



# Nutrition knowledge of food handlers for National School Nutrition Programme (NSNP) in Esikhaleni and Kwa- Dlangezwa schools

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## Abstract

Adequate nutrition knowledge is needed when purchasing and preparing balanced meals. Balanced meals are essential for body maintenance, growth proliferation and general well-being. Poor nutrition knowledge may affect dietary interventions and compromise the purpose of the National School Nutrition Programme (NSNP). The aim of this study was to investigate nutrition knowledge of food handlers in public schools participating in NSNP. A Purposive sampling method was used. Eighty-nine (n=89) respondents were interviewed across twenty-eight schools in Esikhaleni and Kwa-Dlangezwa areas of KwaZulu Natal. Questionnaires were used for data collection. Data were analyzed using SPSS (version 24) to obtain frequencies, percentages, and descriptive statistics. Results showed that only 2.2% (n=89) of respondents could correctly identify the different food groups. Identification of nutrients sources by respondents was generally inadequate as 36.0% (n=89) could identify protein 7.9% (n=89) carbohydrate, 33.7% (n=89) fat and oil, 5.6% (n=89) for vitamins and mineral and 32.6% (n=89) for the best energy sources from the lists provided. Majority of respondents (76.40%; n=89) have never had nutrition training despite working with the NSNP for many years. In conclusion, nutrition knowledge of NSNP food handlers needs improvement and regular nutrition education needs to be provided.

Keywords: Food, food handlers, nutrition knowledge, nutrients and NSNP

## Introduction

Nutrition knowledge is the knowledge of nutrients and foods (Gruner, Wills, Celemín, Lähteenmäki, Scholderer, and Genannt Bonsmann, 2012) Foods are edible substances containing nutrients required for growth and normal body functions. Some foods are cooked to improve the nutritional quality (legumes, grains, fish and much more) while some are (fruits and vegetable) mostly consumed in their raw state (Winkler and Turrell, 2010). Foods originates from plant and animal sources which essentially, contain nutrients such as carbohydrate, protein, fat, minerals and vitamins. Foods are consumed for energy production, life prolongation and grow progression (Brown, 2014).

Good nutrition knowledge is a rudiment (Dickson-Spillmann and Siegrist, 2011) for healthy living. Therefore, adequate nutrition knowledge is needed when purchasing and preparing balanced meals (Kaliamoorthi, 2013). Apart from purchasing and preparing meals, nutrition knowledge is extremely useful in an intervention programme. It provides a baseline in addressing nutrition needs of different age groups in the population. However, poor nutrition knowledge affects food



choices, dietary interventions and possibly can compromise (Baydoun and Wang, 2008) the purpose of National School Nutrition Programme (NSNP). One of the purposes of establishing NSNP is to address micronutrient deficiencies (van Stuijvenberg, 2005) among school-aged children. A food handler or the cook working for NSNP needs to know the various nutrients content of each food type, proper application derived from great ideas and benefit maximisation (Kaliamoorthi, 2013). Failure to acquire potential and competent nutrition knowledge by food handlers of NSNP may jeopardise addressing the micronutrient deficiencies, one of the crucial aims of NSNP that have been widely neglected (van Stuijvenberg, 2005). However, unknowledgeable food handlers could be valid and reliable in NSNP if given necessary mentoring such as working alongside with professionals among others (WHO, 2008). In recent times, poor nutrition knowledge and general practices in handling foods are alarming (Beydoun and Wany, 2008). Therefore, an investigation is essential for proper dissemination and utilisation of nutrition knowledge among food handlers for National School Nutrition Programme (NSNP).

NSNP was implemented on the basis of addressing short-term hunger and alleviating malnutrition. Primarily, as a vehicle used in transporting micronutrient to school-aged children (van Stuijvenberg, 2005). In line with this objective, it is paramount that food handlers for NSNP are knowledgeable in food ingredients/nutrients and optimum diet that addresses the dietary needs of the age groups in question (Popkin, Adair, and Ng, 2012).

