UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF HOME ECONOMICS EDUCATION

NUTRITIONAL QUALITY AND SAFETY OF MEALS SERVED UNDER GHANA SCHOOL FEEDING PROGRAMME IN WA AND CAPE COAST MUNICIPAL SCHOOLS

KATE BIGSON

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KATE BIGSON

(8120100007)

A THESIS IN THE DEPARTMENT OF HOME ECONOMICS EDUCATION, FACULTY OF SCIENCE EDUCATION, SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF THE UNIVERSITY OF EDUCATION, WINNEBA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF PHILOSOPHY (HOME ECONOMICS EDUCATION) DEGREE

OCTOBER, 2017

DECLARATION

STUDENT'S DECLARATION

I, KATE BIGSON, hereby declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and duely acknowledged, is entirely my own original work, and that it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE……

DATE……

SUPERVISOR'S DECLARATION

I, hereby, certify that the preparation and presentation of this thesis was supervised in accordance with the guidelines for supervision of dissertation laid down by the University of Education Winneba.

NAME OF SUPERVISOR : PROF MATTHEW CAURIE

SIGNATURE…….

DATE……

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DEDICATION

This work is dedicated to Him Who sits upon the Throne and to the Lamb: for wisdom, direction, the extravagant grace showed to me throughout the Masters programme. To Him be glory forever and ever, Amen.

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ABBREVIATIONS

GSFP – Ghana School Feeding Programme

SAC – School Age Children

RDI – Recommended Daily Intake

PEM – Protein Energy Malnutrition

RNI – Recommended Nutrient Intake

FAO – Food and Agriculture Organisation

USDA – United State Department of Agriculture

WFP – World Food Programme

RDA – Recommended Daily Allowance

NDO – Netherlands Development Goals

WHO – World Health Organisation

MDGs – Millennium Development Goals

UNDP – United Nations Development Plan

FIFO – First in First Out

NEPAD – New Partnership for Africa's Development

SIC – School Implementation Committee

DIC – District Implementation Committee

GNA – Ghana News Agency

GSS – Ghana Statistical Services

GHS – Ghana Health Service

ABSTRACT

This research was designed to evaluate nutritional quality of meals served under the Ghana School Feeding programme in Wa and Cape Coast schools. It also investigated the safety aspect of the meals. A cross-sectional and descriptive survey research designs were used in the study. A purposive and simple random sampling techniques were employed in selecting 720 respondents for the study, comprising 600 pupils, 60 teachers and 60 kitchen staff. Information was obtained using questionnaire, observation and unstructured interview instruments. Data were analysed using database and statistical softwares (SPSS, ESHA, FNPD and USDA National Nutrient Database for Standard Reference). Findings revealed that meals served in the schools had almost all the food nutrients because a variety of meals were served throughout the week. However, mean daily energy nutritional value intake and weights of the meals served to pupils in both schools did not meet the Recommended Nutrient Intake Value and portion requirements per head. Most schools did not have food storage places. Kitchens were mostly sheds and firewood was mostly used as cooking fuel. The smoke from the fire sometimes disturbed teaching classes. Majority of pupils did not wash their hands with soap under running water. No hand-washing centers for pupils were also seen in most of the schools studied. Majority of the cooks did not have health certificate and had neither attended any in-service training in two years. Some challenges were that the programme had increase the population of pupils astronomically while instructional materials and school infrastructure had remained the same. The price rate per meal prescribed by government was also inadequate and payments to the caterers were irregular and inadequate. Owing to the above findings, it was recommended that: government should consult experts in food and nutrition in each region to draw menu which has nutritional benefits using locally grown foods in each region; government should enact policies for all caterers to buy directly from the farm gate at cheaper prices; designated and well-built kitchens as well as dining rooms be provided for schools; school meal inspectors should be assigned to clusters of schools who would check quality of the meals as well as hygiene of the environment.

CHAPTER ONE
INTRODUCTION

0.1 Overview

This chapter presents the background to the study, the Statement of the problem, Purpose of the study, Research objectives, Research questions, Significance of the study, Delimitation of the study, Limitations, Definition of terms and Organization of Chapters

1.1 Background of the study

In an attempt to achieve Millennium Development Goal (MDG) 1 and 2, Government of Ghana, in partnership with the Netherlands and other partners made a commitment to halving the proportion of people of Ghana suffering from extreme poverty and hunger by 2015. This led to the formation of a number of impact-driven efforts and strategies towards the achievement of this goal. Amid these strategies is the implementation of the Ghana School Feeding Programme (GSFP) in 2005. School Feeding Programmes have been shown to impact positively on nutritional status and cognition of school children as well as hunger and poverty alleviation (Lawson, 2012). The Ghana School Feeding Programmes' objective is to provide pupils in public primary schools and kindergartens in poorest localities with one hot, nutritious meal each day, making use of locally-grown food items. Additionally, the programme envisages to reduce hunger and malnutrition, increase school enrolment, attendance and retention and finally to boost domestic food production (De Hauwere, 2008).

When GSFP started in the year 2005, it gave the impression to be a quick-win intervention against hunger and school drop-out. However, ten years down the lane, the programme seems to be fraught with difficulties in its implementation.

Unanswered issues cited by critics of the programme include the nutritional quality of meals served, the conditions under which food ingredients of the GSFP are procured, stored and the hygienic conditions under which meals are cooked and served and eaten (Gyawu, 2012). These among others are the drivers for carrying out a systematic study to provide answers to the implementation gaps of the GSFP in certain chosen schools. The choice of schools for the study was based on Ghana Statistical Service (2010) data that points to the three northern regions (Upper East, Upper West and Northern Regions) and the Central Region as the poorest regions in Ghana. This therefore led to the selection of Wa and Cape Coast in the research study.

1.2 Statement of the problem

In Ghana, malnutrition of preschool age children (<5 years) being underweight and stunted are respectively14% and 28% (Ghana Statistical Services & Ghana Health Services, 2009). Malnutrition negatively impacts on school attendance, academic achievement and cognitive levels of School Age Children (SAC) (Parish and Gelli, 2013) to the extent that Best *et al.* (2010) declared malnutrition among SAC as a public health issue in developing countries. To combat its impact, GSFP was instituted in 2005, targeting the SAC from low income municipalities of Ghana, to supplement their needed daily food nutrients with an aim of curbing wasting and stunting of the SAC - a major issue identified with SAC in sub-Sahara region (Buhl, 2010). To achieve the goal requires a clear knowledge of how much nutritional deficit is accrued by the SAC and hence how much is required to be in each meal to bridge the nutritional gap. Currently there is lack of information regarding how much nutrients and calories are in the meals that are being served to the SAC. Furthermore, it is unknown whether or not the nutrients in the food are enough to meet the needed amount for the SAC to overcome the issue of the wasting and stunting. Another problem associated with the implementation of the GSFP in Ghana is the lack of

knowledge regarding the health and safety of the food ingredients used in the meal preparation (Dogbe & Kwabena-Adade, 2012), and the hygienic processing conditions the products run through to get onto the plates of the consumers, considering the fact that hygiene is a major challenge in Ghana. This suggests that probably there is no system designed to check the quality and safety of meals fed to the children enrolled under the GSFP.

Although, some researchers have evaluated certain aspects of the programme, no one, to the best of the author's knowledge has studied the nutritional quality and the safety of the meals served at schools in the cities of Wa and Cape Coast. It is therefore necessary to carry out a systematic study with an intention to determine the nutritional quality and safety of meals served under the Ghana school feeding programme among schools where GSFP is practiced in Wa and in Cape Coast.

1.3 Purpose of the study

The purpose of this study was to evaluate the nutritional quality and to investigate the health and safety of meals served under the Ghana school feeding programme within schools in Wa and Cape Coast municipalities.

1.4 Research objectives

Based on preliminary readings and the researcher's field experience, the study sought to accomplish the following objectives.

1. Investigate the nutritional quality of meals served under the GSFP in Wa and in Cape Coast schools.
2. Examine the conditions under which food ingredients of the GSFP are procured and stored in Wa and Cape in Coast schools.
3. Investigate the hygiene of food cooked, served and eaten in Wa and in Cape Coast schools.

4. Identify the challenges facing the implementation of the GSFP in Wa and in Cape Coast schools.

1.5 Research questions

Knowing the goal of the GSFP and the lack of fundamental information required to achieve the goal, the following questions came to mind. They are;

1. What is the nutritional quality of meals served under the GSFP in Wa and in Cape Coast schools?
2. What are the identifiable conditions under which food ingredients are procured and stored under the GSFP in Wa and Cape Coast schools?
3. What is the hygiene of foods cooked, served and eaten under GSFP in Wa and Cape Coast schools?
4. What are the challenges facing the implementation of GSFP in Wa and Cape Coast schools?

1.6 Significance of the study

This research is important and timely for the following reasons. First of all, it is intended to create awareness for caterers as well as government agencies and policy makers under whose authorities the GSFP is functioning to ensure delivery of meals with values that meet Recommended Nutrient Intake by WHO to schools under their care. The kind of food ingredients used for preparation of meals for schools is also of great importance. This study would also serve as a guide for supervisors in ensuring the type of ingredients purchased by caterers to cook for the pupils is of good quality. The outcome of the study would be an eye-opener for supervisors under GSFP on how good and fresh food ingredients are before they are cooked.

Further, this study would provide information for decision making on good storage practices of food ingredients used in preparation of meals under the GSFP,

which ought to be shared with food handlers and caterers under the program. This would also enable them adhere to best practices in ensuring better nutritional value of meals served to schools under their care.

Scholars are of the view that food handling is an important aspect of food management and hence when food is not properly handled, it may lose its nutritional value or become contaminated. Therefore this study would provide useful information for future planning and policy development on effective hygienic practices that the current GSFP is falling short of at the study areas.

Indeed this research work would turn to benefit the academic world and would serve as a very good source of information for all those who are in academia. It will also be of benefit to lecturers, tutors, teachers and students. They could use it in diverse ways to supplement information for further study. For instance, lecturers conducting research can find it is document useful as a secondary data source. Teachers could use this as a reference material when it comes to nutrition and hygiene in schools. It is a tool to convey message to health educators about the importance of integrating hygiene practices into the GSFP. This research is needed to inspire discussion and intellectual debate among health educators, researchers, policy makers and other stakeholders who either have interest in or by the nature of their work, have the responsibility to promote the health and wellbeing of school children in Ghana. In furtherance to this, the research intends to add up to the knowledge base of the researcher in the discipline of Home Economics.

1.7 Delimitation of the study

The study was particularly confined to schools benefitting from GSFP in Wa Municipal and Cape Coast Metropolis. Study participants for the study included only head teachers, teachers, pupils, matrons and cooks. The study focused on assessing

the nutritional quality and safety of meals served under the Ghana School Feeding Programme within Wa and Cape Coast municipal schools.

1.8 Limitations

In the quest of research into the nutritional quality and safety of meals served in some of the GSFP, the researcher went through a myriad of challenges which could have been avoided or reduced to the barest minimum.

Some of these limitations include the unwillingness on the part of the respondents to be interviewed especially the caterers and the head teachers. In assessing the extent to which basic hygienic practices are being adhered to the individual caterers in various schools, respondents intriguingly and clearly revealed that they were not in the right position to disclose such information as originally designed in the interview guide. That notwithstanding, they were able to avail themselves to be interviewed after official introduction has been made supported by a permission letter from the district offices and confirmed by the coordinators of the GSFP of the respective schools.

1.9 Definition of terms

Nutritional value of food: refers to quantity and quality of nutrients found in food items.

Kitchen staff: This included the matrons and cooks or caterers in the various schools.

Served: they are meals or food substances which are given to people to consume.

Foreign material: the word as used in this study means weevils, worms, stones, seeds of other food materials etc. found in meals which have not been added or not part of the ingredients.

Food Quality: Proper appearance, flavor, texture, consistency and nutritional value in food. Food that is stored, prepared and served properly is more likely to have high quality.

1.10 Organization of Chapters

This research is assembled into six chapters. Chapter one gives the preliminary and general introduction to the study. It entails the background to the study, statement of the problem, purpose of the study, research objectives, research questions, significance of the study, delimitation and limitation, definition of terms and organization of chapters.

The second chapter discusses literature review of the study in accordance with the specific objectives set for this study. The sub headings are also as follows; Evaluating nutritional quality, Nutritional value per food ingredient, The concept of school feeding programme and nutrition, The concept of education and the school feeding programme, Nutritional requirement of school age children, The significance of the school feeding programme, Recommended dietary allowance for the nutrient, Micronutrient deficiencies and improve learning, Health and safety issues, Weight of meals served, Wholesomeness and contamination-free food ingredients, Availability of food and food safety under the school feeding programme, Hygiene and the school feeding programme, Effect of malnutrition on pupils performance.

Chapter three takes a look at the methodology of the study, which includes: profile of Wa and some Cape Coast municipals, study design, population, sample size and sampling technique, instrumentation, validity and reliability of instruments, data collection and analysis, ethical consideration, quality assurance mechanism, assumption and dissemination, and use of results.

The outcome of the study is presented in chapter four, which includes presentation of results chapter five discusses the major findings, Lastly chapter six presents summary, conclusion makes recommendation, references and appendices.

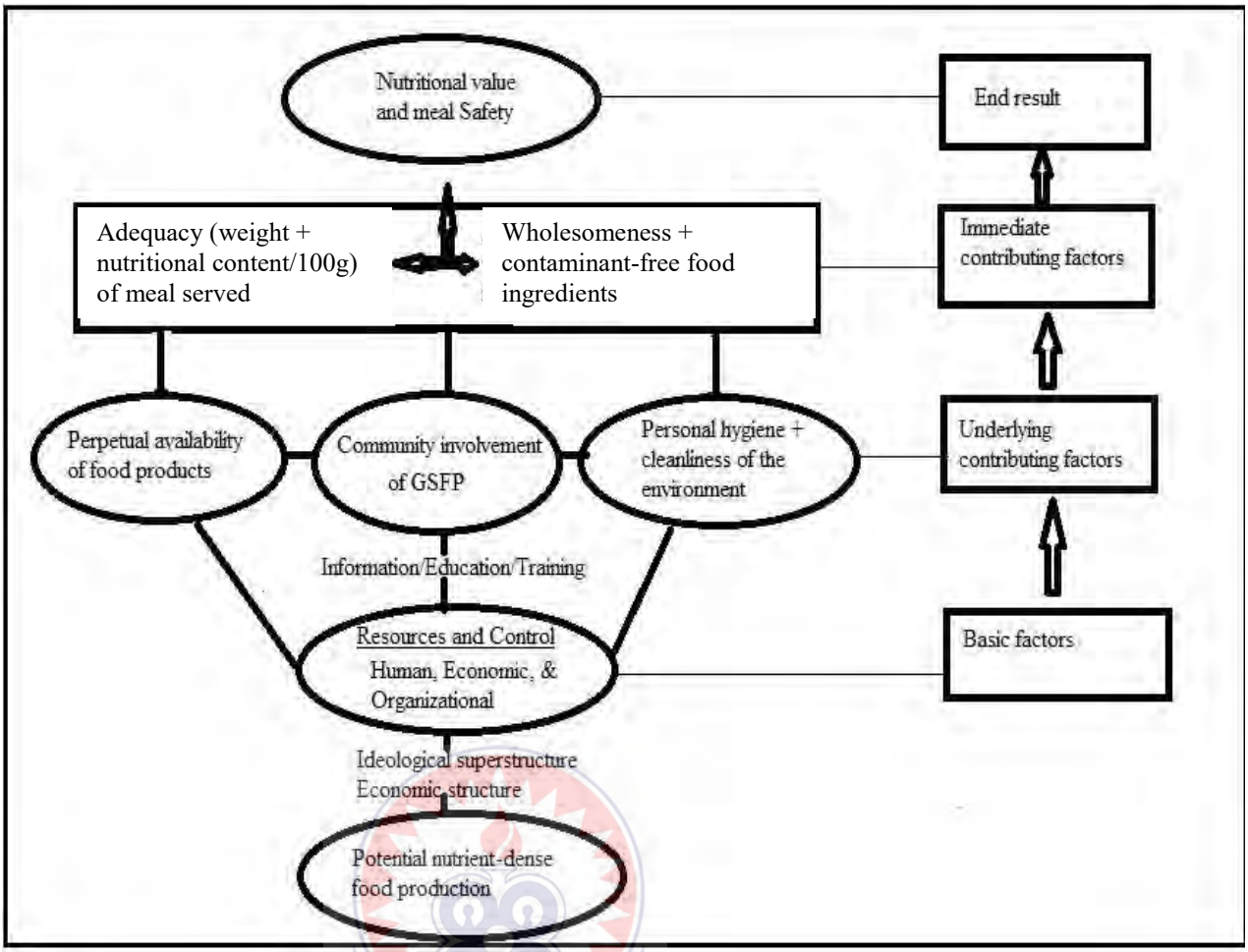
CHAPTER TWO
LITERATURE REVIEW

0.1 Overview

This chapter presents the Conceptual Framework, Evaluating Nutritional Quality, Nutritional value of food ingredients, Concept of School Feeding Programme and Nutrition, and Nutritional Requirements of School Age Children.

2.1 Conceptual Framework

The conceptual frame work for this study is presented in Figure 1, and it describes the links between the underlying parameters that are required to evaluate the nutritional values as well as the safety of the meals. Starting from the top level of Figure 1 the parameters which are considered as the immediate contributing factors are namely: the adequacy (weight) of meal served, in grams; to the SAC, the nutritional content per 100 grams of each of the ingredient, as well as the wholesomeness plus contaminant-free ingredients. Following the immediate contributing factors are the underlying factors, which involve personal hygiene of the kitchen staff and the cleanliness of the environment; community involvement of the programme; and perpetual availability of food products. The next parameters from downward are the basic factors which are also termed the resources and control involving human, economic, and organizational capitals.



Source: Researcher's construction (2015)

Figure 1: Conceptual Framework Scheme of Nutritional quality and Safety of Meal of the GSFP.

2.2 Evaluating Nutritional Quality

With an overarching objective of curbing malnutrition among the School of Age Children, but with nagging uncertainties of exact values of nutritional contents of the meals served under the GSFP at the various schools, it is unclear if the served meals actually meet the daily nutritional needs of the pupils. To ascertain this, various researchers have put in the effort to evaluate the nutritional quality of meals served at schools to SAC in various part of the world with contrasting outcomes. For instance, Owusu (2013) evaluated nutritional status of SAC at schools in Accra, Ghana. Her

findings revealed that the nutritional contents of the food were not enough to meet the nutritional needs of the pupils involved. Abdul-Rahman and Agble (2012) also detected in their studies on nutritional contents of meals served to SAC under GSFP in some schools in Greater Accra and northern regions to be below the RNI values for energy, protein, calcium, iron, thiamine, riboflavin, and vitamin C. Parish and Gelli (2013), however found two contrasting outcomes in their nutritional values assessment of meals at the same localities in Ghana. According to Parish and Gelli (2013) majority of the meals contained sufficient amount of protein and calories. However, most of the meals lacked vitamin A and iron. In Nigeria on the other hand; all the meals evaluated by Parish and Gelli (2013) were found to contain sufficient nutrients including iron and protein of at least 6.05g (33.99% Recommended Dietary Intake) and 16.93g (64.99% RDI) respectively with 30% RDI as the baseline. In South Africa however, a survey of primary school children from a rural area in KwaZulu-Natal, where school feeding program had been in operation at the school level for nearly two years, revealed that a great number of school children with persistent micronutrient deficiencies including inadequacy of vitamin *A* status (40% of pupils), anemia (28% of pupils), and iodine deficiency (97% of pupils) (Buhl, 2010). In Kenya, among 320 Kenyan primary pupils, it was observed that participants had a higher intake of energy (2089 ± 12.41 kcal versus 1841 ± 15.68 kcal) and protein than non-participants (Musamali, 2007). Stevens, Nicholas, Wood, and Nelson, (2013) also states that in England neither the school lunches nor packed lunches provided the balance of nutrients required to meet the nutrient-based standards (based on about one-third of daily energy and nutrient requirements). The school lunches however according to Stevens *et al.* (2013), generally had a healthier

nutrient profile, with lower sodium and lower percentage of energy from fat, but higher fiber and micronutrient content than the packed lunch.

