

**Role of primary school nutrition knowledge on learner's food choices in Kasungu
District**

By

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A thesis submitted to the Faculty of Education in partial fulfilment of the requirements for
the degree of Master of Education in Teacher Education

At

Mzuzu University

August, 2023

STUDENT DECLARATION

I, declare that the thesis entitled “**Role of primary school nutrition knowledge on learners’ food choices in Kasungu District**” is my own work, and that all the quotes or sources used have been acknowledged through appropriate citations and references. The thesis is being submitted in partial fulfilment of the requirements for the degree of Master of Education in Teacher Education at Mzuzu University. It has not been submitted previously, in whole or part for the award of any other academic degree or examination in any other University.

Name of student: -----

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ACKNOWLEDGEMENT

I would like to thank the Almighty God for making it possible to reach this far, from the time I started the task. Thanks should also go to my parents for the prayers. I would also like to acknowledge and give my warmest thanks to my supervisor, Dr Jean Kaunda, who made this work possible. Her guidance and advice carried me through all the stages of writing this thesis. My special gratitude also goes to Dr Kaminga for his statistical support and guidance.

I would also like to give special thanks to my husband, Ishmael Mambala, my daughters Gracea and Ellen, my grandchildren Praise and Patience, for their spiritual, financial and moral support.

Furthermore, I am in great debt to the GIZ for sponsoring my studies during data collection. It would not have been possible without their financial support.

May our Lord be glorified for the success

DEDICATION

I wish to dedicate this work to my husband Ishmael, and the entire family for their patience through the tough economic and social challenges they encountered as a result of my studies at Mzuzu University. They really endured the hardening off until the studies were over.

May God bless them

ABSTRACT

Schools are considered a primary setting for implementing nutrition knowledge since they comprise of large numbers of children who frequently come to school over a prolonged period of time. As such, a school curriculum that focuses on the importance of nutrition can help learners to adopt as well as maintain healthy food choices and life styles. The aim of this study was to assess the role of primary school nutrition knowledge on learners' food choices in Kasungu District. This was a descriptive cross-sectional study using mixed method approach. Three hundred and forty standard seven learners from twenty primary schools which were purposively selected, were involved in the study. Self-administered questionnaires and focus group discussions were used to gather information on nutrition knowledge, eating patterns of the learners and factors influencing the learners' food choices. The results revealed that the learners had good nutrition knowledge on most of the questions ($P < 0.05$). However, the learner's food choices were poor because generally they liked and consumed more energy-dense and non-nutritious foods like Kamba Puffs, Chips, sweets and biscuits. Fruit consumption was low as only 41.5% of the learners consumed fruits frequently. The results also revealed that most learners skipped lunch and breakfast.

In conclusion, this study has revealed that the learners had good nutrition knowledge. However, the study has shown that the learners had poor food choices, for instance, in the selection of snacks bought at school and brought from home. Therefore, having good nutrition knowledge does not warrant making healthy food choices.

ABBREVIATIONS AND ACRONYMS

CPD	Continuous Professional Development
COVID-19	Corona Virus Disease 2019
EFIC	European Food Information Council
FAO	Food and Agriculture Organisation
FGDs	Focus Group Discussions
MIE	Malawi Institute of Education
MOEST	Ministry of Education, Science and Technology
NCDs	Non Communicable Diseases
OBE	Outcome Based Education
PCAR	Primary Curriculum and Assessment Reform
SHN	School Health and Nutrition
SCT	Social Cognitive Theory
UNESCO	United Nation Educational, Scientific and Cultural Organisation
UNICEF	United Nations Children’s Fund
WHO	World Health Organisation

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CHAPTER 1: INTRODUCTION

1.1 Chapter overview

This chapter presents an introduction and background to the topic under study which is ‘the role of primary school nutrition knowledge on learners’ food choices’. This section presents the introduction and background to the study, statement of the problem, research objectives, significance of the study, theoretical framework, delimitations of the study, limitations of the study, definitions of operational terms and conclusion.

1.2 Background to the study

Malnutrition is a serious health problem in the world often caused by unhealthy diets or poor food choices (FAO, et al., 2017). Healthy food choices help to protect against malnutrition in all its forms, as well as non-communicable diseases. Therefore, healthy food choices started early in life fosters healthy growth, hence may have longer term health benefits like reducing the risk of becoming overweight or obese, and developing non-communicable diseases later in life (NCD Alliance, 2017).

Unhealthy foods or poor nutrition and resulting malnutrition are linked to several non-communicable diseases like cardiovascular and diabetes. Around the world, heavy marketing of foods high in salt, fat and sugar influence children’s food preferences and choices. Children with poor nutrition are more likely to develop certain long-term health problems and complications. Food choices is therefore one of the causes of diet related non -communicable diseases. Non-communicable diseases (NCDs) threaten human health, development and the achievement of the Millennium Development Goals. Worldwide, NCDs currently represent 63% of global deaths (36 million of deaths) and 80 % of these are in low- and middle-income countries (NCD Alliance,

2011). If left unchecked, it is estimated that NCDs will be responsible for 73% of all deaths in the 2020s. Most of this increase will be accounted for by emerging NCD epidemics in developing countries. While non-communicable diseases tend to manifest in adulthood, many have their origins in behaviours adopted during childhood.

WHO (2010), comments that unhealthy diets in childhood are associated with overweight and obesity, and rank globally as the fifth leading cause of death. Over 42 million children are overweight and obese which increases their risks of NCDs in adulthood as well as having immediate impact on their health.

In Africa, NCDs are already responsible for more than three quarters of all deaths. Although communicable diseases and other conditions still predominate in Sub Saharan Africa, NCDs are projected to become the leading cause of deaths in 2030 (NCD Alliance, 2011). Unless urgent action is taken, the growing NCD epidemic will add tremendous pressure to already overstretched health systems and pose a major challenge to development in Africa. Monitoring trends in the risk factors such as unhealthy diet among school children are important strategies for addressing non-communicable diseases.

In Malawi, NCDs are estimated to account for 28% of deaths, a figure that continues to rise in countries throughout Sub – Saharan Africa affecting even school going children. Children of primary school age are responsive to health messages and behaviour changes which may be maintained into adolescence and adulthood (Martyn, 2011). Therefore, nutrition interventions aimed at this group may have a positive and continuing effect. Improved practices in nutrition behaviours and a reduction in problems associated with poor nutrition practices like obesity and cardiovascular diseases are some of the positive effects of nutrition interventions. Evaluating

children's nutrition knowledge with an aim of mapping out important nutrition interventions will help to find means of addressing the factors which influence these aspects.

Nutrition is a pillar of development, not only because food is the most human basic need, but also, because without proper nutrition health is impossible. The amount and kinds of food people eat, and their nutritional quality have direct effects on people's health and wellbeing and hence, their ability to act to improve their own lives (FAO, 2005). Education too, is essential for development because it creates choices and opportunities for people and reduces the burden of diseases.

Whitney (2011) contends that nutrition and education are closely interlinked because it is commonly understood that good nutrition during childhood is important for healthy growth and development. But in addition to affecting physical growth, a child's nutritional status also influences several factors that are central to the child's attention span, its learning capacity and its ability to fully engage in educational experience. Studies have shown that good health and nutritional status enhance school attendance and retention (Smolin & Grosvenor, 2013). Well-nourished children produce good results at school, become a pride of the nation, grow into healthy adults and in turn, provide their children a better start in life (UNICEF, 2007).

Therefore, there is need for learners to maintain good health through disease prevention. For this to be achieved, learners need to have wise food choices. For the learners to have wise food choices they need to have a wide knowledge on nutrition. However, school nutrition knowledge should not only focus on the provision of nutrition information, but also on the development of skills and behaviours related to areas such as food preparation, food choices and social cultural aspects of food and eating patterns (Frisvold, 2012).

Nutrition knowledge can be described as knowledge of concepts and processes related to nutrition and health, including knowledge of diet and health, diet and disease, foods representing major sources of nutrients and dietary guidelines and recommendations (Lean & Combet, 2017). People select food basing on many factors such as taste, cost, education, culture and mood, but selection based on nutrition knowledge may better support their health. Poor food choices have been known to increase amongst primary school learners, hence the need for nutrition knowledge must be emphasised. It is important that teachers consider nutrition components in Science and Technology subject and its effects on the food choices of learners.

In Malawi, the new primary school curriculum has integrated nutrition component into Science and Technology. Some of the nutrition elements integrated into science and technology include food and health, food and nutrition, nutritional deficiency diseases, packed meals and improving nutritional value of food. The core idea behind this nutrition component is to develop an understanding of the inter-relationship between nutrition and health problems in homes, communities and the world (MIE, 2007). Hence, it is important for teachers to tackle these areas professionally so that learners are equipped with the right knowledge and skills for better food choices.

The Malawi School Health and Nutrition Strategy (2009 – 2018), also advocates for the delivery of the School Health and Nutrition (SHN) package in all schools. The SHN has the potential to improve learners' health, their cognitive development, learning potential, and future life choices. Thus, improving the health of school-age children contributes to the attainment of one of the sustainable Development Goals, which is ensuring healthy lives and promote well- being for all, at all ages.

Nutrition is important to school children because it equips them with proper and adequate knowledge and skills necessary for critical thinking regarding diet and health. So, the individual can make healthy food choices from an increasingly complex food supply for them to stay healthy and strong (Brown, 2017). Therefore, nutrition knowledge help to create behaviours that prevent learners from developing nutritional diseases by educating them on aspects of healthy eating.

As most children eat snacks at school, nutrition knowledge offers opportunities for learners to practice making healthy eating decisions. For this reason, promotion of nutrition knowledge in primary schools is a key factor in healthy food choices and following healthy eating patterns. Wardlaw et al. (2013), alludes that children spend most of their working hours in school, so it is a great place to learn about positive healthy eating habits. A strong emphasis on nutrition in schools can help children understand why healthy diet habits will make them feel more energetic, look better and work more efficiently. Teachers therefore, need to create opportunities for learners to be active and must practice what they preach when it comes to healthy habits. Wardlaw et al. (2013), adds that nutrition is a lifestyle factor, which is key to developing and maintaining an optimal state of health for a person.

Promotion of nutrition knowledge in primary schools is a key factor in healthy food choices and following healthy eating patterns. Boyle and Zyla (2019) comment that for most people, eating is habitual that they hardly give any thought to the food they choose to eat, yet the food one selects can have a profound effect on the quality, and possibly even on the length of one's life.

High risk behaviours such as unhealthy eating behaviours are increasing among learners. Hence, equipping learners with nutrition knowledge in schools can assist to protect the children as they eat too many low nutrient foods. Nutrition knowledge helps to establish a foundation for healthy

eating habits that children can apply throughout their life. F.A.O (2005) notes that the kinds of food people eat, and their nutritional quality, have direct effects on one's health and wellbeing, and hence on their ability to act to improve their own lives. For instance, poor food choices can contribute to poor nutrition which leads to stress, tiredness, but can also contribute to the risk of developing some illnesses and other health problems such as obesity. Effective nutrition knowledge, thus plays a vital role in combating the rise in non-communicable, diet related diseases. Schools are the natural development zones for nutrition knowledge acquisition. They are one of the main social contexts in which lifestyles are developed. Ensuring that children are healthy and able to learn is essential for an effective education system. Good health increases school enrolment and reduces absenteeism. Meeting the nutrition and education needs of learners is critical to supporting their healthy growth and development. According to WHO (2016), lifestyle diseases are on the rise due to poor eating habits, and are causing deaths globally.

One of the major concerns of the Malawi government is to raise the standards of the population by promoting good health as laid down by Government of Malawi in the Malawi Growth and Development Strategy (2017-2022). The Malawi primary school curriculum has tried to support this idea by including a component of nutrition within the integrated science and technology. MIE (2007) emphasizes that the core idea behind this nutrition component is to develop an understanding of the inter-relationship between nutrition and health into the learners in order to effectively deal with nutrition and health problems in homes, communities and the world. Kaambankadzanja (2011) comments that the aim of outcome-based education is on the outcomes displayed by the learner after teaching and learning. However, one wonders if the nutrition component within the integrated Science and Technology really addresses this core element as most learners seem not to be fully equipped with the knowledge of nutrition and health as

observed through their eating behaviours. This is evidenced by studying the type of food learners bring to school and the type of foods they like buying when at school. It is therefore against this background that the researcher wished to assess the role of nutrition knowledge on primary school learner's food choices as FAO (2005) warns, that most learning about nutrition is useless if it is not ultimately applied to life.

In their study on nutrition knowledge and nutritional status of primary school pupils in QwaQwa, Oldewage- Theron et al. (2010), observed that the learners had average nutrition knowledge with many gaps relating to aspects, such as the role of the various food groups in the diet and safe hygiene practices. A study conducted by Badrasawi et al. (2020), on nutrition knowledge and dietary practices among students in Palestine, found that the students had lower levels of nutrition knowledge. Findings of a study by Mamba et al. (2019) in Tshwane Metropole indicate that there is a gap in the learners' nutrition knowledge, especially of the balanced diet and food groups which impact practices.

1.3. Statement of the Problem

Non-communicable diseases (NCDs) are on the rise in developing countries including Malawi (MOEST, 2017). NCDs are associated with poor diet and poor life styles. Poor food choices are amongst the leading causes of diet related non-communicable diseases where primary school learners are not spared. Food related lifestyle diseases like diabetes and obesity amongst others are increasing among children due to limited nutrition knowledge (Brown, 2017). Children begin to learn about food and nutrition in the classroom. Meeting the nutrition and education needs of children is therefore, critical to supporting healthy growth and development. Wardlaw (2013), comments that school is the most important setting to inculcate nutrition knowledge and skills

because learners spend most of their time in school however, Whitney (2017) warns that each day's food choices may benefit or harm ones' health only a little, but when these choices are repeated over years and decades the rewards or consequences become major. That being the case, paying close attention to good eating habits in young age supports health benefits later in life. Conversely, carelessness about food choices can contribute to many chronic diseases in adulthood. Moreover, the food choices learners make each day will benefit or impair their health in proportion to the wisdom of those choices.

