	Male	45	3.3	1.2	0.99	0.21
	Female	61	3.0	1.3		

Both the Independent Sample-t-test and Levene's test for equality of variance were conducted at 5% significance level

Table 4: Respondents and participants' views of how learners' nutrition knowledge can be improved

Quantitative data	Qualitative Data
81 (75%) of the respondents were of the view that there should be a compulsory subject in the school curriculum which teaches and assess nutrition education.	<i>There should be subjects that teach them. They should be taught in the school nutrition programme. They should be taught in classes about nutrition. All teachers should be involved (TD).</i> <i>That nutrition section should be in the Life Orientation curriculum in grade 8 (PD).</i> <i>All the learners deserve some form of support in nutrition education. Diet and food guide pyramid are the most important principles (PE).</i>
81 (85.0%) of the learners suggested that school nutrition programme stakeholders need to recognise and acknowledge their role in promoting good eating habits.	<i>It is important for the stakeholders to participate in promoting nutrition education (PE).</i> <i>Teachers must teach learners about healthy eating habits. This will help them to avoid fatty foods which can make them sick (FD).</i> <i>Stakeholders, especially parents and the teacher coordinator have to play a very important role in promoting nutrition education (PD).</i>
95 (87.9%) of learners wanted nutrition education competitions to be organised and conducted at school level to assist learners to make good food choices.	<i>Each morning you can have a topic to talk about such as hygiene and healthy eating. They must emphasise the importance of the food provided in the NSNP and the disadvantages of fatty foods (TC).</i> <i>They must also be taught during assembly time where they must be given information of nutritious food items provided in the programme (TB).</i>
87 (80.6%) supported the inclusion of nutrition education competitions at cluster level while 90 (83.4%) suggested that the competitions should be held at district level.	<i>Learners may have education excursions that are well planned so that the presenter will talk about aspects on nutrition. They must be taught the basic knowledge of food groups, eating habits and drinking of water. A person from the nutrition sector or a dietician can address learners on nutrition (PD).</i>

KEY: PC, PD, PE=Principal of School C, D & E; TB, TC, TD = Teacher coordinators of schools B, C & D; FD = Food handler of school D; SG = Food supplier of school G

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