These contrasting observations drove Buhl (2010) to determine the reasons for the various nutrient disparities in the GSFP. Buhl (2010) reveals that in South Africa, not all children entitled to the school feeding programme really receive food. A reason being that, there is a variation in food availability between the rural and urban areas. He further reveals that while the urban schools often report that their stocks are sufficient to provide food regularly, the rural schools are not always with sufficient ingredients. Buhl (2010) again attributes inadequate communication between schools and caregivers regarding whether or not children receive food on a daily basis, as a contributory factor. Gyawu (2012) also established lack of community involvement of the GSFP at Bekwai municipality in Ghana as a cause for the lack of sufficient nutrients needed by the SAC in the participating schools of the GSFP. The community involvement grounded in citizen participation theory whereby private individuals are given the opportunity to influence public decision is found to be discouraging at the Bekwai municipality. Gyawu (2012) revealed that less than 5% of the community participates in the activities of the school feeding program. This is also the case in some part of South Africa where Kwatubana and Makhalemele (2015) reports of lack of parental involvement in the process of implementation of the National School Nutrition Programme in the Sedibeng and Fezile Dabi school districts in the Gauteng and Free State provinces. They further reveal that lack of transparency in the recruitment process of parents and no strategies to empower them to initiate and take ownership of the programme leads to their inability to hold suppliers accountable for any inefficiency. A contrasting observation reported by Okae-Adjei, Akuffo, and Amartei (2016) indicates that in schools at Akuapem North Municipality of Ghana

where the GSFP is instituted, the communities are significantly supporting the program by cooking and serving and donating foodstuff. Another observation made was that the food cooked for the pupils were the traditional food of the communities. Cisse, Erickson, Opekun. Nichols, and Hamaker, (2015) states that indigenous staple grains of millet and sorghum are more satiety and energy dense with slower gastric emptying than non-traditional grains. Parish and Gelli (2013) reports of irregular payment of the farmers and meager price tags put on the meal per pupil by the government of Ghana. (Alhassan & Alhassan, 2014).

2.3 Nutritional value of food ingredients

Martorell (2003) opines that while low-fat diets are recommended for older children and adults children under the age of five years and below need diets that contain good amounts of fat. This fat should come from foods that contain plenty of other nutrients like meat, oily fish and full-fat milk (semi-skimmed milk is unsuitable for children under the age of two, and skimmed unsuitable for under-fives), rather than from high-fat foods that contain few vitamins and minerals like cakes, biscuits and chocolate. Meanwhile, young children should not eat too many fibre-rich foods, either, as these may fill them up so much they can't eat enough to provide them with adequate calories and nutrients.

Choosing foods from each of the six main food groups will help to ensure that children receive all the vitamins and minerals they need for good nutrition and health. Worryingly, figures from the National Diet and Nutrition Survey of Young People reveals that many children have inadequate intakes of many nutrients, including vitamin A, riboflavin (vitamin B_2), zinc, potassium, magnesium, calcium and iron, particularly once they reach the teenage years and have more control over what they eat (Murphy, 2003).

In contrast, the survey showed these poor intakes of vitamins and minerals were combined with too much salt, sugar and saturated fat. It is particularly important that children and teenagers eat a diet that's packed with vitamins and minerals. In fact, older children often have higher requirements for nutrients than even adults in order to support growth for example; 15 to 18 year old boys need more thiamin (vitamin B_1), niacin (vitamin B_3), vitamin B_6, calcium, phosphorus and iron than adult men. Similarly, 15 to 18 year old girls need more niacin, calcium, phosphorus and magnesium than adult women (Tugwell, 2007).

Muthayya, Eilander, Transler, Thomas, van der Knaap, and Srinivasan (2009) state that although obesity is a major problem, children and teenagers still need enough calories to grow and develop into healthy adults. *Table 1* below gives a rough guideline to the daily calorie needs of boys and girls at different ages. Kids who are really active may need more; those who are inactive may need less.

Table 1. Calorie needs of Boys and Girls

Age	Calories per day	
	Boys	Girls
1–3	1,230	1,165
4–6	1,715	1,545
7–10	1,970	1,740
11–14	2,220	1,845
15–18	2,755	2,110
Adults	2,550	1,940

Source: Muthayya, *et. al.*, 2009

Davies (2002) posited that it's important to ensure that children don't have too much salt. While adults should have no more than 6g of salt a day, children need even less as they have smaller bodies. To him sodium in salt is linked to health problems like high blood pressure.

2.4 Concept of School Feeding Programme and Nutrition

2.4.1 Nutrition

Wardlaw and Kessel (2002) defines nutrition as the science of food: nutrients and substances in foods and their action, interaction and balance in relation to health and disease. Whitney, Carinne, Linda, Sharon and Wardlaw (2003) on their part, define nutrition as the process by which the body ingests digests, absorbs transports, utilizes and excretes food substances. While according to Insel and Roth (2004), nutrition is the science of food and how the body uses it in health and in disease. According to Adow, Daaku and Ofosu, (1993) nutrients are the components of food substances which help the body to produce energy, promote growth, repair tissues and regulate body processes.

Santrock (2005) categorized nutrients as large or small molecular sizes. The large molecular nutrients were the carbohydrates, proteins and fat, (the energy providers) and water. The small nutrients were the minerals and vitamins that protected and regulated body tissues processes and were found in foods in small quantities. A healthy diet is essential to human health and wellbeing. Habitual or consistent consumption of a nutritionally balanced diet ensures the greatest benefit to the health and wellbeing of an individual (Berndanier, 2002). As food and nutrition play such a vital role in human life it is important that we attach appropriate significance to the knowledge of foods, as well as the varieties, nutritional relevance and alternatives of common foods (National Nutritional Foods Association at http://www.nnfa.org). Wardlaw (2003) seems to agree with the Nutritional Foods Association by commenting on the importance of educating a child as soon as he learns to speak and walk on the need to develop desirable attitudes towards food and its use. In apparent agreement with Wardlaw's recommendation, Telljohann, Wolford, Symons, Pateman. (2004) also stress the importance of the study of nutrition to

include all aspects of processing, storage, distribution, cooking as well as how food resources can be best utilized in all circumstances.

The relationship between health and nutrition is vital. Healthy nutrition contributes greatly to the quality and productivity of life for the individual, the community and the nation. The Ghana National Population Report (1994) stated that a good health status is desirable in itself, but its direct impact on labour productivity and therefore ultimately on economic growth makes it even more imperative for the government to ensure easy access to modern health facilities to as many Ghanaians as possible.

2.4.2 Dietary adequacy

According to Whitney *et al*. (1991), dietary adequacy is a diet providing all the essential nutrients and energy necessary to maintain health and body weight. They stated that ideally, a diet will be more than just adequate; it will be optimal, providing an assortment and balance of nutrients and energy to maintain appropriate body weight and the best possible state of health. To obtain the other nutrients, you have to eat vegetables, fruits, grains, and other foods; variety in the diet helps to ensure adequacy. The task of designing an adequate, balanced diet therefore requires some thought and skillful planning.

The Ghanaian diet is based on starchy roots (cassava, yam), fruits and cereals (maize, rice). Starchy roots and cereals supply nearly three quarters of energy intake and dietary diversity is low. Malnutrition, which manifests itself as protein energy malnutrition (PEM), stunting, vitamin and mineral deficiencies and other diet-related diseases, remains a pervasive problem (Food and Agriculture Organisation-FAO, 2010). According to FAO (2010), many families in the northern regions of Ghana face severe seasonal food shortages. The main occupation in these areas is subsistence

farming, confined to a short rainy season. As a result most people face chronic food insecurity and abject poverty for the nearly eight months of the year, and unstable food production and lack of road infrastructure also contribute to undernourishment.

In the Northern region, five out of ten people are considered poor, and in the Upper West region, this number climbs to nine out of ten (United Nations WFP Ghana, 2010). In this area, nearly half of all children under five are malnourished, which is more than twice the national average (United Nations WFP Ghana, 2010). Additionally at a national level in Ghana the following deficiencies have been noted (UNICEF, 2010);

i. 14% of children under five suffer from moderate to severe underweight
ii. 9% of children under five suffer from moderate to severe wasting.
iii. 28%of children under five suffer from moderate to severe stunting
iv. Only 32% of households consume iodized salt.
v. Only 24% of children under five receive Vitamin A supplements

Under nutrition in Ghana is associated with widespread micronutrients deficiencies though figures are vague and vary by region and district (FAO, 2010). The proportion of households using adequately iodated salt remains unacceptably low and Vitamin *A* supplementation programmes often do not reach the most vulnerable populations. Anaemia affects more than the quarters of young children and nearly half of women of childbearing age (FAO, 2010). These deficiencies are significant with regards to school feeding programmes as children in poor health start school later or not at all. In Ghana, malnourished children should enter school at a later age and complete fewer years of school than better nourished children (Glewwe & Jacoby, 1994).

2.4.3 Concept of Education under the School Feeding Programme

Education is a key component in school feeding programs and global development because overall, a more educated person has an enhanced amount of opportunities in life, earns more money, and has a higher standard of living than an uneducated individual (Adelman, Gilligan, & Lehrer, 2008). School meals greatly impact recipient children's education status by increasing school enrollment and attendance, decreasing drop-out rates, and improving cognitive abilities and learning achievements (Ahmed, 2004).

Generally, sending children to a school in which school-meals are served offsets the financial and opportunity costs of schooling, and thus families are encouraged to send their children to school (Hoddinott & Yohannes, 2002). Additionally, school feeding programs may serve as an incentive for students to go to school to receive food rather than missing out on food by staying home (Jacoby, Cueto, and Pollitt, 1996). The increased nutrition status of children, as a result of school feeding programs, also enhances students' cognitive abilities and performance in school.

Jacoby (2002) postulates the school feeding programs have the capacity to increase gender equity in access to education, which allows for gender equity across all spheres of social and economic life. There are a variety of reasons that girls' education is impacted by factors on both the supply and demand side of schooling. These include gender-stereotyped curriculum and teaching practices, increased risks for girls' safety outside of the house, socio-cultural practices that cause girls' education to hold a very low value, and school infrastructure that is not suitable for girls. Due to the combination of such barriers, girls are disproportionately affected by the direct and opportunity cost of schooling, which prevents girls from very poor households from attending school (Grantham-McGregor, Chang, and Walker, 1998).

Opportunity costs for girls' education include lost time that would otherwise be spent doing household chores and care work.

According to Abotsi (2013), the GSFP can thus be said to be a laudable programme in promoting education for all in all aspect since its target is not only quantity but quality as well. Ghana's Poverty Reduction Strategies (GPRS) paper named the capitation grant and the school feeding programme as strategies towards meeting the quality needs of basic education. It is based on this premise that the study seeks not only to find out whether the school feeding programme has had any positive impact on school enrolment, attendance and retention, but also on the nutritional value and hygienic contents of meals served to pupils in the basic schools in the Wa and Cape Coast.

2.4.4 Nutrition Standards in Ghana

There is very little published data regarding nationally established nutrition standards in Ghana. In most instances, RDAs and other internationally accepted intake recommendations are used as guidelines in the literature for measuring individual and population-level deficiencies. There are no nationally established nutrition guidelines for school feeding programmes. Schools are instructed to provide a nutritious meal daily and in most districts, menus are said to be prepared with assistance from a nutritionist. However, menus are often not displayed and are not always followed (Netherlands Development Organisation, 2007).

2.5 Nutritional Requirements of School Age Children

School meals have been shown to increase the nutritional status of school-age children in a variety of ways. For example, there is a notable reduction in malnutrition via diet diversification and an increased absorption of micronutrients (Muthayya *et al*., 2009). By increasing the amount of nutrition a child receives at school, that

child's family's nutrition status also increases as their familial demand and requirement for food is decreased (Smith & Haddad, 1999).

However, criticisms of school meals' impacts on nutrition stem from the idea that increased nutrition through school meals is only a temporary fix and does not target the underlying causes of malnutrition, such as high food prices and poor food distribution systems that prevent food security (Beard & Connor, 2003).

According to Murphy (2003), Children suffering from micronutrient deficiencies do poorly in school. Anaemia in particular is a widespread problem with clear health and educational attainment implications (Beard & Connor, 2003; WHO/CDC, 2004): Providing iron supplementation to children to reduce anemia has been shown to improve cognitive development and increase school participation (Bobonis, Miguel, and Puri-Sharma, 2006). It has also been demonstrated that a healthy breakfast improves same-day and long-term performance in undernourished populations; and that breakfast provided at school improves attendance and reduces tardiness. While micronutrient deficiencies and short-term hunger are fairly easy to address through school feeding, supporting children's long-term growth trajectory may not be easy to address (McCann & Ames, 2007). Existing evidence suggests the effect of school feeding on child growth, is minimal. (Powell, Walker, Chang, and Grantham-McGregor, 1998; van Stuijvenberg, Kvalsvig, Faber, Kruger, Kenoyer, 1999; Grillenberger, Neumann, Murphy, Bwibo, van't Veer, Hautvast, 2003).

Anthropometric studies have confirmed that SAC may be too old to experience catch-up growth or recover from growth faltering (Martorell, Khan, and Schroeder, 1994; Martorell, 1995; Behrman, Alderman, & Hoddinott, 2004; World Bank, 2006). However, where school entry is delayed and grade repetition is high, nutritionally-vulnerable older children may benefit from exposure to school feeding

during pre-pubertal growth spurts. As children develop, they require the same healthy foods adults eat, along with more vitamins and minerals to support growing bodies. This means whole grains (whole wheat, oats, barley, rice, millet, quinoa); a wide variety of fresh fruits and vegetables; calcium for growing bones (milk, yogurt, or substitutes if lactose intolerant); and healthy proteins (fish, eggs, poultry, lean meat, nuts, and seeds) (Barrett, 2006).

According to Murphy, (2003), the best way to make teen dietary changes is to present information about short-term consequences of a poor diet: appearance, athletic ability, energy, and enjoyment of life. These are more important to most teens than long-term health. For example, "Calcium will help you grow taller." "Iron will help you do better on tests and stay up later." Walker *et al.* (1997) outlines the following food nutrients:

2.5.1 Calories

Due to all the growth and activity, adolescent boys need 2,500 to 2,800 per day, while girls need around 2,200 per day. It's best to get these calories from lean protein, low-fat dairy, whole grains, and fruits and vegetables.

2.5.2 Carbohydrates

Carbohydrates provide energy and assist with normal elimination of wastes from the body. Carbohydrates contain four (4) calories per gram. There are three groups of carbohydrates: monosaccharides, disaccharides and polysaccharides. Monosacharides include glucose, fructose and galactose. They are found in such common foods as honey, milk and ripe fruits (Telljohann *et al.*, 2004). When monosacharides enter the body, they are quickly changed into energy because they do not need to be broken down. When disaccharides are eaten, they are quickly changed into simple sugars. The three groups are sucrose (table sugar) maltose and lactose

(milk sugar). They are found in many common foods including sweet breakfast cereals, cookies pies, cakes, milk and ice cream. Polysaccharides take much longer for the body to break down, digest and absorb than the simpler monosaccharide and disaccharide carbohydrates. The complexity of polysaccharides is beneficial, because as it takes longer to break them down and absorb, the body is able to use the energy and nutrients contained in these foods over a longer period of time. In addition, polysaccharides contain more nutrients than in the mono and disaccharides (Wardlaw & Kessel, 2002). The three groups of polysaccharides are starch, glycogen and cellulose (fiber). Common foods that contain complex carbohydrates are breads, some cereals fruits, potatoes, rice and vegetables, (US Department of Agriculture-USD, (2000).

2.5.3 Fats

Fats function to delay hunger, insulate the body, protect vital body organs, provide energy and carry fat-soluble vitamins for important body functions (Wardlaw *et al.*, 2004). Fats contain nine (9) calories per gram. There are three main types of fat; saturated fats, monounsaturated fats, polyunsaturated fats. Saturated fats are usually solid at room temperature and are found in some vegetable oils, such as coconut, shea nut and palm oil as well as in foods derived from animal sources including whole milk, cream, butter, cheese, poultry and meat (USDA, 2000). High amounts of saturated fats in the diet have been linked to cardiovascular disease because they seem to raise blood cholesterol levels. Other health problems associated with a high intake of saturated fats include cancers of the breast, uterus, prostate, colon, and rectum.

Monounsaturated fats are usually found in foods that are derived from plant sources such as olive oil, peanut oil, peanut butter and derived dressings (Wardlaw *et al.*, 2004) and shea nut oil (Kao, Lin, Lai, Lin, Kong, & Wong, 2016). Unlike polysaturated fats, monounsaturated fats tend to decrease blood cholesterol levels

(Whitney *et al.,* 2001). Polyunsaturated fats are also found in corn, cotton seed and sunflower oils and some fish. (US Department of Agriculture, 2000) Like the monounsaturated fats, polyunsaturated fats also tend to decrease blood cholesterol levels (Telljohann *et al.*, 2004). High levels of blood cholesterol are believed to increase fatty deposits in arteries, causing cardio-vascular diseases. To decrease the build-up of fatty deposits in arteries, the amount of cholesterol in the diet should be reduced. A good rule of thumb suggests that, the more saturated the fat in a food product, the higher the percentage of cholesterol in that food product (Boyle & Zyla, 1992).

2.5.4 Vitamins

Vitamins are micronutrients that do not in themselves provide energy, rather they are needed to transform foods into energy, act as catalysts helping with body functions and help the body resist infections. There are two types of vitamins; fat-soluble (Vitamins A, D, E, K) and water-soluble (B-complex and C vitamins). Fat-soluble vitamins can be stored and transported by the body's fat cells. Water-soluble vitamins cannot be stored in the body and must be replenished regularly through the consumption of healthy foods. Any excess water-soluble vitamins are excreted by the body (US Department of Health & Human Services, 1993). Worthington–Roberts and Williams (1996) stated that because of their high energy requirements, adolescents need high amount of thiamin, riboflavin and niacin which are of the Vitamin B complex group. Vitamin *D* is also especially needed for rapid skeletal growth during adolescence.

2.5.5 Minerals

Like vitamins, minerals are micronutrients that do not provide energy, rather they are tissue building materials that help regulate body functions (Worthington – Roberts & Williams, 1996). There are two types of minerals; macro minerals and trace minerals. Healthy people need more than 100 milligrams of macronutrients per day including calcium, phosphorus, potassium, sulfur, sodium, chlorine and magnesium. By contrast, people need less than 100 milligram of trace elements per day, including iron manganese, copper, iodine, cobalt and zinc. Just as each vitamin serves a different purpose, so does each mineral (Telljohan *et al*., 2004).

