

**ATTITUDE TOWARDS LEARNING FOOD AND NUTRITION SUBJECT AND
EATING BEHAVIOURS OF ORDINARY LEVEL SECONDARY SCHOOL
STUDENTS IN DODOMA REGION.**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN HUMAN
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MOROGORO, TANZANIA.

EXTENDED ABSTRACT

The learning outcome of food and nutrition subject depends on attitude of the learners towards the subject. In Tanzania, food and nutrition subject is taught in selected secondary schools at the ordinary level education and in even fewer schools at the advanced level. This study aimed to determine whether the attitudes towards learning food and nutrition subject influence eating behaviours of secondary school students. Data were collected in Dodoma region from three purposively selected secondary schools. The study involved 381 students who were randomly selected whereby 194 students opted and 187 did not opt to study food and nutrition subject. Nutrition information in the syllabus, teaching and learning materials were collected through documentary desk review. Students' attitudes towards studying food and nutrition subject and their eating behaviours were assessed through structured questionnaires that included, the dietary diversity component among others. Statistical Package for the Social Sciences (SPSS) Version 20 software was used to analyze descriptive and inferential statistics where t-test was conducted while qualitative data were analyzed by the text analytics program and interpreted according to the emerging themes. The study observed that syllabus had objectives that were relevant to the nutritional needs of the country. The subject specific textbooks were absent instead there were eleven (11) reference books used in all the surveyed schools. Those reference books had outdated nutrition information hence, not satisfactory to fulfil the need of the current syllabus and on address the existing problem of triple burden of malnutrition. Gender was found to influence choosing of the subject since mean attitude scores for males ($M = 2.0154$) which was half to that of females ($M = 4.4995$). Opting to study the subject influences eating behaviour significantly ($p\text{-value} < 0.01$). Among the 194 students who opted to study food and nutrition subject, 93% had proper eating behaviour because number of food groups eaten per day was five and above

hence their dietary diversity score was above five (5). The students who had improper eating behaviour due to the fact that their diet consist less than five food groups was 7% hence their dietary diversity score was below five. The study concluded that students practice what was taught to improve their eating behaviour because students who opted for Food and Nutrition Subject had adequate dietary diversity in their diet compared to those who did not opt for studying the subject. The study recommends that, subject extracurricular activities on nutrition programs should be given to all students in order to emphasis and provide opportunity of improving their eating behaviour for their lifelong future benefits.

DECLARATION

I, VASHTY, NYABHIGESO SONGO, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

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DEDICATION

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LIST OF ABBREVIATIONS

| | |
|-------|---|
| CBN | Chemistry, Biology and Nutrition |
| CESAC | Comparative Education Study and Adaptation Centre |
| DDS | Dietary Diversity Score |
| FAO | Food and Agriculture Organization |
| FNS | Food and Nutrition Subject |
| KIE | Kenya Institute of Education |
| MOEC | Ministry of Education Council |
| MOEVT | Ministry of Education and Vocational Training |
| NBS | National Bureau of Statistics |
| SDG | Sustainable Development Goals |
| SPSS | Statistical Package for the Social Sciences |
| T/L | Teaching and learning |
| TIE | Tanzania Institute of Education |
| TNNS | Tanzania National Nutrition Survey |
| UN | United Nation |
| WHO | World Health Organization |

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Nutrition education is defined as any approach accompanied by environmental support that is designed to facilitate voluntary adoption of food choices and other food and nutrition-related behaviour conducive to the health and wellbeing of individuals (Food and Agriculture Organization [FAO], 2012). Usually, nutrition education is delivered to individuals through multiple ways in different environments such as at schools and homes (Kinabo *et al.*, 2012).

At the school, nutrition education is provided through food and nutrition subject and other related subjects like biology (Tanzania Institute of Education [TIE], 2010; 2019). The use of school environments in provision of nutrition education is the most effective way of reaching students because most of them engage themselves in unhealthy eating behaviour such as skipping meals and consumption of fast food (WHO and FAO, 2003; Perez *et al.*, 2008). Unhealthy eating habits is linked to chronic health problems such as osteoporosis, obesity, diabetes, cardiovascular diseases and iron deficiency anaemia in the future (Nani, 2016). In addition, integration of nutrition education in the school curriculum is the best public health approach in promoting healthy eating behaviour through the acquisition of proper nutritional knowledge (Kigaru *et al.*, 2015, Sadegholvad *et al.*, 2017). This is because the students can act as ambassadors in their respective communities, making education reach to different areas faster and sustainably.

The curriculum which is currently for Tanzanian ordinary level secondary school was revised in 2007, it has a food and nutrition subject as elective subject (TIE, 2013). This is

also found under the Home Economics syllabus of secondary schools as an elective subject (TIE 2019). In other subjects like biology, there is one subtopic on "Food nutrients and its disorders" which is taught in form two level of education (TIE 2010). Furthermore, in the primary school curriculum, the content of food and nutrition is learnt in science subjects in which there are few sub-topics including health care and environment whereby students learn about food groups and few nutritional disorders (Moses, 2010). Although food and nutrition have been included, students need to understand more about the roles of food in health and the impacts of improper eating behaviour on overweight/obesity, undernutrition and micronutrients deficiencies (Kinabo *et al.*, 2016).

Since most of the secondary school students are adolescents who have increased nutritional demands for calories, protein, and other nutrients such as iron, calcium, and vitamins, it is important to assess their attitudes towards learning food and nutrition subject and its influence on their eating behaviors (Syeda *et al.*, 2018). This is because, improper eating behaviour at an early stage of adolescence has long-lasting negative effects on overall growth, cognitive development and educational attainment (Worku *et al.*, 2017). But there is no enough data on FNS whether the attitude towards learning food and nutrition subject (FNS) influences eating behaviours of ordinary level secondary school students. Hence, the study was conducted to find out if the knowledge provided in this subject has direct impact on improvement of students eating habit.

1.1.1 Integration of food and nutrition subject in Tanzanian school curriculum

The basic desire of the government on integrating FNS in the school curriculum is to facilitate understanding of various nutritional needs of the population including the concept of healthy eating, identifying and solving food-related problems in the society

(Tanzania Institute of Education [TIE], 2013; Rangel *et al.*, 2014). In developed countries, there is a great encouragement of including FNS in all levels of education from nursery, primary, secondary, and tertiary to reach a large segment of the population especially young people (Perez *et al.*, 2008 and Lai-Yeung, 2010).

1.1.2 Consumption pattern and dietary diversity among students

Dietary Diversity is defined as the number of different food groups consumed over a given reference period (Ruel, 2003). This delivers intuitions of the household to access adequate varieties of food and encourages people towards biodiversity on nutritional adequacy which finally reduces the prevalence of chronic diseases (Vakili *et al.*, 2013; Powell *et al.*, 2017; Mukherjee *et al.*, 2018; Isabirye *et al.*, 2020). Globally, 17% of adolescents have a diversified diet while in Iran it was about 24% to 50%, in Zimbabwe it was 11% and in Ethiopia, it was about 27% (Birru, 2018). The promotion of adequate dietary diversity becomes one of the global concerns because nowadays peoples' diet depends mostly on processed foods rather than on traditional foods due to nutrition transition (Kinabo *et al.*, 2008; Birru, 2018). A study done in northwest Ethiopia reported that few numbers of adolescents have adequate dietary diversity where micronutrient dense foods such as animal products, fruits, and vegetables are less consumed leading to a widespread of micronutrient deficiencies (Tamirat *et al.*, 2019). Research studies were done by Arora (2012) in India and Fouzia *et al.* (2016) in Pakistan found that students prefer unhealthy food such as too much-refined carbohydrates, empty-calorie foods, sugary snacks and sweetened beverages, they frequently consume 'fast food' and rarely take fruits and vegetable dishes. Usually, this eating habit among students is influenced by their interest, peer pressure, peer norms, and exposure to media (Islam, 2019).