### **The purpose of NSNP in South African schools**

National School Nutrition Programme (NSNP) was introduced on a national scale in South Africa in 1994 (van Stuijvenberg, 2005). The main purpose of NSNP is to improve the quality of education and general health by increasing learning ability, mitigating short-term hunger, improving school attendance and punctuality and as a vehicle for transporting micronutrient to school aged children (Jomaa, McDonnell and Probart, 2011). NSNP consist of three components, namely: (1) school feeding, with the aim to reduce short-term hunger by providing nutritious meals to learners, thus enhancing the child learning capacity; (2) nutrition education to improve nutrition knowledge as well as healthy lifestyles among schools and (3) sustainable food production initiatives to provide knowledge and transfer skills to schools and communities, thus improving household food security (Faber, Laurie, Maduna, Magudulela and Muehlhoff, 2014). On one estimate, 5 million children in 15,000 schools are annually fed from this program (van Stuijvenberg, 2005). In combating malnutrition, the South African democratic government in 1994, formulated and adopted an Integrated Nutrition Strategy in terms of the Department of Health's White Paper for Transformation of Health in South Africa (Labadarios, Mchiza, Steyn, Gericke, Maunder, Davids and Parker, 2011), and later handed over to the Department of Basic Education (DBE) in 2004 (Faber et al., 2014).

The nutritional status of school-aged children impacts their health, cognition, and subsequently their educational achievement (Best, Neufingerl, van Geel, van den Briel and Osendarp, 2010). The potential long-term societal impact of the intervention, such as reducing poverty and diminishing disparities between socio-economic groups are also inclusive in adequate nutrition intervention package (Walke, Wachs, Grantham-McGregor, Black, Nelson, Huffman, Baker-Henningham, Chang, Hamadani, Lozoff, and Gardner, 2011). Yunusa, Gumel, Adegbusi, and Adegbusi (2012) commended on school feeding as the medium used in reducing malnutrition prevalence among school-aged children particularly, those from poor homes. School meals and snacks assist in developing the child feeding patterns providing, one-third to half of many students' daily nutritional needs (Briggs Safaii and Beall, 2003). The school is an opportune setting to provide health and nutrition services to disadvantaged children. School-aged children



are usually neglected during health and nutrition surveys; therefore, school feeding presents a medium to reach out to this age group (Bundy, 2009; Best et al., 2010).

However, Malnutrition is a global peril that still persists especially in the developing nations (De Onis and Blössner, 2000; Troesch, van Stuijvenberg, Smuts, Kruger, Biebinger, Hurrell, Baumgartner and Zimmermann, 2011), impacting negatively on the health, development and educational achievement of the children. This highlights the importance of nutrition interventions targeting school-aged children in transition countries (Faber et al., 2014). Malnutrition is presented as under nutrition (stunting and wasting) or overnutrition (obesity and overweight). The former is persistently, prevalent among school-aged children (Mian, Ali, Ferroni, and Underwood, 2002). South Africa experiences the double burden of undernutrition and overweight in its populace. A national survey showed that 20.7% of 1- to 9-year-old children were stunted, 8.1% were underweight, 5.8% were wasted, and 14.0% were either overweight or obese. Overweight/obesity increases progressively as children become older, and the second national youth risk behaviour survey showed that 20% of secondary school learners were overweight and 5% were obese (Faber et al., 2014). It is well documented that malnutrition deficiency during the school years can inhibit a child's physical and mental development. Stunting (low height-for-age) is associated with long-term consequences, such as impaired intellectual achievement and school performance and also leads to a reduction in adult body size and, subsequently, reduced work capacity and obstetric complications (Flores, Macías, Rivera, Barquera, Hernández, García-Guerra, and Rivera, 2009; Best et al., 2010).

### **Dietary determinant of school-aged children**

Over the past several decades, increased purchases of convenient, less healthful away-from-home food, have negatively affected the nutritional quality of children's diets and make it more difficult to meet current dietary recommendations (Fulkerson, Kubik, Rydell, Boutelle, Garwick, Story, Neumark-Sztainer, and Dudovitz, 2011). Most times, children are compelled to eat the provisions made available as they are dependent on others. In emerging countries, the most consumed foods are carbohydrate-based with low intake of fruits and vegetables. Just over half (51%) eat less than one serving portion of fruit a day and 29% eat less than one serving of vegetables a day (Briggs, 2010). Similarly, the majority of the South African population consumes a predominantly cereal-based diet, with a low intake of foods of animal origin, vegetables and fruit, a diet which is thus lacking key essential micro-nutrients (Faber et al., 2014).