2.5.6 Proteins

In order for the body to grow and maintain muscle, teens need 45-60 grams per day. Most teenagers easily meet this need from eating meat, fish, and dairy, but vegetarians may need to increase their protein intake from non-animal sources like soy foods, beans, and nuts. Protein is obtained from both animal and vegetable sources. Animal protein foods include meat, fish, milk and snails. Vegetable proteins are from pulses like peanuts, beans of all kinds, nuts, melon seeds (Adow *et al*., 1993). The main function of proteins is to assist in the growth and repair of all body tissues. Proteins supply four (4) calories per gram and are found in all body cells. When proteins enter the gastrointestinal tract they are broken down into amino acids. Amino acids are absorbed into the bloodstream and carried throughout the body to help build and repair tissues (Boyle & Zyla, 1992).

There are two types of amino acids; essential and non-essential. The human body cannot produce essential amino acids. Rather essential amino acids must be supplied by foods. However, the body can produce nonessential amino acids from essential amino acids (Shafter & Irwin, 1991).

2.5.7 Calcium

According to Worthington-Roberts and Williams (1996), calcium is an important nutrient in adolescence because of the amount of the mineral needed for skeletal growth. Forty-five percent of total bone growth occurs during adolescence. According to Weaver (2000), the skeleton accounts for at least 99% of the body`s stores of calcium and the gain in skeletal weight is most rapid during the adolescent growth spurt. About 45% of the adult skeletal mass is formed during adolescence, although skeletal growth continues well beyond the adolescent period into the third decade (Weaver, 2000). Wardlaw *et al.* (2004) state that all the calcium for the growth of the skeleton must be derived from the diet .The largest gains are made in early adolescence, between about 10-14 years in girls and 12-16 years in boys. During peak adolescent growth, calcium retention is, on average, about 200mg/day in girls and 300/day in boys. According to Weaver (2000), the efficiency of calcium absorption is only around 30% so it is important that the diet supplies an adequate calcium intake to help build the densest bone possible. The achievement of peak bone mass during childhood and adolescence is crucial to reduce the risk of osteoporosis in later years.

Wardlaw and Kessel (2002) stated that, by eating several servings of dairy products, such as milk, yoghurt and cheese, the recommended calcium intake can be achieved. As well as a good dietary supply of calcium, other vitamins or minerals, like vitamin D and phosphorous, are needed for building up bones. Weaver (2000) stated that physical activity is also essential, particularly weight-bearing exercise, which provides the stimulus to build and retain bone in the body. Activities such as cycling, gymnastics, skating, ball games, dancing and supervised weight training for at least 30-60 minutes a day, three to five times a week can help build bone mass and density. Many teens do not get sufficient amounts of calcium, leading to weak bones and osteoporosis later in life. Encourage teens to cut back on soda and other overly-

sugary foods, which suck calcium from bones. The 1,200 mg of calcium needed per day should come from dairy, calcium-fortified juice and cereal, and other calcium-rich foods such as sesame seeds and leafy greens like spinach.

2.5.8 Iron

Both males and females require higher intakes of iron in their diets during adolescence. Males require more iron during adolescence because the building of muscle mass is accompanied by greater blood volume, which in turn requires more iron. Adolescent females require more dietary iron than children because they will begin to lose iron monthly with the onset of menses (Gong *et al.*, 1988). Iron deficiency can lead to anemia, fatigue, and weakness. Boys need 12 mg each day, and teen girls, who often lose iron during menstruation, need 15 mg. Iron-rich foods include red meat, chicken, beans, nuts, enriched whole grains, and leafy greens like spinach and kale.

2.5.9 Zinc

Zinc is known to be essential for growth as well as sexual maturation and therefore of great importance in adolescence (Golub, 2000). The retention of zinc increases, especially during the growth spurt, leading to more efficient use of the nutrient in the diet. Worthington-Roberts and Williams (1996), states that the roles of other minerals in the nutrition of adolescents are not well studied. However, magnesium, iodine, phosphorus as well as copper, chromium, cobalt and fluoride are important.

2.5.10 Water

Water constitutes roughly 60 percent of a person's body weight. The functions of water include transporting usable materials to and wastes away from cells, regulating body temperature and helping with digestion, absorption, circulation, excretion and

tissue building. A person can live for days without food but can last only a few days without water. Children who are physically active should be especially careful to consume enough water every day Water is consumed in the form of tap water, or is derived from foods. Milk is about 87 percent water and bread is about 35 percent water (US Department of Health & Human Services, 1993).Teachers should not restrict the intake of water for children, especially in warm weather (Telljohann *et al*., 2004).

2.6 Significance of the School Feeding Programme

School feeding is a tool which today effectively enables hundreds of millions of poor children worldwide to attend school in developed and developing countries alike. In the most-developed nations, there are hungry children who can be helped by school meals (FAO, 2005). Millions of school children have benefited from school feeding in Finland, Japan and the United States, for example, in excellent programs which have been sustained over several decades. However, school feeding has increasingly come to represent a more varied and comprehensive set of uses of food for the achievement of educational outcomes. In this more comprehensive definition, all the following could be classified as school feeding (Latham, 1997).

School Feeding Programmes are effective programmes which can enable children to go to school despite poverty and hunger. More specifically, school feeding can: Alleviate short-term hunger In-school meals provided directly to hungry children reduce short-term hunger; and can serve as a vehicle for meeting their nutritional requirements. When poor children go to school, they often leave home on an empty stomach. Providing school meals, especially breakfasts, can play a critical role in ensuring that such children can learn. Various studies have shown learning achievements to be higher for children receiving school feeding. Benefits are

particularly strong for already undernourished children and/or those who miss breakfast. To be most effective in boosting children's achievement and behavior, school feeding should take place as early in the day as possible by providing a vehicle for micro-nutrient supplementation. The use of fortified foods for in-school feeding is an effective means to address specific nutritional needs and deficiencies such as Vitamin A, iron or iodine (McCann & Ames, 2007).

Recent studies indicate two of the factors that can cause childhood depression; being hungry and being out of school. School feeding addresses those two causes by enabling poor children to go to school and by providing them with at least one nutritious meal a day. This is frequently the reason for which poor families do not send their children to school. School feeding and take-home rations can add to the food baskets of families when targeted for food-deficit areas. The fact that their children will be fed at school or receive take-home rations means that more food is available for the family and is enough incentive for many poor families to send their children to school. (Miguel & Kremer, 2004).

Community involvement contributes to program management, complementary activities, and in the long term, program sustainability. Create jobs and private sector opportunities scant attention appears to be given in countries to the role of the private sector in education. In developed countries, there are very strong direct and indirect links between education and private sector interests. Simply put, governments invest in education; this investment creates employment and profits, as well as producing a skilled workforce. Taxes are paid by the workers and the companies alike, some of the tax revenues are re-cycled into education and other social programs.

The World Food Programme's vision is to reduce hunger among school children so that hunger is not an obstacle to their development. A daily school meal

provides a strong incentive to send children to school and keep them there and allows the children to focus on their studies, rather than their stomachs. Providing school meals has many and varied benefits. The fact that almost all countries in the world - both affluent and developing - provide school meals is proof of this. School feeding supports the achievement of the Millennium Development Goals on hunger, education and gender parity and offers multiple benefits (FAO, 2005).

2.7 Recommended Dietary Allowance (RDA) For the Nutrients

RDA's have been designed by the Food Nutrition Board of America and other developed countries like Canada and the United Kingdom to serve as guides to average daily requirements for specific nutrients and to protect people from getting too much or too little of those nutrients (Wardlaw *et al.*, 2004). Insel and Roth (2004) have suggested that the body's nutritional status varies for each individual nutrient needs and that RDA's serve as a guide for estimating one's nutritional needs.

The FAO/WHO (1998) recommendation considers that people worldwide are generally smaller and more active than in the United States of America. Nevertheless the recommendations of the various nations and agencies fall within the same range (Whitney & Rolfes, 2002). They put the RDA's in perspective by indicating that the RDA's intake are for healthy people and they do not apply to people with health problems who may require supplemented or restricted intake of specific nutrients. Secondly, the RDA's are safe and adequate recommendations that include generous margins of safety. They are not minimum requirements for individuals. The average daily intakes are met through diets composed of a variety of foods. The RDA's were established for specific age and gender categories and should be used in conjunction with food tables.

Shafer and Irwin (1991) point out that the RDA standards for adequate nutrition have been developed for the average adult. No such specific standards have been defined for the growing, developing adolescent. Therefore, nutritional recommendations should be viewed as general guidelines and should be adjusted for special conditions such as a significant growth spurt, athletic participation or major stress. The caloric needs for adolescents, ages 11-14 and 15-18 are 47 kcal/kg and 40 kcal/kg respectively (Escott-stump, 2008). It is generally accepted that of this total, 55-66 percent should be derived from carbohydrates and less than 30 percent from fat (with less than 10 percent from saturated fat). The recommended protein intake for adolescents 11-14 years old is 46 g (1g/kg body weight) and for those 15-18 years old is 44 g (0.8g/kg body weight). (Subcommittee on the Tenth Edition of RDA's, 1989).

The American Heart Association (2004) recommends that carbohydrates supply approximately 50 to 55 percent of the calories or about 300 grams in a child's daily diet at 2,400 calories. The U.S Department of Agriculture Human Nutrition Information Service (1989) recommends that fats should supply 30 percent or less or about 72 grams of a Child's daily diet of 2,400 calories (U.S Department of Health & Human Services, 1993). That department also suggests that protein should constitute approximately 12 percent or about 70 grams of a child's daily diet of 2,400 calories. The recommended amounts of vitamin A, C and B_6 are the same as those for adults. (U.S Department of Health & Human Services, 1993). It is recommended that a person consumes 48 to 64 ounces of water or 6-8 glasses of water a day. Children who are physically active should be especially careful to consume enough water every day.

The RDA has been translated into a daily food plan for an adequate diet. Five principal food groups (minus fats and oils) are recommended with a minimum number

of servings listed in each group to form the foundation of a good diet. By following such a plan families can plan meals to meet nutritional requirements of different family members.

2.8 Food Groups of Ghana

Very little work has been done on the foods of Ghana with respect to their RDA's. Adow *et al.* (1993) classified the staple food of Ghana into six groups according to their function in the body, composition, and uses in our meals.

The food groups are:

a) Animal products: meat, fish milk, egg, snails

b) Beans, nuts and oily seeds: groundnuts, cowpeas, agushie

c) Fruits and vegetables: nkontomire, okro, tomatoes, carrot, mangos, oranges, banana etc.

d) Cereals and grains: rice, maize, sorghum, millet

e) Starchy roots and tubers: plantain, cassava, yam, cocoyam, plantain

f) Fats and oils: palm oil, groundnut oil, margarine

Adow *et al.* (1993) advised that people should select items from as many of the groups as possible to include in their daily intake of food to have an adequate and well balanced diet and for a better nutritional status.

Table 2. Recommended Portion per Person for a Meal of Some Common Foods

Food Food item	Recommended Portion Per head
Gari (dry)	90grams (medium evaporated milk tin level
Gari (to be taken with beans)	40 grams
Polished Rice (Raw)	150g (1/2 margarine tin)
Cooked Rice	300g (4 rounded serving spoon)
Plantain (raw peeled)	200g (1 medium size)
Plantain (Apem)	3 small fingers
Beans (Dry)	60g (1/2 milk tin)
Raw corn dough for Akasa	70grams (3 ladles)
Kenkey (fanti)	400g (1 large ball)
Kenkey(Ga)	400g (1 large ball)
Banku (raw corn dough)	300g (11/2 small sizes)
Cooked cocoyam	300g (3 small rolls)
Boiled yam	400g (4 small sizes)
Bread rolls	100g (2 small rolls)
Quaker oats (raw)	50g
Fish	100g(1 small size)
Meat	100g
Palm soup	3-4 ladles
Groundnut paste for soup	80g
Agushie	10g(1 dessert spoon)
Fresh tomatoes	100g (1 medium)
Onion	20g (2 small shallot)
Red palm oil	30mls (3 dessert spoons)
Other cooking oils	30 mls (3 dessert spoons)

Source: Ministry of Health, Ghana, 1989

Table 3. Food Groups and their Chief Nutrients

Food group	Chief nutrients
Animal products	Protein of high biological value
Beans nut and oily seeds	Protein of low biological value
Fruits and vegetables	Vitamins and minerals
Cereals	Carbohydrates
Starchy roots and plantain	Carbohydrates
Fats and oils	Fats

Source: Adow *et. al.* (1991).

According to Adow *et al.* (1993), the energy requirements of school children are still high because of growth and activity. Therefore, there should be a progression towards an adult-style healthy diet, but with continued emphasis on foods with a high energy and nutrient content. The progression should be gradual with an increase in fibre, reduction in fat and increase in starch content in the diet. Nutrition for kids is based on the same principles as nutrition for adults. Everyone needs the same types of nutrients (vitamins, minerals, carbohydrates, protein and fat). What is different about

nutrition for kids, however, is the amount of specific nutrients needed at different ages (Badake, 2014).

Table 4. The Food Guide Pyramid – A Summary

Food category	Major contributions of nutrients
Milk, yogurt and cheese	Calcium Phosphorus Carbohydrates Protein Riboflavin Vitamin D Magnesium Zinc
Meat, poultry, fish, dry beans eggs and nuts	Thiamin Niacin Vitamin B-6 Phosphorus Carbohydrates Protein Riboflavin Vitamin B-12 Magnesium Zinc Foliate Iron
Fruits	Vitamin C Carbohydrates Foliate Potassium Vitamin A Magnesium Dietary fiber
Vegetables	Vitamin C Carbohydrates Foliate Potassium Vitamin A Magnesium Dietary fiber
Bread, cereal, rice and pasta	Thiamin Dietary fiber Carbohydrates Niacin Iron Foliate Riboflavin Magnesium Zinc
Fats, oils and sweets	Food from this category should not replace any from the other groups. Amounts consumed should be determined by individual energy needs.

Source: Wardlaw (2003).

The United States Department of Agriculture (2008) created a food pyramid of daily guidelines for kids. Essentially, a child's daily diet should be composed mostly of calories from complex carbohydrates and lean proteins and no more than 20 percent of calories from fat. Here are particulars about each category of food and the specific daily nutritional breakdown for preschoolers, elementary school children, and teenagers all derived from the U.S.D.A. and Institute of Medicine. The guideline is as follows:

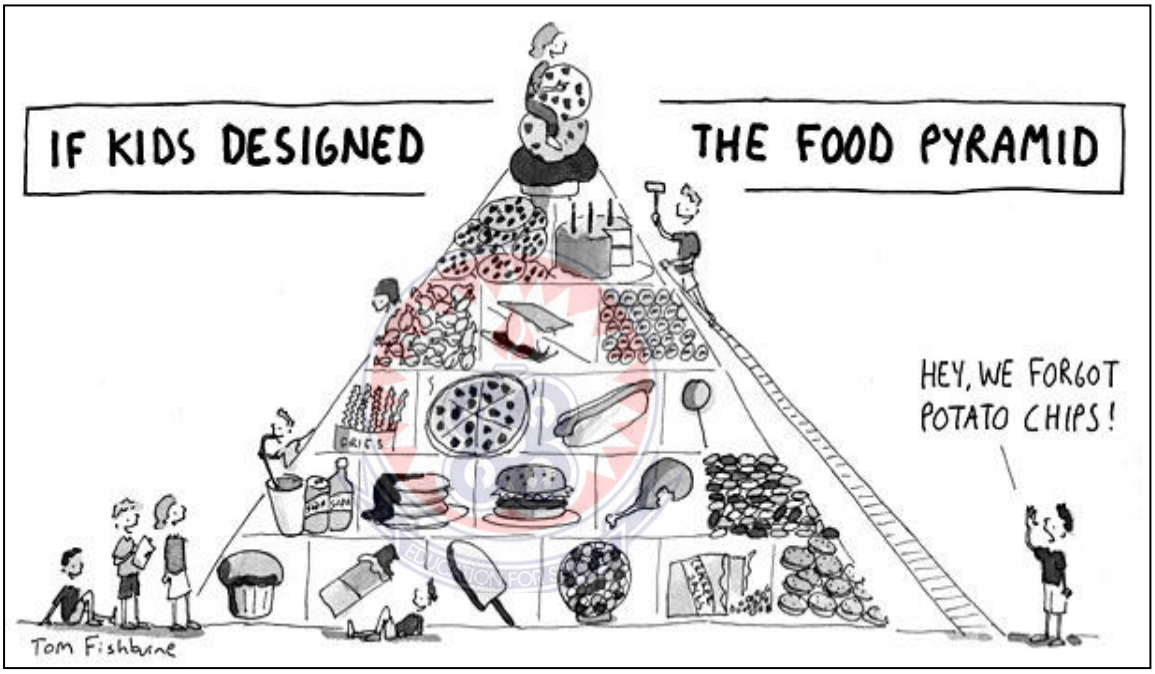


Figure 2. Food Pyramid (source: Bowman et al, 2008)

Vegetables: These foods are noted for their contributions of Vitamin A, Vitamin C folate, potassium, magnesium and fiber and for their lack of fat and cholesterol. Opt for bright and dark veggies. Spinach, sweet potatoes, and carrots are great choices. Starchy, whiter foods, such as baked potatoes and corn have lesser nutrients. **Fruits:** Fruits are notable for the contribution of Vitamin A vitamin C potassium and fiber, and for their lack of sodium, fat, and cholesterol. Choose vitamin-rich fresh fruits, such as strawberries, peaches, mangoes and apples. Fruit juices should be

consumed as little as possible. When offering juice, make sure it is 100 percent real fruit juice with no sugar added.

Grains: These foods are notable for their contributions of complex carbohydrates, riboflavin thiamin, niacin, iron, protein magnesium, and fiber. Use whole or multigrain flours, whole-grain breads, oatmeal, whole-grain low-sugar cereals, brown rice, and whole-wheat pasta. Avoid white bread and white rice in your house.

Meats and Beans: Meat, chicken and fish are notable for their contributions of protein, phosphorus, vitamins, B, zinc, iron, niacin, and thiamin; legumes are notable for their protein, fiber, thiamin, folate vitamin E, potassium, magnesium, iron and zinc and for their lack of fat and cholesterol. Serve lean proteins every day, such as beef, pork, chicken, fish, beans, tofu, or eggs. When preparing any protein-rich food, opt to serve it steamed, baked or grilled, not fried.

Dairy: These foods are notable for their contributions of calcium, riboflavin, protein, vitamin B and when fortified vitamin D and A. Serve lean sources of dairy, such as low-fat milk (check with your doctor to determine whether your child should have whole or reduced-fat milk), low-fat yogurt, ricotta, or cheese.

Fats and Oils, sweets: These foods contribute sugar, fat and food energy (kcalories). They should be used sparingly because they provide food energy while contributing few nutrients. Use healthy oils, such as olive-preferably extra-virgin-safflower and vegetable oils. They provide vitamin E for healthy skin. Limit intake of butter, cream, sugary cereals, soda, candy, and the like as much as possible. However nutrition guidelines recommended for adults are inappropriate for most children under the age of five. This is because young children only have small tummies and so need plenty of calories and nutrients in a small amount of food to ensure they grow properly (Levinson & Bassett, 2007).

2.8.1 Food Groups of USA

a) Meat, Poultry, fish dried beans, eggs and nuts

b) Milk, yoghurt and cheese

c) Vegetables

d) Fruits

e) Bread, cereal, rice and pasta

f) Fats and oils and sweets (use sparingly)

Variety in diet is needed to meet the nutritional needs of an individual because the required nutrients are scattered among many different foods (Wardlaw *et al.*, 2004). Dietary variety means choosing a number of different foods within the respective food groups.