Unhealthy eating habits contribute to low cognition and poor academic performance among students who become relatively independent on making choices of food for their diet when they are away from home (Majabadi *et al.*, 2016). There is a need of providing basic education on healthy eating at schools because inadequate knowledge on food and nutrition can contribute to poor diet in terms of nutrient intake (Welker *et al.*, 2016; Islam, 2019). According to Hallström (2013), much attention and care are needed on the provision of FNS in schools because it gives students the opportunity of developing long-term healthy eating habits, reducing the risks of low cognition and poor academic performance. In addition, the study was done in Tanzania among students from 661 selected public schools whereby 24-hour dietary recall was used to interview students in order to understand what foods and beverages they had consumed over the previous 24 hours. The study found that the majority of students consumed cereals and grains (69.7%) while vegetables (32.2%) and legumes were 29.6% (Sauli *et al.*, 2019).

However, there is limited information on whether FNS taught in Tanzania secondary schools is enough to contribute to the improvement of students' eating habits. Therefore, the current study assessed the eating habits of students by comparing students who opted to study FNS and those who did not opt for the subject.

1.2 Problem Statement

The promotion of proper eating behaviour is one of the global concerns especially among students because their diets lack diversity, which puts them at significant risk of nutritional deficiencies (Birru *et al.*, 2018). Scholars report that, for the successful promotion of proper eating behaviour, students' knowledge and attitudes on food choice must be considered (Mirmiran *et al.*, 2007, Pacific and Hoefkins, 2014). The choice of

healthier food among students depends on the availability of food and nutrition knowledge because it is observed that students who attend nutritional education courses have better knowledge of proper food choices compared to those who do not attend (Nani, 2016). Hence, food and nutrition subject in the schools may contribute to good food choices and eating behavior. Healthy food choices may in turn help to reduce the risk of micronutrients deficiencies, overweight/obesity and undernutrition among students (Story *et al.*, 2005; Moreno *et al.*, 2010; Seliske *et al.*, 2013; Falkenbach *et al.*, 2018).

Like many other developing countries, Tanzania is experiencing a nutrition transition where there is a co-existence of a triple burden of malnutrition, namely micro and macronutrient deficiencies as well as overweight and obesity among students (John *et al.*, 2021). To address this, Islam (2019) calls for special policies and programs of improving and sensitizing students on healthy eating behaviour.

Food and nutrition education have been integrated in the school curriculum in (TIE, 2013). Although the subject has been given priority in the curriculum, Ndalichako and Komba (2014) reported that due to insufficient teachers, teaching and learning facilities, Tanzania has very few schools offering FNS. However, there is limited information on whether the content of food and nutrition subject offered in secondary schools is updated to enhance knowledge and skills on food preparation and eating behaviors of students to enable them to prevent the risk of malnutrition.

Therefore, the present study was conducted to assess the contents of the syllabus, teaching and learning (T/L) materials for FNS, students' attitudes towards learning FNS and their students' eating habits.

1.3 Study Justification

The study findings provide scientific information for policy makers and other educational stakeholders in deciding better ways of improving and using food and nutrition subjects to enhance proper attitude and eating behaviors among students. Most of the studies have been done to nutritional status and dietary quality among students, adequacy of T/L facilities like equipment and materials (John *et al.*, 2019; Amiri, 2015). Also, the study done to assess effectiveness of teaching and learning Agricultural science subject in selected ordinary level secondary schools in Tanzania. The study found out teaching and learning of Agricultural science subject in ordinary level secondary schools lead to skills achievement and attitude modification to students (Tesha, 2018).

This study is in line with Sustainable Development Goal number four (4) (SDG 4) which aims at ensuring inclusive and equitable quality education that promotes lifelong learning opportunities (UN, 2015). It also contributes to the Sustainable Development Goal number three (3) which aims at ensuring quality health for all and focusing on reduction of premature death through prevention and treatment of non-communicable diseases (NCDs). It supports the aim of Tanzania Development plan of removing all forms of malnutrition in the country through provision of nutrition educational programmes and promotion of healthy eating (MFP, 2021).

1.4 Study Objectives

1.4.1 General objective

The main objective of this study was to determine the attitude towards learning food and nutrition and its influence on eating behaviour of secondary school students in Dodoma region.

1.4.2 Specific objectives

This study was specifically carried out to;

- i. Determine adequacy of teaching and learning materials used for food and nutrition in ordinary level secondary schools.
- ii. Assess attitudes towards learning food and nutrition subject among secondary schools' students.
- iii. Compare the eating habits of students who opt and those who do not opt to study food and nutrition subject.

1.5 Research Questions

Specifically, this study sought to answer the following research questions:

1. Are the available materials for teaching and learning food and nutrition subject in ordinary level secondary schools adequate to cover emerging nutrition topics?
2. What is the students' attitude towards studying food and nutrition subject in secondary schools?
3. Does learning FNS influence eating habits of secondary school students?

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CHAPTER TWO

**2.0 ANALYSIS OF THE CONTENT FOR TEACHING AND LEARNING
MATERIALS OF FOOD AND NUTRITION FOR SECONDARY SCHOOLS IN
TANZANIA**

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Abstract

Effective teaching and learning of food and nutrition subject can only take place if there are adequate and relevant instructional materials. This study aimed to assess whether the contents of the existing teaching and learning materials for food and nutrition subject consider emerging nutritional issues. The study conducted a desk review of the documents for teaching and learning materials for food and nutrition subject used in secondary school where nutrition knowledge concerning emerging nutritional issues were collected. The emerging issues considered includes overweight and obesity, undernutrition (stunting, wasting, underweight and micronutrients deficiencies) as well as Non-Communicable Diseases (NCDs) such as diabetes, cardiovascular diseases, cancers, hypertension. Teaching and learning materials used in food and nutrition were collected, their contents reviewed and the main nutrition knowledge were identified in relation to emerging nutrition issues. Reviewed teaching and learning material included syllabus, textbooks, reference books and pamphlets.

Statistical Package for the Social Sciences (SPSS) Version 20 software was used to analyze qualitative data by the Text analytics program and interpreted according to themes. The study observed that the syllabus objectives were relevant to the emerging nutritional issues of the country. Furthermore, there were no subject textbooks which correspond to that syllabus instead; there were eleven (11) different kinds of supplementary books for learning the subject. The reference books used were slightly or not related to emerging nutritional issues of the country because most of them are old. The study recommends that, the government through Tanzania Institute Education should prepare textbooks that incorporate the current content of the Food and Nutrition Subject syllabus. Also, they should recommend specific reference books to be used for teaching

and learning Food and Nutrition Subject in order to bring uniformity in teaching and learning as well as fair students' assessments in this subject.

Keywords: Food and Nutrition subject, Teaching and learning materials, emerging nutritional issues

2.1 Introduction

Tanzania is experiencing a nutrition transition where there is co-existence of communicable and non-communicable diseases (NCDs) within the same household or among individuals of all age categories (Lateef, 2016). These diseases are like Malaria, Tuberculosis, HIV/AIDS, overweight and obesity, undernutrition (stunting, wasting, underweight and micronutrients deficiencies) as well as NCDs (diabetes, cardiovascular diseases, cancers, hypertension). For example, Tanzania National Nutrition Survey indicated that malnutrition among children under the age of five years and adolescents has become a well-known problem (Table 2.1).

Table 2.1: Trend of malnutrition among Tanzanian children under the age of five years

| Child Malnutrition | Trend of Malnutrition | | |
|--------------------|-----------------------|-------|-------|
| | 2014 | 2015 | 2018 |
| Underweight | 13.4% | 13.4% | 14.6% |
| Stunting | 34.7% | 34.4% | 31.8% |
| Wasting | 3.8% | 4.5% | 3.5% |

Source: Tanzania National Nutrition Survey, 2018

In 2018, Tanzania National Nutrition Survey showed that 28.8% of non-pregnant women of 15-49 years of age suffered from anaemia and about 31.7% of women of reproductive age were overweight, 11.5% were obese and 7.3% underweight (TNNS, 2018). These were high compared to the survey done in 2014 as 29.7% of women were overweight, 9.7% obese and 5.9% were underweight while anaemia prevalence was not recorded (TNNS, 2016). A cross-sectional National School Malaria and Nutrition Survey (SMNS) was conducted among students (5-19 years of age) in mainland Tanzania to assess nutritional status and dietary quality among students from 661 selected public schools.

The findings indicated that 25% were stunted, 11% thin and 5% overweight or obese (John *et al.*, 2021). The observed trend could be due to limited nutritional awareness especially on healthy eating behavior and other health related issues (Lateef, 2016; John *et al.*, 2021). To address this, Islam (2019) calls for special policies and programs of improving and sensitizing students on healthy eating behaviour through food and nutrition education.