The Malawi Primary School Curriculum advocates for healthy living by teaching nutrition knowledge aspects through integrated Science and Technology subjects from standard 5 to 8. Some of the nutrition elements which are taught are food and health, packed meals, nutrition and health, improving nutritional food value and methods of cooking.

Despite these nutrition aspects being integrated in Science and Technology, it has been observed that most learners still opt for eating foods which are not good for their health. This has been revealed through observing the type of foods learners bring from home and buy at school during break times. Boyle and Zyla (2019) comment that for most people, eating is so habitual that they hardly give any thought to the foods they choose to eat. Yet, the food one selects can have a profound effect on the quality, and possibly, even the length of ones' life.

Poor nutrition coupled with poor eating patterns may lead to obesity in the learners. Children who have poor health do not concentrate in class, leading to poor performance (Smolin & Grosvenor, 2013). From literature, it has been observed that many studies conducted on primary school learners' nutrition knowledge have been from outside Malawi, hence little is known about the level of nutrition knowledge and primary school learners' food choices in the Malawian

context. It is against this background that the researcher sought to examine the role of primary school nutrition knowledge on learner's food choices.

1.4. Main Research Objective

The main purpose of the study was to assess the role of primary school nutrition knowledge on learner's food choices in Kasungu District.

1.5. Specific Objectives of the Study

The specific objectives of the study were to:

- Assess the level of nutrition knowledge among primary school learners in the integrated Science and Technology.
- Investigate teaching methods used by primary school teachers when teaching food and nutrition concepts.
- Analyse eating patterns of primary school learners regarding food bought at school and brought from home.
- Explore factors that influence food choices in primary school learners.

1.6. Significance of the Study

It is hoped that the information which will be gathered from the study will bring an insight into the teaching of nutrition related topics in Science and Technology. This will translate into improved learner's food choices knowledge. The information from this study will help the learners to have better food choices which will enhance strong and healthy bodies. With this knowledge

and skills gained, the learners will be able to extend nutrition education issues to their families and the community at large, and thus building a healthy nation. In addition, the information obtained will help Science teachers to make appropriate decisions on areas which will require CPD activities to improve their performance in the teaching of nutrition. The information will also assist curriculum designers to review nutritional components as integrated in Science and Technology subject.

1.7. Theoretical Framework

The focus of this study was to explore the role of primary school nutrition knowledge on learner's food choices in Kasungu District. Rolling (2016) warns that nutrition programmes may be more effective if it is derived from theoretically sound information. This idea led the researcher to the choice of Social Cognitive Theory (SCT) of Bandura (1986). SCT holds the theoretical view that, human behavior is the result of dynamic interactions between personal, behavioural and environmental factors. Personal factors include an individuals' thoughts and feelings. Behavioural factors involve health-related knowledge and skills in regulating and taking action. Environmental factors are external factors that can affect health behaviours of an individual such as the physical and social environments (Bandura, 1989).

Schunk and Usher (2019) contend that SCT synthesises concepts from behaviour, and emotional models of behaviour change, so it can readily be applied to nutritional intervention for disease prevention and management. A basic premise is that people do not only learn through their own practice, but also by observing the actions of others. SCT therefore, describes the influence of individual experiences, the action of others, and environmental factors on individual health behaviours. SCT is suitable for understanding nutrition knowledge and food choices due to the

interaction between an individual, environment and behaviour. This aspect guided the researcher in examining whether nutrition knowledge is assisting learners to have wise food choices for a better healthy living.

SCT's core idea therefore, describes the interaction between a person, environment and behaviour. A person's behaviour both effects and is effected by the persons and environmental factors. SCT is one of the commonly used theoretical frameworks underlying interventions to promote healthy eating among the youth. Therefore, the researcher decided to use principles of SCT to measure the ability to participate in beneficial nutrition behaviour and explain how other variables such as self-efficacy, behavioural capability and outcome expectations are essential to integrating health nutrition lifestyles.

1.7.1 Self -efficacy

Self -efficacy is one of the most powerful predictors of health behaviour (Bandura, 1986). It is a component of Banduras SCT's behavioural factors which is believed to play a crucial role in the determination of health behaviours. According to Social Cognitive Theory, a personal sense of control facilitates a change of health behaviour. It pertains to a sense of control over one's environment and behaviour (Bandura, 1986). Self-efficacy beliefs are cognitions that determine whether health behaviour change will be initiated and how much effort will be expended and is directly related to health behavior, but it also affects health behaviours such as food choices. Whitney (2011) describes self-efficacy as a belief in one's ability to accomplish specific tasks. According to Bandura, self – efficacy is a central construct that is integral for the interrelationship between personal, environment and behavioural factors. Of importance, self – efficacy is correlated with dietary habits within children including improvement in self confidence in

choosing more healthful foods. It is not concerned with skills that one has, but with the judgements of what one can do with whatever skills he or she possesses. In reviewing the role of self – efficacy in achieving health behaviour change, it is seen that there is a strong relationship between self – efficacy and both change and maintenance of behaviour.

Bandura (1986), argues that self-efficacy, influences choices of a behaviour a person undertakes such as, starting new behaviours and changing existing behaviours. Self-efficacy therefore, makes a difference in how the learners feel, think and act on food choices and influence their effort to change a risk behaviour and the persistence to continue striving despite barriers and setbacks.

1.7.2 Behavioural Capability

Behavioural capability is another construct of SCT. This refers to an individual’s ability to perform a behaviour using knowledge and skills (Wayne, 2019). In other words, it is a person’s actual ability to perform a behaviour through essential health-related knowledge and skills in regulating and taking action (Bandura, 1989). In order to successfully perform a behavior, a person must know what to do and how to do it. For example, to promote consumption of healthy foods, learners must know foods which are healthy for them so that they make wise food choices. People learn from the consequences of their behaviour, which also affects the environment in which they live. Nutrition aspects are therefore, expected to enable the learners to have the capacity of choosing food accordingly, as a result of the knowledge and skills gained.

1.7.3 Outcome expectations

Lent (2013) describes outcome expectancies, which is another construct of SCT, as believed consequences of a person’s prospective behavior. This is the anticipation of physical, self-evaluative and social outcomes of a behaviour .When people decide upon performing a behaviour,

they consider what they will likely gain or lose as a result of their behaviour. The weighing of expected consequences of a person's behaviour is therefore the central element of expectancy. With outcome expectations, learners will be able to understand the link between their behaviour and its outcomes, when deciding upon a course of action as relates food choices.

1.8. Delimitations of the study

The study was delimited to twenty of the 378 primary schools in Kasungu District. The participants targeted were standard seven learners and standard seven Science and Technology teachers.

1.9. Limitations of the study

The study was limited to twenty schools only out of 378 primary schools, hence findings may not be generalised to other schools in Kasungu District. Secondly, reliance on self-reported data likely affected the results due to human error.

1.10. Operational Definition of Terms

Cardiovascular- A general term that refers to any disease of the heart and circulatory system.

Eating patterns-Eating habits, food choices and preferences of learners during the study.

Food choice –How people decide on what to buy and eat.

Healthy food – Food which is beneficial for health in terms of nutrition.

Junk foods – Food and drinks low in nutrients and high in calories, saturated fats, added sugar and / or salt.

Non communicable Diseases –Diseases that are not spread through infection or through other people, but are caused by unhealthy behaviours.

Nutrients- Chemical compounds in food that are used by the body to function properly and maintain health.

Nutrition-Study of nutrients in food, how the body uses them, and the relationship between diet, health and disease.

Nutrition knowledge –Knowledge of the concepts and processes related to nutrition and health, including diet and health, diet and disease, dietary guidelines and recommendations.

Non communicable diseases –Diseases that are not spread through infection or through other people, but are typically caused by unhealthy behaviours.

Snack –Food eaten between main meals of the day.

1.11 Chapter summary

The chapter has presented the introduction and background to the study. In addition, it has also presented statement of the problem, research objectives, significance of the study, theoretical framework, delimitations of the study, limitations of the study and operational definition of terms.

Literature review will be presented in the next chapter.

CHAPTER 2: LITERATURE REVIEW

2.1 Chapter Overview

The aim behind this chapter is to find out what other researchers have written on the role of primary school nutrition knowledge and their food choices.

2.2 The concept of primary school curriculum in Malawi

In Malawi, primary school education falls in the category of basic education which is meant to equip children with basic knowledge and skills to allow them to function as competent and productive citizens in the free society when they grow up. The primary education cycle takes eight years to be completed and is categorised into infant, junior and senior levels. The primary curriculum went into a reform that was known as primary curriculum and reform (PCAR). PCAR is learner centered, outcome based, employs continuous learner assessment and continued teacher development.

The philosophy of Outcome-Based Education (OBE) is the foundation of the primary school curriculum (MIE, 2008). An outcome-based curriculum focuses on learner's achievement with emphasis on participatory approaches. Chirwa & Naidoo (2014) agrees that the curriculum advocates for learner centred approach. For the outcomes to be achieved, learners need to be introduced to new knowledge in the context of the existing knowledge so that they can develop new understandings. This means that the process of learning is integrated to the final product. MOE (2005) alludes that these products are the outcomes which learners achieve in terms of teaching competencies and are clearly stated before they begin teaching.

Nitiko (1994) observes that curriculum is the total learning experience provided by a school. It includes the content of courses (the syllabus), the methods employed (strategies), and other aspects, like norms and values, which relate to the way the school is organised.

On a contrary view (MOEST, 2005) defines curriculum as the planned interaction of pupils with instructional content, materials, resources, and processes for evaluating the attainment of educational objectives. However, both definitions target a learner as a central point in the teaching and learning process. Hence, curriculum is defined as the total learning experiences of the individual. This definition is anchored on Dewey (2009)'s definition of experience and education. Dewey believed that reflective thinking is a means that unifies curricular elements. Dewey suggests that thought is not derived from action, but tested by application. The philosophy of PCAR mainly focuses on outcomes after instructions.

2.3. Nutrition: A historical perspective

The history of nutrition dates to the dawn of humanity. Diet was largely determined by the availability and palatability of foods (Carpenter, 2003). Teachings and techniques that were used to obtain and prepare food came from trial and error and incredible capacity of human inventiveness. "Though should eat live; not live to eat" is a saying attributed to Socrates. Hippocrates of Kos was among the first to establish the role of diet. He proposed lifestyle modifications, such as diet and exercise to treat diseases, and is often quoted with "let food be your medicine. Trueb (2020), adds that before 1875, many scholars had published their opinions on how food was used in our bodies, but it was only with the "Chemical Revolution" in France at the end of 18th century.

Accelerating economic development and modernisation of agricultural food process and food formulation techniques globally, reduced single deficiency diseases. In response, nutrition science shifted to research on the role of nutrition in complex non-communicable chronic diseases (Carpenter, 2003).

2.4. Nutrition knowledge in schools

Brown (2017) emphasises that adequate nutrition continues to play an important role during school age years in ensuring that children reach their full potential for growth, development and health. Lean and Combet (2016) describes nutrition as the science that links foods to health and disease, whereas Whitney et al. (2011) describes nutrition as the science of foods and the nutrients and other substances they contain. On the other hand, Lean and Combet (2017) describes nutrition as the process of taking in food and using it for growth, metabolism and repair. However, all the descriptions focus on food and its functions in the body.

The prevalence of obesity is increasing, but the beginning of eating disorders can also be detected in school age children and preadolescent children (Brown, 2017). Therefore, adequate nutrition and the establishment of healthy eating behaviours can help to prevent immediate health problems as well as promote a healthy life style. This may reduce the risk of the learners from developing a chronic condition such as type 2 diabetes and cardiovascular diseases later in life. The foods we eat support good health in many ways depending on their components. However, lifestyle habits and other factors may have a bigger impact on learners' food choices than the food components themselves. Learners may suffer from diseases that could have been prevented if they had known more about the foods and more importantly, had applied this knowledge when planning meals and designing their diets.

FAO (2005), comments that nutrition, health and education are the three major pillars that make a healthy nation because they form the foundation of addressing malnutrition, hunger and above all, ill health. The pillars are interrelated because the positive outcomes of the three factors become more effective if accompanied by the others. For this reason, nutrition knowledge is beneficial to learners because it will help them for life.

Gordon (2013) warns that understanding what drives us to eat and what affects food choice will help you understand the complexity of factors that influence eating, especially the effects of our routines. On the other hand, Whitney (2011), argues that sound nutrition throughout life does not ensure good health and long life, but can certainly help to tip the balance in their favour. Nevertheless, most people choose foods for reasons other than their nourishing value.

In primary school, nutrition knowledge is firstly imparted to teachers while at the Teacher Training College, in an integrated manner in Science and Technology, according to Phiri (2015). According to the primary school science and technology curriculum, learners are supposed to undergo the following nutrition content; food and health, nutrition and health, nutritional deficiency diseases, meal planning and presentation, food preservation, methods of cooking, food preservation, meals for special groups of people, methods of cooking food, food processing, improving nutritional food value and nutritional deficiency diseases.

This content is taught through integration in science and technology. If it were taught in a separate manner, it would be more effectively taught. This agrees with Phiri (2015) who says that, “the Integrated Science and Technology Curriculum has seriously compromised the quality of skill and knowledge acquisition in Home Economics”.