However, it is generally believed that children's dietary preferences are environmental and availability based, especially fruits and vegetables whose consumption has been described to be low for school-aged groups (Timperio, Ball, Roberts, Campbell, Andrianopoulos, and Crawford, 2008). A number of school-based interventions aimed at modifying the dietary guidelines of meals and increasing exercise and physical activities of school-age children have been instituted for dietary intake enhancement (Hesketh and Campbell, 2010). These interventions should focus on changing wrong and unhealthy dietary behaviours. Schools have been a popular setting for implementation of interventions, as they offer continuous, intensive contact with children (Brown and Summerbell, 2009).

### **Nutrition knowledge of food handlers**

Concerns about nutritional foods have placed a great deal of attention in recent times (Poti and Popkin, 2011). Professional and knowledgeable persons could make a great deal of difference in purchasing appropriate ingredients, healthy methods of preparation, and dietary needs of target groups (Baydoun and Wang, 2008). In order to maintain and be useful food handlers for NSNP,



further improvement in food nutrients and health consciousness is needed by means of different innovations (Guerrero, Guàrdia, Xicola, Verbeke, Vanhonacker, Zakowska-Biemans, Sajdakowska, Sulmont-Rossé, Issanchou, Contel and Scalvedi, 2009). Improved and advanced technology for food storage preparation and cooking that will be result-oriented is required by knowledgeable and skilful food handlers for effective service delivery (Chenhall, 2010). Meal planning is another advantage in effective service delivery. It strategies planning and optimized dietary quality served to school-aged children. A weekly meal planning update is encouraged as a curiosity for recent or modern planning further enhances nutrition knowledge of food handlers (Fulkerson, Story, Neumark-Sztainer, and Rydell, 2008). However, appropriate meal planning for unknowledgeable food handlers remains a concern. Wrong dissemination of nutrients cannot be ruled out in such instances but occasionally, unknowledgeable cooks or learner can work alongside professionals. By so doing, they invariably gain the knowledge and skills necessary in meal planning, purchasing sound food items, preparing healthy and flavourful foods that nourishes and satisfies the consumers (Condrasky, Baruth, Wilcox, Carter and Jordan, 2013).

### **Nutrition Education**

Nutrition education is an essential tool for dissemination of nutrition knowledge (Wilkins, 2007) Propagation of nutritional knowledge is a valued and extensively acknowledged precautionary degree to reduce the occurrence and commonness of chronic (non-communicable) illnesses in a populace (Schönfeldt, Hall and Bester, 2013). Several media, including dietary guidelines, nutrition manuals, food pyramids and a nutrition programme educator can be used to enhance the nutrition knowledge of either individuals, an organization or the public.

As stated by Stehle (2007), food pyramid and food-based dietary guidelines are means of propagating viable nutritional information to individuals or the public. A Food Guide Pyramid is a positive novel mechanism that inaugurates new education programmes. It is used in translating dietary standards and recommendations into simple nutrition education tools (Wilkins, 2007). Although, a food guide pyramid forms the foundation for the general population, it could equally be adapted by professionals to address the nutritional needs of different age groups. Cowell, (1999) asserts that it is an invaluable resource helping caregivers responsible for feeding school-aged children understand those foods that are healthful as well promoting health using contemporary message and knowledge. It is achievable for the consumers and the health experts to get gender- and age-specific systematic information as well as authorized tools for effective nutrition education.

The South African Food-Dietary Guideline (SAFBDG) is another tool necessary for adoption by NSNP food handlers. The South African food-based guidelines comprise of locally available nutritious foods capable of assisting food handlers formulate menus for school feeding (Schönfeldt et al., 2013). The guidelines include: (1) Enjoy a variety of foods (2) Make starchy foods the basis of most meals (3) Fish, chicken, lean meat and eggs can be eaten daily (4) Eat plenty of vegetables and fruits every day (5) Eat dry beans, split peas, lentils and soya regularly (6) Have milk, maas (fermented milk) or yoghurt every day (7) Use salt and foods high in salt sparingly (8) Use fat sparingly; choose vegetable oils rather than hard fats (9) Use sugar and food and drinks high in sugar sparingly (10) Drink lots of clean, safe water (11) Be active (12) if you drink alcohol, drink sensibly (Stehle, 2007; Schönfeldt et al., 2013; Department of Health, 2013).