Food and nutrition education have been integrated in the school curriculum in Tanzania for instance, in ordinary level secondary schools' food and nutrition subject (FNS) is one of the elective subjects from form one to form four (TIE, 2013). The subject has a great influence on proper eating behaviour which link to reduction of all forms of malnutrition among students (Story *et al.*, 2005; Moreno *et al.*, 2010; Seliske *et al.*, 2013; Falkenbach *et al.*, 2018). Although the subject seems to be important and has been given priority in the curriculum, Ndalichako and Komba (2014) reported that Tanzania has very few schools offering FNS due to insufficient teachers as well as teaching and learning facilities.

Effective teaching of FNS can only take place if there are adequate and relevant instructional materials such as books (Afolabi and Adeleke, 2010). Furthermore, the schools should be well equipped with basic infrastructure like food and nutrition room with all necessary equipment (Ndalichako and Komba, 2014). A study done in Tanzanian schools which aimed to find the opinion of stakeholders on improving enrollment of student in the FNS noted that teaching and learning (T/L) facilities are not adequate and for those which were available were too old creating a need of updating them (Amiri, 2015). However, there is limited information on whether the T/L materials for food and

nutrition subject offered in secondary schools are updated to address the co-existence of triple burden of malnutrition.

2.2 Methodology

2.2.1 Research design and data collection

The study adopted a descriptive cross-sectional design whereby qualitative data were collected at one point in time. Only four schools which found in Dodoma urban, (that is Viwandani, Kikuyu, Msalato and Dodoma) were purposely included in the study because they provide FNS. The schools which did not offer FNS was excluded from the study. The study involved a desk review of the T/L materials used for teaching FNS. Teaching and learning materials used in FNS were collected in schools after asking the subject teachers. The contents reviewed and the main nutrition knowledge were identified in relation to emerging nutrition issues such as co-existence of communicable and non-communicable diseases (NCDs) among young children, adolescents and adults including Malaria, Tuberculosis, HIV/AIDS, overweight and obesity, undernutrition (stunting, wasting, underweight and micronutrients deficiencies) as well as NCDs (diabetes, cardiovascular diseases, cancers, hypertension).

Therefore, the food and nutrition subject syllabus of 2019 and other T/L materials which were commonly used by at least more than one school were included in the review, while the one which were not currently used was excluded from the study. These were syllabus, textbooks, reference books and any other supplementary materials including pamphlets. A checklist of questions which aimed to identify the topics taught and their relevance in the emerging nutrition issues was used to guide the review process. The study ensured that each question in the checklist was answered critically according to the information obtained after assessing the syllabus, reference books and supplementary materials.

2.2.1 Data analysis

The qualitative data obtained from the document review checklist were summarized manually, coded and categorized according to the emerging themes. The processed data were analyzed using SPSS Text analytics program (Edgington, 2011; Xu and Reynolds, 2012). Finally, the data were sorted and synthesized according to themes and interpreted to get valid and reliable meaningful information.

2.3 Results and Discussion

The review shown that there was one syllabus of the year 2019, no textbooks available for T/L Food and nutrition subject (n=0), commonly complementary / reference books (n=11) as indicated in Table 2.2.

Table 2.2: The reference books for food and nutrition subject (n=11)

| C/No | Author and year | Title | Publisher | Number of pages | Country of origin |
|-------------|--|--|---|------------------------|--------------------------|
| 1 | Tull (1987) | Food and Nutrition | Oxford University Press | 188pp | United Kingdom |
| 2 | Ministry of Education and Culture (2001) | Family Life Education for Secondary Schools Form 3 and 4 | Ministry of Education and Culture | 98pp | Tanzania |
| 3 | Tanzania Institute of Education (1996) | Child Care and Home Nursing | Dar es Salaam publisher | 194pp | Tanzania |
| 4 | McGrath (1988) | All About Food | Oxford University Press | 223pp | United Kingdom |
| 5 | Kenya Institute of Education (1990) | Secondary Home Science Pupils' Book | Kenya Institute of Education | 164pp | Kenya |
| 6 | Comparative Education Study and Adaptation Centre (1989) | Food and Nutrition Pupils' Text Book | Macmillan Publisher | 161pp | United Kingdom |
| 7 | Wood <i>et al.</i> 2008 | Community healthy | AMREF Publisher | 450pp | Kenya |
| 8 | Kioko <i>et al.</i> 2004 | Home Science Form Three | East Africa Educational Publisher | 168pp | Kenya |
| 9 | Gitobu (1991) | Home Science: Junior Course | Longman publisher, Kenya | 232pp | Kenya |
| 10 | Wright and Adesimi (1987) | Home Management for Secondary School, | Davies publisher, Nairobi, Kenya | 160pp | Kenya |
| 11 | Ndungu (1982) | Food and Nutrition for Schools and Colleges | Evans Brothers Publishers Limited, Kenya. | 177pp | Kenya |

2.4 Objectives of the Syllabus in Relation to Emerging Nutritional Issues of the

Country

The syllabus which is currently used in learning FNS was published in 2019 (TIE, 2019). It has clear objectives which describe the expected outcomes and topics related to the emerging nutritional issues in the country (TIE, 2019; pp. vi) stated as;

“Student should be able to demonstrate good manners and grooming. Develop knowledge in matters concerning mother and child care. Select and use appropriate tools and fabrics in garment making. Develop knowledge in selecting, planning and preparing food to promote health. Care for the house and its surroundings and using entrepreneur skills in generating income”

It is noted that the syllabus includes aspects of maternal and child health care which are very important in reducing the prevalence of malnutrition among children below five years in Tanzania. It also focuses on developing knowledge concerning proper eating habits through proper food choice and preparation in such a way that it promotes good nutrition and health of individuals. Aspects of care of the house and surroundings through sanitation are important for nutrition security. This is in line with the global target of 2016 to 2030 aiming to eliminate communicable diseases such as malaria because most of these diseases are caused by poor sanitation hence, linked to malnutrition (UNICEF and WHO, 2016). Furthermore, low income is linked to malnutrition therefore, syllabus shows objectives of learning different income-generating activities including home gardening as a source of fruits and vegetables for household consumption and as a source of income. In addition, the syllabus includes home baking and sewing skills which can also help them to earn money for purchasing other healthy foods to increase their dietary diversification. For example, in Eastern Uganda most of adolescent had low dietary diversity due to low income (Isabirye, 2020).

The present study found that the FNS syllabus had the main nutrition knowledge which reduce factors which linked to malnutrition such as low income. The findings concur with the study done in Ghana which shows that the subject syllabus equips students with occupational skills which enable them to eliminate poverty in their life as well as to appreciate the need for healthy living through improved sanitation and preparation of nutritious meals for the healthy bodies and brain (Arkhurst, 2005).

2.5 Availability of the Food and Nutrition Subject Textbooks

The study reported that there are no textbooks prepared by TIE to be used to accomplish the syllabus objectives and expected learning outcomes. However, in all schools involved in the study, there are eleven (11) supplementary books that are commonly used to learn the subject matter hence, were reviewed. Among the identified materials, only two books were published in Tanzania and the remaining nine (9) books are from Kenya and United Kingdom (Table 2.2). The most current book was published in 2008 and the oldest was in 1982. It seems that most of the books were out dated hence, most likely that they do not include the current nutrition issues that are the outcome of globalization, urbanization and changes in food consumption pattern.

The absence of subject textbooks necessitates the use of supplementary books in order to fulfil the objectives of the subject syllabus. However, the supplementary books may not suffice the need due to lack of direct link with the current syllabus. This makes the process of teaching and learning FNS difficult especially in ensuring uniformity of teaching, syllabus coverage and making a summative evaluation of students' learning outcomes. The reported situation is alarming since subject textbooks are expected to be

compatible with the syllabus. Hence, something should be done by the Tanzania Institute of Education (TIE) to counteract the situation.

This finding echoes the study done in Zimbabwe revealing that, lack of adequate textbooks for teaching food and nutrition in schools failed in effective implementation of food and nutrition syllabus (Shadreck, 2012). In addition, a similar finding was reported in studies by Ndalichako and Komba (2014) and Amiri (2015) that T/L materials especially for FNS in Tanzania were not enough and for those which were available were too old which may affect teaching and learning process.