Studies on nutrition knowledge have been done worldwide, even in Africa .For example, in Kenya and Nigeria, all these studies agree that nutrition knowledge is important to learners because it assists them to choose healthy foods which will help in improving their academic performance (Schimmit, 2010). This is so because healthy foods are essential to maximising brain functions such as focus, comprehension, evaluation and application in learning. (Molotja, Maliwichi, & Jideani, (2020); Murimi, Crisman, Mc Collum & McDonald 2016), in their studies of nutrition knowledge and food choices agree that nutrition is important for the health and education performance of school age children.

Mamba et al. (2019), from their studies in Tshwane, South Africa established that the learners had inadequate nutrition knowledge. Talip et al. (2017) in Brunei, Darussalam, in their study reported favourable knowledge on the learners. These findings translate that it is important to establish learner's nutrition knowledge so that corresponding intervention is rendered.

2.5. Concept of teaching

Teaching is a process of imparting knowledge, skills, values and attitudes to the learner (MOEST, 2009). In order for teaching and learning process to be effective, the teacher employs various teaching methods which cater for different learning styles of learners, including those with special needs.

2.5.1 Methods used in teaching food and nutrition

Teaching methods are techniques that teachers use to help learners develop knowledge and skills (MOEST, 2009). A number of teaching methodologies are used when imparting knowledge on food and nutrition depending on the topic being tackled, competency of the teacher, including available time. In his study on strategies for enhancing teaching of food and nutrition, Mahundi

(2015) found that methods used in the teaching of food and nutrition include demonstration, lecturing, discussion, experimentation, project work, peer teaching, debate, guided and individual self-discovery.

On investigating the teaching of Home Economics in Primary Schools which include the element of food and nutrition, Chulumanda (2021) found that in the teaching faculty, the teachers used several teaching methods including demonstration, discussion, field work, projects, group work, quiz methods, question and answer, practical, role play, case studies and problem solving.

In their study on Home Economics Education in the elementary level which include the element of food and nutrition, Mendoza et al. (2006), found that the commonly employed methods used were discussion, lecture, group work, demonstrations, field trips and laboratory work or hands on experience. The methodologies are designed to enhance the knowledge of the learners and acquisition of skills. Hands on approaches makes the learners be able to develop manipulative skills so that they end up having refined motor skills. Some of the mostly used methods in schools are going to be clarified below:

2.5.1.1 Think-Pair –Share

This method involves individual thinking about an issue or a problem and sharing the results with a partner (Ott, 2012). This is done in the beginning of the lesson in order to direct the learners' attention to the topic at hand or in between, if there is a problem to think about before the lesson continues. As such, the method encourages learners to examine concepts and meanings of given terms individually, and come up with the correct meaning by analysing each other's responses in pairs. Hence, promoting critical thinking in the learners.

2.5.1.2 Group work

This is a method where learners do given tasks in numbers of more than two. The main purpose of group work is to collect experiences and knowledge, processing knowledge, discussing opinions, practising skills, and jointly preparing presentations (MOEST, 2012). In group work, learners get used to cooperating with others while working and learning: assisting each other, discussing learning strategies, planning the work, listening, sharing, integrating ideas and opinions of others, and handling disagreements constructively.

2.5.1.3 Discussion

MOEST (2010) describes discussion as the interaction between the teacher and learners, and among learners themselves. The discussion method makes learners active throughout the lesson and also provides opportunities to learners for critical thinking and practice listening attentively. Moreover, discussion encourages learners to learn from each other. Learners easily understand when they discuss what they have learnt, as they would be clarifying understood concepts. As such learners do not easily forget what they have discussed. Furthermore, discussions enhance team working spirit in learners

2.5.1.4 Brainstorming

MIE (2013) describes brainstorming as a method in which learners contribute ideas about a topic. It involves collecting ideas, opinions, and short statements on a topic. There is no pressure for one to be brilliant in order to contribute ideas, and there is no correct or wrong answer at this stage. The ideas are tested and improved as they are shared with others during whole class discussion.

2.5.1.5. Demonstration and Practice

As far as food and nutrition is concerned, demonstration is the best teaching method. MOEST (2010) describes demonstration as an instructional activity in which the teacher performs an activity to show how something is done. It has the strength that it trains learners to be keen observers and stimulates thinking. Another strength of demonstration is its ability to provide a concrete and realistic visual picture of what is being presented to supplement world images. This helps the learners to have a more long lasting impression. Demonstration proves to be a key method in the teaching of food and nutrition because of its pragmatic approach, as after demonstration, learners must be able to follow suit. As such, it is important that demonstrations should be followed by giving learners an opportunity to practise the skill, either individually or in groups.

2.5.1.6 Question and answer

This is another method of teaching learners. In this method, questions and answers are used. Question and answer teaching method is defined by MOEST (2009), as a method both for teaching and oral testing, based on the use of the questions to be answered by the learners. Question and answer method helps the teacher to monitor the progress of the learners in a lesson (MIE, 2006). Another strength is that question and answer helps to clarify and expand certain points in the lesson. It also provides feedback to the teacher.

2.5.1.7. Lecture

Lecture method is a way of teaching in which the teacher talks to the learners while the learners listen. The learners follow the class proceedings while the teacher is teaching (MOEST, 2009). The learners have no opportunity to ask questions or offer comments during the lesson. Even though lecture method appears to be an efficient teaching method, as little or no time is spent on

discussing, learning is not guaranteed. If not properly planned and used, the lecture method leads to boredom and learners go to sleep. Moreover, learners seldom express their feelings and attitudes on what is going on. Therefore, it is difficult to assess whether learning has taken place and to what extent or if learning has not taken place. However, lectures can be used for teaching large classes and helps the teacher to cover a lot of content in a short space of time.

2.6. Eating Patterns in the school environment

An eating pattern can be described as the combination of foods and beverages that make up an individuals' complete dietary intake over time. (Lean & Combet, 2017). It represents all what individuals habitually eat and drink, and those dietary components work together to impact health. Healthy eating habits can help achieve and maintain a healthy body weight, support nutrition needs and reduce the risk for chronic diseases. Healthy eating patterns encompasses all food and beverage choices over time, providing an adaptive, personalised framework tailored to preferences, culture, traditions and budget.

A study done by Oellingrath et al. (2010), on eating patterns of children in Telemark, Norway, revealed that snacking in children was characterised by sugar sweetened drinks consumed between meals, combined with low breakfast and dinner frequency. In addition, it was also found that junk was characterised by high- fat and high- sugar processed fast foods such as processed pizza, sweets, ice- cream and soft drinks.

In their studies, Vesela and Stankova (2008) found that beginning of school attendance is a very important dividing line in the physical as well as mental development of children. The child gains the role of a pupil and learns new behaviour patterns. A few learners encounter eating in the school environment for the first time of their life. Vesela and Stankova (2008) also found that healthy

food and appropriate drinking regime facilitate good school results. A primary school therefore, means a great change in pupils eating patterns. However, this change can either be positive or negative, and the influence of peer group on eating is of great importance as well.

Alejandra, Paula and Patricia (2016), in their study whose aim was to know the nutrition adequacy of a group of students at primary school level and their relationship with nutritional habits, found that when the children can choose food products with higher trans fats content, they found them more attractive than healthier ones. The results indicate that the diets of these primary school learners were relatively low in fruits and vegetables. The study suggested that the possibility of assuming the responsibility of food purchasing and selection during school recess, can affect the eating patterns of primary school learners since they still lack the experience of nutritional health. For this reason, health recommendations are required to improve nutritional habits of primary school learners which would influence their adult lifestyle in terms of eating patterns.

In their studies on nutrition knowledge and practices of primary school children in Metropole Mamba, Napoles and Mwaka (2019), found that learners displayed inadequate knowledge of a balanced diet (23%), as well as low knowledge of food groups. About attitudes, the most liked food group was drinks and snacks (72%) while the least liked food group was fruits and vegetables (8.4 %).

With regard to practices the most frequently consumed food group was drinks and snacks at 72%, while fruits and vegetables were the least consumed. However, 78.91 % of the learners displayed very good nutrition -related practices such as making their own breakfast and eating breakfast. This therefore, means that inadequate knowledge displayed by the learners indicate a gap with

nutrition knowledge in the curriculum. Hence, there is a need to explore innovative and novel approaches to improve nutrition knowledge of school children.

In their studies, Lee et al. (2017), on eating patterns of children's favourite foods and its related factors among elementary students in Korea, two factors were derived as major eating patterns from the data of children's favourite foods, the unhealthy eating pattern which mainly involved confectionary, chocolate and fried food; and the healthy eating pattern which mainly involved soybean milk, vegetables, fruit juice and nuts. A stepwise selection procedure through the regression analysis revealed that the use of screen media, less awareness of policies on children's favourite foods and less interest in health, were positively related to the tendency of healthy or less healthy eating patterns.

A research on British primary school going children showed that the school going children prefer free fatty and sugary foods. In agreement, a study conducted by Navied et al. (2017) revealed that 55% of the children had a preference of eating junk food over home cooked food. However, the preference of food taste was observed in 25.5% of children, meaning that food preferences is related to eating patterns in children.

2.7. Food choices

Food is important in the human body. Food is classified into vegetables, fruits, legumes and nuts, food from animals, fats and staples (MIE, 2007). It provides substances for energy, growth, repair of the body and protection from diseases. When foods are eaten, the body acquires nutrients that are needed to keep it healthy (Chindenga, 2018). A healthy diet keeps our body running on daily basis and this depends on food choices. Choices of food made by children matters for their good health. Chindenga et al. (2018) warns that unwise food choices may lead to nutrition- related

disorders such as diabetes and heart diseases. Bleich et al. (2015) adds that the relationship between food and health is complex. Everyone needs food to live, but too little food, too much food, or the wrong type of food has negative consequences for health.

Meiselman et al. (2003) describe food choice as the study of those factors that influence choice. On the other hand, EFIC (1995) describes food choice as how people decide on what to buy and eat. However, all these descriptions lead to one idea of decision making when choosing food. Hence, it is important to make wise food choices for a better health. Chindenga et al. (2018) agrees that the choice of foods that one eats should be done with a lot of care so as to ensure that all nutrients are provided in the body.

According to Sobal and Bisogni (2009), food choice is a complex phenomenon. Wardlaw et al. (2013), advises that understanding what drives us to eat and what affects food choice will help you understand the complexity of factors that influence eating ,especially the effects of our routines. A study conducted in Greece among Greek children agrees that food choice is a complex human behaviour that is affected by many interdependent factors ranging from biological mechanisms and genetic predispositions at one end of the scale to social and cultural factors at the other. Conner et al. (2005) findings, assert that health food choices such as eating fruits have not only physical, but also mental health benefits and might be a long-term investment in future wellbeing. This view contradicts with the belief that high calorie foods taste better, make us happy and alleviate negative moods. Studies indicate that the level of education can influence dietary behaviour (Gordon, 2013).

In contrast, Wardle (2000) argues that nutrition knowledge and good dietary habits are not strongly correlated. This is because knowledge about health does not lead to direct action when

individuals are unsure of how to apply their knowledge. Taste is consistently considered to be one of the major determinants of food choice. Taste is the sum of all sensory stimulations that are produced by the ingestion of food; not only taste but also smell, appearance and texture of food.

Lean & Combet (2017) asserts that a preference for sweetness and a dislike of bitterness are considered innate human traits present from birth, although taste preferences develop above all through experiences and are influenced by attitude, beliefs and expectations. In their study on nutritional practices among urban primary schools in Nairobi, Kigaru et al (2015), agrees that taste is one of the factors that affects food choices.

Theuma and Malta (2015) found that the factors affecting food choice can be biological like hunger and taste, economical which include cost and income, physical as with access and education, social, like meal patterns and peers, and psychological factors like mood and stress. Risuas, Panagiotakos and Zampelas (2008) from their studies, contend that food choice is a complex human behaviour that is affected by many interdependent factors ranging from biological mechanisms and genetic predisposition at one end of the scale, to social and cultural factors at the other. They add that organoleptic characteristics such as taste and smell can impact food choice. However, they argue by saying that besides food related factors, there are many more external factors that affect food choice, including marketing, promotion techniques and price. In agreement in their studies, Runo, Kiara and Mandela (2020), found that social economic differences among pupils and peer pressure are factors affecting food choice. However, motivation to change, access to target foods and the belief that behaviour change has positive effects on future health are other factors that affect food choice too.

There is no doubt that the cost of food is a primary determinant of food choice. Whether cost is prohibitive depends on a person's income and social economic income. Low income groups have a greater tendency to consume unbalanced diets and have low intakes of fruits (Anderson et al, 2000). However, access to more money does not automatically equate to a better-quality diet but the range of foods from which one can choose should increase. Culture and religion affect food habits in many families. MIE (2005) agrees that food taboos and beliefs can influence one's habit and the food habits affect food choice and eating patterns.

2.8 Chapter Summary

The chapter has presented what has been documented by other researchers on the role of primary school nutrition knowledge on learners' food choices. The review has looked at the concept of primary school curriculum in Malawi, history of nutrition knowledge in schools, methods used when teaching food and nutrition topics, and eating patterns in primary schools .The chapter has also focussed on factors which affect learner's food choices. The next chapter will focus on methodology of the study.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1. Chapter Overview

This chapter will look at the methodology which was used in conducting the study. The methodology comprised of the research paradigm, research design and approach, sampling technique and sample size, pilot study, data collection methods and instruments ,data management, data analysis techniques, research dissemination strategy and ethical considerations.

3.2 Research paradigm

Neuman (2014) defines a paradigm as a framework or philosophical assumption which guides the research process. There are many research paradigms like critical theory, positivism, pragmatism and constructivism. All authors agree on one important role of the paradigms which is shaping the research process. This research was positioned within pragmatism research paradigm. According to Creswell (2018), pragmatism is not committed to one method of inquiry such as qualitative and quantitative, but believes in drawing from both qualitative and quantitative to derive knowledge about the research problem. In addition, pragmatism allows the use of multiple methods, different world views and different assumptions, as well as different forms of data collection and analysis. As such, pragmatism allowed the researcher to use all approaches available to understand the role of primary school nutrition knowledge on learner's food choices.