Advancement in nutrition knowledge has the capability of generating culinary understanding, meal formulation and dietary quality improvement. Culinary proficiency could enable the food handler to cook and integrate the essential foods for a healthy diet and could widen their food choices (Ternier, 2010). Nutritive information is imperative as it affects self-reliability, cooking proficiency, nutritional performance and superiority, as well as individual health. It also affects meal preparation, food intake processes and the manner in which a food handler is able to manage



and tactically handle demanding nutrition and culinary conditions particularly in large group feeding such as in school feeding schemes. However, the absence of food understanding that enhances culinary capability may impair one's ability to multi-task in demanding food preparation circumstances (Ternier, 2010). Improving nutrition knowledge is a significant instrument for inspiring dietary behaviour that advances meal planning and adoption of healthier cooking methods. Klohe-Lehman, Freeland-Graves, Anderson, McDowell, Clarke, Hanss-Nuss, and Milani (2006) found that nutrition knowledge was predictive of the dietary variations and those making one or two dietary changes had superior nutrition knowledge scores.

## **Research design**

The study was for non-therapeutic purposes and essentially a descriptive study. A purposive sampling method was used in selecting schools and participants. This method of sampling procedure was relevant as only schools that part-take in school feeding programme and gave permission were included in the study.

## **Data collection**

Data collection took place in an interview format. The aim and objectives of the research were made known to the respondents before the commencement of the interviews. Questionnaires were structured with relevant questions and answers in the relation to the study. The questions were straight forward with simple grammatical construction that can be easily understood by a layman. However, the questions were subsequently translated into IsiZulu for proper understanding by the respondents. The language was adequately translated as the translator speaks English and IsiZulu fluently. Questions were read out from the questionnaire in IsiZulu version and were properly recorded immediately in the space provided to minimize error and omission of valid points. The questionnaire contains the following aspects:

- Socio-demographic profile of respondent, participants were asked to provide information on the following age, gender, marital status, home language, religion, educational level, ethnicity and source of income.
- The nutrition knowledge of respondent was tested with questions such as, which are the best sources of protein? How many major food groups do you know? Which of these foods are best vitamins and minerals sources? Which of these foods are best sources of fats and oil and finally what is the best source of energy among the nutrients foods?
- Nutrition education - the participants were asked; have you enrolled in any nutrition or related program? Options were neither yes nor no.
- Duration worked for NSNP- the participants were also asked duration worked for NSNP with a different option (1-3, 4-6, 7-9 and >10 years) to choose from.

## **Data analysis**

The questionnaire was checked for completeness. The information on the socio-demographic profile, nutrition knowledge, nutrition education and duration worked for NSNP were coded in excel spreadsheet and imported into SPSS 24 version to produce frequency, percentage and descriptive data analysis.

## **Ethical considerations**

The investigation approaches and techniques were in agreement with the drive and rationalization of aims of the study. It was a step by step approach to investigate and observe a scientific problem. The study was conducted according to the guidelines laid down by University of Zululand



Ethical Committee and all procedures involving human subjects were approved and issued the clearance certificate as (UZREC171110-030 Dept.2013/24).

Permissions to conduct this research were obtained from principals of schools in Eskaleni and Kwa-Dlangezwa and the respondents respectively, before the commencement of the study. Food handlers for NSNP were the participants for this study. An informed consent was issued to each participant. All that participated voluntarily signed a consent form and became part of the study. An information letter was translated into the local language (IsiZulu) and visual aids were used to assist in understanding. A trained research assistant who speaks the local language and English fluently, acted as a field worker assistant. A valid and reliable socio-demographic, nutrition knowledge and nutrition education and duration worked for NSNP questionnaires were developed. Eighty-nine participants were interviewed across 28 schools in Eskaleni and Kwa-Dlangezwa.

## Results

**Table 1. Socio- demographic profile of respondents (n=89)**

Characteristic	Frequency (f)	Percentage (%)
1. Gender		
Male	3	3.37
Female	86	96.63
Total	89	100
2. Home Language		
IsiZulu	89	100
Others	0	0
Total	89	100
3. Ethnic group		
Black African	89	100
Others	0	0
Total	89	100
4. Age groups of respondent		
18-25	2	2.24
26-35	23	25.84
36-40	25	28.1
45-50	23	25.84
>50	16	17.98
Total	89	100
5. Marital status of respondent		
Single	60	67.42
Married	20	22.47
Widowed	5	5.61
Divorced	2	2.25
Leaving together	2	2.25
Total	89	100
6. Religion practice		
Christianity	81	91.01
Others	8	8.99
Total	89	100
7. Educational level		
Never attended school	8	8.99
Primary school	33	37.08
Secondary school	46	51.68
Tertiary school	2	2.25
Total	89	100
8. Source of income		