2.6 General Nutrition Knowledge in Teaching and Learning Materials for Food and Nutrition

The study found that some supplementary books present relevant and sufficient nutrition knowledge based on syllabus objectives and level of the learners (TIE, 2013). For example, three reviewed books explain how vitamins and minerals are important in reducing the impact of macro and micronutrients deficiency to an individual;

“People who are not well exposed to sunlight may suffer from rickets and osteomalacia” (McGrath, 1988; pp.47).

Similar observation is made by (Comparative Education Study and Adaptation Centre [CESAC] 1989; pp.53-54) who reveals that;

“Vitamins and some minerals are needed in small amount but are vital important to the body with specific function and lack of any one has its characteristic effect”

On the same concept, Tull (1987; pp. 90) said that;

“Often food is fortified with vitamins and mineral salts to increase its food value”

Many people in our societies suffer from several forms of macro and micronutrient deficiency which have negative impact on children's mental abilities (Worku *et al.*, 2019). Therefore, through appropriate T/L materials, teachers can provide nutrition education to students which are somehow relevant to meeting the current nutritional needs of society. Teaching and learning materials provide the basis for healthy eating and knowledge transmission to their parents and next-generation on improving diets to get rid of cognitive and other related nutritional disorders (Kigaru *et al.*, 2015). This is consistent with the findings in a study by Hallström (2013) who encourages the proper provision of nutrition education in schools to give students the opportunity of developing long-term healthy eating habits to reduce risks of low cognition and poor academic performance.

2.7 Non-Communicable Diseases

It was also found that some supplementary books have details of how to reduce the occurrence of nutritional disorders, promote health and reduce the risk of NCDs by providing knowledge that frequently focuses on healthy eating and lifestyle changes as stated below;

“Many people who have an unwise choice of diet, suffer from an unhealthy eating disorder. For example, the foods which contain too much fat, sugar which results in nutritional disorders such as heart diseases, obesity, intestinal diseases, tooth decay and gum diseases” (Tull, 1987; pp.44).

Similarly, (Kenya Institute of Education [KIE], 1990) observes that;

“It is important for one to eat good quality food and in sufficient quantities in order to maintain good health”

Elsewhere, it is stated that;

“It is important that the meals prepared for the family are balanced, adequate and attractively served. Also, it should meet the dietary requirements of each member of the family” (MOEC, 2001; pp.49).

According to KIE (1990), it is evident that;

“When planning meals for special groups of people, it is important to know their nutritional needs in order to meet them. Some special groups of people include Children, adolescents, the elderly, expectant and lactating mothers, invalids and vegetarians”

It was revealed further that, the authors provide the required nutrition education to students, which encourages individual healthy eating habits and proper meal planning of family by considering nutrition needs of family members to ensure healthier families in society.

Due to the existing burden of NCDs which are increasing in developing countries drastically, it is better to focus on adolescence because the majority of behavioural risk factors for NCDs start to emerge at this age (Ismail *et al.*, 2020). Bay (2017) made similar observation that the provision of preventive health education on NCDs to adolescents is a unique opportunity of addressing the problem as it builds the lifelong capability of preventing the development of risk factors for NCDs.

2.8 Disease Prevention Through Hygiene and Sanitation

The study found that three authors mentioned the ways of preventing the spread of illnesses among the population by practicing proper hygiene for the improvement of the general health of the people. As McGrath (1988; pp.88-89) suggests the following;

“Wash your hands before preparing foods and after handling pets”

Similarly, KIE (1990) states;

“It is important to keep our surroundings clean to ensure hygienic conditions so as to prevent illnesses, the spread of diseases and worm infestation.”

Elsewhere (Kioko *et al.*, 2003; pp.10) recommends;

“Proper hygiene should be maintained in a latrine and bath shelter. Its floor should be dry and well disinfected”

Poor hygiene is mostly linked to health problems such as diarrhoea and worm infestation; symptoms which leads to low intake of food nutrients hence, interfering with the nutrition status of an individual. It is worth educating students on safe water, sanitation and hygiene to improve the health of the community and prevent the outbreak of diseases. In contrast, a study by Olukanni (2013) found in public schools in southwest Nigeria inadequate practises of proper hygiene due to poor emphasis on proper hygiene in the education system.

2.9 Breast Feeding Knowledge

Also, this study noted that nutritional knowledge concerning the importance of breastfeeding to babies was emphasized in the reviewed books. For instance, literature does not recommend the intake of infant formula unless in an emergency; otherwise, exclusive breastfeeding should be practiced. In supporting this, McGrath (1988) has this to say,

“If a baby is not breast fed, it should be fed on infant formula by following its instructions clearly” (pp.14).

On the similar matter, TIE (1996; pp.48) observes that;

“During pregnancy the expectant mother should be educated on the importance of breastfeeding and encourage to breast her baby also taught how to prepare her breast for feeding”

Elsewhere TIE observes;

“There is no perfect substitute for breast milk. Cows’ and other milk can be modified so that the percentage of constituents approximates that of human milk.

Although it does not completely meet the nutritional requirement of the baby, it provides a satisfactory food” (TIE, 1996; pp.49).

KIE (1990) writes;

“Breastfeeding is the nourishment of a baby on milk through the breast. However, some mothers may experience problems which may require a help from health professionals, counselors and experienced breastfeeding mothers’”

In another study TIE (1996) observes;

“Breastfeeding must be strongly encouraged as it is important for the survival of the baby. The baby is allowed to suckle soon after delivery. The first yellowish milk gives him/her protection against infections” (pp.44).

Similarly, Wood *et al.* (2008) says;

“Human breast milk is by far the best food for babies and all mothers must be encouraged to breastfeed their babies exclusively for the first 6 months and continue to feed for as long as possible after that” (pp.86).

Also, there was a concern on advising breastfeeding mothers who are HIV positive on the safety of the baby as observed by Wood *et al.* (2008; pp.87).

“A mother who is HIV positive should be advised to choose either feeding the baby on breast milk exclusively for 4 months or feeding the baby on infant formula or milk from animal sources. Also, the mother should be advised to avoid mixing the feeding practises of the baby (breast milk and solid food at a time)”

Furthermore, these findings have revealed a significance emphasis on breastfeeding over infant formula which is consistent with what is recommended by the WHO guideline of 2018 on HIV and infant feeding. The results of a systematic review study by Lassi (2020) indicate that breastfeeding is essential for infant health as it improves the immune system and promotes proper growth of a child and that early introduction of new food leads to

undesirable consequences to the growth and development of a child. Also, according to WHO (2018), infant milk formula should be used for a baby whose mother is HIV positive and who has decided to stop breastfeeding at the age of fewer than six months.

2.10 Updating of Teaching and Learning Materials for Food and Nutrition Subject

The study looked at the frequency of updating T/L materials and the of inclusion of emerging issues concerning food and nutrition. The study found that majority of food and nutrition supplementary books used in ordinary level secondary schools were published between 1987 and 2008, and have never been revised ever since. Some of these outdated T/L materials used have no clear explanations on some very crucial topics such as breastfeeding and complementary feeding as evidenced from one of the reviewed books shown below,

“Benefits of Breastfeeding can carry on or even stop at 4-6 month of baby’s age”

(McGrath, 1988; pp.40).

The statement encourages the stoppage of breastfeeding a baby at an early age regardless of the benefit of breastfeeding. However, WHO (2001) encourages the continuation of breastfeeding babies even after introducing new semi-solid foods other than mothers' milk at the age of six months (complementary feeding). There is a need to update these books to clarify these issues and avoid contradictions with the new knowledge.

Generally, the nutritional knowledge provided through T/L materials especially some of supplementary books of FNS matched with the need of subject syllabus objectives. Most of those T/L materials were also relevant in addressing the co-existence of the triple burden of malnutrition in the society through providing the basis of healthy eating habits, proper hygiene practises and proper breastfeeding. These findings are in line with two

studies done in Finland which is one of the countries that integrated FNS in the home economics syllabus. Authors found that food and nutrition information in subject textbooks of secondary school had emphasised value of foods in good health as striving towards better nutritional health among children and adolescents (Kuurala and Rauma, 2008; Hokkanen and Kosonen, 2013). In contrast, a study done in India to assess FNS textbooks of secondary education reported that some important nutrition issues like nutritional needs during adolescence, obesity and unhealthy foods are not covered in those books hence, the authors encourage the strengthening of textbook content (SubbaRao *et al.*, 2012). A study done in Nigeria oppose these findings by claimed that the scope of the subject matter in textbooks is poorly designed because it is not able to develop skills to the student on examined issues that affect individuals, their families and the community (Abiola and Tihamiyu, 2015).