3.3. Study design and approach

The study used a descriptive cross-sectional study design as data was collected from many different individuals at a single point in time. A cross sectional study allows researchers to collect

data across a pre-defined sample population at a single point in time (Fraenkel et.al, 2012). A cross section of primary school learners was studied to find out the role of nutrition knowledge on their food choices.

A mixed study approach was employed where both quantitative and qualitative approaches were used. Mixed methods provided a more complete understanding of the research problem than either quantitative or qualitative data alone (Creswell, 2014). Both quantitative and qualitative data was collected concurrently and was merged during interpretation. Qualitative research allowed the researcher to have a detailed understanding on how learner's food choices were being affected or enhanced by nutritional knowledge. Quantitative approach helped to collect numerical data that was presented and interpreted into tables and graphs to give meaningful information.

3.4. Study site

The study was carried out in 20 primary schools within Central Eastern Education Division in Kasungu District.

3.5 Study population

The study participants were standard seven learners and standard seven Science and Technology teachers from 20 primary schools within Kasungu District. Standard 7 was chosen behind the idea that the learners had gone through most of the primary school nutrition topics, as such had adequate knowledge to make them answer without problems the items on the questionnaire.

3.6 Sampling technique and sample size

Fraenkel et al. (2015) describes a sample as a group of people on which information is obtained. Kasungu has a total of 378 primary schools which are located within 35 education zones. These zones are distributed in 9 education regions. Thus, in order to have a representative sample, a multistage sampling was adopted. From each education region, an education zone was purposively selected. Thereafter, the number of primary schools to be selected from each zone was determined by the following formula:

$$t = \sqrt{\frac{n}{2}}$$

Where t= the number of primary schools to be selected from a zone; and n is the total number of primary schools in a zone (Kodinariya & Makwana, 2013).

Finally, equal proportion of students was selected from each selected primary school based on the notion of 1:60 teacher pupil ratio.

Since this was a cross-sectional study, the following sample size formula was used for determining sample size as recommended by statisticians in cross-sectional designs on large populations.

$$n = \frac{z^2 \times p \times q}{E^2}$$

Where z=1.96 corresponds to the 95% confidence interval; p is the proportion of an attribute of interest; q=1-p; and E is the error of estimation.

In this study, $p=0.5$, and $q=1-p=1-0.5=0.5$ was chosen because we did not want to be biased on the attributes of interest, and because there was no previous information about the attributes of interest. The error of estimation was set at 0.0532 in this study. Therefore, using these values in the formula, the estimated sample size was 340 learners. According to the sampling plan the following zones were selected and the number of primary schools to be studied were indicated against each zone.

Zone	Number of primary schools studied
A	2
B	2
C	2
D	2
E	2
F	2
G	3
H	2
I	3
Total	20

Using the 1:60 teacher pupil ratio (UNESCO, 2018), each school had an equal number of students to be selected. Therefore, this is determined by the following calculation.

$$\frac{\text{Number in std 7}}{\text{Total in std 7 for all schools}} \times \text{Sample size}$$

Since there were 20 schools at an average of 60 students in STD 7 per school, then the target population had 1200 students.

So,

$Number\ per\ school = \frac{60}{1200} \times 340 = 17$, therefore 17 students were randomly sampled from each of the 20 schools.

3.7. Data collection methods and instruments

Data was collected in different ways. This agrees with Ary (2006) multimethod whereby different types of data collection instruments are used, which relates to the objectives. For objectives number 1 and 3 which were quantitative in nature, data was collected through a self – administered questionnaire developed by the researcher to find out the level of nutrition knowledge among the learners and eating patterns of the learners (Appendix F). In addition, lesson observations were done using classroom observation checklist to investigate methods employed by the teachers when teaching food and nutrition aspects within the integrated Science and Technology (Appendix H). Moreover, three focus group discussions, in three different schools were conducted with learners. A focus group discussion guide was used to find out factors that influence learner’s food choices (Appendix G). English language was used as a means of communication in collecting data for objectives 1, 2 and 3. For objective number 4, Chichewa was used as a means of communication, so that respondents would be able to express themselves freely.

3.7.1 Questionnaires

A questionnaire was one of the instruments used to collect data in the study. McLeod (2018) defines a questionnaire as a research instrument consisting of a series of questions for the purpose of gathering information from respondents. The questionnaire was used to collect information on nutrition knowledge of the learners whose questions were limited by the Science and Technology syllabus focussing on food and nutrition related topics. The questions were self-administered so as to make clarifications if need arose and contained closed questions (see Appendix F). The questionnaire was also used to collect information on eating patterns of the learners.

3.7.2. Focus Group Discussions (FGDs)

Focus group discussions were used to collect information on factors affecting learners' food choices (see Appendix G). USAID (2011) describes FGDs as facilitated discussions held with a small group of people who have specialist knowledge or interest in a particular topic. Three FGDs were held and an average of 17 learners participated. These focus groups comprised of both boys and girls. The composition was 8 boys and 9 girls. The discussions helped the researcher to find out the reasons for their different food choices. Thus the researcher was able to crosscheck an individual's opinion with other opinions gathered. Moreover, in the FGDs, learners were open and the interaction enriched the quality and quantity of information needed.

3.7.3. Classroom Lesson Observations

Classroom lesson observations were used in order to establish an understanding of the methods teachers use when teaching nutrition topics. Classroom lesson observation is an act of watching a teacher's performance in their classroom or learning environment. Classroom lesson observations were important because they provided a natural setting for the researcher to get

information on methods used, which was being investigated. The data also helped to find out if Science and Technology teachers used effective methods which would allow learners to acquire relevant knowledge on nutrition. Classroom lesson observation checklist was used as a tool to examine methods teachers used in teaching nutrition elements (see Appendix H).

3.8 Data Management

A variety of storage locations was used to store data such as laptop, external hard drive and flash drives, and the researcher was the only one accessing the information. Upon completion of the study, the collected data was stored in the repository of the institution.

3.9. Validity, Reliability and Trustworthiness

In order to achieve accurate and consistent results in a research study, the components of validity, reliability and trustworthiness are critical. Creswell and Poth (2013) describe validity as a measure of how accurately the study answers the questions and hypothesis it was commissioned to answer. On the other hand, reliability refers to the consistency of scores or answers provided by an instrument (Fraenkel, 2012). The researcher made sure that the language was suitable for the group being studied to avoid the recording of invalid data if inappropriate language was used. The researcher also wrote down the questions asked by participants in addition to the answers given as this helped the researcher to make sense at a later date out of the answers recorded earlier. In addition, the researcher used audio recordings for further listening. Piloting was done for the questionnaire to ensure validity and reliability.

3.9.1 Pilot Study

To check the effectiveness of data collection instruments such as focus group discussion guide, questionnaire and lesson observation checklist, a pilot study was carried out. Kumar (2011) describes a pilot study as a small study conducted in advance of a planned project to test aspects of a research design. On the other hand, Robson (2011) describes pilot study as a small-scale version of the real thing or a tryout of what you want or propose so that its feasibility can be checked. Piloting was done to standard seven learners and teachers at one school within Kasungu District, which was not among the schools to be studied. Piloting was important as it gave room for improvement of the items on the focus group discussion guide and questionnaire by eliminating or rephrasing questions which were inappropriate or ambiguous, and might not have yielded usable data in the manner in which they were formulated prior to the study, and thus ensuring clarity of the questions and instructions. In so doing, validity and reliability of the instruments were enhanced. Piloting also helped the researcher to determine the duration of the focus group discussions.

3.10. Data analysis

3.10.1 Quantitative data

Cohen, Manion and Morrison (2012), describe data analysis as the process of looking and summarising data with the intent to extract useful information and develop conclusions. Demographic information was collected which assisted the researcher to better understand certain background characteristics of the learners such as age and genders. For this study, quantitative data from the questionnaires on nutrition knowledge and eating patterns were entered into SPSS for analysis as well as on the excel sheet. The level of statistical significance for analysis was set

at $p < 0.05$. Percentages and frequencies were calculated and presented in graph form as well as pie charts. The data was then interpreted using narrative description.

3.10.2 Qualitative data

Qualitative data from FGDs were recorded and transcribed. Transcription is the process of converting audiotape recordings or field notes into text data (Creswell, 2012). Coding, which is the process of segmenting and labelling text to form descriptions and broad themes in the data, was done to make sense out of the text data, and also to examine codes for overlap and redundancy, and collapse these codes into broad themes. Themes are similar codes aggregated together to form a major idea in the data base (Fraenkel, Wallen & Hyun, 2012). The themes provided the basis for discussions and arguments in relation to the topic under study.

3.11. Research dissemination strategy

A copy of the thesis will be submitted to Mzuzu University Faculty of Education, and again one article will be published in peer reviewed journal. The researcher will look forward to publishing the research work with some journals.

3.12. Ethical considerations

The research dealt with individual cases and unique instances that would have involved personal and sensitive matters. Hence, it raised the question of identification, confidentiality and privacy of individuals (Cohen, 2011). For this reason, the researcher asked for permission (see Appendix A) and got clearance from Mzuzu University Research Ethics Committee (see Appendix B) to conduct the study. A request letter was also sent to Kasungu District Education Manager to conduct the study (see Appendix C). Informed consent, voluntary participation, anonymity and confidentiality were ethical matters which were looked upon as recommended by Gary (2013).

3.12.1 Informed consent

To ensure that participation was voluntary, the process of informed consent was followed (see Appendix I). Assent was sought from parents through school authorities for children under 18 years of age (Appendix E). Individuals were informed of the purpose of the research and made a voluntary decision about whether to participate. Kumar (2011) recommends that participants must have the right to participate. It was also made clear to the participants that refusal to participate or decision to withdraw would not result in any penalty.

3.12.2 Confidentiality and anonymity

Anonymity and confidentiality of participating schools, teachers and learners was observed by not using real names. Hence, names of participants and the schools were not mentioned anywhere in the whole research write up. This was done to protect the identity of the participants as well as the site (Liu & Maitlis, 2010).

3.12.3 Covid 19 prevention

Covid 19 preventive measures as prescribed by WHO and Ministry of Health were adhered to during the study period. These preventive measures included social distancing, wearing of face masks and washing hands with soap.

3.13. Chapter summary

This chapter has dealt with the methodology on how the researcher planned and conducted the research following mixed methods design. The chapter has therefore, looked at research paradigm, study design and approach, study site, study population, study period, sampling technique and sample size, pilot study, inclusion and exclusion criteria, data collection and

management, data analysis, research dissemination strategy and ethical considerations. The next chapter presents and discusses research findings.

CHAPTER 4: PRESENTATION AND DISCUSSIONS OF RESEARCH

FINDINGS

4.1 Chapter overview

This chapter presents and discusses the findings of the study in order of the specific objectives. The main objective was to assess the role of primary school nutrition knowledge on learners' food choices in Kasungu District. In particular, the study aimed at assessing the level of nutrition knowledge among primary school learners which has been integrated in Science and Technology; investigating teaching methods used by teachers when teaching food and nutrition concepts; analysing eating patterns of primary school learners regarding food bought at school and food brought from home and lastly, exploring factors that influence primary school learners' food choices in Kasungu District. The data was collected through self-administered questionnaires, focus group discussions with the learners and classroom lesson observations.

4.2. Demographic Information

Twenty primary schools were involved in the study and the total number of participants was n=337. These subjects were drawn from Standard seven. These were chosen because they were in their formative years of syllabus coverage. The participating sample was gender sensitive as both boys and girls formed part of the sample. The total number of boys was 165 representing 49% of the total sample, while the total number of girls was 172 representing 51 % of the total sample. Table 1 shows the sample size by school and gender:

Table 4. 1: Sample size by school and gender

School	Total no of participants	Boys	Girls	Percentage (%)		
				Boys	Girls	Total
A	19	8	11	42	58	100
B	17	9	8	53	47	100
C	17	8	9	47	53	100
D	17	9	8	53	47	100
E	16	9	7	56	44	100
F	17	7	10	41	59	100
G	16	8	8	50	50	100
H	17	9	8	53	47	100
I	16	8	8	50	50	100
J	17	8	9	47	53	100
K	15	8	7	53	47	100
L	17	8	9	47	53	100
M	17	8	9	47	53	100
N	17	8	9	47	53	100
O	17	9	8	53	47	100
P	17	8	9	47	53	100
Q	17	8	9	47	53	100
R	17	8	9	47	53	100
S	17	8	9	47	53	100
T	17	9	8	53	47	100
Total	337	162	175	48	52	100