School feeding	44	49.44
Others	45	50.56
Total	89	100
9.Average monthly income		
<R1000	45	50.56
R1000-R2000	33	37.08
R2000-R3000	8	8.99
R3000-R4000	1	1.12
>4000	2	2.25
Total	89	100

The result on table 1 for socio-demographic profile indicates that majority of the respondents received an average income of <R1000 (50.56%) followed by >R1000 (37.08%). The poor average income received could be accredited to the level of education as majority also had only secondary school education (51.68%), and are between the ages of 26-35 (25.84%), 36-40 (25.84%) and 40-50 (28.1%). Past study also confirms; the high percentage of age group involved in handling food practices are between the age of 20 – 50 years with low educational background which affected income received (Nee & Sani 2011). The dominant gender is female (96.63%) and mostly singles (67.42%). Abdul-Mutalib, Abdul-Rashid, Mustafa, Amin-Nordin, Hamat, and Osman (2012) agrees that; the majority of food handlers are females.

### Nutrition knowledge of respondents

Table 2. Frequency and percentage of overall nutrition knowledge of respondents

Best sources protein	Frequency	Percentage
Chicken and egg	32	36.0
potato	11	12.4
Yoghurt	3	3.4
Chicken or egg	43	48.3
Total	89	100
Best sources of carbohydrate	Frequency (f)	Percentage (%)
Bread and maize meal	7	7.9
Carrot	12	13.5
Beans	8	9.0
Tomatoes	13	14.6
Maize meal or bread	49	55.1
Total	89	100
Best sources of Minerals and vitamins	Frequency (f)	Percentage (%)
Beans, carrot, orange, potato, seafood and fish	5	5.6
Mentioned 5 sources	1	1.1
Mentioned 4 sources	11	12.4
Mentioned 3 sources	19	21.3
mentioned 1-2 sources	53	59.6



Total	89	100
<b>Fats and oils sources</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
peanut and vegetable oil	30	33.7
Beans	2	2.2
Rice	3	3.4
Bread	1	1.1
peanut or vegetable oil	53	59.6
Total	89	100
<b>Best energy nutrients</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
Minerals	22	24.7
Carbohydrate	29	32.6
Vitamins	21	23.6
Proteins	17	19.1
Total	89	100
<b>Food groups</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
Three	62	69.7
Four	25	28.1
Five	2	2.2
Total	89	100

The overall nutrition knowledge on table 2 indicates that respondent's demonstrated moderate to very poor nutrition knowledge. No excellent knowledge level was recorded. An average or moderate knowledge needs improvements. It is expected that food handlers demonstrate potentials for effective realization of NSNP. Nutrition questions for best protein sources (48.3%), best carbohydrate sources (55.1%), best fats and oil sources (59.6%) and vitamins and minerals sources (59.6%) are classified as moderate knowledge as it does not depict an exact option as expected to be identified by respondents.

Out of several food items listed for the sources of the various food groups, respondents only picked one source in place of two sources for protein, carbohydrate, fat and oil and five sources for vitamins and minerals. The study of Baydoun and Wang (2008) reported lapses in food handling practices, pointing out nutrition knowledge could determine food choices amongst others which positively affected the quality of dietary intake as well as healthy food purchasing and suggested needs for improvement.

However, working with professionals could eventually improve their handling practices (WHO, 2008). Furthermore, Srilahshmi (2003) reported adequate nutrition knowledge is paramount in handling foods hence dietary intervention is possible.



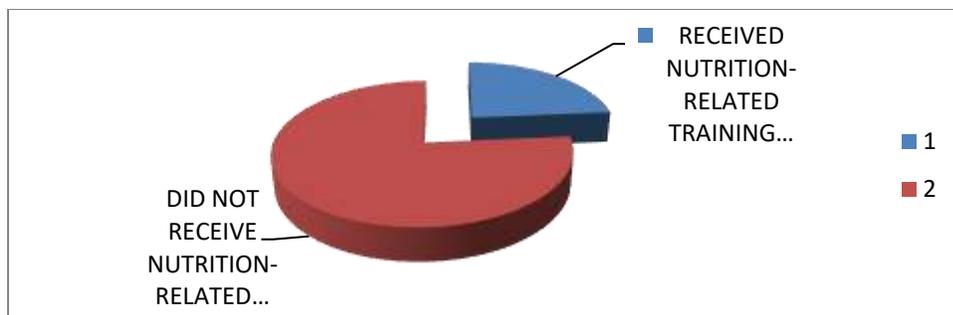
**Table 3. Appropriate options as indicated by respondents on nutrition knowledge**