2.11 Conclusion and Recommendations

The present study found that the FNS syllabus indicated the main nutritional knowledge which corresponded with the emerging nutritional issues of the country but there are no textbooks aligned with the syllabus. Some of the existing supplementary books were published more than 10 years ago and had outdated nutrition information hence, not satisfactory to fulfil the need of the current syllabus and on address the existing problem of triple burden of malnutrition. It is recommended that the government through Tanzania Institute Education (TIE) should prepare textbooks for teaching and learning FNS in order to bring uniformity in teaching and learning as well as fair students' assessments in this subject. The syllabus should also recommend some supplementary books to be used in addition to the textbooks.

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CHAPTER THREE

3.0 INFLUENCE OF STUDYING FOOD AND NUTRITION SUBJECT WITH EATING BEHAVIOUR OF SECONDARY SCHOOL STUDENTS IN DODOMA

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Abstract

This study aimed to assess the influence of learning Food and Nutrition Subject on attitudes and eating behaviour of students. Data was collected in Dodoma region from three selected ordinary level secondary schools. The study involved 381 students who were randomly selected whereby 194 students opted and 187 did not opt to study food and nutrition subject. Students' attitudes and eating behaviours were assessed through structured questionnaires. Twenty-four hours dietary recall questionnaire was used to qualitatively assess food intake. Scores for the attitudes were obtained by Likert scale and proper eating behavior was calculated by dietary diversity score. A t-test was used to compare the dietary diversity score (DDS) of students who opted and those who did not opt to study food and nutrition subject. A Chi-square test was used to check the relationship between students' dietary diversity score and learning food and nutrition subject. The results show that among the 187 students who opted for learning FNS, 49.2% (n=92) were males. Among the 194 students who opted for the subject, 93% consume above five food groups. There was a significant relationship between studying food and nutrition subject and the dietary diversity score of students where $p\text{-value} < 0.01$. Gender was found to influence choosing of the subject since mean attitude scores for males ($M = 2.0154$) which was half to that of females ($M = 4.4995$). It concluded that students who did not opt for food and nutrition subject had inadequate dietary diversity in their daily diet compared to those who opted for studying the subject. This indicates that it is easier for students to practice what was taught in FNS to improve their eating behaviour.

The study recommends that, provision of nutrition programs to all students as opportunity of improving their eating behaviour for their lifelong future benefits.

Keywords: Food and Nutrition subject, secondary schools' students, eating behavior,

3.1 Introduction

Tanzania's education system supports studying food and nutrition subject (FNS) by integrating it with the school curriculum as one of the elective subjects from form one up to form four which makes few numbers of students to learn it (Ndalichako and Komba, 2014). As indicated in the curriculum, form one and form two students shall study ten (10) subjects including seven (7) core subjects such as Mathematics, English, Kiswahili, Biology, Civics, Geography and History; three elective subjects including Physics, Chemistry or Bookkeeping and Commerce; Food and nutrition or Technical subjects and religion (TIE, 2013). In form three and form four, students shall take six core subjects namely; Mathematics, English, Kiswahili, Biology, Civics and Geography with one or more elective subjects such as Chemistry, Physics, Bookkeeping, Commerce, History, Food and nutrition or other Technical subjects (TIE, 2013). Furthermore, in Advanced Level Secondary Education, FNS is meant for students selected to study Chemistry, Biology, and Nutrition combination (Moses, 2010).

Biology is a compulsory subject for every student at ordinary level secondary school education. However, the content of food and nutrition is limited in Biology because there are few subtopics related to FNS such as food nutrients, food processing, preservation and storage (TIE, 2010: 2019). In primary schools, some content of FNS is found in science subject whereby students learn only about food groups and a few nutritional disorders (Moses, 2010).

In Tanzania, most of the studies that have been done in secondary schools based on assessing nutritional status and dietary quality among students, adequacy of T/L facilities like equipment and materials (Amiri, 2015; John *et al.*, 2021). In developed countries,

there is a great encouragement of including FNS in all levels of education from nursery, primary, secondary, and tertiary to reach a large segment of the population especially young people (Perez *et al.*, 2008 and Lai-Yeung, 2010). Therefore, it was important to understand how FNS provided in ordinary level secondary schools influence eating behaviour of students in order to address the existing triple burden of malnutrition among them.

The eating behaviours is determined by the number of different food groups consumed over a given reference period (Ruel, 2003). This is also delivering intuitions of the household to access adequate varieties of food and encourages people towards biodiversity on nutritional adequacy which finally reduces the prevalence of chronic diseases (Vakili *et al.*, 2013; Powell *et al.*, 2017; Mukherjee *et al.*, 2018; Isabirye *et al.*, 2020). Globally, 17% of adolescents have a diversified diet while in Iran it was about 24% to 50%; in Zimbabwe it was 11% and in Ethiopia it was about 27% (Birru, 2018). The promotion of proper eating behaviour through adequate dietary diversity becomes one of the global concerns because nowadays peoples' diet depends mostly on processed foods rather than on traditional foods due to nutrition transition (Kinabo *et al.*, 2008; Birru, 2018).

A study done in northwest Ethiopia reported that few numbers of adolescents have adequate dietary diversity where micronutrient dense foods such as animal products, fruits, and vegetables are less consumed leading to a widespread of micronutrient deficiencies (Tamirat *et al.*, 2019). Arora (2012) in India and Fouzia *et al.* (2016) in Pakistan and found that students prefer unhealthy food such as too much-refined carbohydrates, empty-calorie foods, sugary snacks and sweetened beverages, they

frequently consume 'fast food' and rarely take fruits and vegetable dishes. Usually, this eating habit among students is influenced by their interest, peer pressure, peer norms, and exposure to media (Islam, 2019).

Unhealthy eating habits contribute to low cognition and poor academic performance among students who become relatively independent on making choices of food for their diet when they are away from home (Majabadi *et al.*, 2016). In addition, the study was done in Tanzania among students from 661 selected public schools and found that the majority of students consumed cereals and grains (69.7%) while vegetables and legumes were 32.2% and 29.6% respectively (John *et al.*, 2021).

Although there are some studies done on FNS, there is no enough information on association between studying FNS and eating behaviours. Hence, the study was conducted to find out the influence of learning food and nutrition subject on students' eating behaviour.

3.2 Materials and Methods

3.2.1 Description of the study area

The study was conducted in Dodoma region, which is a capital city of Tanzania, located in the central part of the country. It shares borders with Manyara region in the north, Iringa region in the south, Morogoro region in the east, and Singida in the west. It is situated between latitude 6°16' South, and 35°75' East with an area of 41 311km², density of 50/km² and general total population of 2 083 588 (NBS, 2012). Dodoma is the one among 31 administrative regions of Tanzania which has seven (7) districts including Bahi, Chamwino, Chemba, Dodoma urban, Kondoa, Kongwa and Mpwapwa. Data were collected in Dodoma urban in three secondary schools (Dodoma, Viwandani and Kikuyu)

that are situated in three wards namely, Makole, Viwandani and Kikuyu kaskazini respectively (Figure 2.1).

The study area was chosen because of its rapid population increase due government relocation that has led to rapid changes in lifestyles, modernization, and socioeconomic transition. World Health Organization reported an increase of overweight and obese among children and adolescents, from 4% in 1975 to 18% in 2016 worldwide is associated with urbanization, changes in lifestyles and social economic transition (WHO, 2016). In addition, according to Tanzania National Nutrition Survey of 2018, the region has high prevalence of malnutrition with stunted growth among children under five years old accounting to 37.2%, which is higher than the national level prevalence of 32.1% and underweight of about 18% that exceed the national prevalence level of about 15% (TNNS, 2019).