Table 5. The Recommended Dietary Allowance of Calories and Nutrients for Gender and Age Categories

Energy and Nutrient type	Adult Men Light Work	Adult Men Heavy Work	Adult Women Light Work	Adult Women Heavy Work	Adolescent 15-19 yrs Male	Adolescent 15-19 yrs Female	Older Children 10-12yrs	Older Children 13-15 Male	Older Children 13-15yrs Female
Calories	2700	3200	2100	2760	3100	2180	2300	2800	2400
Proteins g	70	70	60	70	75	65	50	65	60
Calcium g	500	500	500	500	600	600	600	700	700
Vitamins	7500	7500	7500	7500	7500	7500	7500	7500	7500
Thiamine mg	1.1	0.85	1.1	1.2	1.2	0.8	0.9	1.1	0.95
Riboflavin, mg	1.5	1.2	1.5	1.7	1.7	1.2	1.25	1.5	1.3
Vitamin B – 3 mg	11	9	11	14	14	8	8	11	10
Vitamin C, mg	50	50	50	50		50	50		

Source: FAO, 1998.

2.9 Micronutrients Deficiencies and Improved Learning

According to Bryan, Osendarp, Hughes, Calvaresi, Baghurst, and van Klinken, (2004) deficiencies of iron and iodine are among the most harmful types of malnutrition with regard to cognition. Iron deficiency renders children listless, inattentive and uninterested in learning. The research literature suggests a causal link between iron deficiency anemia and less than optimal behavior for learning (Nokes *et al.*, 1998). Poor performance on a wide range of achievement tests among iron deficient children in school has been consistently documented. Remediation of iron deficiency through supplementation has eliminated the differences in school performance and IQ scores between schoolchildren previously deficient in iron and those without iron deficiencies (Sood, 2010).

In the case of iodine, most studies have focused on the differences in cognitive test performance between children who lived in communities with and without endemic goiter. The results show differences in favor of the non-goiter areas. In Sicily, for example, the proportion of children with below-normal cognitive scores was 3% in areas with sufficient iodine, 18.5% in areas where iodine was inadequate, and 19.3% where iodine was inadequate and cretinism was endemic (Gratham *et al.*, 1999). Studies in Indonesia and Spain have documented similar effects on children in areas with insufficient iodine (Bryan *et al.*, 2004). Fortification of school rations is the most efficient and effective route to alleviating micronutrient deficiencies in schoolchildren where SFPs are in operation. A case-control study of the impact of providing home-fortified cookies to school children in Chile found higher concentrations of hemoglobin among children receiving the fortified cookies through the school lunch program. The impact was most significant among children with greater demands for iron such as post-menarcheal girls and pubertal boys (Jomaa, 2011).

2.10 Health and safety issues of food

Information regarding health and safety of the food served under the GSFP of Ghana is scarce. Data on conditions of crops, storage houses, hygienic conditions of the kitchens, and water quality for the food preparation is scanty. However, the integrity and the wholesomeness of the food served to the school pupils cannot be overlooked, especially when one considers the magnitude of health and sanitation issues that are plaguing the West African nations. Protection of food of high quality is paramount and therefore, it is imperative that health and safety of the food be verified in tandem with the nutritional values assessment of the GSFP. Authors like Sulemana, Ngah, and Majid, (2013) reports of school kitchens being in the openings under trees or in temporary structures such that when it rains, food has to be cooked either in a classroom or on the veranda. This apparently is counterproductive to the achievement of the goals of GSFP, as it disrupts teaching and as well affects the maintenance of a hygienic environment for food preparation. Suleman *et al*. (2013) further reveals that sixty per cent of the schools visited did not have adequate stock of plates, cups, and spoons. As a result pupils eat in turns creating prolonged lunch breaks and reduced time spent in class by the pupils. It also subjects the children to a possibility cross contamination of diseases and other contaminants.

Water is also cited as a major problem in many of the schools. Some schools had to buy water from mobile truck water tanker for cooking. Some of the schools also did not have adequate storage facilities to store the water, let alone sanitary conditions of the water tanks.

2.11 Weight of Meal Served

Weight of meal served and that of leftovers on the plates are essential variables for determining the weight of the meal consumed by the pupils. In many studies, mention is made of the weight served without that of the leftovers. This probably may be due to the fact that the leftovers are assumed to be negligible. For example, Falade, Otemuyiwa, Oluwasola, Oladipo, and Adewusi, (2012) reported of meal plan consisting of foodstuffs as rice and fish, porridge (yam, cowpea and palm oil), rice and cowpea, cowpea and egg and finally rice and fish, for each day of the week respectively leaving out the left overs which are important in the evaluation of total amount of nutrients that the pupils consume per meal.

2.12 Wholesomeness and Contaminant – free Food Ingredient

Wholesome meal may be defined as a meal that contains all the supposed nutrients that the food should contain without other harmful constituents to the consumer. In Europe, the idea of wholesome nutrition movement started in the beginning of the mid-nineteenth century as a result of negative effects of industrialization on nature and man. Max Bircher-Benner with his clinical experience and Werner Kollath with his experimental contributions rediscovered the value of raw and minimally processed foods that retain all essential and health-promoting substances necessary for supporting immune competence and self-healing properties of the body (Leitzmann, 2005). Now the concept of wholesome nutrition combines new knowledge on health, population growth, resources and environment, together with experiences tested by time. The concept of nutrition also takes into consideration biological, social, ecological and economic aspect of human concern.

In Ghana the two main staple foods are cassava (*Manihot esculenta*) and maize. Dishes that are made with Cassava include fufu, kokonte, and banku. Maize is

also used to prepare variety of dishes such as banku, kenkey, and porridge. The cassava especially, ranks first among root crops in Ghana with 14 million tons produced in 2012 (Ofori, Tortoe, Akonor, & Ampah, 2016). In fact cassava and maize are considered food security crops on the continent of Africa in that drought and heat resistant varieties are being raised to withstand the effect of global warming. However, some of Ghanaian staples have been found to contain such contaminants like aflatoxin, arsenic, mercury, lead, and faecal colliform. Bortey-Sam, Nakayama, Ikenaka, Akoto, Baidoo, Yohannes, and Ishizuka, (2015); Abbas (2005) and Amonoo-Neizer, and Amekor, (1993); Amonoo-Neizer, Nyamah, and Bakiamoh, (1996) found the said contaminants in staple foodstuffs such as peanuts, kenkey plantain, cassava, and fishes in Ghana. The presence of the contaminants in ingredients when used to prepare meals without proper treatment to remove them makes the meals unwholesome. While many of the contaminants get into the ingredients through anthropogenic activities, a lot more of them get in naturally. Contaminant like aflatoxin is a naturally occurring fungal metabolite that is commonly found in food that undergoes fermentation process (Juodeikiene *et al.*, 2012). And once it contaminates, aflatoxin cannot completely be destroyed by any known food processing means (Bullerman & Bianchini, 2007). Further, epidemiological surveys carried out over the past 25 years in Asia and Africa reveal a strong statistical association between aflatoxin ingestion and PLC incidence in humans (Wogan, 1992). Aflatoxins like all microbes, is assumed to grow with time and substrates. It is however, unclear if prolonged fermentation of corn dough affects the concentrations of aflatoxin.

Arsenic is an inorganic contaminant that has been found in food, soils and water bodies in and around towns and cities, in Ghana, where gold mining activities

are prominent. Arsenic occurs naturally in rocks and soils and is associated with gold in the form of arsenopyrite (Tomkins & Mavrogenes, 2015). During growth plants absorbs minerals with arsenic from the soils through their roots and deposit them in the edible part. Upon ingestion of edible part of the plants containing the arsenic over a period of time, calcinogen is known to be inflicted on the consumer. Mercury contamination is commonly used in mining areas by small scale miners to process gold from ore. With no effective regulation on the use and disposal of mercury, the miners dispose mercury haphazardly into the environment. Mercury causes nerve impairment and lowering of cognitive function when ingested. (Tomkins & Mavrogenes, 2015).

2.13 Availability of Food and Safety under the School Feeding Programme

School feeding programs have been defined by the World Bank as targeted social safety nets that provide both educational and health benefits to the most vulnerable children, thereby increasing enrollment rates, reducing absenteeism, and improving food security at the household level (World Food Programme, 2005).

Beyond improvements in access to food, school feeding programs also have a positive impact on nutritional status, gender equity, and educational status, each of which contributes to improving overall levels of country and human development. While school meals are provided by the governments of most high and middle-income countries around the globe, the children who may benefit most from school feeding programs are in low-income countries that do not have government-provided school meals. School feeding in low-income countries often starts through funding by international organizations such as the United Nations World Food Programme or the World Bank or national governments through programs. However, some governments have first started school-feeding programs and then requested the help of these

organizations and programs. Additionally, many countries have “graduated” from their dependency on foreign assistance by reshaping their school feeding programs to be country-led and self-supported (Musamali, Nalingo, & Mbagaya, 2007).

According to the United Nations World Food Programme, 66 million primary school age children go hungry every day, with 23 million hungry children in Africa alone (FAO, 2008). Furthermore, 80% of these 66 million children are concentrated within just 20 countries. Additionally, 75 million school-age children (55% of them girls) do not attend school, with 47% of them living in sub-Saharan Africa (Winch, 2011). Thus, the need to reduce hunger while increasing school enrollment in these children is evident, and school feeding programs have been developed to target this multifaceted problem.

Schools have become a natural and convenient setting for the implementation of health and education interventions. School feeding is just one facet of school health initiatives, as other programs may include de-worming, HIV/AIDS prevention and education, and life and health skills education. Overall, school feeding programs have been shown to directly increase the educational and nutritional status of recipient children, and indirectly impact the economic and social lives of themselves and their family. Additionally, school feeding directly addresses the Millennium Development Goals (MDGs) of reducing hunger by one-half, achieving universal primary education, and achieving gender parity in education by 2015 (UNDP, 2005).

2.13.1 Food Safety

Unsafe food usually results from contamination due to biological hazards, chemical hazards or physical hazards. According to Tamplin (1994) to ensure food safety, one must establish standards that focus on controlling time and temperature,

practice good personal hygiene, maintain a sanitary facility, prevent cross contamination and purchase food supplies from approved supplies.

Unsafe food usually results from contamination, which is the presence of harmful substances not originally present in the food. Some food safety hazards are introduced by humans or by the environment, and some occur naturally (Bolton, 1997). Food-safety hazards are divided into three categories: biological hazards chemical hazards and physical hazards. Biological hazards he said include certain bacteria, viruses, parasites and fungi as well as certain plants, mushrooms and fish that carry harmful toxins. Chemical hazards on the other hand include pesticides, food additives, preservations clean supplies and toxic metals that leach from cookware and equipment. Again he explained physical hazards consists of foreign objects that accidentally get into the food such as hair, dirt, metal staples and broken glass.

Whether cooking for your family, or for a business, personal hygiene is an important and vital part of food safety (Hoddonott & Yohannes, 2002). It is thought that many food poisoning cases originate in our own homes and with some basic knowledge of safe practices, the numbers of cases could be substantially reduced. Due to the fast-paced nature of the foodservice environment, employee training in hygiene and food preparation practices for preventing food borne illness should be an ongoing process to keep top of mind and employee hygiene training program, foodservice operators should educate staff on the proper methods to clean food preparation areas and equipment to prevent food borne illnesses from occurring. Cross-contamination can result from lack of hygiene in the kitchen, improper handling of meats and vegetables and failure to follow established procedures for maintaining clean serving areas (Hoddinott & Yohannes, 2002).

According to Buttenheim, Alderman, and Friedman, Arnold (2011), food fed to small children may play a more important role than safe drinking water in the transmission of diarrheal diseases in developing countries. According to Bolton (1997) young children are more at risk for contracting food borne illness because they have not yet built adequate immune system (the body's defense system against illness) to deal with some diseases. Normally, pathogens are not present in foods, therefore the contamination of food must come from contact with faecal material or micro-organisms delivered by contact with contaminated hands, cooking surfaces and utensils, soil on the ground, or improperly cleaned dishes and cutlery.

2.13.2 Keeping Food Safe in Storage

Every establishment needs to store food and supplies. How and where they are stored affects food quality and safety. When foods are stored improperly and not used in a timely manner, quality and safety will suffer. Poor storage practices can cause food to spoil quickly, with potentially serious results (National Restaurant Association Educational Foundation, 1999).

Kotschevar (1994) posits that every facility has a wide variety of products that needs to be stored. Some he said may be stored for a few hours and others may be in storage for several weeks. He therefore gave a few general rules that can be applied to most storage situations.

i. Use the first in, first out FIFO method.
ii. Keep potentially hazardous foods out of the temperature danger zone of (5c to 60c).
iii. Check temperatures of stored food and storage area.
iv. All foods should be tightly wrapped in clean and moisture proof materials
v. Keep all storage areas clean and dry.
vi. Store foods only in areas designed for them.

According to Bendall (1998) all foods should be stored in clean, covered food containers with clearly marked labels. Uncovered foods can absorb odours from other foods. Leaving food uncovered can also cause cross contamination.

Longree (1996) opines that storerooms for dry foods should be clean and dry. Dry foods have a long shelve life if held in the right conditions. Moisture and heat are the biggest problems of the store room. Dry foods should be stored at least six inches off the floor away from walls and out of direct sunlight. Foods should be stored on shelves in their original packages whenever possible. Store rooms should be well ventilated.

2.13.3 Perpetual Availability of Food Products

School feeding as it is practiced in Ghana refers to the provision of one hot nutritious meal at school during the school day to primary pupils. (Government of Ghana, 2006). The school feeding programme is aimed at increasing school enrolment. Earlier studies attest to the fact that poor parents who cannot provide food for their wards while they are in school do not go to the extent of enrolling them. Even those parents who manage to enroll their children in schools, find it thorny to ensure that their wards attend and remain in school every day till the school closes. In this regard, they cannot provide food for their children in school every day throughout the term (Tan, Lane, & Lassibille, 1999). One of the cardinal principle of the GSFP is to motivate parents to enroll their children in school and to see that they attend school regularly (GSFP, 2010). In light of this, pupils' enrolment in schools with the GSFP has seen an increase as well as attendance and retention as this is supported by literature on school feeding programmes in various countries and contexts, including Ghana (Department for International Development, 2008).

2.13.4 Hygiene and the School Feeding Programme

Hygiene is a set of practices performed for the preservation of health (WHO, 2012). According to Kauffman, Fewtrell, Kay, Enanoria, Hallen and Colford (2005), what is considered hygienic or not can vary between different cultures, genders and ethnic groups. Hygiene has so many components and for the sake of this paper personal hygiene, food hygiene and environmental/kitchen hygiene shall be discussed.

2.13.5 Personal Hygiene

Personal hygiene involves those practices performed by an individual to care for one's bodily health and well-being, through cleanliness. Practices that are generally considered proper hygiene include bathing regularly, washing of hands regularly and especially before handling food, keeping hair short and covering it while cooking wearing aprons, underwear, wearing clean clothes, brushing one's teeth, cutting fingernails covering one's mouth when coughing.

According to WHO (2008), about 2million people die every year due to diarrheal diseases, most of them being children less than 5years of age. The most affected are the populations in developing countries, living in extreme conditions of poverty. Providing access to sufficient quantities of safe water, the provision of facilities for a sanitary disposal of excreta, and introducing sound hygiene behaviors are of capital importance to reduce the burden of disease caused by those risk factors.

Research shows that, if widely practiced, hand washing with soap could reduce diarrhea by almost fifty percent (Curtis & Caimcross, 2003) and respiratory infections by nearly twenty-five percent (Jefferson, Flolee & Del Mac, 2007) hand washing with soap also reduces the incidence of skin disease (Nath, 2005) eye infections like trachoma and intestinal worms.

Hoddinott and Yohannes (2002) are of the view that a person handling food should be clean, and clothed in fresh apparel. Hair should be pulled back from the face, and from the food being prepared. In the past, it was required that a food server either wear a hat, or a hair net. Smoking, or chewing tobacco or gum is prohibited, as saliva carries bacteria and viruses that can easily be transmitted to food (Grantham-McGregor *et al.,* 2011).

2.13.6 Food Hygiene

Food hygiene is concerned with the hygiene practices that prevent food from poisoning. According to WHO (2012) there are five key principles of food hygiene:

i. Prevent contaminating food with pathogens spreading from people, pets and pests.
ii. Separate raw and cooked foods to prevent contaminating the cooked foods.
iii. Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.
iv. Store food at the proper temperature.
v. Use safe water and raw materials.

FAO (2008), posits that there are so many ways to put others at risk, when handling food. Recent statistics in some states, have confirmed that over half of food borne illnesses can be traced directly back to food handlers and improper hygiene. If a few simple rules are followed, then food safety will not be a problem. One outbreak of food borne illness can ruin the reputation of a restaurant or cafe, as well as make many people severely ill (Martorell *et. al.,* 1994).

According to Victora, Huicho, Amaral, Armstrong-Schellenberg, Manzi and Mason, (2006), failure on the part of food servers to wash their hands (or to wash them properly) is one of the biggest threats to consumers. There is so much contamination that can occur in a kitchen, such as improperly handling raw foods, and then handling cooked foods without sanitizing the hands or utensils. World Food

Programme (2007) posits that an exposed sore or wound that harbors bacteria. Handling of ready to eat foods with bare hands can also present a danger. It is wise to wear food server disposable gloves, whenever possible. However, gloves are not a substitute for hand washing, and it is imperative to change your gloves, if you have in any way contaminated them. Ehiri, Azubuike, Ubbaonu, Anyanwu, Ibe, and Ogbonna, (2007) is of the view that handling food increases the risk of contamination; 14-79% of mother's hands in developing countries have been shown to be contaminated with faecal bacteria. Utensils (bowls, cups and spoons) have been found to have very high levels of bacterial in village settings. Water can become contaminated by contaminated hands (Ehiri *et al*., 2007).

Hoddinott and Yohannes (2002) outlines that instances where hand washing is so vital include: after using the restroom, after handling garbage, after taking a break, after touching dirty dishes, after using cleaners or chemicals, after smoking, drinking, or eating, and after coughing, sneezing, or blowing your nose. Again, food should never be prepared by someone who is experiencing nausea, vomiting, diarrhea, or other communicable diseases. Cooks or servers with a fever jaundice, or food borne illness should also not report to work. Kitchen workers or servers, with certain serious illnesses, may be required to be cleared by a physician, before returning to work.

Guidelines for proper hand washing (2011) state that the water should be hot (at or above 110 $^{\circ}$C), and soap should be used. Lather and scrub hands (both front, back, and wrists) for a minimum of 20 seconds (Very few people actually wash their hands long enough to kill all germs). Food service kitchens are required to have a separate hand washing sink, to prevent food contamination. Longree, (1996) is also of the view that hand washing stations (a sink set aside for hand washing only, never used for cleaning chemicals or for washing food or utensils) should be set aside.

2.13.7 Kitchen and environmental hygiene

Kitchen hygiene practices can reduce contamination of food and the transmission of disease. Bundy, Burbano, Grosh, Gelli, Jukes and Drake (2009) posits that the concentration of bacteria found in contaminated food is much higher than in water. The level of contamination of cooked food depends on the time between preparation and consumption, as bacteria can replicate rapidly in ambient temperatures. If cooked food is eaten within one hour of being prepared, it should be safe. According to Bukenya and Nkwolo (1991), foods cooked in the morning for reheating at night may therefore be heavily contaminated with bacteria. Food must be reheated to above 60 $^{\circ}$C in order to be safe to eat.