Nutrition knowledge	Correct answers	Frequency (f)	Percentage (%)	Mean score	Standard deviation
How many major groups (classes) of food do you know?	Five	2	2.2	1.33	±517
Which among these are best protein sources?	Chicken and egg	32	36.0	2.64	±1.392
Which of these are best sources of carbohydrate?	Maize meal and bread	7	7.9	3.96	±1.381
Which of these foods are best sources of fats and oil?	Vegetable oil and peanut	30	33.7	3.51	±1.884
Which of these foods are best sources of minerals and vitamins?	Beans orange, carrot, potato and sea foods	5	5.6	4.28	±1.097
Best source of energy nutrient	Carbohydrate	29	32.6	2.37	±1.059

### **Appropriate options as indicated by respondents on nutrition knowledge**

The Nutrition knowledge data in Table 3, shows the appropriate or correct options identified by respondents. From the data collected on nutrition knowledge as shown in Table 1 and 2, nutrition knowledge is completely inadequate resulting from poor or lack of nutrition education. Respondents also demonstrated poorly on nutrition knowledge as regarding choosing the appropriate options in major food groupings (2.2%), best carbohydrate sources (7.9%), and vitamins and minerals sources (5.6%). These are the only percentage of respondents that could identify the various foods sources as listed above correctly.

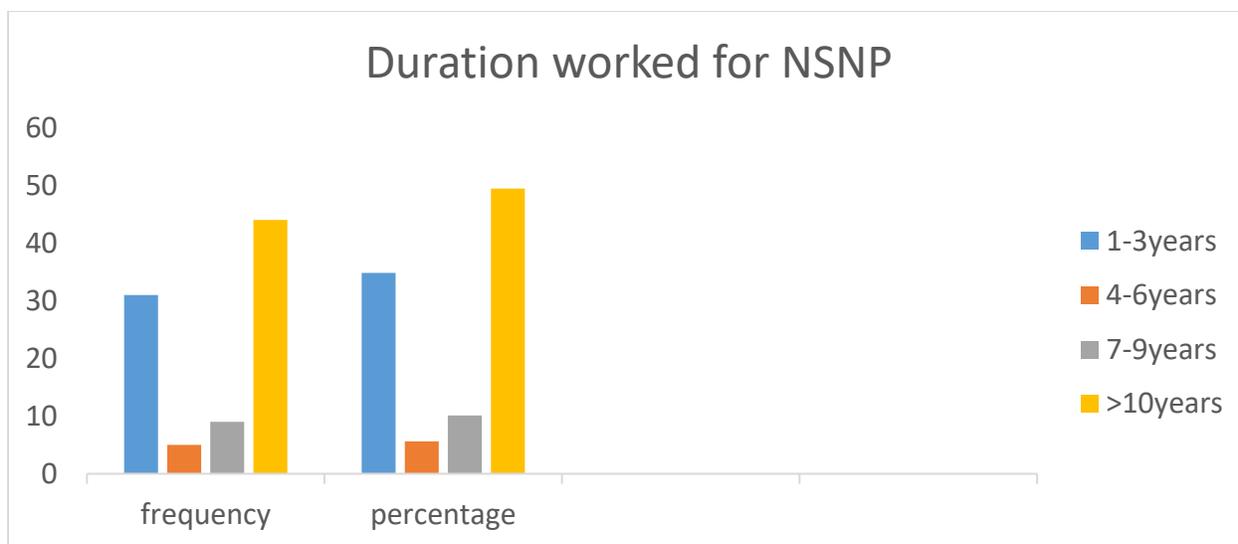
On major food groupings, the study of Briggs, Safaii and Beall (2003) comments on the inadequacy of school meals as result of incompetency of food handlers. That, only 2% of the school-aged children meet the Food Guide Pyramid (FGP) serving recommendations for all major food groups, and more than 30% eat the recommended amount from any one of the major five groups. The study of Faber et al. (2014) reported that 60% of food handlers have been trained in basic hygiene in food preparation, preparation of food for school meals and mixing of food items. None was mentioned on the nutrients contents of foods. All 'hands must be on deck', if realization of NSNP's objectives is to be actualized, strategies should thus be employed to ensure that food handlers know good practices for food handling. The most widely used strategy is training, which is considered to be an important method to increase knowledge and skills (da Cunha, Fiorotti, Baldasso, de Sousa, Fontanezi, Caivano, Stedefeldt, de Rosso and Camargo, 2013).