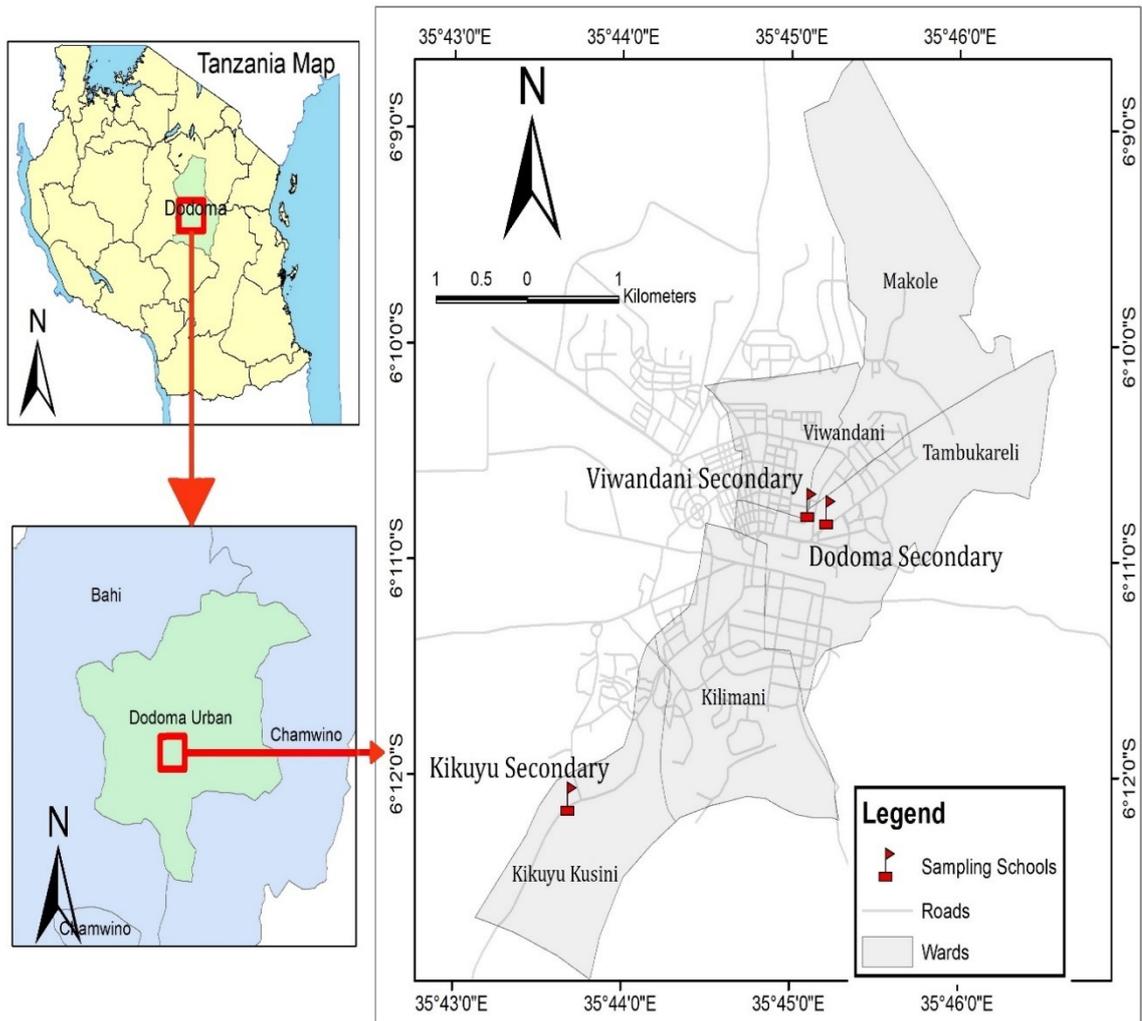


Figure 2.1: A Map of Dodoma urban with sampled schools

Source: Researcher's Own Constructs (2020)

2.2.2 Study population, sampling procedures and sample size

The study adopted a descriptive cross-sectional design. The study population was ordinary level secondary school students including form two, three and four students. Form One students were excluded from the study because they had just reported at the school during data collection and were considered not having enough background of the subjects. Due to the repetitive nature of meals offered in most secondary school menus, boarding students and students with special dietary needs were excluded from the study.

Sample size for students was calculated by using a cross-sectional survey sample size formula proposed by Kothari to minimise errors and biases of the sample from each respondent (Kothari, 2004). The sample size of this study was 381 after inclusion of 10% of non-response rate and 95% confidence interval considering appropriate. Similar studies done in Malawi and Tanzania considered 10% of non-response rate (Kaphagawani, 2015; Mwita, 2018), as shown below;

$$n = N \div (1 + Ne^2) \dots\dots\dots (1)$$

Whereby;

n - Sample size,

N - Population size, which is 2618

e - Level of precision, which is 0.05

$$n = \frac{2618}{1 + 2618 (0.05)^2}$$

n =346

Then to include 10% drop out rate;

$$346 \times 10 / 100 = 34.7$$

$$\text{Sample size} = 346 + 34.7$$

$$= 380.7$$

The calculated sample size in this study was 381 students.

The proportional allocation method proposed by Pandey and Verma (2008) was used to obtain a sample estimate in each school according to population size. Then 84, 102 and 195 students from Kikuyu, Viwandani and Dodoma secondary schools respectively were selected using the formula shown below;

$$n_i = n \times N_i / N \dots\dots\dots (2)$$

Where;

i = School 1, 2, 3 (Kikuyu secondary school, Viwandani secondary school and Dodoma secondary school)

n – Total sample size (381)

N_i – Total number of students in each school (579,702 and1337)

N – Total population size (2618)

n_1 (Kikuyu S.S) = $381 \times 579/2618 = 84$

n_2 (Viwandani S.S) = $381 \times 702/2618 = 102$

n_3 (Dodoma S.S) = $381 \times 1337/2618 = 195$

Dodoma region has only five secondary schools that teach FNS namely, Msalato, Viwandani, Kikuyu, Dodoma and Bicha and there were no private schools teaching FNS during data collection period. Only four of these schools are found in Dodoma urban, and three out of the four secondary schools (that is Viwandani, Kikuyu and Dodoma) were purposely included in the study because they are day school and provide co-education. One school was excluded because it was a single sex (girls only) and boarding.

Students in each school were divided into strata according to their classes that is in form two to form four based on the option of learning FNS. The students who studied FNS were 187 and those who did not opt for the subject were 194. Each stratum consisted of an equal number of students according to the number of selected students in a school. The number of students in each stratum was 28, 34, and 65 from Kikuyu, Viwandani and Dodoma secondary schools respectively. In total, the involved students were 84 in form two, 102 in form three and 195 in form four. Simple random selection was carried out to ensure an equal number of boys and girls in each stratum.

2.2.3 Data collection

Self-administered questionnaire was used to solicit information about socio-demographic characteristics of the study population, students' attitudes towards learning FNS and 24 - hour dietary recall. In 24 - hour dietary recall, study subjects were required to recall and report the foods and beverages consumed either at home or outside home in the previous day prior to the survey. The foods consumed were grouped into ten food groups namely grains, white roots, tubers and plantains; pulses, nuts and seeds; milk and other dairy products; meat, poultry and fish; eggs; dark green leafy vegetables; Vitamin A-rich fruits and vegetables; other vegetables and other fruits (FAO, 2016). Dietary Diversity Score (DDS) was obtained by summing up the score from all food groups consumed by students. Students who had $DDS \geq 5$ were considered as having adequate dietary diversity while those with $DDS < 5$ were considered as having inadequate dietary diversity (Caswell *et al.*, 2018). In addition, students were asked to provide all T/L material, which they used in learning FNS.

In order to determine the reliability of the instruments, which were used in this study, students' questionnaires were pre-tested in the study area but the respondent and data collected were not included in the analysis. The Cronbach alpha was calculated from SPSS and the score value of reliability of the instrument obtained for students' questionnaire was 0.829. The obtained score value suggested that the instruments used in this study were reliable (Mohajan, 2017).