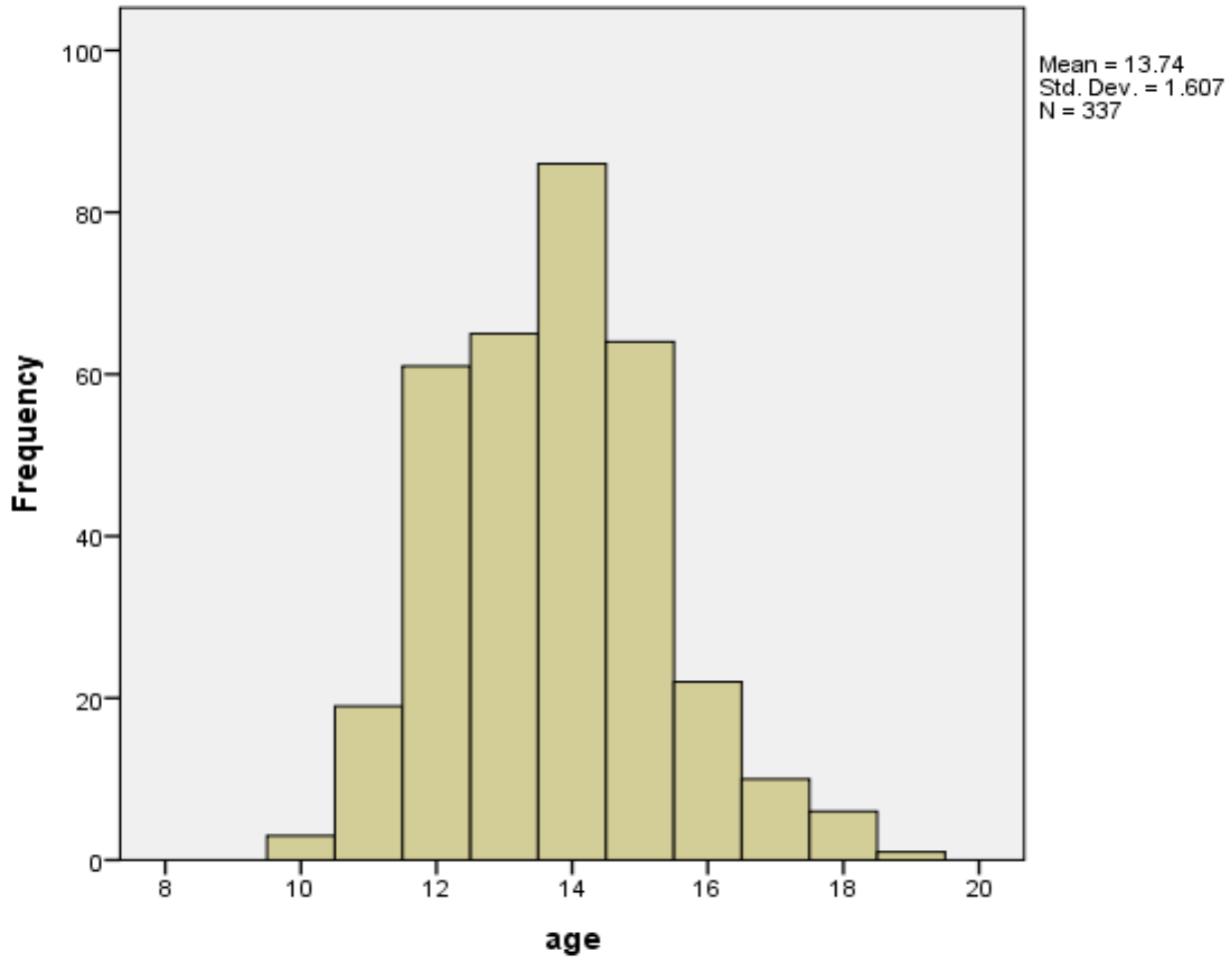


Figure 1: Composition of respondents by age

Figure 1 shows data for the participants according to their ages. The findings show that most of the participants were of the age 14 (86) which represented 25.5%, and a smaller proportion of the participants were at age 10 (3) which represented 0.9%, while the least proportion was at age 19 (1) representing 0.3%. The mean age was 13.74. This means that most of the learners were in their late childhood and early adolescence.

Of the total number of learners who participated in this study, 175 were girls while 162 were boys. There was no significant difference ($P>0.05$) between sexes. The learners were within the age range of 10 – 19. The highest number of learners (215) were within the range of 13- 15 years, followed by learners within the range of 10 – 12 (83) and the lowest number of learners was within the range of 16 – 19 years (39). All these were standard seven learners

4.3. Level of nutrition knowledge among primary school learners

This objective aimed at assessing the level of nutrition knowledge among primary school learners. In order to assess the level of nutrition knowledge, the learners responded to a self-administered questionnaire. The questions were drawn from primary school nutrition related topics which have been integrated in the Science and Technology syllabus and provided information on how much knowledge the learners had gained after going through most of those topics. The responses to nutrition knowledge questions which were assessed have been presented in Table 4. 2

Table 4. 2: Level of nutrition knowledge

Item	Nutrition Knowledge level						Homogeneity test of proportions
	I know		I don't Disagree		Agree		p-value
	F	%	F	%	F	%	
1 Food is classified into six groups	2	.6	10	3.0	325	96.4	<0.001
2. Tomatoes are source of carbohydrates	36	10.7	168	49.9	133	39.5	< 0.001
3. Energy producing nutrients are carbohydrates fats and proteins	18	5.3	58	17.2	261	77.4	< 0.001
4. Vitamins, minerals and proteins are protective nutrients	21	6.2	53	15.7	263	78.0	< 0.001
5. A person needs two to three litres of water per day	20	5.9	81	34.0	236	70.0	< 0.001
6. Milk and milk products are sources of protein	21	6.2	55	16.3	261	77.5	< 0.001
7. Excessive use of salt increases blood pressure and increases the risk of diseases	41	12.2	81	24.0	215	63.8	< 0.001
8. Fats are divided into animal and vegetable fats	47	11.0	106	31.5	193	57.3	< 0.001
9. Water is needed for food digestion	12	3.6	51	15.1	274	81.3	< 0.001
10. Anaemia is caused by lack of iron in the diet	36	10.7	106	31.5	195	57.9	< 0.001
11. Sunshine helps to prevent rickets	33	9.8	216	64.1	88	26.1	< 0.001
12. Use of Iodised salt in food helps to treat goitre	47	13.9	95	28.2	195	57.9	< 0.001
13. Packed meals should be well balanced	18	5.3	58	17.2	261	77.4	< 0.001
14. Fruits provide vitamins	2	.6	23	7.4	310	92.0	< 0.001
15. Eating only one meal a day is an example of bad food habits	31	9.2	131	38.9	175	51.9	< 0.001
16. Cooking food using a variety of methods is a good food habit	13	3.9	46	13.5	278	82.5	< 0.001
17. Eating more proteins causes diseases	33	9.8	186	55.2	118	35.0	< 0.001

For item 1, learners displayed the knowledge that food is classified into six groups as agreed by 96% of the total learners. With item 2, (Tomatoes are a source of carbohydrates) a majority of the learners had the knowledge that tomatoes are not a source of carbohydrates as 49.9% disagreed to the idea. Similarly, 77.4% of the learners knew that carbohydrates, fats and proteins are energy producing nutrients. A good number of the learners knew the fact that vitamins, minerals and proteins are protective nutrients as evidenced by 78.0% of the learners who agreed to the point. For item number 5, 70% of the learners displayed the knowledge that a person needs two to three litres of water per day. Item 6 was also well known to the learners that milk and milk products are sources of proteins as 77.5% of the learners agreed to the statement. On the fact that excessive use of salt increases blood pressure and increases the risk of other diseases which was item 7, most learners were aware of it as 63.8% agreed to the fact. For item 8 (Fats are divided into animal and vegetable fat) it was found that 57.3% of the learners had moderate knowledge for it. It was also noted that 81.3% of the learners had the knowledge to Item 9 that water is needed for food digestion. Moreover, 57.9% of the learners had the knowledge that anaemia is caused by lack of iron in the diet. Learners had the knowledge to the fact that use of iodised salt in food helps to treat goitre as 57.9% agreed to the statement. Consequently, 77.4% of the learners responded well to item 13 that packed meals should be well balanced. A good percentage (92.0%), had the knowledge that fruits provide vitamins and this was Item 14. For item 15 (Eating only one meal a day is an example of a bad eating habit), 51.9% of the learners agreed to the item. Most of the learners (82.5%) were knowledgeable on the fact that cooking food using a variety of methods is a good food habit.

However, for Item 11, Sunshine helps to prevent rickets, a majority of the learners (64.1%) disagreed to the fact. The same applies to Item 17, eating more proteins causes diseases, where 55.2% of the learners disagreed to the fact

The level of nutrition knowledge was determined per item. Thus, the proportion of percentages of learners who got an item right, guided to deduce the overall nutrition level of the learners on each item. The study established that in most of the questions, the learners had good nutrition knowledge except on the items” sunshine helps to prevent rickets” and “eating more proteins causes disease” where most learners had poor knowledge. On most of the items regarding nutritional knowledge, the results were statistically significant at $P < 0.001$. This finding implies that the learners were well equipped with the knowledge on what good nutrition is all about. Concurring with the findings, Talip et al. (2017), in his study on Bruneian primary school children, found that the children had higher nutrition knowledge. Contrary to this finding, a study conducted among primary school learners in Limpopo province, South Africa, by Molotja et al. (2020), found that the learners demonstrated poor nutrition knowledge, more especially in terms of food groups and their roles. Again, a study in Dikgale village on primary school learners by Modjadji (2019) showed that the learners had fair healthy diet knowledge.

Nutrition knowledge may lead to improved health, as such, there is need to promote the knowledge in learners. The current studies’ finding can be to the fact that teachers used appropriate methodologies and skills in delivering nutrition lessons which made learners understand the content and that nutrition aspects were not being overlooked by the Science teachers. The teaching methods which the teachers employed played a great role on learners’ knowledge. For instance, demonstration which was often used in practical lessons helped learners to grasp skills well since the learners observed and experienced the process. Moreover, the multi-sensory approach (sight,

hearing, smelling and feeling) made demonstration method to be more effective (Mahundi, 2015; MOEST (2010).

When procedural knowledge is acquired, it can result in behaviour change. Although the learners had a good level of nutrition knowledge, this level of knowledge did not have any relationship with eating patterns as per this study. The learners continued eating foods and drinks which are not good for their health such as Kamba puffs, sweets and fizzes, despite the knowledge they had on dangers of unhealthy foods towards their body health.

Similarly, a study conducted by Abdollahi et al. (2008) on nutritional knowledge of primary school children in Tehran, found that learners were aware of food groups, the relation between food and diseases, and that healthy food may increase their intelligence. Almost all the children knew about the effects of unhealthy food but they continued to consume some of them. However, a study conducted by Kigaru et al. (2015), among urban primary school children in Kenya, found that children in the study had moderate nutrition knowledge which was attributed to the fact that health lessons were offered in schools. Again, concurring with Kigaru et al.' findings, Yang et al. (2007) in their study, found that the nutrition knowledge of the school children was fair (67.3%), learners answered the nutrition questions correctly. Similarly, Oldewage –Theron & Egal (2010) conducted a study to determine the nutrition knowledge and nutrition status of primary school children in Qwa Qwa, a rural town in South Africa. They found that the majority of learners had moderate nutrition knowledge. Contrary to these findings, Mamba et al. (2019), assessed nutrition knowledge and practices of grade 4-6 learners from three primary schools in South Africa. The assessment indicated limited nutrition knowledge among learners. On the other hand, a study in Italian children found that children with higher nutritional knowledge scores were less likely to consume unhealthy food (Grosso et al., 2013). While Sharrif et al. (2008) argues that whereas

appropriate nutrition education can bring about the intention to change nutrition related practice, appropriate facilities and support is needed within the school environment to allow pupils to transform intention to change nutrition practices into actual practices. This is in agreement with SCT which stresses that nutrition interventions are more successful if they improve environmental factors (Bandura, 2004). Moreover the theory stresses that nutrition knowledge which the learners were found to have is among the personal factors which affect food choice

4.4. Methods used in teaching nutrition concepts

From the classroom lesson observations which were conducted, the study found that teachers employed a variety of teaching and learning methods. For instance, at school A, the teacher employed brainstorming, question and answer, think –pair-share, explanation, authors chair, futures wheel, group work and discussion methods of teaching. In addition, the teacher also used demonstration and practice. At school B, the teacher used question and answer, brainstorming, explanation, group work, quick write, discussion, demonstration and practice. At school C, the teacher used group work, discussion, explanation, question and answer, brainstorming, demonstration and practice. From the findings, the most used teaching methods are brainstorming, question and answer, explanation, group work, demonstration, practice and discussion.

Being participatory in nature, learners were always kept active in discovering and understanding ideas in a lesson. The quality of education depends, to a large extent, on the quality of teachers' professional performance (Kumar & Azad, 2016). The development and delivery process of teaching depend on the methods used by teachers during the process of teaching and learning, since it has an impact on how a concept of that particular lesson is perceived by the learners.

Different teaching methods were used for different topics and different groups of learners in line with their learning abilities.

These findings are in line with those of Mahundi (2015), who found that demonstration, explanation, experimentation, discussion, project work and debate were some of the methods which enhanced the teaching and learning of food and nutrition to learners. Similarly, in their study, Mendoza et al (2006), found that discussion, group work, demonstrations, field trips and hands on experience were some of the methods which enhanced the teaching and learning of food and nutrition topics. In a study done by Chulumanda (2021), it was found that the methods which were used were group work, demonstration, field trips, question and answer, practical, research, quiz, discussion, role play, case studies and problem solving.

The different teaching methods used, helped to stimulate, guide, direct and encourage learning in the learners. Moreover, the methods which the teachers employed helped learners to achieve the learning outcomes. The different methods work hand in hand since there is no single method that can successfully be used on its own without depending on the other. Teachers of science and technology should, therefore, use methods which suits the learners. Teachers have to vary the methods in the process of teaching and learning to avoid boredom and this would promote learner participation. As food and nutrition addresses issues involving the understanding of healthy food choices, it is important that teachers should have the professional competencies necessary for imparting knowledge to learners.

This being the case, proper methodologies need to be employed so that there is effective teaching and learning. As per this study, the methods which teachers used in the process of teaching and learning food and nutrition topics were appropriate. For instance, the teachers employed

participatory methods like futures wheel, demonstration, practice and brainstorming amongst others, which have been highlighted in the primary school curriculum (MIE,2008).

To crown it all, food and nutrition being a component of Science and Technology which is practical in nature, provides a conducive learners environment for gaining knowledge, acquiring skills and for improving attitudes. The methods employed by the teachers helped to achieve the highlighted criteria as demanded by the Primary School curriculum which advocates the use of participatory teaching methods or learner centered teaching approach (MIE, 2008; MOEST, 2010; MOEST, 2012; MOEST, 2013).As such, teachers need to be creative enough to make lessons motivating so that learners are able to grasp the concepts easily.