**Figure 1:** Nutrition education received versus nutrition education not received

### Nutrition knowledge education

Figure 1 shows nutrition education of respondents. About three-quarter (76.4%) of food handlers working for NSNP have not received any form of food related training (nutrition education) in Eskaleni and Kwa-Dlangezwa schools. Only one-quarter of the respondents (23.6%) have received nutrition education training. Nutrition education of food handlers for NSNP needs to be enhanced as the study of Faber et al. (2013) also recorded that, only 15% had received training in nutrition.



**Figure 2:** Duration worked for NSNP

### Duration worked for NSNP

Figure 2 shows that the majority of the respondents had worked for NSNP for over a ten year period (49.2%). One would have established the fact that the respondents for this study should be experts due to the number of years invested in NSNP as the popular saying goes to say “experience is the best teacher”, but sadly, it does not tally with this statement. Possible reasons could be because prior nutrition knowledge of respondents (23.60%) did not measure up significantly as most nutrition knowledge question asked were poorly answered. For instance, nutrition questions asked on major food groupings, only on 2.2%, for best sources of vitamins 5.6% and 7.9% best sources of carbohydrate out of 23.60% respondents with prior nutrition knowledge, could correctly identify these food items. The study of Abdul-Mutalib et al. (2012)



commented on regularity on nutrition education as prior knowledge could be obsolete due to continuous advancement in technology.

## **Conclusion and Recommendations**

The food handlers for NSNP in Esikhaleni and Kwa-Dlangezwa schools demonstrated poorly in overall nutrition knowledge which was explicitly affected by poor and insufficient nutrition education they had received. The respondents (49.2%) claim to have worked for NSNP over ten years as shown in figure 2, but the duration worked for NSNP has no positive effect or improvement on their nutrition knowledge.

Nutrition knowledge being the dependent variable was directly menaced by the independent variable (nutrition education). Also, prior nutrition education (23.6%) or skill acquired by respondents needs to be intensified as it could not add a significant difference to respondent nutrition's knowledge. The study of Power et al. (2005) concurs with the findings of this study and reported on the effect of nutrition knowledge on dietary intervention, that nutrition knowledge was adversely affected by nutrition education.

Research commented on poor food choices adopted by schools in current times, stating that schools can critically reverse these trends through school nutrition policies that encourage coordination of comprehensive nutrition education program (Briggs, Safaii and Beall, 2003). Prior nutrition education (23.6%) or skilled acquired by respondents needs to be intensified as it was not found to add any significant difference to respondents nutrition's knowledge. The study of Power et al. (2005) agrees with this study and reported on the effect of nutrition knowledge on dietary intervention, that nutrition knowledge was adversely affected by nutrition education.

Research commented on poor food choices adopted by schools in recent times, stating that schools can critically reverse these trends through school nutrition policies that encourage coordination of comprehensive nutrition education programmes (Briggs, Safaii and Beall, 2003). It was also clearly stated by Parmenter, Waller and Wardle (2000), that nutrition education is a viable tool in selecting healthy food constituents and contents, emphasizing minimum knowledge as a criterion for basic nutritional commendations for school-aged children. The study of Kandiah and Jones (2002) also reported the effectiveness of a nutrition education programme on nutrition knowledge scores and healthy food choices. However, the study of Condrasky et al. (2013) records improvement on nutrition knowledge of unknowledgeable cooks or learner working alongside with professionals. Knowledge gained improved the skills necessary in meal planning, purchasing sound food items, preparing healthy and flavourful foods that nourish and satisfies the consumers and contents, emphasizing minimum knowledge as a criterion for basic nutritional commendations for school-aged children.

Ascertaining the effect of skills acquired on their nutrition knowledge for purchasing and preparing food for the NSNP was also poor and inadequate. Competency is lacking even among the trained food handlers. For the effective realization and actualization of NSNP objectives, all aspects must be given a touch of professionalism and handled efficiently.

NSNP may adopt the following for effective service delivering: (1) compulsory training in nutrition education or food-related programs for all food handlers NSNP (2) newly employed food handlers must possess related knowledge or advice to do so before enrollment and (3) regular nutrition education needs to be provided for advancement in current innovative ideas and knowledge.



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