2.2.4 Data analysis

Data were analyzed using SPSS Version 20 software. Descriptive statistics were computed to determine frequencies, percentages, means, maximum and minimum values of individual variables according to 5-point Likert scales (Strongly Agree, Agree, Unsure,

Disagree and strongly disagree) using an index-summated scale as applied by Mosses (2010). Unsure carried 0 mark while positive attitude such as strongly agree and agree carried a score of "2" and "1" respectively. Negative attitudes such as disagree and strongly disagree were given "-1" and "-2" respectively. This gave a score range of -20 to +20 for the attitude section. The scores in attitude were categorized as poor ($\leq 50\%$), fair (51% to 69%) and good (70% to 100%) (Khan, 2014). Since the items consist positive attitudinal statement strongly agree "5", agree "4", unsure "3", disagree "2" and strongly disagree "1" then mean score was calculated and interpreted as positive attitude when mean score ≥ 4 while mean score ≤ 2 was the term to be negative attitude and 3 was neutral (Olum *et al.*, 2020). Chi-square test was employed to examine the relationship of attitude towards learning FNS between students who opted to study food and nutrition and those who did not opt to study the subject and their gender difference was examined by comparing their mean scores.

Then t-test was used to compare the DDS of students who opted and those who did not opt to study FNS. A Chi-square test was used to check the relationship between students' DDS and learning FNS.

3.3 Results and Discussion

3.3.1 Students socio-demographic characteristics

The results show that among the 187 selected students who opted for learning FNS 49.2% (n=92) were males. The age distribution of the study population ranged from 13 to 18 years with their mean age of $15 \pm 1.4SD$ (Table 3.1).

Table 3.1: Student's socio- demographic characteristics (N=381)

| Variable | Opted FNS (n=187) | | Not opted FNS (n=194) | | Mean age of students | Std. Deviation |
|--------------------------|----------------------|------|--------------------------|------|-------------------------|----------------|
| | n | % | n | % | | |
| Sex of respondent | | | | | | |
| Male | 92 | 49.2 | 95 | 48.9 | | |
| Female | 95 | 50.8 | 99 | 51.1 | | |
| Age (years) | | | | | | |
| 13-14 | 58 | 31.0 | 60 | 31.0 | | |
| 15-16 | 74 | 39.6 | 63 | 32.5 | 15 | 1.4124 |
| 17-18 | 55 | 29.4 | 71 | 36.5 | | |
| Class | | | | | | |
| Form II | 64 | 34.2 | 66 | 34.0 | | |
| Form III | 63 | 33.7 | 65 | 33.5 | | |
| Form IV | 60 | 32.1 | 63 | 32.5 | | |

3.3.2 Students attitudes towards learning food and nutrition subject

Students were given attitudinal statements which required them to respond according to the five Likert scales whose responses were summarized in terms of percentages. It was revealed that more than half (53%) of the students enjoyed studying FNS. The majority of the students (72.2%) said there are benefits of studying FNS in their school, and a few (9.4%) participants believe that gender does not influence the attitudes towards learning FNS. The average mean score of students' attitudes towards learning FNS was 4.01 which was considered to be a positive attitude (Table 3.2).

Also, the level of attitude varied between students who opted for studying FNS and those who did not. Those who opted to study FNS have a positive attitude compared to those who did not opt because for those who opted ($M = 4.5182$) and those who did not opt ($M = 2.1396$) which is greater than the average mean of ($M = 4.01$). Gender wise, the findings reveal that the level of attitude of students varies since the mean scores for males ($M = 2.0154$) and females ($M = 4.4995$). This implies that males had a negative attitude towards learning FNS compared to females (Table 3.3).

The current study reports variation in attitude towards learning FNS among students in the Dodoma region because students who were already exposed to FNS had the knowledge and thus made them aware of the usefulness and benefit of food and nutrition in their lives. The results observed in this study are not far from those reported in various countries across the world as acknowledged by Kivrak and Altın (2018), in Turkey students who take nutrition have a positive attitude towards the subject as opposed to those who do not attend nutrition classes. Likewise, the study done in the USA revealed that 92.5% of students felt they had benefited from learning FNS (Partida *et al.*, 2018). In contrast, the study done in Norway shows that students have a negative attitude towards learning FNS as they thought it is for the less gifted and girls' students due to cooking activities conducted during learning period (Øvrebø, 2014).

However, the study found variation in attitude towards learning FNS between male and female students; as male students tend to have a negative attitude towards FNS compared to females. Since male students believe that the subject has no benefit in their lives; so, the subject should be offered to females only due to male dominance culture where domestic chores are left to females. A similar result was reported by Sempele *et al.* (2018)

in Zimbabwe indicating that male students claim that FNS is special for female students as it is more to do with cooking activities. In contrast to the findings in the current study, a finding in a study by Shadreck (2012) demonstrates that 75% of students who participated in the study have a negative attitude towards FNS regardless of their gender.

Table 3.3: Comparison of attitude towards learning food and nutrition subject among students (N=381)

| Variables | n | Mean | Std. Deviation | p-value |
|--|----------|-------------|-----------------------|----------------|
| Opting Food and nutrition subject | | | | |
| Opted | 187 | 4.5182 | 0.7105 | 0.009 |
| Not opted | 194 | 2.1396 | 0.9352 | |
| Sex of respondent | | | | |
| Male | 187 | 2.0154 | 0.8825 | 0.011 |
| Female | 194 | 4.4995 | 0.7042 | |

3.3.3 Eating habit of students who opted and those who did not opt to study food and nutrition subject

The study found that all studied students consume grains, white roots, tubers and plantain. It was further noted that the majority of the participants who opted for studying FNS consumed mostly pulses (57.2%), nuts and seeds (61.9%) and meat, poultry, and fish (78.4%). They had a limited intake of other foods such as vegetables including dried leaves of bean and pumpkin (13.9%). Most of the students who did not opt for studying FNS consumed meat, poultry and fish (67.9%). They had a limited intake of foods such as eggs (8%), and other vegetables (9.1%) (Table 3.4).

In the present study, a considerable proportion of foods consumed by students who did not opt to study FNS are not proper for their healthy. For example, low consumption of eggs, milk, vegetables and fruits was noted which could lead to deficiencies of important nutrients required by these growing students. This practice could be due to a lack of nutrition knowledge obtained from FNS hence, students eat food that satisfies their interest without considering nutrients.

Table 3.4: Food groups consumed by students (N=381)

| Variables | Opted Food and nutrition subject | | | |
|---|----------------------------------|------|-------------------|------|
| | Opted (n=194) | | Not opted (n=187) | |
| | (n) | (%) | (n) | (%) |
| Food groups | | | | |
| Grains, white roots tubers and plantain | 194 | 100 | 187 | 100 |
| Pulses | 111 | 57.2 | 91 | 48.7 |
| Nuts and seeds | 120 | 61.9 | 77 | 41.2 |
| Milk and dairy products | 58 | 29.9 | 31 | 16.6 |
| Meat poultry and fish | 152 | 78.4 | 127 | 67.9 |
| Eggs | 43 | 22.2 | 15 | 8 |
| Dark green leafy vegetables | 95 | 49 | 44 | 23.5 |
| vitamin A rich fruits and vegetables | 84 | 43.3 | 23 | 12.3 |
| Other vegetables | 27 | 13.9 | 17 | 9.1 |
| Other fruits | 98 | 50.5 | 34 | 18.2 |

These similar results on students eating habits were reported in the studies done in Ethiopia and Tanzania whereby students were consuming many kinds of cereal, grains and tuber and their diet was lacking eggs, milk, vegetables and fruits (John *et al.*, 2021; Tamirat *et al.*, 2019). In Kenya, it was found that students, especially girls, have unhealthy eating habits because they want to be slim and this is due to a lack of proper nutrition knowledge (Kigaru, 2015). Likewise, results are reported in a study by Partida *et*

al. (2018) and Kostanjevec *et al.* (2013) reveal that students learn more about nutrition as they are observed to have healthier eating habits in their lives compared to others.

Table 3.5: Comparison of dietary diversity among students who opt and those not opted to study food and nutrition subject (N =381)

| Variable | n | DDS_categories | | | | p-value |
|---|-----|----------------|-----|-----|-----|---------|
| | | <5 | | ≥5 | | |
| | | (n) | (%) | (n) | (%) | |
| Opted Food and nutrition subject | | | | | | |
| Opted | 187 | 14 | 07 | 3 | 93 | 0.002 |
| | | 11 | | 17 | | |
| Not opted | 194 | 1 | 57 | 83 | 43 | |

The results indicate that a large proportion (93%) of students who opted for FNS had DDS of above five (5). However, it was found that most (57%) of the students who did not opt for studying FNS had a DDS of below five (5). This implies that there is a significant relationship between studying FNS and the DDS of students since the p-value is 0.002 which is less than 0.05 (Table 3.5).