According to Bundy *et. al*. (2009), animal faeces have been shown to harbor a number of organisms that may also be infective to humans. Animal dung in the environment also encourages fly proliferation. There are studies in developing countries that have shown an association between animal faeces and diarrhea. For example, Bukenya and Nkwolo (1991) found that children in houses which kept pigs had 69% greater diarrhea incidence than houses without. This problem can be mitigated by keeping animals out of the food preparation area and by using tables for preparation and cooking rather than working and eating on the ground.

In situations of poverty and adverse environmental conditions, sustainable strategies for preventing diarrhea associated with contaminated foods may involve developing a protocol that permits the production of safe food in unsafe environments. Though a polluted environment poses many hazards for children's food, the hygienic quality of prepared food can be assured if basic food safety principles are observed (Ehiri *et. al*., 2007).

According to Bundy *et al*. (2009), a clean restroom also signals good kitchen hygiene to consumers. According to a 2011 survey commissioned by SCA, more than

76 percent of adults agree that restroom cleanliness is an indication of the hygiene standard of the restaurant and its kitchen since there are deadly diseases that are spread through cross contamination of food, poor personal hygiene and unhygienic methods of handling food products. This indicates that proper kitchen hygiene can help to protect families from contracting these deadly diseases. It all starts in the home.

2.14 Effect of Malnutrition on Pupils' Performance

Good nutrition is essential throughout life for good health and development and therefore an inadequate access to this may result in malnutrition. Malnutrition continues to be a worldwide problem and plays an important role in the health and welfare of individuals. It may result in morbidity, poor academic performance and fewer opportunities for economic development (Wardlaw & Kessel, 2002).

Malnutrition, according to Wardlaw and Kessel (2002), can be defined as the insufficient, excessive or imbalanced consumption of nutrients. Malnutrition is a broad term which refers to both under nutrition and over nutrition. Individuals are malnourished or suffer from under nutrition if their diet does not provide them with adequate calories and protein for maintenance and growth or they cannot fully utilize the food they eat due to illness.

According to the FAO of the United Nations (2005), there were about 850 million people worldwide who were malnourished between 1999 and 2005 and the worst affected were children. In Africa, the problem of child malnutrition is more prevalent than elsewhere in the world as more than half malnutrition-related deaths occur in sub-Saharan Africa (Neumann, 1999). Children who are severely malnourished typically experience slow behavioural development even mental retardation may occur. Even when treated, under nutrition may have long-term effects

in children with impairments in mental function and digestive problems persisting; in some cases for the rest of their lives (WHO, 2012) adds that malnutrition during childhood usually results in worse health and lower educational achievement during adulthood. Malnourished children tend to become adults who have smaller babies. The Ghana Demographic Health Survey (1998) indicates that the major nutritional challenges in Ghana among children of school-going age are protein-energy malnutrition and micro-nutrient deficiencies. The report further established that the incidence of stunting, underweight and wasting among children of school-going age were 26%, 25% and 10% respectively.

The Ghana Demographic Health Survey (2003) also reported that 30% of children of school-going age were stunted and 11% were severely stunted. Malnutrition in children is known to adversely affect their cognitive and mental development. Therefore, access to good nutrition, both at home and through the educational system, is essential and would contribute to the elimination of malnutrition and all its associated health and developmental problems (Ohene-Afoakwa, 2003).

Hunger and malnutrition among children in developing countries continue to impair health, quality of life, and survival (WHO & FAO, 2004). It is estimated that a child dies every six seconds from hunger related causes and one out of four children in developing countries are underweight (Latham, 1997). School-age children are particularly vulnerable to under nutrition as the priority in nutrition interventions is often to prevent malnutrition during fetal development and the first years of life – the most critical period for growth and development. However, school feeding offers an excellent opportunity for targeted intervention in this age group, both as a means for enhancing nutrition and improving school attendance and educational outcomes.

Progress toward these ends is directly in line with Millennium Development Goals 1 and 2: To halve the proportion of people who suffer from hunger around the world, and to ensure that all children are able to complete a full course of primary school (Honere, Falciglia, Couch, & Lavin, 2007).

Lack of proper nutrition caused by not having enough to eat, not eating enough of the right things or being unable to use the food that one does eat represents both a cause and consequence of poor human health, development, and achievement across the lifespan (Vermiglio *et al*., 1990). According to WHO (2012), under nutrition is the greatest single threat to global public health. It is commonly reflected in a high prevalence of wasting, stunting, and micronutrient deficiency. Stunting, or low height for age, is a physical indicator of chronic or long-term malnutrition, whereas wasting or underweight (low weight for age) is an indicator of both chronic and acute malnutrition (Kristiansen *et al.,* 2007).

Both are widespread in school-age children in developing countries. Perhaps most common, however, are less apparent, "hidden" forms of undernourishment with respect to energy, protein, and micronutrient deficiencies that can adversely affect child growth, development, life quality, resistance to infection, and chances of survival (Latham, 1997). Micronutrient deficiencies affect nearly two billion people worldwide. Deficiencies of iron, vitamin A, iodine, and zinc among children are the most devastating in terms of impaired development and mortality. Iron deficiency, the most common form of micronutrient deficiency in school-age children, is caused by inadequate diet and infection, particularly hookworm and malaria (Honere, Falciglia, Couch & 2007). More than half the school-age children in low-income countries are estimated to suffer from iron deficiency anemia. To Martorell (1995), iron deficiency impedes cognitive development and evidence suggests that children with iron

deficiency perform worse on educational tests and are less likely to attend school. Iodine deficiency affects an estimated 60 million school-age children in the developing world, and is also associated with lower test scores and cognitive abilities. Studies of iodine deficiency indicate that between 35 and 70 percent of school children in developing countries may be iodine deficient (Grillenberger, Neumann, Murphy, Bwibo, van't Veer and Hautvast, 2003).

Recent data also suggests that vitamin A deficiency is a major public health problem, affecting an estimated 85 million school age children (Katz, 1999). This deficiency impairs immune function and increases the risk of dying from diarrhea, malaria, and measles. It is also the leading cause of child blindness in developing countries. Finally, zinc deficiency contributes to growth failure and weakened immunity in young children and results in some 800,000 child deaths per year (Walingo & Musamali, 2008).

The Ghana School Feeding Programme was launched in 2005 with the goal of contributing to poverty reduction and increasing food security in Ghana. The three objectives of the programme: are to (1) reduce hunger and malnutrition by providing all primary and kindergarten pupils in beneficiary schools a nutritious meal each school day (2) increase school enrollment, attendance and retention; and (3) boost domestic food production by sourcing GSFP meals locally, providing a sustainable market for local food producers in the community (GSFP, 2012). These objectives align closely with United Nations' Millennium Developmental Goals surrounding hunger, poverty and primary education. The key actors in the implementation of the GSFP are Government of Ghana and the Dutch Government, which is co-funding the project. The technical partners include USAID, the Adventist Development and Relief Agency (GSFP, 2010).

In an effort to boost enrollment rates and ensure that school-age children are well fed, the Government of Ghana initiated two types of feeding programme: 1) take home rations for girls in schools in deprived communities in three Northern regions; and 2) provision of one hot meal per school day to primary-school children using locally-grown food products (Lagarde, Blanc & Mckena, 2008). The later branch of the programme originally provided lunches to over 975 primary schools and over 400,000 pupils. It was projected that by 2010 the programme would serve 2,900 schools and approximately 1.04 million primary school children. Other estimates show that the programme covered 656,000 pupils or about 22% of all pupils in public schools across the country (GNA, 2009). Seventy-five percent of primary school age children in Ghana attend school though this number fluctuates dramatically by region (UNICEF, 2010). There is a continuous decline in enrollment at the junior high and secondary level especially among the poorest of the poor (WFP, 2007). A television report (17/11/2015) shows that Ex-President J. A Kuffour expressed misgivings about the school feeding programme. He stated that the objective of introducing the school feeding programme is not being achieved.

The take home ration component of the programme was piloted as part of a New Partnership for Africa's Development NEPAD and WFP Home-Grown School Feeding and Health Programme. This programme was designed to link to school feeding to agricultural development through the purchase and provision of domestically grown food products from local farmers and encouraging higher rates of school enrollment, attendance and retention for girls in particular (Bundy, 2009). Locally produced food were also used in some districts for the school lunch programme though the WFP provided fortified food rations (composed of 150grams of fortified corn-soy blend, 3grams of iodized salt and 10grams of palm oil per child

per day) to children to complement the nutritional value and type of foods produced locally (WFP, 2007).

An initial analysis of the average cost of take-home rations indicated that rationing came at a higher cost compared with other modalities of school feeding (Gelli *et al.,* 2012). However, the costs were due mostly to the larger volumes of food distributed per child; take-home rations delivered twice the amount of food per child as compared to on-site meals alone (Gelli *et al.,* 2012). This ration programme for girls which began in 1999 contributed to attainment of gender parity in Ghana's three northern regions and it gradually phased out and was replaced with the national school feeding programme (WFP, 2010).

Ghana, like most African countries, used a decentralized approach relying heavily on local structures to implement school feeding programmes (Bundy, 2007). Although it was rolled out nationwide under high level of political leadership, Ghana's SFP varied at the regional, district and school levels in structure, how food was obtained menu development, and meal preparation (Bundy, 2007). In most regions in Ghana resources were channeled to a School Implementation Committee (SIC), which was responsible for buying, storing and preparing the food (Netherlands Development Organisation, 2007). The SIC was to receive resources from the District Implementation Committee (DIC) to procure necessary supplies. DIC's were set up by the District Assemblies, which were responsible for ensuring that DICs and SICs were established and that the necessary infrastructure was in place to mobilize communities to provide needed inputs to schools in the programme. At the regional level, the Regional Coordination Offices and the Regional Coordinating Council were assigned to oversee district levels operations and provided regional leadership (NDO, 2007).

A review of the school feeding programme in some regions in Ghana published by the Netherlands Development Organisation (NDO) (2007), revealed that regional/ district school partnerships and organisation mechanisms were limited, and many schools lacked a functional school implementation committee (NDO, 2007). Hence, a number of schools reported problems in the regularity of food and supplies. The findings were based on a large-scale school-level inventories and exposed irregularities in coverage and implementation, structural deficits, and financial deregulation's throughout the GSFP (NDO, 2007).

Additional school feeding challenges in Ghana included in the report were (NDO, 2007):

i. Lack of kitchens, storage, and dining halls, in GSFP schools
ii. Insufficient supply of food to schools creating inadequate/ irregular food portions.
iii. Lack of sanitation facilities and regular safe water (a large proportion of schools are still without poly tanks).
iv. Inadequate resources for students, following influx of attendees in response to school feeding programme.
v. Varying degrees of linkage to local farmers/ local food supply for food procurement.
vi. Difficulties in monitoring cooking done outside the school
vii. Lack of transparency in records of food supply and payment procedures.
viii. Pupils not receiving daily meals, lack of communication with parents.
ix. Cooks paid irregularly.
x. Low community involvement.
xi. High regional disparity in the allocation of beneficiary schools.
xii. Lack of preparedness of most districts to pre-finance supplies.
xiii. Increasing school enrolment without commensurate increase in food supply, number of classrooms and teachers.

GSFP (2012) and GNA (2009) reported that based on the findings of the inventory and reported mismanagement of funds, in 2007, the Dutch Government chose to suspend its financial support of the programme. However, financial support was reinstated in late 2009 following implementation of recommendations and managerial restructuring (GSFP, 2012). This vote of confidence, along with renewed commitment from the government of Ghana to establish GSFP as a permanent national programme indicated advancement in the right direction for the success of school feeding in Ghana. At a February, 2010 Parliament workshop, the then Minister of Local Government and Rural Development - Joseph Yiele Chireh, also expressed the need to explore alternative sources of funding for the programme to enhance its sustainability should donor funding come to an end (GSFP, 2012).

The GSFP continued to rely on financial and technical support from the government and from development partners. Additional partnerships between the GSFP and the Ministry of Agriculture will be necessary to ensure that local products are purchased for use within beneficiary schools. While the GSFP initiative has led to an increase in enrollment and attendance especially in poor and rural districts, this increases the likelihood that educational quality will be compromised if the number of students exceeds available resources (teachers, desks, textbooks, etc.). Indeed in the 2006/2007 academic school year national enrolment increased by 21% (WFP, 2010). Attention should be drawn not only to consistent nutritious food provisions and nutritional standards, but also to learning and educational conditions within beneficiary schools.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter describes the materials and method used in the study. The method was organized under the following headings: study design, study area, population, sample size and sampling techniques, instrumentation, data collection and analysis, quality assurance mechanism, assumptions and dissemination of results, and ethical consideration.

3.1 Study area

The study took place in two capital towns in central and Upper West regions of Ghana. The towns were Cape Coast and Wa.

3.1.1 Profile of Cape Coast metropolis

The total population of Cape Coast Metropolis is 118,106 out of which 57,365 are males and 60,741 females. Farmers and fishermen form about 60% of the population (Ghana Statistical Service, 2000). Active agricultural population is approximately 18,000. Commercial farmers are approximately 0.3% and peasants (majority) approximately 99.7%. Cape Coast Metropolis is bounded on the East by Abura-Asebu-Kwamankese District, West by Komenda-Edina-Eguafo-Abrem (K. E. E. A.) district and South by the Gulf of Guinea and North by Twifo Heman Lower Denkyria District. There are 84 communities and the inhabitants are mainly Fantes. The people are of different educational backgrounds from illiterates to degree holders who are involved in occupations such as trading, artisanship, farming, teaching, health services, fishing, transport, government employment, construction, financing, tourism and ministration. The metropolis has one regional referral and teaching hospital, one district hospital and one university hospital. Schools include 9 public second cycle institution, 3 private second cycle institution. There are about 120 junior high schools,

primary schools and pre-schools belonging to both public and private sectors. There are 14 schools under the school feeding programme in the metropolis out of which 8 schools were chosen for the study. Each school had an average of 300 students. A major market is located in the Cape Coast Township with market days throughout the week. Smaller markets exist in most communities e.g. Abura and Efutu. Transportation is mainly by buses, trucks and cars (taxi) and head portage. Within farming communities (house to farm), it is mainly by head portage.

3.1.2 Profile of Wa Municipality

Wa is the capital of the Upper West Region of Ghana located in the northwestern corner of the country and is boarded by Burkina Faso to the north and Ivory Coast to the west. Neighbouring towns include Nandom, Daffiema, Jirapa, Kaleo, Nadowli, Lawra and Tumu.

According to the 2010 Population and Housing Census (PHC), the Wa Municipality has a total population of 98,675 (Ghana Statistical Service). Wa town alone has a population size of 66,441. The growth rate of the Municipality varies between 2.7% for rural and 4% for the urban. In the year 2006 the municipality population was estimated to be 119,387 (male: 57,985/female: 61,402), a percentage change of 20.9%. Currently, the total population of the municipal stands at 127,284 (male: 61,826/female: 65,458). The increasing population has its associate development implication in the areas of housing, education and health facilities, environmental sanitation, and water supply. The major economic activity of the region is agriculture. Crops grown include corn, millet, groundnut, soya beans okro, shea butter and rice. The region covers a geographical area of approximately 18,478 square kilometers. Wa metropolis has 68 schools participating in the GSFP out of

which 12 schools were chosen. The average population in a school is about 300 pupils.

3.2 Study design

In this study, the researcher employed descriptive and survey designs. This approach is termed the mixed method which, according to Johnson and Onwuegbuzie (2004), involves collection and analysis of numerical and narrative data to address research question(s) defined for a particular research study that otherwise could not be fully answered with either quantitative or qualitative designs. In method, both quantitative and qualitative research approaches complement each other to fully answer a complex question (Williams, 2007). Descriptive (observational) and cross sectional surveys were adopted to identify the existence and extent of disparity that might be in the GSFP in the Wa and Cape Coast metropolitan schools.

3.3 Study population

In this study the target population included all male and female head teachers, teachers, pupils and kitchen staffs found within schools benefitting from GSFP in the Wa Municipality and Cape Coast Metropolis. The researcher considered them as valuable source of information because they were capable of bringing out the needed information. The choice of head teachers, teachers, pupils and kitchen staffs therefore enabled generation of first-hand information on nutritional adequacy on meals served under the GSFP.

3.4 Sample Size

A total of seven hundred and twenty respondents participated in the study. This sample size was computed by Graph pad Prism Version 16, statistical software. It used the following parameters: standard normal variance (at 5% type 1 error ($P < 0.05$) it is 1.96% and at 1% type 1 error ($P < 0.01$) it is 95%±2.58 confidence interval.

As majority of studies *P* values are considered significant below 0.05 hence 1.96 was used by the software.

Table 6. Breakdown of the sample size

Categories of Respondents	Number of Respondents
Pupils	600
Head teachers and Teachers	60
Kitchen Staff	60
Total	**720**

3.5 Sampling Techniques

Non-probability Sampling Technique

Non-probability sampling established a certain criterion devoid of randomness for selecting the sample. In this sampling technique, samples are selected in a process that does not give all the individuals in the population equal chances of being selected. In the use of non-probability sampling technique, purposive sampling technique was used. Purposive sampling was used to identify public schools benefitting from GSFP. All schools under the GSFP in Wa and Cape Coast municipal schools were chosen. Schools in Wa were 68 and schools in Cape Coast were 14. The information was obtained from the district offices. For the selection of the teachers and head teachers, the researcher had limited control. For instance, the Head teachers of the participating schools were all automatic selectees since there was only one Head teacher per school. Besides that there was one teacher in charge of the SFP at each school who was automatically selected. The rest of the teachers for the study were chosen by the Head teachers. In Wa about half of the number of the schools' class five and six teachers were also automatically selected. This was because their pupils were participants in the study.

Probability Sampling Techniques

This method is based on the fact that the respondents chosen are representative of cross-section of teachers, pupils, and kitchen staffs in Cape Coast and in Wa community schools benefitting from GSFP. That means, every teacher, pupil, and kitchen staffs in the schools under GSFP have a nonzero probability (equal chance) of being included in the sample. The researcher used simple random sampling method to select 12 schools out of 68 which were under the SFP from Wa. The procedure was repeated in Cape Coast to select the 8 out of 14 schools. They were selected in a process where a list of all the various schools was written and numbers assigned to the schools. The numbers were therefore written on a sheet of paper and put into a container and mixed thoroughly by shaking the container. The researcher selected from the container without replacement.

For the selection of the pupils for the study, the class registers were used. In each class, the third consecutive name on the register was selected. This method was applied in seven schools in Wa and three schools in Cape Coast. In other cases where the class registers were not immediately available, the pupils were systematically random sampled. Pupils who bore the same numbers were put in the same group for study. In all cases, 30 pupils were selected from classes five and six from each school, whereby 15 came from each class. The upper primary were chosen specifically because they could read and write and understand better when questionnaire is explained to them, they also had a higher sense of reasoning and because they could work without much assistance. The container for pupils, teachers and kitchen staffs were different and labeled as such.

3.6 Instrumentation

Instrumentation involves the data-collection tools used for the study and how these tools were used to achieve the research objectives. In this study, all those processes used to collect data are fully explained. Here, structured questionnaires, unstructured observational guide were the data gathering instruments employed. The observational guide was non-interventional in nature to ascertain the existence of problems with the GSFP. The questionnaire was explained to some of the kitchen staff who could not read or write and researcher ticked on their behalf.

Questionnaires

A structured questionnaire with open and closed-ended questions was used to obtain information from the respondents. This technique facilitates the collection of both quantitative and qualitative data. The researcher designed three sets of questionnaires which were administered to the head teachers or the teachers, the pupils and the kitchen staff. The questionnaire was divided into five sections, the Demography of respondents, Section A (Nutritional Values), Section B (Purchase and storage of food ingredients), Section C (Hygienic conditions of implementing GSFP), and Section D (Challenges facing the GSFP). Apart from the demography section, each section corresponds to the specific objective in this study.