4.5 Eating patterns of primary school learners

The analysis on eating patterns was done using a self- administered questionnaire. The questionnaire provided information on meals often eaten; foods learners like to eat at school; beverages liked to drink; frequency of eating junk foods per week; snacks often bought at school; consumption of breakfast, lunch, supper and consumption of fruits.

Table 4. 3: Distribution of meals often eaten

Meals eaten	Frequency	Percent (%)	P-value
Supper	148	43.9	
Lunch	90	26.7	<0.001
Breakfast	99	29.4	

Homogeneity test of proportions

P<0.05*

The findings in Table 4.4 reveal that 43.9% take supper often. It also reveals that 29.4% and 26.7% of the learners take breakfast and lunch, respectively. The results show that the frequency of taking

lunch is low as compared to breakfast and supper. There were significant differences in the consumption of supper, lunch and breakfast amongst the learners ($P < 0.001$).

Table 4. 4: Food leaners like to eat at school

Food	Frequency	Percent	P-value
liked to eat			
Kamba	53	15.7	
Biscuits	121	35.9	<0.001
Oranges	137	40.7	
Jiggies	26	7.7	

Homogeneity test of proportions

$P < 0.05^*$

Table 4.5 reveals the frequency of the learners liking for Kamba Puffs, biscuits, oranges, and jiggies where 15.7% like Kamba puffs, 35.9% like eating biscuits, 40.7% like eating oranges and 7.7% like eating jiggies. The results are statistically significant at $P < 0.001$.

Table 4. 5: Distribution of snacking time

Snacking time	Frequency	Percent (%)	-value
Morning	70	20.8	
Evening	31	9.2	<0.001
Afternoon	176	52.2	
Whole day	60	17.8	

Homogeneity test of proportions

$P < 0.05^*$

Table 4.6 shows distribution of snacking times for learners. It was found that the majority of learners (52.2%) like snacking in the afternoon, 20.8% like snacking in the morning, and 17.8% like snacking the whole day and 9.2 % snack in the evening. The results are statistically significant ($P < 0.001$).

Table 4. 6: Beverages learners like to drink

Beverages liked	Frequency	Percent (%)	<i>P</i> - value
Tea	76	22.6	
Water	87	25.8	<0.001
Fanta	123	36.5	
Thobwa	51	15.1	

Homogeneity test of proportions

$P < 0.05^*$

Table 4.7 reveals that there were significant differences on the learners liking on different beverages ($P < 0.001$) as the majority of the learners (36.5%) like drinking Fanta, 25.8% of the learners like drinking water, 22.6 % like drinking tea and only 15. 1% like drinking thobwa.

Table 4. 7: Junk food consumption

Junk food eating weekly	Frequency	Percent (%)	<i>P</i> -value
Once	37	11	
Twice	43	12.8	
3 times	111	32.9	<0.001
More than 3 times	146	43.3	

Homogeneity test of proportion

P<0.05*

Table 4.8 shows that majority of the learners (43.3%) eat junk foods more than three times in a week, 32.9% of the learners eat junk foods 3 times in a week whereas 12.8% eat junk foods twice in a week, and only 11% of the learners eat junk foods once in a week. The results are statistically significant at P <0.001.

Table 4. 8: Number of meals eaten in a day

Number of meals/day	Frequency	Percent (%)	P-value
1	79	23.4	<0.001
2	117	34.7	
3	141	41.8	

Homogeneity test of proportion

P<0.05*

Table 4.9 shows the number of meals learners eat per day. It is seen that most learners skip either one or two meals in a day. As illustrated above, 23.4 % have one meal in a day, while 34.4% are able to have two meals in a day, and only 41.8 % manage to have all the three meals per day. The results are statistically significant at P < 0.001.

Table 4. 9: Snacks often bought by learners at school

Snacks often bought by learners	Frequency	Percent (%)	P-value
Mandasi	68	20.2	<0.001
Sweets	29	11.3	
Fizzes	139	18.7	
Bananas	38	8.6	
Krunchy naks	63	41.2	

Homogeneity test of proportion

P<0.05*

Table 4.10 shows snacks often bought by learners at school. It is noted that 41.2 % go for Krunchy Naks, 20.2 % often buy Mandasi, 18.2% are for fizzes, 11.3% opt for sweets and only 8.6% choose bananas. There were statistically significant differences in the results at P<0.001).

Table 4. 10: Eating pattern for breakfast

Consumption of breakfast	Frequency	Percent	P-value
No	199	59.1	0.001
Yes	138	40.9	

Homogeneity test of proportion.

P<0.05*

Table 4.11 shows that the majority of learners (59.1%) do not take breakfast at home when going to school. Fewer learners (40.9 %) take breakfast when going to school. The differences were statistically significant (P- value 0.001).

Table 4. 11: Packed meals

Do you take	Frequency	Percent	P-value
packed meals			
No	175	51.9	0.479
Yes	162	48.1	

Homogeneity test of proportion

$P > 0.05^*$

Table 4.12 presents the number of learners who take packed meals from their respective homes and those who do not take packed meals. It was found that 51.9% do not carry packed meals whereas 48.1% carry packed meals. There was not much difference between those who bring packed meals and those who do not bring packed meals (P- value 0.479).

Table 4. 12: Proportions for liking of junk foods

Liking for junk	Frequency	Percent	P-value
foods			
No	137	40.7	0.001
Yes	200	59.3	

Homogeneity test of proportion

$P < 0.05^*$

Table 4.13 shows the proportions for the learners' liking of junk foods over home cooked food. The results revealed that the majority of learners (59.3%) like junk foods. Those who do not like junk foods were 40.7%. The results were statistically significant (p-value 0.001).

Table 4. 13: Fruit consumption

Do you eat fruits frequently	Frequency	Percent	P-value
No	197	58.5	0.003
Yes	140	41.5	

Homogeneity test of proportion

P>0.05*

Table 4.14 reveals the eating pattern of the learners in terms of fruit consumption. More learners 58.5% do not eat fruits frequently and only 41.5 % consume fruits frequently. The results proved to be statistically significant as more learners do not eat fruits frequently (P- value 0.003).

The eating patterns which were focused on, were frequency of meals eaten per day, most liked foods, snacking times, beverages liked, frequency of liking junk foods, number of meals eaten per day, snacks often bought at school, consumption of breakfast, taking of packed meals, liking for junk foods over home cooked food, and frequency of fruit consumption. The findings revealed poor eating patterns in the learners. The majority of learners skipped meals like breakfast, snacked unhealthy foods frequently, and liked junk foods. In agreement with the current findings, in their study, Talip et al. (2017) found that the school children's preference was on less healthy foods such as junk and fast foods. Mamba et al. (2019) in their study which was conducted in Tshwane Metropole, South Africa, agrees that drinks and snacks such as soft drinks, biscuits, cakes and sweets were the most highly consumed food group by learners alongside fruits, proteins and cereals. A study in Nairobi City, Kenya by Kigaru et al. (2015) reported unhealthy eating amongst the learners with potato chips and chocolate as the most preferred snacks with less consumption

of fruits (9.4%). Similarly, Zarborskis et al. (2012) in their study on Lithuanian school-aged children, found that as regards consumption of less healthy food products like sweets, chocolates, biscuits and soft drinks, the children were characterised positive.

An important part of healthy eating includes healthy eating patterns. Healthy eating patterns are important for developing a good relationship with food and with the body. Therefore, establishing healthy eating patterns early in life can protect a child from developing later healthy related problems (Damiano et al. 2015). As such, Kuzbicka et al. (2013), warns that some eating patterns like skipping meals, snacking highly processed and calorie rich foods between meals, skipping breakfast and drinking sugar-sweetened beverages are crucial factors for the development of obesity. For this reason, the study sought to analyse eating patterns of primary school learners.

The findings' translates that, though the learners had a good level of nutrition knowledge, the knowledge had no significant relationship with their eating patterns because they still continued consuming unhealthy foods which would have a negative impact on their lives. The learners valued the importance of nutrition, but they did not care about the health benefits of foods in the foods they selected. This is in agreement with SCT which advocates for a need of self-efficacy in order for one to overcome barriers to adopting and maintaining healthy life style habits. As such, there is need for other interventions which can assist to promote the learners healthy eating patterns such as posters, videos and even songs, related to healthy eating patterns.

4.5.1 Frequency of meals eaten per day

The present study provides the information that not all of the meals recommended to be eaten in a day are being taken by primary school learners, and these are breakfast, lunch and supper. The study has revealed that 43.9% of the learners take supper, 29.4% take breakfast while 26.9% take

lunch. The reasons for most learners taking supper might be to the fact that by this time, they have knocked off from school and have ample time to prepare and eat supper. These proportions indicate that learners do skip meals and the most skipped meal is lunch. These findings are in consistent with studies done by Katungwe et al. (2015) who found that school children consumed lunch and supper while skipping breakfast. Again, in a study conducted in Uganda, it has been reported that similar meal frequencies were observed where school children consumed two to three meals in a day consisting of breakfast, lunch and supper. Findings from a study by Kalimbira and Gondwe (2015) in Lilongwe Township, showed that the likely meals skipped were breakfast and lunch among the children studied. Furthermore, in his study, Pac et al. (2012), found that a high proportion of children eat regularly and nearly 6% of the students eat two or fewer meals a day. Contrary to these findings, a study by Yang et al. (2007), found that more than 92.1% of participants stated that they ate lunch every day.

These irregularities in frequency of meals eaten per day may be due to the reason that learners' most time of the day is spent in school as they knock off late, and sometimes they also have extracurricular activities after normal lesson hours. As such, these irregularities lead to unhealthy eating patterns and promotes the eating of non-recommended foods such as biscuits, kamba puffs and other salty snacks. Learners need not skip meals as these omissions affect their well-being and behaviour throughout the day. For instance, breakfast plays a great role on learners' performance at school as it boosts brain power hence improves concentration, memory, alertness and learning which are all essential for performing well at school (Drummond, 2014). In addition, breakfast of good quality helps to provide children with the energy they need for the day, and the nutrients they need to grow. Moreover, children who do not skip breakfast are not likely to snack (Drummond, 2014). Since snacking is associated with energy dense food which is linked to the development of

childhood overweight and obesity, educating children into a good breakfast routine at the start of the day is essential.

4.5.2 Snacking

The findings from the current study show that most learners snack on foods which contain more fats, sugar and salts, is on the rise. The study revealed that 41.2% of the learners buy Krunchy naks, 20.2% of the learners buy mandasi, 18.7% buy fizzes, and only 8.6% buy bananas. Studies for snacking trends in developed countries show that snack intake is not related to hunger and it accounts for more than one-quarter of children's daily energy intake (Hess et al., 2016). These findings agree with those of Kalimbira (2015), who found that almost all the primary school children under study (97%) consumed snacks with Malawi- produced processed snacks (Kamba puffs, sweets, biscuits and jiggies) being the commonly consumed by at least 30% of the children. Kalimbira adds that a fried wheat dough – based snack (mandasi) and fried whole- maize flour snack (Zitumbuwa) were commonly eaten by the children.

A study conducted by Rokhma et al. (2020) about knowledge on healthy snack selection in primary school students in a rural area in East Java found that sweets were the most commonly eaten products among the students. In agreement, another study on nutritional behaviours of learners by Buczak (2013), found that learners were more likely to choose sweets and salty snacks. Such snacks may result to more calories intake than normal daily requirements.

Malecka- Tendera (2011) asserts that obesity complications begin early in childhood and affect the proper functioning of several body organs and systems, and causes poorer learning outcomes. In another study, by Kigaru et al. (2015), on primary school learners, consumption of other healthy snacks like nuts and milk, was assessed. It was noticed that although nuts like groundnuts were

available and packaged in small and affordable portions, most children never consumed them. Instead, the study found that children preferred to buy processed juices and carbonated sweet drinks rather than the milk. Study findings on learners eating patterns in Telemark County, Norway, by Oellingrath et al. (2010) resonate with current findings that snacking in learners is characterized by sugar- sweetened drinks consumed between meals, combined with low breakfast frequency. Moreover, junk is characterised by high-fat and high sugar processed fast foods such as processed pizza, sweets, ice-cream and soft drinks.

On the time of snacking, the current study found that the majority of learners snack in the afternoon (52.2%) and (20.2%) snack in the morning. This may be attached to the fact that most learners do not take packed meals from their respective homes and during lunch break most of them do not go home for lunch. To concur with this finding, in their study on the frequency and context of snacking among children in New Zealand, Ryan et al. (2020), also found that most snacks 55.9% were consumed in the afternoon period. Proportionally, fewer snacks were consumed in the morning (29 .7%) and for the evening it was 14.0%. This means that children ate more discretionary snacks than healthful snacks across all the hours. Highest rates of snacking were observed in the afternoon.

Similarly, a study done in Poland by Pac et al. (2017) on snacking of children, reported that 77% of young people in Poland snacked and that 23% of those also snacked at night. A study in Ghana reaffirmed that it is not simply snacking that poses a problem rather the actual types and quantities consumed (Asiedu et al. 2012). It is therefore important to promote the eating of healthy foods to the learners for a better health. This can be achieved through restricting the selling of junk foods around the school premises and encouraging learners to bring food from home.

4.5.3 Fruit consumption

It was found that 58.5% of the learners eat fruits frequently while 41.5% rarely eat fruits. Findings on learners' frequency of fruit consumption unveiled that the difference was statistically significant ($p < 0.05$). This may be due to the fact that most fruits are expensive so that some learners and even some parents cannot afford to buy them. Moreover, it was found that fruits are rarely sold around the school premises because they are scarce within the communities. These results agree with those of Upton et al. (2012), who found that children's intake for fruits was poor. There was insufficient fruit consumption which was attributed to differences in availability. Though there is strong evidence that eating fruits has many health benefits and that fruits significantly reduce the risk of cardiovascular diseases, learners still remain ignorant of the knowledge.