The current study revealed that there is a significant difference in eating habits between students who opted and those who did not opt to study FNS. These findings imply that opting for studying FNS has an impact on students in having adequate DDS which to improve and rectify their unhealthy eating habits. However, other factors such as food availability and accessibility are likely to influence students' choices. The observed results

are consistent with the results in a study in Ohio which revealed that students who attend nutrition class had healthy dietary practices compared to those who had not attended the class (Nani, 2016). Similarly, in Nigeria, it was reported that inadequate nutrition education in secondary school leads to healthy eating habits for students especially in making good food choices (Essien *et al.*, 2014).

3.4 Conclusion

The present study found that students who opted to study FNS have a positive attitude towards learning FNS in ordinary level secondary schools because they think it is beneficial in their health as it adds skills and brings changes in their eating habits. Also, the study found that gender has an influence on attitude towards learning FNS since male students have a negative attitude as they perceive the subject as designed for females only. Also, the study established further that, students who did not opt for FNS had inadequate dietary diversity in their daily diet compared to those who opted for studying the subject. This indicates that it is easier for students to practice what was taught in FNS to improve their eating behaviour.

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CHAPTER FOUR

4.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The present study found that FNS syllabus indicated the main nutritional knowledge which corresponded with the emerging nutritional issues of the country but there are no textbooks aligned with the syllabus. Some of the existing supplementary books were published more than 10 years ago and had outdated nutrition information, which are not satisfactory to fulfil the need of the current syllabus and address the existing problem of triple burden of malnutrition. Also, the study found that, majority of reference books used in ordinary level secondary schools have never been revised ever since published. Among those eleven (11) common books used, only two (2) books originated from Tanzania but the remaining nine (9) books are from foreign countries such as Kenya and United Kingdom.

The present study found that students who opted to study FNS have a positive attitude towards learning FNS in ordinary level secondary schools because they think it is beneficial in their health as it adds skills and brings changes in their eating habits. Also, the study found that gender has an influence on attitude towards learning FNS since male students have a negative attitude as they perceive the subject as designed for females only.

The study established further that, students who did not opt for FNS had inadequate dietary diversity in their daily diet compared to those who opted for studying the subject. This indicates that it is easier for students to practice what was taught in FNS to improve their eating behaviour.

4.2 Recommendations

Based on the findings, the study recommends the following;

- i. The government through Tanzania Institute Education (TIE) should prepare textbooks that incorporate the current content of the FNS syllabus. Also, TIE should recommend specific reference books for teaching and learning FNS in order to bring uniformity in teaching and learning as well as fair students' assessments in this subject.
- ii. Students should be encouraged to have positive attitude towards FNS through proper guidance on the objectives of learning FNS before allowing them to decide on whether to elect the subject. Also, subject extracurricular activities on increasing nutrition programmes should be given more emphasis to male students in order to provide the opportunity of improving their eating behaviour for their lifelong future benefits.
- iii. Further studies on the contribution of nutrition education on students' food choice in relation to NCDs are necessary.

APPENDICES

Appendix 1: Students' questionnaire

My name is Vashty Songo. I am a student at Sokoine University of Agriculture. The purpose of this questionnaire is to find out students' attitudes towards learning Food and nutrition subject and its impact on dietary diversity. The information you give concerning your feelings towards learning of food and nutrition will be handled confidentially. Please respond to the items below as honestly as possible. Your participation is completely your choice. You do not have to participate if you do not want to. There is no penalty to you if you choose not to participate. Also, you are free to not answer questions you do not wish to answer. Your cooperation is greatly appreciated.

My name is..... student from.....

I agree to participate in this study.

Signature Date

PART A: DEMOGRAPHIC INFORMATION

Questionnaire number

1. Sex: (1) Male (2) Female []
2. Class / form: (1) Form two (2) Form three (3) Form four []
3. What is your age: (1) 13-14 (2) 15-16 (2) 17-18
[]
4. Are you opting to study food and nutrition subject: (1) opt (2) Not opt []

PART B: ATTITUDES OF STUDENT TOWARD NUTRITION SUBJECT

1. This section has items that you are to decide carefully whether you Strongly agree (5), Agree (4), Unsure (3), Disagree (2), or Strongly Disagree (1) against each item put tick (✓) depending on your feelings.

| | ITEMS | SD=1 | D=2 | UN=3 | A=4 | SA=5 |
|------|---|------|-----|------|-----|------|
| i | Like to study CBN in "A' 'level | | | | | |
| ii | Benefits of studying FNS | | | | | |
| iii | FNS is a favourite subject | | | | | |
| iv | You like to pursue FNS for your further studies | | | | | |
| v | FNS is useful in life | | | | | |
| vi | It is better FNS to be compulsory | | | | | |
| vii | Your parents and relatives encourage you to learn FNS | | | | | |
| viii | Being a boy interferes you to learning FNS | | | | | |
| ix | Always you enjoy learning FNS | | | | | |
| x | There are enough teachers of FNS | | | | | |

2. If you answer 2 in Question: 4 in part A above, Give reason

.....

3. If you agree in Question: 2 (ii) in part B above, give reason to support your answer

.....

4. What is the name of textbooks and reference books used to learn food and nutrition subject at ordinary secondary school?

.....

.....

PART C. Dietary diversity**Dietary Diversity Questionnaire**

Please write down all food and beverage that you have eaten or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink eaten in the morning. Feel free to add additional information that best describes your food in detail.

| Breakfast | Snack | Lunch | Snack | Dinner | Snack |
|-----------|-------|-------|-------|--------|-------|
| | | | | | |

Dietary diversity score questionnaire

| | Food group | Examples | YES=1 NO=0 |
|----|---|---|-----------------------|
| 1 | Grains, white roots and tubers, and plantains | Bread, noodles, porridge, white potatoes, white yam, white cassava, or other foods made from roots | |
| 2 | Pulses | Dries beans and peas and lentils | |
| 3 | Nuts and seeds | Nuts, seeds or foods made from these (e.g. Peanut butter) | |
| 4 | Dairy | Milk, cheese, yoghurt or other milk products | |
| 5 | Meat, poultry and fish | Liver, kidney, heart or other organ meats, eggs (chicken, duck) beef, pork, lamb, goat, rabbit, game, chicken, duck, other birds, insects fresh or dried fish or shellfish | |
| 6 | Eggs | Eggs from chicken, duck, guinea fowl or any other egg | |
| 7 | Dark green leafy vegetables | Dark green leafy vegetables, including wild forms + locally available vitamin A rich leaves such as amaranth, cassava leaves, kale, spinach | |
| 8 | Other vitamin A-rich fruits and vegetables | Pumpkin, carrot, squash, or sweet potato that are orange inside + other locally available vitamin A rich vegetables (e.g. red sweet pepper) 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 | |
| 9 | Other vegetables | Other vegetables (e.g. tomato, onion, eggplant) + other locally available vegetables | |
| 10 | Other fruits | Other fruits, including wild fruits and 100% fruit juice made from these | |

Source: FAO 2016. Minimum Dietary Diversity for Women. A Guide to Measurement.

Thank you very much for your cooperation.

Appendix 2: Checklist for assessing teaching and learning materials

1. What are the kinds of textbooks and reference books used to teach food and nutrition subject at ordinary secondary school?
2. Are those books relevant to cover the current nutrition issues such as stunting, underweight, wasting, complementary feeding, infant formula, common non communicable diseases related to nutrition, breastfeeding, HIV and breast-feeding issues, care for SAM, ending malnutrition, hidden hunger, zero hunger, nutrition intervention, water and sanitation.
3. What is the year of publication of current syllabus used?
4. What are topics taught at different classes / year of study (form i, ii. iii and iv)?
5. Are objectives of each subtopic relevant to the current nutrition issues according to level of the study?
6. Are the teaching and learning materials updating each year according to the changes of nutrition situation in a country?
7. Are those teaching resources efficient in teaching this subject?
8. Details of teaching and learning materials
 - i. Name of Learning Material.....
 - ii. Author
 - iii. Year of publication
 - iv. Place of publication

Thank you very much for your cooperation.