Section A consists of meals served, food ingredients that were likely to be used in preparing meals for the pupils. Respondents were asked to tick the meals they were served within the week. The section on food ingredients has been divided into animal food and products, legumes nuts and oily seed, fruits and vegetables, cereals and grains, Starchy roots and plantain and fats and oils. Respondents were asked to tick the various food items used in preparing their meals.

Section B consists of where food ingredients were purchased, how they were treated and stored. These questions mainly went to the kitchen staff respondents.

Section C addressed the hygienic conditions of food under the GSFP in the schools. The sub-division under this section includes, who washes their feeding bowls, whether they washed their hand before eating, the regular source of water for cooking their meals, their assessment of the hygienic conditions under which their food was cooked and served.

Section D, which is the last section, looked problems facing the GSFP in the two townships.

Observational guide

An unstructured observational guide was developed to assist the researcher to identify hygiene practices of pupils and kitchen staffs. It also includes the examination of environments under which food ingredients were stored and processed. The observational guide also included items that helped to identify materials and equipment that promote good personal hygiene, food hygiene practices, and environmental hygiene within the various schools selected. Weights of food ingredients used in preparing the meals per day were taken using a Mettle 346L weighing scale. The captured weights of the ingredients were then fed into ESHA Food Nutrient Processor Database software to estimate their nutritional values. This process was repeated on all the various food ingredients used to prepare each meal throughout the week. The weights of the meals served to each pupil in two schools in Wa and Cape Coast were taken with the Mettle 346L weighing scale. This data was then fed into USDA National Nutrient Database for Standard Reference, Release 28 software to establish nutritional values of the meals. This information was then compared to the Food and Agriculture organization Meal Chart to ascertain whether

the meals served to pupils met the weight of food needed to be served to them. For results refer to appendix 5. Using the camera cannon 232, pictures were taken while meals were being prepared, eaten and weighed (refer to Appendix 6). Field notes were taken to enable a detailed log of the development of the study. Field notes are the written account of what the researcher sees, hears, experiences and thinks about in the course of collecting data in a qualitative study (Bogdan & Biklen, 1997).

3.7 Validity and Reliability of Instruments

The validity of an instrument refers to how well an instrument measures a particular concept it is supposed to measure (Whitelaw, 2001). The validity of any research instruments shows clearly the magnitude to which the research instrument measures what it is made to measure (Otieno, 2014). To ensure the validity of the instruments, the study instruments were made available to some senior members of the University of Education, Winneba, colleagues and supervisors of the research work to go through and make suggestions where necessary.

Reliability, according to Bless and Higson-Smith (2000), is concerned with the consistency of an instrument to reproduce a measurement. An instrument is, thus, said to have high reliability if it can be trusted to give an accurate and consistent measurements of an unchanging values. He argued that an instrument must be reliable before it can be valid, implying that the instrument must be consistently reproducible and that once this has been achieved, the instrument can then be scrutinized to assess whether it is what it is purported to be. Reliability of data collection instrument again speaks of the internal consistency of a measuring device (Mugenda, 1999).

To test the reliability of the data collection instruments used in this study, a pilot was carried out in two schools around Winneba with similar features and benefitting from GSFP. These pilot-test respondents did not form part of the final sample used. The data from the pretest questionnaire was analysed using the statistical

package for the Social Sciences (SPSS). The Cronbach's alpha (α) was computed for all the sections to determine the internal consistency coefficient of the instrument. According to Pallant (2007), Cronbach's alpha coefficient is a measure of internal consistency reliability. Such reliability, they continue, is an alternative way of looking at the extent to which items go together. According to Coolican (1999), Cronbach's alpha is probably the most commonly used statistical tool for estimating a test's reliability. The reliability test carried out during the pretest produced Cronbach Alpha values for all the sections to be ≥ 0.75; therefore the research instrument used was considered reliable. According to Pallant (2007), Cronbach Alpha values of > 0.7 imply that the instrument is reliable.

After the pre-tests, debriefing sessions were held with the two research assistants in order to get feedback about the clarity and consistency of concepts, terminologies and questions in the questionnaire. Few questions that we identified to be unclear were adequately adjusted. This pre-testing experience and exposure was helpful in strengthening and improving the data collection process. It has also helped to identify emerging issues and areas that needed further probing.

3.8 Data Collection Procedure

A three member team comprising of a principal researcher and two research assistants, collected data for the study. Prior to the start of the study, the research assistants were given the required orientation to enable them to play their part in the research. In the orientation, the research assistants were made to answer a questionnaire each to ensure that they understood what they were supposed to do. With the observation checklist, the researcher guided on what to look out for on personal hygiene, environmental hygiene, and food hygiene.

The three member team then started with the data collection process. Both male and female respondents were requested to participate. Respondents who met the inclusion criteria and volunteered to participate in the study were given the questionnaires to answer. The team personally presented the questionnaires to the respondents. This is because Ngomi (2008) stated that personal contact with respondents by researcher had been found to have a positive effect on the rate of completed questionnaires that were eventually returned. Each respondent was given a questionnaire and asked to freely express their views in writing without any interference from anyone after explanation of the items on the questionnaire. English, Fante and Waala was used in the respective geographical locations as the medium of communication in the course of administering the questionnaire. The questionnaires were administered in two separate phases. At the onset, the questionnaires were given to head teachers and class teachers because they could read and write clearly. The questionnaire for the pupils and some of the kitchen staff were explained in their local language and they were guided to tick. Face-to-face approach was adopted to explain and make it easier for some of the respondents who could not read and, write and understand the content of the questionnaire easily. The essence of this technique is to have room for the varied backgrounds of respondents that comprised literates, and illiterates. This practice was undertaken for the kitchen staffs and the pupils in a conducive atmosphere devoid of interference.

Seating arrangements were such that closeness between respondents was exclusive. This was done to avoid one individual from being influenced by another. All questionnaires (100%) were retrieved after each session. Points from observation were recorded and documented. Pictures were used to complement the other data collection instruments. Data was collected using a longer time frame.

3.9 Data Analysis

Data cleaning preceded the analysis; this was done using SPSS (version 20.0), Graph Pad Prism (trial version 5), Microsoft Excel 2007; and PAST Statistics/data analysis software. The various nutritional contents of meals were calculated using ESHA Food Nutrient Processor Database (trial version). Both descriptive and inferential statistical tool were used for data analysis. The relevant information retrieved such as nutrient composition of meals, source of acquisition and handling of ingredients used etc. were put in tables. The interpretation of the data was done using frequencies, means, and percentages of the information gathered. The discussion of the results was based on the relevant data retrieved and on the specific objectives.

3.10 Quality Assurance Mechanism

Quality assurance implies a process of tests or filters to ensure that products or services pass a quality threshold (Research Information Network, 2010). The researchers identified some major quality assurance components necessary to adhere to in order to produce a quality work. These are:

- *Preparation*: The research assistants were oriented and trained to understand the nature, purpose and procedures for the study. Training sessions were held for them to make them familiar with research procedures so that standardized interpersonal engagements and research techniques would be employed.
- *Interpretation*: The questions in the questionnaires were translated for those who could not read nor write and their responses were also recorded. This was necessary because some of the kitchen staffs were unable to speak English fluently.
- *Preventing bias*: In order to reduce bias in the study, care was taken in selecting the right sampling method for the research. Purposive and simple random

samplings were selected as a sampling method. Furthermore, care was also taken to avoid bias and giving fair chance to all schools under GSFP in Wa and Cape Coast municipals.

3.11 Assumptions

Ngomi's (2008) Central Limit Theorem states that the sampling distribution of any statistics will be normal or nearly normal if the sample size is large enough or more. Subsequent to this, it was assumed that the sample size of 720 respondents is normal for the study. Thus, information provided by the respondents were assumed to be accurate and a true reflection of the situation in study area.

3.12 Dissemination and Use of Results

After the study, the findings and recommendations drawn from respondents were presented to Ghana Education Service. The results of the study were expected to aid the Ghana Education Service in formulating and devising strategies to address nutritional value and safety of meals served under the GSFP. Finally, a copy was also presented to the Faculty of Science Education of the University of education, Winneba for the award of Master of Philosophy in Home Economics.

3.13 Ethical Considerations

Permission was sought from Ghana Education Service district offices, to conduct the research. Permission was also sought from head teachers in the various schools under GSFP who met the inclusion criteria. Respondents were handed with information on the front page of the questionnaire concerning the study, and they could then choose to participate or not. Respondents were encouraged to exercise the right to pull out from the study if they so desired and no penalties were attached to such withdrawals. Three pupils withdrew when chosen as respondents from various schools and three others voluntarily replaced them.

The research group explained the importance of the study to the respondents, in that it would provide indispensable information which would be used to improve upon GSFP. Their solitude, particularly with regards to their personal lives were respected and their identities kept anonymous. Also the schools that participated in this study were not published. Questionnaire numbers and coding were used instead of names of respondents. This was done to ensure anonymity and confidentiality of information and respondents. Before embarking on this research introductory letter was also sought from the Board of Ethics of the University of Education, Winneba.

CHAPTER FOUR

RESULTS

4.0 Overview

This chapter presents the data and findings based on the specific objectives of the study.

4.1 Demographic data of respondent

Table 7: Sex distribution of pupils

Schools	Wa municipal (N=360) %	Cape Coast Metro Schools (N=360) %
Male	65	56
Female	35	44
Total	100	100

Table 8: Age distribution of Pupils

Age range	Wa Municipal (N=360) %	Cape Coast Metro School (N=240) %
9-10 years	8	11
11-12 years	16	37
13-14 years	26	48
15-16	48	4
17 and above	2	-
Total	**100**	**100**

Demographically, a total of 720 respondents participated in the research, out of which 600 were pupils, 60 were teaching staff and other 60 were kitchen staff. Out of the 600 pupils, 360 were from schools in Wa municipality while 240 were from schools in Cape Coast metropolis. For the teaching staff, 36 were from Wa schools whilst 24 were from Cape Coast schools. And for the kitchen staff, 36 were from Wa schools and 24 from Cape Coast schools.

Of the 360 pupils from Wa schools, 65 percent were males and 35 percent were females. Out of the 360 respondents 48% were between the ages of 15-16 years; and in Cape Coast Metro School 48% were between 13-14 years.

4.2 Research Question 1

What are the nutritional quality of meals served under the GSFP in Wa and Cape Coast municipal schools?

Data collected from the various schools in both Wa Municipality and Cape Coast Metropolis are presented as follows:

4.2.1 Questionnaire Results Meals Served to Pupils under the GSFP

Table 9: Menu prescription observed in Wa municipal Schools.

Days	Monday	Tuesday	Wednesday	Thursday	Friday
Meals	Rice and beans with tomato stew or groundnut soup	Tuo Zaafi with green vegetable soup or dry okro soup	Gari and beans	Banku and groundnut soup	Jollof rice

Table 10: Menu prescription observed in Cape Coast municipal Schools.

Days	Monday	Tuesday	Wednesday	Thursday	Friday
Meals	Rice with tomato stew	Banku with okro soup or groundnut soup	Gari and beans	Gari with palava sauce or tomato stew	Rice and beans with tomato stew or Jollof rice

The menu and hence the meals served to the schools in both Wa and in Cape Coast were about the same *Tables 9* and *10*. According to the tables, the meals served in the various schools in both areas were made with rice, maize, or cassava. The added stews and soups and their contents differed from time to time in each area. Some of the meals served in the Cape Coast Metropolis schools, for instance, included rice and tomato stew, *gari (pinno) or eba* (Nigeria) and palava sauce while

banku and groundnuts soup, *tuo zaafi* and *ayoyo* soup among others were served in the Wa schools. The most common meals served in both schools were gari and beans.

Observation results from respondents in Wa municipal schools

It was observed that the meals served in Wa schools usually contained more green leaves and vegetables. Another observation made was that the schools in Wa Municipality strictly adhered to the menu given by the district office. The caterers prepared the meals in all the schools at the same time and the pupils ate the same meal in all the schools at the same time. The menu that the schools in Wa Municipality followed is shown in *Table 9*.

Observation Results in Cape Coast metro schools

The situation at Cape Coast schools was somewhat different. Although, the schools had been given a menu (Table 10) the menu was not strictly followed. However, by the end of the week all the meals that were on the menu were prepared and served.

4.2.2 Mean Daily Intake of Nutrients in the School Meals

Table 11: Mean daily intake of Nutrients in Meals served for a 5 Day Study in Wa municipal schools.

Nutritional Component (1/3 RNI)	Mean	± S.D.	% RNI	p-Value
Calories kcal (720 kcal)	520.6	30.1	72.22	0.005
Protein g (14 g)	10.2	0.9	72.86	0.000
Carbohydrates g (43 g)	90.6	6.3	166.5	0.002
Vitamins A µg RE (200 µg RE)	726.4	85.2	314.2	0.521
Thiamin mg (0.4 mg)	0.2	0.1	75.0	0.004
Riboflavin mg (0.4 mg)	0.1	0.1	25.0	0.243
Vitamin C mg (13.3 mg)	8.4	0.3	59.4	0.000
Iron mg (5 mg)	4.0	0.4	78.8	0.000
Calcium mg (433.3 mg)	84.6	8.3	19.5	0.000
Zinc mg (3 mg)	1.9	0.2	70.0	0.000

Table 12: Mean Daily Intake of Nutrients in Meals served for a 5 Day Study in Cape Coast metro schools.

Nutritional Component (1/3 RNI)	Mean	± S.D.	% RNI	p-Value
Calories kcal (720 kcal)	440.8	20.1	61.22	0.001
Protein g (14 g)	10.8	0.8	77.14	0.030
Carbohydrates g (43 g)	69.3	5.2	161.2	0.055
Vitamins A µg RE (200 µg RE)	548.2	75.1	274.1	0.147
Thiamin mg (0.4 mg)	0.3	0.2	75.0	0.032
Riboflavin mg (0.4 mg)	0.1	0.2	25.0	0.223
Vitamin C mg (13.3 mg)	6.7	0.4	50.4	0.041
Iron mg (5 mg)	3.3	0.3	78.8	0.140
Calcium mg (433.3 mg)	92.8	9.4	22.3	0.90
Zinc mg (3 mg)	2.3	0.3	76.7	0.000

Tables 11 and *12* present the mean daily energy and nutritional value of intakes determined in 5 day studies of ingredient per meal served to pupils in both Wa and in Cape Coast schools in regards to the nutritional quality of the meals served in both places. The resulting nutritional value was compared with one third of the Recommended Nutrient Intake (RNI) value (WHO, 2014), in brackets in the first column. The determined daily nutritional value over the 5 day study period results were obtained using Food Nutrient Processor Database software from ESHA and database of NutritionalValue.org.

4.2.3 Mean Weights of Meals Measured

Table 13: Mean Weights of meals measured in schools in Wa and Cape Coast municipals.

	Gari balls and tomatoes stew	Gari And Beans	Rice and tomatoes stew	Rice and beans with tomatoes stew	Banku and okro soup	Banku and groundnut soup	Rice with palava sauce	Jollof Rice	Tuo Zaafi with green vegetable soup
	FAO Standard								
Schools	**400 g**	**310 g**	**550 g**	**450 g**	**650 g**	**650 g**	**600 g**	**450 g**	**700 g**
meals at Wa 1	NA	210	193	192.5	NA	342	NA	195	400
meals at Wa 2	NA	217	191	190.5	NA	347	NA	201	392
meals at Cape Coast 1	178	184	179	NA	202	NA	188	NA	NA
meals at Cape Coast 2	180	186	199	NA	199	NA	186	NA	NA

Table 13 reveals the mean weights of meals served in two schools in both Wa and Cape Coast. For the sake of anonymity the schools were given numbers 1 and 2. The results revealed that the meals were consistently below the FAO standards.

4.3 Research Question 2

What are the identifiable conditions under which food ingredients were acquired and stored under the GSFP in Wa and Cape Coast schools?

Answering research question 2, both qualitative and quantitative data on conditions under which food ingredients were acquired and stored were collected through closed and open ended type questionnaires. Analyzing the data with GraphPad 5.0 and SPSS 16.0, the results were presented in percentages as follows:

4.3.1 Questionnaire Results Sources of Food Ingredients

Table 14: Sources of procurement of ingredients used in meal preparation from kitchen staff's point of view

Sources ingredients	Wa		Cape Coast	
	Yes (%)	No (%)	Yes (%)	No (%)
Open Market places	97.22	2.73	100	0
Local farmers	2.73	97.22	0	100
Total	**100**	**100**	**100**	**100**

Table 14 above indicates the sources where ingredients were obtained for meal preparation for GSFP in Wa and Cape Coast schools. *Table 14* revealed from the kitchen staff that the ingredients were obtained mostly from open Market places and from local farmers in both Wa and Cape Coast. In Wa 97% of the staff indicated that they procured their food ingredients from the open Market while 3% were purchased from the local farmers.

Observation Results on sources of food ingredients.

It was observed that some of the caterers bought some ingredients from hawkers who found their ways to the school compounds. An interview with some caterers in both Wa and Cape Coast municipal schools revealed that the farmers

increased the prices of their goods if they knew they were caterers from GSFP. Caterers alleged that the farmers thought the government had given out huge sums of monies to the caterers for the purchases and thus could afford more expensive food stuffs. Hence the farmers increased their prices. Again, an interview with some of the Head Teachers at two schools at Wa also revealed that the government sometimes supplied the caterers with local rice, canned tomatoes, cooking oils, and iodated salts on credit basis, payable within 3 months period.

4.3.2 Questionnaire Results on Types of Animal Food Products Used in Meal preparation

Table 15: Animal and animal products used to prepare meals for school children in Wa

Animal food and product	Respondents					
	Pupils (N=360)		Teachers (N=36)		Kitchen staff (N=36)	
	Yes %	No %	Yes %	No %	Yes %	No %
Beef	0.00	100	0.00	100	0.00	100
Fish	100	0.00	100	0.00	100	0.00
Eggs	0.00	100	0.00	100	0.00	100
Chicken	0.00	100	0.00	100	0.00	100
Others	1.00	99.0	NA	NA	NA	NA

Table 16: Animal and animal products used to prepare meals for school children in Cape Coast

Animal food and product	Respondents					
	Pupils (N=360)		Teachers (N=36)		Kitchen staff (N=36)	
	Yes %	No %	Yes %	No %	Yes %	No %
Beef	1.93	98.07	0.00	100	0.00	100
Fish	100	0.00	100	0.00	100	0.00
Eggs	0.00	100	0.00	100	0.00	100
Chicken	24.7	75.3	12.6	87.4	0.00	100
Others	1.10	98.9	NA	NA	NA	NA

The responses to the type of animal food products that the pupils, teachers, and kitchen staff identified to be used to prepare meals in Wa and Cape Coast schools are shown in *Tables 15* and *16*. In both Wa and Cape Coast schools 100% of the pupils, teachers, and Kitchen staff stated that fish was used in preparing meals. The

pupils in Wa however, complained that they could not find any fish in the food, although the fish was not powdered. The schools in both Wa and in Cape Coast indicated that beef and eggs were not served to them at all, except during the last day of vacation termed "Our Day" on that day Cape Coast schools had chicken not beef in their meals. And the size was as small as palm kernel. Eighty percent (80%) of the teachers and 100% of the kitchen staff also admitted that the sizes of the fish served them were woefully inadequate.