Also supporting the findings, a study done by Webb et al. (2013) in Trinidad, found that students were consuming fewer amounts of fruits than expected, as they were not knowledgeable on the importance of fruits which placed them at a greater risk of developing chronic non-communicable diseases in the future. Runo et al. (2020), in their study on primary school learners in Kenya, the results indicated that fruits were among the least consumed foods. Similarly, a study by Kigaru et al. (2015), found that regarding fruit consumption, only 9.4 % of the learners had consumed fruits 4- 7 times in the previous seven days prior to data collection. Follow up questions on reasons why those learners consumed the fruits, showed that they consumed fruits because of the sweet taste, others it was because they were told by parents and others it was for the reason that they saw other family members eat them.

Fruits are very important for children .They are a good source of vitamins and many contain important minerals such as potassium, calcium and iron which are important for their health. Another good part is that most fruits are low in fat content. Therefore, eating fruits during

childhood, rather than foods high in fat, sugar and salt can protect children against health problems such as obesity, diabetes and cardiovascular diseases. Moreover, eating fruits when young, can be habit forming, hence, promoting healthy eating in adult life. SCT advises that knowledge of health risks and benefits creates the precondition for change.

4.6 Factors affecting primary school learners’ food choices

The focus group discussions (FGDs) revealed that there are factors which influence primary school learners’ food choices. The responses summary has been outlined in table 4.14, together with themes and categories which developed after an analysis of the data.

Table 4. 14: Themes and Categories

Theme	Category
Food taste	Influence of food taste on learners food choices
Cost	Influence of food price on healthy food choices
Availability	Influence of food available around the school
Friends	Influence of friends on healthy food choices
Time	Influence of time to distant learners on healthy food choices
Food appearance	Influence of food appearance on learners food choices

4.6.1 Influence of peers

The results of this study indicate that influence of friends is one of the factors behind learners’ food choices as evidenced through the FGDs held across the three schools. Most of the learners

cited peer pressure as a factor behind their food choices. One of the learners remarked that, “*Ndimanera anzanga kugula Kamba puffs*” (*I buy Kamba puffs because I follow my friends*) (FGD 1, female). A male learner from FGD 2, commented that, “*Timafuna kuti tizikopa anzathu*” (*we buy Kamba puffs because we want our friends to like us*). Another male learner from FGD 3 commented that, “*anzanga amandiumiriza kugula zakudya zimenezi*” (*my friends force me to buy these type of foods*). Food choices are greatly influenced by friends or peers. Brechward & Prinstien (2011), describe peer influence as pressure to think or act along certain guidelines set by peers and this form of social pressure has empirically been demonstrated to have power in many social contexts, with food choice in a social situation being one possible example. Robinson et al. (2013), contends that eating is not only a physiological action but it is also a social practice that takes place in a social context. Peers are important social agents whose influence on the development of learners eating behaviour should not be underestimated. Mancuso (2022) comments that from the moment we begin school, our values and choices are shaped by those with whom we associate. This means that the influence of friends in school going children is strong. As children grow up and gain independence, the degree to which their parents influence their food selections reduces. What learners observe their peers eat at school, substitutes what families want the learners to eat?

This finding is similar to that of Risvas et al. (2008), who found that influence from friends played a crucial role in the food choices of the learners. Friends were the main modulators of the children’s eating habits. A study conducted by Runo (2019), the informants took it that whatever foods friends suggested, were healthy foods. This confirmed the significance of peer pressure as an important food choice factor. This is in line with Social Cognitive Theory which proposes that Social-environmental characteristics such as peers, influence behaviour (Bandura, 1989). For

children, eating is typically a social occasion and other eaters, including peers as well as children's observations of the eating behaviour of others, influence the development of their own preferences and eating behaviours. Evans, Cristoffel, Necheles & Becker (2010), advise that modelling positive nutrition behaviours can encourage emulation in peer settings such as schools where children can model healthy eating. The findings imply that peers socialise one another into acquiring a culture of consumerism and feeding habits by watching others around them and being actively involved.

Peers influence on learner's healthy eating patterns is often found to be negative. This is due to the increase in consumption of foods rich in fat, salt, and sugar and foods which are low in nutrients. However, sometimes this influence can also be a positive one. As such, finding measures of how it could be applied in encouraging health food choices of the learners is of great importance.

4.6.2 Availability

The current study found that availability of the food within and around the school premises affected the learners' food choices. Three quarter of the learners from all the three focus groups echoed that availability of unhealthy foods within and around the school campus contributed to their poor food choices. A female learner from FGD 3 commented that, "*timagula chifukwa ndi zakudya zomwe zimapezeka*" (*we buy because they are the foods which are found*). Another female learner from the same FGD aired out that, "*timagula zakudya zomwe zimagulitsidwa pa sukulu pano*" (*we buy foods which are sold here at the school*). A male learner from FGD 1 commented that "*ndi chifukwa chakuti zakudya zimenezi ndi zomwe zimagulitsidwa pa sukulu pano*" (*it's all because these are the foods which are sold within the school area*). Depending on where one lives, one might not have easy access to a variety of foods. Consequently, the food choices that are made are entirely based on what is currently available. At times limited availability may make it difficult to eat

nutritionally balanced meals. Many remote geographically isolated schools in Kasungu experience problems with food availability.

The current study's finding is similar to the findings of a study which was conducted in South Africa by De Villiers et al. (2015), which reported that school children buy and consume unhealthy foods near school premises which calls for creating enabling healthy environment. Another study in Brazil, showed that public school learners are exposed to food stores which provide fewer natural foods but rather, energy dense foods (Corvalan et al. 2017). In his study, Molotja et al. (2020) found that learners bought unhealthy snacks from informal vendors within or just outside the school, and they bought what was available or sold in and around the school premises.

Also, in support to this finding, Smith et al. (2010) highlight that availability of cheap snacks in the environment encouraged the consumption of junk food by the pupils. This concurs with SCT which looks at the environment which in this case, the school is setting influence learner's food choices. Social environmental factors may have a direct influence on eating behaviour. For example, the food made available at school is likely to be related to the child's consumption of such foods. An environment which supplies and makes healthy food available and accessible to learners is effective in molding food choices for the learners. WHO (2015) comments that the school environment needs to be conducive to promoting the health and nutritional well-being of learners. Bleich, et al.(2015) adds that food choices are sensitive to environmental cues and constrained by what is available in the food supply. Environmental factors are a construct of Social Cognitive Theory (Bandura, 1986) .In agreement, the research has demonstrated relationships between availability of food in the school environment and learners consumption of the food. Therefore, the school environment should promote learners healthy food choices by ensuring the availability of a variety of healthy foods including plenty of fruits and regulate the

promotion, marketing and sale of foods and beverages that are high in fats, salts and sugars. In so doing, learners will have healthy food choice options since many children live in environments that promote consumption of foods high in fat and sugar.

4.6.3 Taste

Taste was found to be the most frequent mentioned factor for the learners' food choices in this study. The majority of the learners from all the focus groups testified that they chose food due to its taste. A learner from FGD 1 commented that "*Ndimagula mabisiketi chifukwa amakoma*" (*I buy biscuits because they taste sweet*). Another learner from FGD 2 said that (*the foods we buy, like Kamba are very good, the way they taste*), and another learner from FGD 3 commented that, "*ndimagula jiggies chifukwa amayikamo mchere umene umawonjezera kukoma*" (*I buy jiggies because they are delicious with the salt added to it*). This concurs with Ndlovu (2015) findings, where learners mentioned taste as a factor that influenced their food choices. Contento (2012) alludes that children's food choices are driven primarily by taste. Above all other influences, taste has been confirmed as the largest influence on what snacks children choose.

Moreno et al. (2000) in their study, sweet taste was also highlighted among the main reasons for consumption of soft drinks. Thiruselvakumar et al. (2014) in their study of factors affecting food choices and attitudes among adolescents, it was found that the most important factor considered while buying any snack is tastiness. Only 15% of the participants felt that the healthy nature of the snacks matter for them. Kourouniotis et al. (2016) in their study also found that taste of food plays an important role in food choice.

Furthermore, the study found that foods high in fat, sugar and salt are highly palatable to children and associated with increased food consumption. Repeated consumption of high energy nutrient

poor foods can lead to undesirable health outcomes such as increased risk of obesity and chronic diseases like cardiovascular diseases and type 2 diabetes. This is because most fast food is high in sugar, salt, saturated fat, processed ingredients and calories (Jia et al., 2022). A better knowledge on the links between food tastes, individual taste preferences, food choices and food intake provide an understanding of why some people might select and consume unhealthy foods. This is all in agreement with the Social Cognitive Theory which indicate that food choices are associated with personal factors one of which is taste preferences.

4.6.4 Cost

Cost of food was found to be another factor influencing the learners' food choices. A great number of the learners said that nutritious foods are expensive while that of unhealthy foods are affordable. *For instance ,“ma orange ang’onoang’ono amagulitsa K100 limodzi ,pamene paketi ya Kamba ndi K50,komanso timagula ma sweet pa mtengo wa K20 imodzi” (small oranges cost K100 each while a packet of Kamba puffs sells at K50 and with K20, we can buy sweets)* one male learner from FDG 1 emphasised. Another learner from FDG 3 commented that *“Zakudya zopatsa thanzi zimafuna ndalama zambiri” (nutritious foods demand a lot of money)*. As such, how much food costs is an important factor that influences food choices. How much money the learners have at their disposal restricts what food they can buy. This is especially true when more nutritious foods tend to cost more than highly processed, nutrient –drained foods. Learners therefore, should be sensitised on the dangers of cheap foods which most of the times, happen to be unhealthy.

These findings are in line with other studies which revealed that nutritious food is expensive and a barrier for promoting healthy food choices in learners. A mini-review on Indian school children's food environment by Raychaudhuri et al. (2013), also reported high access of school children to low cost energy dense foods like refined carbohydrates, saturated fats and sugar sweetened

beverages. In their study, Kassier and Veldman (2013), reported that the price of fruits and other nutritious foods are higher than any other food. Therefore, the consumption of unhealthy foods by the learners can be as a result of the expensiveness of healthy foods.

Findings from Kigaru et al. (2015) study on nutrition knowledge, attitude and practices among primary school children in Nairobi, also found that availability of cheap snacks in the environment surrounding the school encouraged consumption of the junk foods by the pupils. Concurring with the findings, a study on Bruneian primary school learners by Talip et al. (2017), also found that the learners adopted poor eating habits as unhealthy foods remain cheaper.

4. 6. 5 Time

Another factor which was found to have influenced learners' food choices among learners was time. Most of the learners said time influenced their food choices in different angles. A learner from FGD 1 commented that *“Kwathu ndi kutali ndi sukuluyi.Sindingathe kupita kukadya chifukwa ndikhoza kuchedwa kumaphunziro a masana”* (My village is far away from the school. I can't go to eat lunch because I would be late for afternoon classes). Another learner from FGD 2 was in agreement by saying that *“Timakhala ndi nthawi yochepa yopumira ndiye ndimangogula zakudya zomwe zapezeka.”*(We have short lunch break, so I just buy whatever food is available). These findings agree with Ndlovu (2015), who found that time was considered a barrier to adopting healthful eating practices because classes started very early and learners had to leave for school very early on empty stomach, and this made them to eat food which was unhealthy. Again, concurring with the findings, Krolner et al. (2011) agree that time appears to be crucial and the adolescents studied reported to have made a trade between eating healthy and time.

Young adults face time constraints due to school and those time constraints are seen as barriers to healthy food consumption (Pelletier & Laska, 2012). It is, therefore, important for school authorities to look into the issue of time. Learners need to be given enough break time so that they are able to prepare or have healthy foods.

4.6.6 Food appearance

The findings of the study revealed that food appearance was another important factor which influenced the learners' food choices. Three quarters of the learners commented that the way food appears affects their food choices. The appearance was in terms of colour and shape. One learner from FGD I commented that "*Kungoona maonekedwe, umafuna udye' Mwachitsanzo Kamba puffs komanso ma sweet amaoneka mokongola*" (*We are taken by the way a certain food looks, for instance, kamba puffs and sweets look nice*). Another learner from FGD 3 aired out that "*ma bisiketi ali m'mitundu osiyanasiyana, ena ozungulira, ena ngati mtima*" (*Mapangidwe amenewa amanditenga moyo.*) (*How the food is shaped attracts me to eat, automatically. For instance, some biscuits are rounded and others heart shaped*).

Agreeing with the findings, in their study, identifying barriers to healthy eating, Murimi et al. (2016), found that it was apparent that visual appearance was one of the gatekeepers for the students' food choices. Nago et al. (2012), also found that sensual properties like colour or shape were the most important factors that affected learners' food choices. Stevenson et al. (2007) in their findings, reported that aesthetic qualities like appearance was among the most powerful reinforcers of food choices among adolescents.

4.7. Chapter summary

This chapter has presented and discussed the study findings following the order of the specific objectives under the topic, role of primary school nutrition knowledge on learners' food choices".

The objectives were: To assess the level of nutrition knowledge among primary school learners in the integrated Science and Technology curriculum, investigate the methods used by Science and Technology teachers when teaching nutrition concepts, analyse eating patterns of primary school learners regarding food bought at school and brought from home and explore factors that influence food choices in primary school learners.

CHAPTER 5: CONCLUSION AND IMPLICATIONS.