Observation Results on Types of Animal Food Products Used in Meal preparation

From the perspective of the caterers, when an ingredient was scarce for any reason either an alternative ingredient was used or none at all. An interview with a caterer in Cape Coast revealed that sometimes processed meat like sausages were used to cook for the pupils instead of fish. In Wa, powdered dry leaves were used instead of fresh leaves.

4.3.3 Questionnaire Results Forms of Legumes and Nuts used for Meal Preparation

Table 17: Forms of legumes and nuts used for meal preparation in Wa municipal schools.

Legume and Nuts	Respondents					
	Pupils (N=360)		Teachers (N=36)		Kitchen staff (N=36)	
	Yes %	No %	Yes %	No %	Yes %	No %
Beans	100	0	100	0	100	0
Groundnuts	100	0	100	0	100	0
Agushie	0.83	99.17	16.67	83.33	8.33	91.64
Soyabeans	0.56	99.44	27.78	72.22	33.33	66.67
Dawadawa	99.4	0.6	94.44	5.56	100	0
Palm fruit	0	100	8.33	91.67	8.33	91.67

Table 18: Forms of legumes and nuts used for meal preparation in Cape Coast metro schools.

Legume and Nuts	Respondents					
	Pupils (N=240)		Teachers (N=24)		Kitchen staff (N=24)	
	Yes %	No %	Yes %	No %	Yes %	No %
Beans	100	0.00	100	0.00	100	0.00
Groundnuts	95.8	4.2	91.7	8.3	100	0.00
Agushie	52.5	47.5	62.5	37.5	50.0	50.0
Soyabeans	2.5	97.5	25.0	75	83.3	80
Dawadawa	2.5	97.5	8.3	71.7	12.5	80
Palm fruit	4.2	95.8	8.3	91.7	25.0	75.0

In *Tables 17* and *18* the major types of legumes and nuts used for meal preparations were beans and groundnuts. The respondents from Wa schools revealed that *dawadawa* was used in the meals for them. Soya bean was the least used legume, according to the pupils. However, the teachers in Wa claimed that palm fruit was the least used ingredient followed by Agushie. The claim was supported by the kitchen staff. At Cape Coast all the respondents stated that beans were the most used ingredient for meal preparations. And for the agushie usage there was a split decision on it among the caterers and the pupils. The least used ingredients were soyabeans and *dawadawa* according to the pupils and teachers but 83.3% kitchen staff claimed that they used soyabeans.

Observation Results

The researcher observed four caterers in Wa using soya beans in the form of roasted milled soya bean powder. The roasted soya beans powder was mixed with groundnut paste to prepare soup. In Cape Coast, the researcher again observed two caterers who soaked soya beans overnight and milled them into paste and used it to substitute Agushie to prepare palava sauce.

4.3.4 Questionnaire Results on Forms of Cereals and Grains used for Meal Preparation

Table 19: Forms of cereals and grains used for meal preparation in Wa municipal school.

Cereals & Grains	Respondents					
	Pupils (N=360)		Teachers (N=36)		Kitchen staff (N=36)	
	Yes %	No %	Yes %	No %	Yes %	No %
Maize	99.6	0.4	100	0	100	0
Rice	99.0	1	100	0	100	0
Millet	0.56	99.44	11.11	88.89	5.55	94.45
Sorghum	0	100	11.11	88.89	5.55	94.45

Table 20: Forms of cereals and grains used for meal preparation in Cape Coast metro schools

Cereals & Grains	Respondents					
	Pupils (N=240)		Teachers (N=24)		Kitchen staff (N=24)	
	Yes %	No %	Yes %	No %	Yes %	No %
Maize	91.7	8.3	100	100	100	0
Rice	100	0	100	0	100	0
Millet	0.56	99.44	0	100	0	100
Sorghum	0	100	0	100	0	100

Tables 19 and 20 show the grains and cereals used in the meals in both Wa and in Cape Coast. From these Tables all the respondents agreed that maize and rice were the most used grains and the least used were millet and sorghum. Less than 12% of the respondents also indicated that sorghum or millet was ever used in Wa while in Cape Coast less than 1% revealed that millet or sorghum were ever used. The most used cereals and grains were rice and maize.

4.3.5 Type of Vegetables used to Prepare Food for Pupils

Table 21: Fruits and Vegetables Used To Prepare Foods for Pupils in Wa municipal schools.

	Respondents					
	Pupils (N=360)		Teachers (N=36)		Kitchen Staff (N=36)	
Fruits And Vegetables	Yes %	No %	Yes %	No %	Yes %	No %
Banana	1.1	98.9	0.00	100	0.00	100
Mango	0.1	99.9	0.00	100	0.00	100
Leaves	100	100	83.33	16.67	100	0.00
Okro	89	11	100	0.00	100	0.00
Garden eggs	1.67	98.33	27.78	62.22	5.56	94.44
Tomatoes	98.61	1.39	100	0.00	100	0.00
Pepper	99.72	0.28	100	0.00	100	0.00
Onion	95.56	4.44	100	0.00	100	0.00
Cabbage	0.56	99.44	6.7	93.3	16.7	83.3
Carrot	0.27	99.73	0.00	100	6.7	93.3

Table 22: Fruits and Vegetables Used To Prepare Foods for Pupils in Cape Coast metro schools.

	Respondents					
	Pupils (N=240)		Teachers (N=24)		Kitchen staff (N=24)	
Fruits and vegetables	Yes %	No %	Yes %	No %	Yes %	No %
Banana	1.1	98.9	0.00	100	0.00	100
Mango	0.1	99.9	0.00	100	0.00	100
Leaves	40.4	59.6	33.3	66.7	78.3	21.7
Okro	56.7	43.3	41.7	58.3	81.7	18.3
Garden eggs	3.3	96.7	21.7	78.3	63.3	36.7
Tomatoes	94.9	5.1	100	0.00	100	0.00
Pepper	97.6	2.4	100	0.00	100	0.00
Onion	99.9	0.1	100	0.00	100	0.00
Cabbage	0.8	99.2	6.7	93.3	16.7	83.3
Carrot	0.4	99.6	0.00	100	6.7	93.3

Table 21 reveals that green leaves and fruits were used a lot in meal preparation in Wa. These green leaves and fruits included okro, cassava leaves, pumpkin leaves, beans leaves and baobao leaves. In *Table 22* not much green leaves were used according to the pupils in Cape Coast. The kitchen staff however indicated that more substantial green leaves were used contrary to the pupils' claim.

Observation Results

It was observed in all the schools visited that, all the caterers used canned tomatoes rather than the fresh one. According to the caterers, they only used fresh tomatoes when it was in season and cheaper at the market.

4.3.6 Questionnaire Results on Type of Starchy Roots (processed) to Prepare Food for Pupils

Table 23: Starchy roots (processed) used to prepare food for pupils in Wa municipal schools.

	Respondents					
	Pupils (N=360)		Teachers (N=36)		Kitchen staff (N=36)	
Starchy roots (Processed)	Yes %	No %	Yes %	No %	Yes %	No %
Fresh cassava	1.67	98.33	2.78	97.22	5.56	94.44
Konkonte	91.39	8.61	97.22	2.78	100	0.00
Gari	90	10.00	100	0.00	100	0.00
Others	12.5	87.5	63.89	36.11	27.78	72.22

Table 24: Some types of starchy roots (processed) to prepare food for pupils in Cape Coast metro school.

	Respondents					
	Pupils (N=240)		Teachers (N=24)		Kitchen staff (N=24)	
Starchy roots (Processed)	Yes %	No %	Yes %	No %	Yes %	No %
Fresh cassava	2.5	97.5	4.2	95.8	5.56	94.44
Konkonte	15.1	84.9	2.8	97.2	0.10	99.90
Gari	100	0.00	100	0.00	100	0.00
Others	5	95	8.7	91.3	27.78	72.22

As indicated in *Tables 23* and *24* above, fresh cassava was scarcely served in the schools. Majority of the respondents in Wa indicated that *Konkonte* was rather used for preparation of meals. In Cape Coast on the other hand, the respondents indicated that *konkonte* was not used at all. It is clear from the Table that *gari* was the most used processed starchy root in meal preparations.

Observation results

In the schools in Wa municipal, *konkonte* was not served per se, but mixed with corn dough to prepare *banku* and with corn flour to prepare *tuo zaafi*. It was also observed in Cape Coast schools that fresh cassava was made into dough and mixed with corn dough to prepare *banku*. Hence in both Wa and in Cape Coast processed cassava was used instead of pure cassava.

4.3.7 Questionnaire Results on Type of Fat and Oil used to Prepare Foods for Pupils.

Table 25: Fat and Oil used to Prepare Foods for Pupils in Wa municipal school.

	Respondents					
	Pupils (N=360)		Teachers (N=36)		Kitchen staff (N=36)	
Fats & Oils	Yes %	No %	Yes %	No %	Yes %	No %
Vegetable oil	100	0.00	100	0.00	100	0.00
Coconut oil	1.39	98.61	5.56	94.44	0.00	100
Palm Oil	100	0.00	100	0.00	100	0.00
Kernel oil	0.56	99.44	2.29	97.71	0.00	100
Shea butter	2.22	97.78	13.89	82.11	41.67	50.33
Margarine	0.28	99.72	0.00	100	0.00	100
Others	0.4	99.6	16.7	83.3	16.7	83.3

Table 26: Types of Fat and Oil used to Prepare Foods for Pupils in Cape Coast.

	Respondents					
	Pupils (N=240)		Teachers (N=24)		Kitchen staff (N=24)	
Fats & Oils	Yes %	No %	Yes %	No %	Yes %	No %
Vegetable oil	100	0.00	100	0	100	0.00
Coconut oil	4	96	5.56	95	0.00	100
Palm Oil	100	0.00	100	0.00	100	0.00
Kernel oil	0.5	99.5	2.29	97.71	0.00	100
Shea butter	3. 4	2.6	13.89	86.11	15.0	85.0
Margarine	1.3	9.7	0.00	100	0.00	100
Others	0.5	99.5	16.7	83.3	16.7	83.3

Findings in *Tables 25* and *26* show that the main oils used in meal preparation in schools in both Wa and in Cape Coast were decolourised vegetable cooking oil and

red palm oil according to the kitchen staff. Shea butter was also used in preparing vegetable soup for Tuo Zaafi in some of the schools in Wa municipal.

4.3.8 Questionnaire Results on Where the Ingredients were Stored before Supplying to the Kitchen

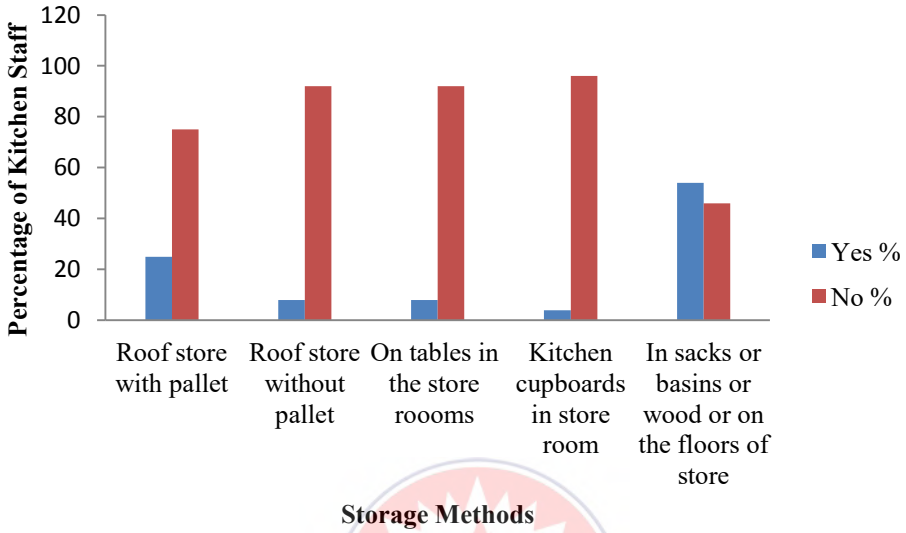


Figure 3: Places where foodstuffs were stored in schools before they are supplied to the kitchen in Wa schools.

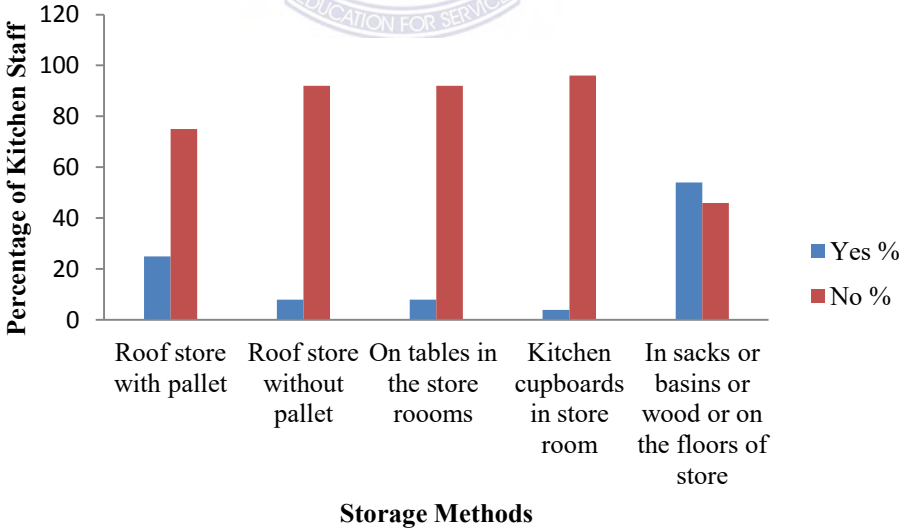


Figure 4: Places where foodstuffs were stored in schools before they are supplied to the kitchen in Cape Coast schools.

Figures 3 and *4* show where the ingredients are kept in the schools when brought from the market before supplying to the kitchens. Majority of the respondents

(both teachers and kitchen staffs) indicated that the ingredients were stored in sacks put in aluminum basins or on wood on the floor of store rooms.

Observation Results

Store rooms

Some of the store rooms were not accessible to the researcher and some were non-existent. The reasons given by some caterers for their inability to show the storerooms to the researcher was that, they had to rent their own rooms in town to use to store the food. Others had to use their own house because separate store rooms had not been built for the caterers. These situations were observed in both Cape Coast and in Wa.

Kitchens

Most of the schools visited in Wa municipal, either cooked in the open or under sheds because their kitchens were too small. The kitchen staff also used firewood to cook and thus could not work in restricted environments like their small kitchens where smoke could be trapped. Eight schools out of 12 were seen to have kitchen while four did not have kitchens. In these circumstance all the schools in Wa cooked in the open. In Cape Coast, six schools had kitchens and two schools had no kitchens. For the six schools with kitchen, they also sometimes cooked under sheds likewise the other two that did not have kitchens.

Cooking fuel

All the schools visited in Wa used firewood as fuel for cooking. An interview with some of the pupils in three schools revealed that the school authorities asked each pupil to come to school with some firewood each week. In Cape Coast, four schools used gas and charcoal while the other four used both charcoal and firewood.

4.3.9 Questionnaire Results on Length of Time for Food Storage

Table 27: Number of week's percentage affirmative responses foodstuff stayed in storage before being used to prepare food in Wa municipal schools.

	Storage duration			
	1 week %	2 weeks %	3 weeks %	4weeks and above %
Fresh Ingredients	100	0.00	0.00	0.00
Dry Ingredients	0.00	8.33	13.9	77.8

Table 28: Number of weeks percentage affirmative responses food stuff stayed in storage before being used to prepare food in Cape Coast

	Storage duration			
	1 week %	2 weeks %	3 weeks %	4weeks and above %
Fresh Ingredients	100	0.00	0.00	0.00
Dry Ingredients	0.00	16.7	33.4	50.1

In *Tables 27* and *28* 100% of the respondents stated that fresh ingredients including pepper, green leaves, etc. were stored for less than one week. However, 50.1% of the respondents in Cape Coast *Table 28* indicated that the dry ingredients were stored for 4 weeks and above, while 77.8% of the respondents in Wa *Table 27* revealed that dry ingredients were stored for over four weeks.

Observation Results

An interview with one of the caterers in Wa revealed that she stored her beans in sold chemically sprayed sacks for three months and over without sun drying them.

4.3.10 Questionnaire Results on Distribution of Treatment given to ingredients

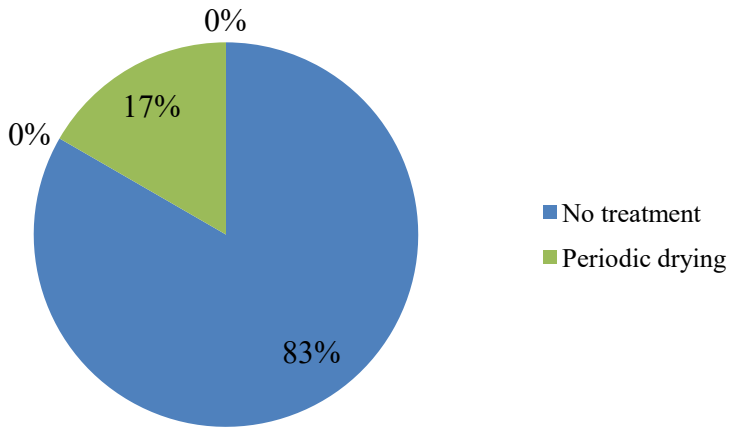


Figure 5: Pie chart of treatment of fresh ingredients used in the preparation of meals in Wa municipal schools.

Figure 5 depicts how ingredients are treated prior to be used for meals preparation. In the case of the fresh ingredients, 83% of the kitchen staff stated that no chemical or physical treatment was performed on fresh ingredients besides being washed with clean water and drying 17% indicated there was periodic drying of the fresh vegetables while the others said there was rather periodic spraying or regular sweeping compared to the dry ingredients in *fig. 7*.

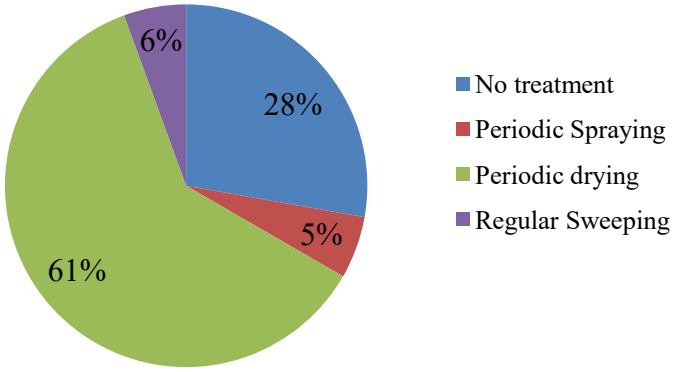


Figure 6: Percentages of a total of 36 Kitchen Staff responses to treatment of fresh ingredients used in the preparation of meals in Wa schools.

In the case of the dry ingredients in *Figure 6* 61% of the respondents in Wa indicated a periodic drying of the ingredients while 28% said there was no treatment at all. Five percent (5%) and 6% of the respondents indicated that there were periodic spraying and regular sweeping of the storage places respectively.