5.1 Chapter overview

The purpose of the study was to assess the role of primary school nutrition knowledge on learners' food choices in Kasungu District. The research was guided by the following research objectives: assess the level of nutrition knowledge among primary school learners in the integrated Science and Technology, investigate teaching methods used by teachers when teaching food and nutrition concepts, analyse eating patterns of primary school learners regarding food bought at school and brought from home, and explore factors that influence food choices in primary school learners. Therefore, this chapter provides the conclusion, recommendations and areas for further studies.

5.2 Conclusion

The study has shown that learners demonstrated good nutrition knowledge. However, there was no association between the knowledge and the learners' food choices. The nutrition knowledge which the learners displayed, was not applied when making food choices.

As regards eating patterns, the learners generally liked and consumed more energy- dense and less nutritious foods like mandasi, sweets, chips and fizzes, though they knew that these had poor effects on their health. Therefore, this concludes that nutrition knowledge alone did not translate into making healthy food choices. To improve the learners eating patterns, there is need for monitoring.

In terms of teaching methods, it has been found that teachers dedicate themselves to a variety of teaching methods. The methods include brainstorming, question and answer, group work, explanation, authors' chair, futures' wheel, think-pair-share, demonstration, practice and experimentation. These methods were participatory in nature, hence promotes critical thinking in

the learners. Teachers need to vary teaching methods to encompass the needs of a wider range of learners in terms of the different learning characteristics which need different approaches.

As for factors which influence learners' food choices, it was found that factors such as exposure to certain unhealthy foods, peer pressure, taste and time ,contributed to the learners' unhealthy food choices. As such, a high rate of health risk behaviours like consuming more energy dense foods, low intake of fruits coupled with high unhealthy snacking among the learners, indicate an alarming situation towards their future health. This calls for a need to find ways of promoting learners healthy food choices.

5.3 Implications of the study

The study has found that despite the learners having good nutrition knowledge, there is no behaviour change. As such learners may end up having non-communicable diseases later in life but also not concentrating in class which may lead to poor performance.

5.4. Contributions of the study

The information from this study will help primary school learners to have better food choices which will enhance strong and healthy bodies. With the knowledge gained, learners will also be able to extend the nutrition knowledge issues to their families and the community at large, hence building a healthy nation. The study will also remind teachers to employ effective teaching and learning methods in food and nutrition lessons for the benefit of the learners.

5.5. Suggested areas for further study

This study focussed on the role of primary school nutrition knowledge on learners' food choices.

Further research should focus on:

- Exploring strategies for promoting healthy food choices among primary school learners.
- Assessing nutrition knowledge and food choices of primary school learners' parents.
- Investigating ways of enhancing the teaching and learning of primary school nutrition knowledge concepts.

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APPENDICES

APPENDIX A: APPLICATION TO CONDUCT RESEARCH

Kasungu TTC

P/B 23

Kasungu

Cellophone: 0999639549

Email: makondetsacutless@gmail.com

The Chairperson

Mzuzu University Research Ethics Committee

P /B 201

Luwinga

Mzuzu

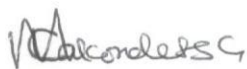
RE: APPLICATION FOR PROPOSAL CLEARANCE

I am **Cutless Makondetsa**, a Master of Education (Teacher Education) student at Mzuzu University with the registration number **MEDTE 1620**. I would like to do a research on **“Role of primary school nutrition knowledge on learner’s food choices in Kasungu District**.

As a partial fulfilment for the award of a Master of Education Degree in Teacher Education at Mzuzu University, I am supposed to carry out a study which must pass through your committee for ethical clearance and approval. I therefore write to apply for ethical clearance from your office in order to proceed with this study.

I hope the application will favourably be considered.

Yours faithfully,



CUTLESS MAKONDE TSA

APPENDIX B: CLEARANCE LETTER



MZUZU UNIVERSITY

DIRECTORATE OF RESEARCH

Mzuzu University
Private Bag 201
L u w i n g a
M z u z u 2
M A L A W I
TEL: 01 320 722
FAX: 01 320 648

MZUZU UNIVERSITY RESEARCH ETHICS COMMITTEE (MZUNIREC)

Ref No: MZUNIREC/DOR/22/19

28/03/2022

Ms. Cutless Makondetsa,
Mzuzu University,

P/Bag 201,

Mzuzu.

Email:

makondetsacutless@gmail.com

Dear Ms. Makondetsa,

RESEARCH ETHICS AND REGULATORY APPROVAL AND PERMIT FOR PROTOCOL REF NO: MZUNIREC/DOR/22/19: ROLE OF PRIMARY SCHOOL NUTRITION KNOWLEDGE ON LEARNER'S FOOD CHOICES IN KASUNGU DISTRICT

Having satisfied all the relevant ethical and regulatory requirements, I am pleased to inform you that the above referred research protocol has officially been approved. You are now permitted to proceed with its implementation. Should there be any amendments to the approved protocol in the course of implementing it, you shall be required to seek approval of such amendments before implementation of the same.

This approval is valid for one year from the date of issuance of this approval. If the study goes beyond one year, an annual approval for continuation shall be required to be sought from the Mzuzu University Research Ethics Committee (MZUNIREC) in a format that is available at the

Secretariat. Once the study is finalised, you are required to furnish the Committee with a final report of the study. The Committee reserves the right to carry out compliance inspection of this

Committee Address:

***Secretariat, Mzuzu University Research Ethics Committee, P/Bag 201, Luwingu, Mzuzu 2;
Email address: mzunirec@mzuni.ac.mw***

approved protocol at any time as may be deemed by it. As such, you are expected to properly maintain all study documents including consent forms.

Wishing you a successful implementation of your study.

Yours Sincerely,



Gift Mbwele

MZUZU UNIVERSITY RESEARCH ETHICS ADMINISTRATOR

For: CHAIRMAN OF MZUNIREC Committee Address: *Secretariat, Mzuzu University Research Ethics Committee, P/Bag 201, Luwingu, Mzuzu 2; Email address: mzunirec@mzuni.ac.mw*

APPENDIX C: REQUEST TO THE DEM

Mzuzu University

P/B 201

Luwinga

Mzuzu

Cell: 0999639549 / 0884570900

Email: makondetsacutless@gmail.com

The District Education Manager

Kasungu District Education Office

P.O Box 38

Kasungu

Dear Sir/ Madam,

REQUEST TO CONDUCT A RESEARCH STUDY IN SELECTED SCHOOLS IN KASUNGU DISTRICT

I am a post graduate student at Mzuzu University pursuing a Master of Education degree in teacher Education. I am carrying out a research study on the role of primary school nutrition knowledge on learner's food choices in Kasungu District, in partial fulfillment of the award of master's degree.

I am therefore writing to request for permission to carry out this study in some of the schools within your Education District.

Yours faithfully,



Cutless Makondetsa

APPENDIX D: REQUEST LETTER TO HEADTEACHERS

Mzuzu University

P/B 201

Luwinga

Mzuzu

Cell; 0999639549 /0884570900

Email: makondetsacutless@gmail.com

The Headteacher,

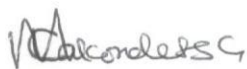
Dear Sir / Madam,

REQUEST TO CARRY OUT A RESEARCH IN YOUR SCHOOL

I am a postgraduate student at Mzuzu University pursuing a Master of Education Degree in Teacher Education. I am carrying out a study on the role of primary school nutrition knowledge on learner's food choices in Kasungu District in partial fulfilment of the award of a Master's degree.

I therefore write to request for permission to carry out this study in your school. Attached is an introduction letter from Mzuzu University.

Yours faithfully,



Cutless Makondetsa

APPENDIX E: CONSENT FORM FOR PARTICIPATION IN A RESEARCH

Parent /guardian approval

I **Cutless Makondetsa** from Mzuzu University, invite your child to participate in a research study. The aim is to analyse the level of nutrition knowledge he/she has attained after learning nutrition concepts through standard 5 to standard 7, his /her eating patterns and factors which affect his/her food choices. Your child was selected because he/she is in standard 7.

If you decide to allow your child, he/she will participate in a focus group discussion that will be audio taped. He/she will also be involved in responding to a questionnaire. Pseudonyms will be used and there will be no benefits for the child.

The information provided by the child in relation to the study will remain confidential and the participation is voluntary. Your child is free to withdraw with your consent and stop participating at any time without any penalty. If you have any questions about the study, feel free to contact me at 0999639549. Your signature indicates that you have read and understood the information provided above.

Signature of parent/guardian

Date.....

APPENDIX F: QUESTIONNAIRE FOR LEARNERS

Instructions:

- Do not write your name on this paper.
- Fill and tick where appropriate.
- All responses will be treated with confidentiality.

Demographic details

Age :.....

Sex:.....

Class:

Section A: Nutritional Knowledge

For the following statements, indicate Agree, Disagree or I don't know against each statement:

1. Food is classified into six groups.....
2. Tomatoes are a source of carbohydrates
3. Energy producing nutrients are carbohydrates, fats and proteins.....
4. Vitamins, minerals and proteins are protective nutrients.....
5. A person needs 2 – 3 liters of water per day.....
6. Milk and milk products are the most important sources of proteins.....
7. Excessive use of salt increases blood pressure and increases the risk of diseases.....
8. Fats are divided into animal and vegetable fats.....
9. Water is needed for food digestion.....
10. Anaemia is caused by lack of iron in the diet.....
11. Sunshine helps to prevent rickets.....

12. Use of iodised salt in foods helps to treat goiter.....
13. Packed meals should be well balanced.....
14. Fruits provide vitamins.....
15. Eating only one meal a day is an example of bad habits.....
16. Cooking food using a variety of methods is a good food habit.....
17. Eating more proteins causes diseases.....

Section B: Eating patterns

1. Which meal do you often eat?
 - a. Lunch
 - b. Dinner
 - c. Breakfast

2. Which food is suitable for packed meals?
 - a. Kamba puffs
 - b. Biscuits
 - c. Oranges
 - d. Jiggies

3. When do you snack?
 - a. Morning
 - b. Evening
 - c. Afternoon
 - d. The whole day

4. What beverages do you like drinking?

- a. Tea
- b. Water
- c. Fanta
- d. Thobwa.

5. How many times do you eat junk foods in a week?

- a. Once
- b. Twice
- c. 3 times
- d. More than three times

6. Do you take breakfast daily?

- a. Yes
- b. No

7. Do you take packed meals from home frequently?

- a. Yes
- b. No

8. Do you like junk foods over home cooked food?

- a. Yes
- b. No

9. How many meals do you eat in a day?

- a. 1
- b. 2
- c. 3

10. Do you take fruits frequently?

- a. Yes
- b. No

If yes, which fruits?

11. Which snacks do you like to buy?

- a. Mandasi
- b. Sweets
- c. Fizzes
- d. Bananas
- e. Krunchy naks

Thank you for your participation

APPENDIX G: FOCUS GROUP DISCUSSION GUIDE

1. What foods do you buy at school?
2. What foods do you take from home?
3. What beverages do you like?
4. What makes you buy or take these foods?
5. Do you think the foods are good for your health? Give a reason for your answer.

In Chichewa

1. Ndi zakudya ziti zimene mumagula kuno ku sukulu?
2. Ndi zakudya ziti zimene mumatenga kunyumba?
3. Mumakonda zakumwa zANJI?
4. Chimakuchititsani ndi chiyani kugula kapena kutenga zakudya zomwe mwatchulazi?
5. Kodi zakudya zimenezi ziri ndi ubwino pa thanzi lanu ?Perekani chifukwa.

Thank you for your participation

APPENDIX H: LESSON OBSERVATION CHECKLIST

Observation checklist on methods teachers used when teaching nutrition concepts

Method	School A	School B	School C
Authors chair			
Brainstorming			
Demonstration			
Discussion			
Explanation			
Futures wheel			
Group work			
Practice			
Question and answer			
Think-pair-share			
Others			

APPENDIX I: INFORMED CONSENT FORM



Mzuzu University Research Ethics Committee (MZUNIREC)

Master of Education in Teacher Education

Introduction

I am CUTLESS MAKONDE TSA from Mzuzu University. I am doing a research on the” **role of primary school nutrition on learners’ food choices**”. This consent form may contain words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them of me or of another researcher.

Purpose of the research

This research aims to assess the role of primary school nutrition knowledge on learner’s food choices.

Type of Research Intervention

This research will involve your participation in responding to a questionnaire and focus group discussions.

Participant Selection

You are being invited to take part in this research because you are in standard seven and learn Science and Technology.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. If you choose not to participate, nothing will change. You may skip any question and move on to the next question.

Duration

The research takes place for a period of 5 months from 3rd January to 31st May.

Risks

You do not have to answer any question or take part in the discussion/interview/survey if you feel the question(s) are too personal or if talking about them makes you uncomfortable.)

Reimbursements

You will not be provided any incentive to take part in the research.

Sharing the Results

The knowledge that we get from this research will be shared with you and your community before it is made widely available to the public. Following, we will publish the results so that other interested people may learn from the research.

Who to Contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact: Miss CUTLESS MAKONDE TSA, KASUNGU TTC, P/B 23, KASUNGU: 0999639549/0884570900

This proposal has been reviewed and approved by Mzuzu University Research Ethics Committee (MZUNIREC) which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find out more about the Committee, contact Mr. Gift Mbwele, Mzuzu University Research Ethics (MZUNIREC) Administrator, Mzuzu University, P/Bag 201, Luwingu, Mzuzu 2, Phone: 0999404008/0888641486

Do you have any questions?

Part II: Certificate of Consent

*I have been invited to participate in research about **the role of Primary School nutrition knowledge on learner's food choices.***

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have been asked to have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Print Name of Participant _____

Signature of Participant _____

Date _____

Day/month/year

*If illiterate*¹

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Print name of witness _____

Thumb print of participant

Signature of witness _____

Date _____

Day/month/year

Statement by the researcher/person taking consent

I have accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands the research project. I confirm the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.