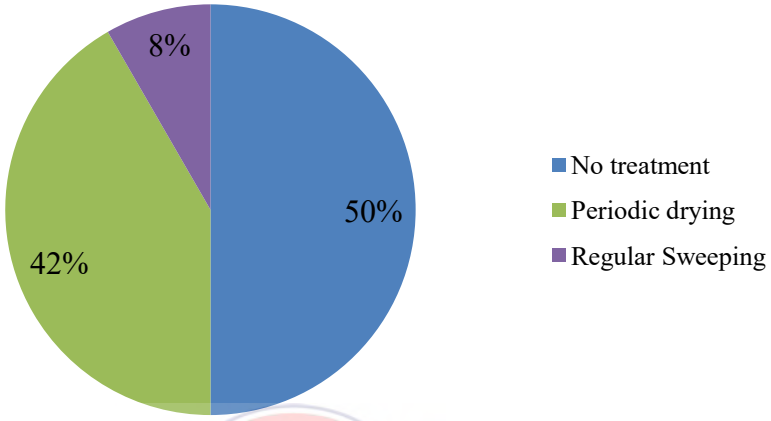


Figure 7: Treatment of fresh ingredients used in preparation of meals in Cape Coast metro schools

In Cape Coast metro schools, 100% of the respondents stated that there was no treatment of the fresh ingredients besides washing with clean water. In the case of the dry ingredients 50% in *Fig.7* stated that there was no treatment at all while 42% said there was a periodic drying, and 8% indicated that there was a regular sweeping to keep the food ingredients safe from insects and pests during storage. Canned tomatoes were not treated like other raw food stuffs because they were already preserved in a can.

4.4 Research Question 3

What was the hygienic conditions under which food was cooked, served and eaten in Wa and Cape Coast municipal schools?

4.4.1 Questionnaire Result on Washing of Bowls from which Pupils ate

When respondents were asked who washed the bowls from which school children ate in Wa the responses indicated that 98% of the bowls were washed by the school pupils and the statement was supported by 93% of their teachers while 66.7% of the kitchen staff claimed they washed the bowls.

Observation Results on Washing of Bowls from which Pupils ate

The researcher however observed in Wa that only three schools out of 12 school provided bowls for eating and the pupils washed the bowls. Pupils from the remaining schools brought their own bowls from the house and washed them after eating.

In Cape Coast metro school, responses indicated that 94.6 of the pupils washed their bowls and this was supported by 92.2% of the teachers while 87.6% of the kitchen staff claimed they rather washed the bowls. This is contrary to the responses from the Wa schools where the kitchen staff claimed to be washing the bowls.

Table 29: Questionnaire Result on Data on hand washing techniques by pupils in Wa municipal schools

Respondents	Respondents					
	Pupils (N=360)		Teachers (N=36)		Kitchen staff (N=36)	
	Yes %	No %	Yes %	No %	Yes %	No %
With soap under running water	7.78	92.22	27.78	72.22	11.11	88.89
Running water without soap	17.50	82.50	16.67	83.33	8.33	91.67
Bowl of water with soap	40.83	59.17	41.67	58.33	55.56	44.44
Bowl of water without soap	8.61	91.39	5.55	94.45	25.00	75.00
Don't wash hand	22.5	77.5	1.23	98.72	0.00	100
Others	2.78	91.22	1.10	98.90	0.00	100

Table 30: Data on hand-washing techniques by pupils in Cape Coast metro schools.

	Respondents					
	Pupils (N=240)		Teachers (N=24)		Kitchen staff (N24)	
	Yes	No	Yes	No	Yes	No
Respondents	%	%	%	%	%	%
With soap under running water	35.42	64.58	33.33	72.22	41.66	58.34
Running water without soap	25.83	74.17	16.67	83.33	20.83	91.67
Bowl of water with soap	16.66	83.34	29.16	70.84	25.00	75.00
Bowl of water without soap	10.42	89.58	16.67	83.33	12.50	87.50
Don't wash hand	11.67	88.33	4.17	95.83	0.00	100
Others	0.1	99.09	0.00	100	0.00	100

With a definition of good hand washing practice being washing both hands with soap under running water, *Tables 29* and *30* show that the majority of the pupils in Wa and in Cape Coast schools did not practice good hand washing techniques. For example in Wa, 92% of the pupils supported by 72% of the teachers and 89% of the kitchen staff claimed that the pupils did not wash their hands with soap under running water before eating. Also, in Cape Coast, 65% of the pupils supported by 72% of the teachers and 58% of the kitchen staff claimed that the pupils did not wash their hands with soap under running water before eating, a practice that needs to be discouraged.

4.4.2 Questionnaire Result on Source of Water for Cooking Meals in the schools.

Table 31: Source of water for cooking meals in Wa municipal schools.

	Respondents		
	Pupils (N=360)	Teachers (N=36)	Kitchen staffs (N=36)
Water for cooking	%	%	%
Pipe borne water	100	100	91.7
Local well	2.5	1.0	15.3
Boreholes	78.20	82.3	41.7

Table 32: Source of water for cooking meals in Cape Coast metro schools.

	Respondents		
	Pupils (N=240)	Teachers (N=24)	Kitchen staffs (N=24)
water for cooking	%	%	%
Pipe borne water	100	100	100.0
Local well	0.5	1.0	15.0
Boreholes	70.10	80.3	40.7

Tables 31 and *32* show the regular sources of water for cooking. All of the respondents in Wa and Cape Coast (pupils, teachers and kitchen staffs) mentioned that they used pipe-borne water for cooking meals. Other sources of water used included bore holes and local wells when the pipe borne water was not available.

Source of water for drinking

Observational Result

Most schools visited in Wa and Cape Coast had standing pipes on the school compounds from which pupils drank water. In one school in Wa for example, parents had provided two poly-tanks which had been filled with water for pupils to drink and wash their hands. However, in another school in Wa, water had not been provided for the pupils to wash their hands nor for drinking and had to buy from water vendors. They reported that the water they bought was not enough to drink, let alone to wash their hands.

4.4.3 Evidence of Health Certificate

Questionnaire Results revealed that 66.7% of the kitchen staff had health certificates which qualified them as healthy cooks in schools in the Cape Coast Metropolis. In Wa Municipal schools, only 42% of the kitchen staff had health certificates.

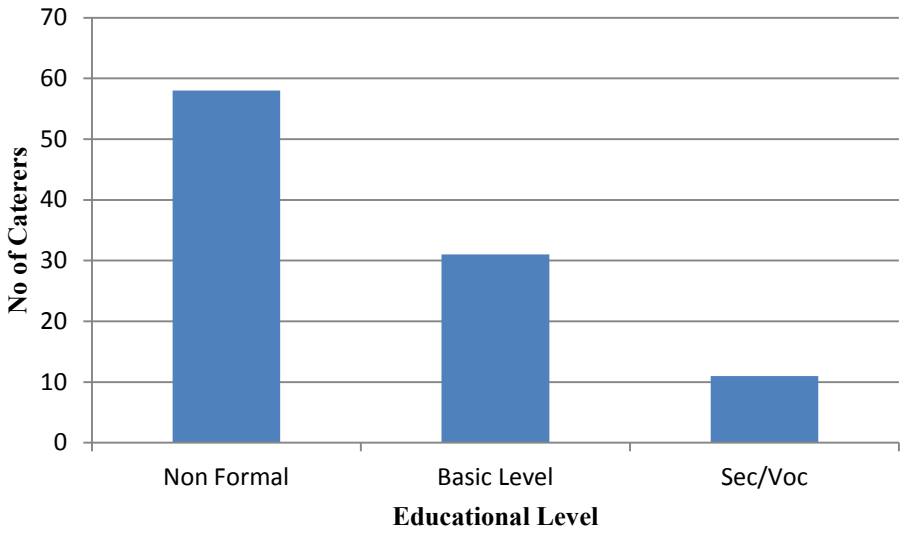


Figure 8: Education levels of caterers in Wa Municipal schools

Fifty-seven point three (57.3%) of kitchen staff had in-service training within a period of two years in Wa while in Cape Coast, 100% of the respondents had in-service training.

Analysis of *Figure 8* also reveals that 58% of caterers in Wa Municipality had non-formal education, 31% had basic education, and 11% had secondary or vocational training. This is contrary to observations made in Cape Coast Metropolis where a 100% of the caterers had secondary or vocational education. Kitchen staff who went to work when ill was 65%. Seventy percent (70%) of kitchen staff did not go to hospital for periodic screening. Only 30% of the respondents went to the hospital periodically for screening.

Table 33: Hygienic conditions under which meals were prepared for pupils in Wa municipal schools

Hygienic Conditions	Respondents		
	Pupils (N=360) (%)	Teachers (N=36) (%)	Kitchen staffs (N=36) (%)
Excellent	9.4	16.7	16.7
Very good	16.7	16.7	11.1
Good	34.7	33.3	22.2
Fair	23.9	19.4	38.9
Poor	15.8	13.8	11.1

Table 34: Hygienic conditions under which meals were prepared for pupils in Cape Coast metro schools.

Hygienic Conditions	Respondents		
	Pupils (N=240) (%)	Teachers (N=24) (%)	Kitchen staffs (N=24) (%)
Excellent	3.8	20.8	25.0
Very good	10.8	16.7	25.0
Good	37.0	20.8	41.7
Fair	43.8	37.5	4.2
Poor	4.6	4.2	4.2

The conditions under which food was prepared for pupils in Wa scored 60% good and excellent according to the pupils; teachers were 66.7% while kitchen staff were 91.7%. This is a revelation from *Table 35*.

Table 35: Hygienic conditions under which meals were served to pupils and teachers in Wa municipal schools.

Hygienic Conditions	Respondents		
	Pupils (N=360) (%)	Teachers (N=36) (%)	Kitchen staffs (N=36) (%)
Excellent	0.0	2.8	2.8
Very good	18.3	16.7	50.0
Good	27.8	27.7	30.5
Fair	30.8	22.2	11.1
Poor	23.1	30.5	5.5

Table 36: Hygienic conditions under which meals were served to pupils and teachers in Cape Coast metro schools.

Hygienic Conditions	Respondents		
	Pupils (N=240) (%)	Teachers (N=24) (%)	Kitchen staffs (N=24) (%)
Excellent	0.0	4.1	4.1
Very good	23.3	16.7	62.5
Good	32.1	37.5	25.0
Fair	40.8	29.1	4.1
Poor	3.8	12.5	4.1

Findings in *Table 36* indicate that, about 23% of the pupils in Wa municipal schools claimed that hygienic conditions under which the meals were served were poor. This was supported by about 30% of the teaching staff. The kitchen staff however, stated that the conditions were generally very good. At Cape Coast, the findings in *Table 37* indicate that, about 96% of the pupils claimed that the hygienic

conditions under which the meals were served were fair. This was supported by 88% of the teaching staff. The kitchen staff also stated that the conditions were generally very good.

Table 37: Hygienic conditions under which meals are eaten by pupils in Wa municipal schools.

Hygienic Conditions	Respondents		
	Pupils (N=360) (%)	Teachers (N=36) (%)	Kitchen staffs (N=36) (%)
Excellent	2.5	5.5	2.8
Very good	8.6	25	22.2
Good	17.2	52.8	30.5
Fair	16.6	5.5	27.8
Poor	55	11.1	19.4

Table 38: Hygienic conditions under which meals are eaten by pupils in Cape Coast metro schools.

Hygienic Conditions	Respondents		
	Pupils (N=240) (%)	Teachers (N=24) (%)	Kitchen staffs (N=24) (%)
Excellent	1.6	8.3	16.6
Very good	5.8	20.8	33.3
Good	40.4	50	25
Fair	17.9	12.5	8.3
Poor	32.5	8.3	16.6

Findings in *Table 38* indicate that the hygienic condition under which meals were eaten by the pupils in Wa was poor according to the majority of the pupils. The majority of the teachers however said it was good and so did the kitchen staff. The findings from *Table 39* in Cape Coast revealed that majority of the pupils claimed that the conditions under which they were served and ate was good. But quite a significant percentage 32.5% of the pupils thought otherwise. The teachers as well as the kitchen staff indicated that the conditions were quite good.

Observation Results

Out of the 12 schools studied in Wa municipal, seven had their cooks wear uniforms and had their hairs also covered. The meals were dished into covered containers before sending them to the classrooms. However, animals like goats and

fowls were seen in the cooking areas in most of the schools. Dirty water made while cooking was also thrown in front of the kitchen and stray dogs and goats were seen feeding on the dirty water. Dirty cooking utensils were also seen piled up around the cooking areas in two of the schools and the filth was overwhelming.

In one school, the cooks were seen sleeping in the cooking area with huge trash piled up in a corner of the kitchen as time ticks for the pupils to go for their lunch. In another school the trash was spread around by toddlers of some of the kitchen staff while the meals were being served into bowls lined up on the floor. At another school human faeces was located underneath teak trees that had been planted on the schools compound boundary many houseflies were hovering over the faeces and into the classrooms and the kitchen.

In Cape Coast the situation was somewhat different. Out of the eghit schools visited, only two had their cooks in uniforms. Most of the cooks did not cover their hair either but when interviewed they knew they should cover their hair. However the meals were dished into covered containers before sending them to the classrooms.

In both Wa and Cape Coast municipal schools, animals were seen roaming around some of the open kitchens. This observation was encountered more often in Wa than in Cape Coast. There were also open gutters around some of the kitchens in Cape Coast with flies in them. Two schools had their kitchens built inside the school among the classrooms and the kitchens used gas to cook. There were mice in some of the kitchens in Cape Coast metro schools.

Table 39: Visual contact with pests and rodents at cooking areas in Wa municipal schools.

Pupils (N=360)		Teachers (N=36)		Kitchen Staff (N=36)	
Yes %	No %	Yes %	No %	Yes %	No %
67.3	32.7	14.0	86.0	12.0	88.0

Table 40: Visual contact with pests and rodents at cooking areas in Cape Coast metro schools.

Pupils (N=360)		Teachers (N=36)		Kitchen Staff (N=36)	
Yes %	No %	Yes %	No %	Yes %	No %
20.3	79.7	6.0	94.0	2.0	98.0

In Wa pupils had visual contact with pests or rodents in the cooking areas while the teachers and the cooking staff did not. In Cape Coast the pupils, teachers, and kitchen staff reported no evidence of rodents or pests in the cooking areas.

4.5 Research Question 4:

What are the challenges facing the implementation of the Ghana school feeding programme in Wa and Cape Coast municipal schools.

4.5.1 Questionnaire Results on Complaints made by pupils and teachers about meals served.

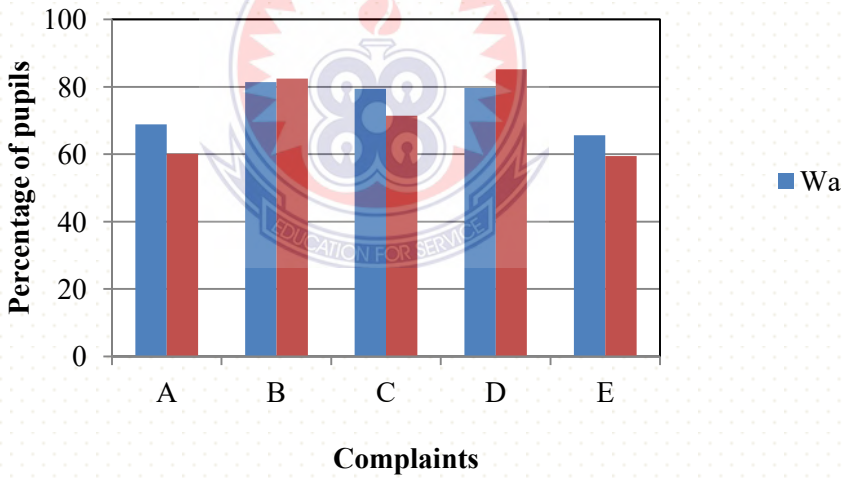


Figure 9: Pupils of complaints made about meals served.

A. offensive smell; **B. partially cooked;**
C. foreign material in the meal; **D. watery soup;**
E. color not appealing

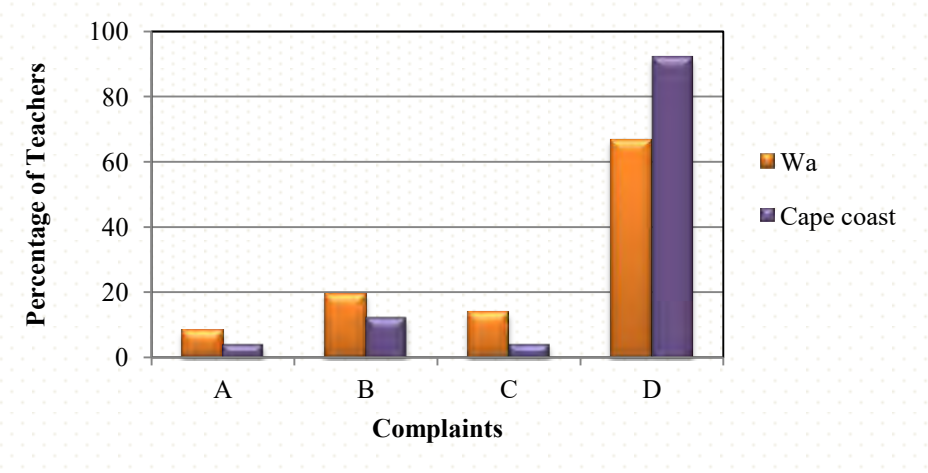


Figure 10: Number of complaints made about meals served by teachers.

A. offensive smell; **B. partially cooked meal;**
C. foreign material in the food; **D. watery soup**

Figures 9 and *10* portray complaints made by both teachers and pupils about the meals served in their various schools. From the figures, 16.7% of the students stated that the smelly meals served were good. However 41.7% of the teachers found nothing smelly about the meals served. There were 50% of teachers who reported the meals to be partially cooked 87.7% of the pupils claimed that the meals served were partially cooked. Though 24.4% of the pupils found no foreign materials in the meals served 90% of the teachers found a substantial quantity of foreign materials in the food served to pupils. There was also disagreement between the teachers and the pupils on whether the colour of the meals served was appealing or not. While the pupils said the colour was unappealing, the teachers disagreed. However both the pupils and teachers agreed that the soup served to them was watery.

4.5.2 Questionnaire Result on Acceptance of the taste of meals

Table 41: Acceptance of meal in Wa and Cape Coast municipal schools.

Taste of Meal	Percentage	
	Wa	Cape Coast
Tasty hence I ate all my meal	27.8	37.5
Tasty but unable to eat	9.4	4.5
Not tasty but I ate all my meal	50	44.2
Not tasty hence unable to eat	12.8	13.8
Total	100	100

Findings in *Table 42* revealed that although 27.8% of the pupils in Wa said their meals were tasty, and so ate all their meals 9.4% said though tasty they were unable to eat all the meal. Fifty percent (50%) said the meals were not tasty but ate them all while 12.8% said the meals were not tasty and were unable to eat the meals. At Cape Coast 37.5% of the pupils claimed that their meals were tasty hence ate all, while 4.5% said their meals were tasty but unable to eat. Thirteen percent (13%) claimed their meals were bad and so could not eat the meal. Though not tasty 44.2% of the pupils in Wa ate all their meals. A higher percentage of the pupils in Wa and Cape Coast ate all the meals though it was not tasty.

Observation Results

In one of the schools in Wa, almost all pupils in the upper primary rejected the food. This was because the food was not tasty according to the pupils. This was confirmed by the teachers including the head teacher that the food served was less than what could be described as food for humans.

Although the pupils rejected the food, the caterers consistently cooked the meals and this caused a lot of apparent surpluses. Where the surplus eventually ended up was unknown but could best be guessed to end up in the homes of the cook or refuse dumps.

In both Wa and Cape Coast municipal schools, none of the kitchen staff admitted that pupils and teachers ever complained about the meals they served to the pupils.

4.5.3 Challenges of pupils in schools with GSFP

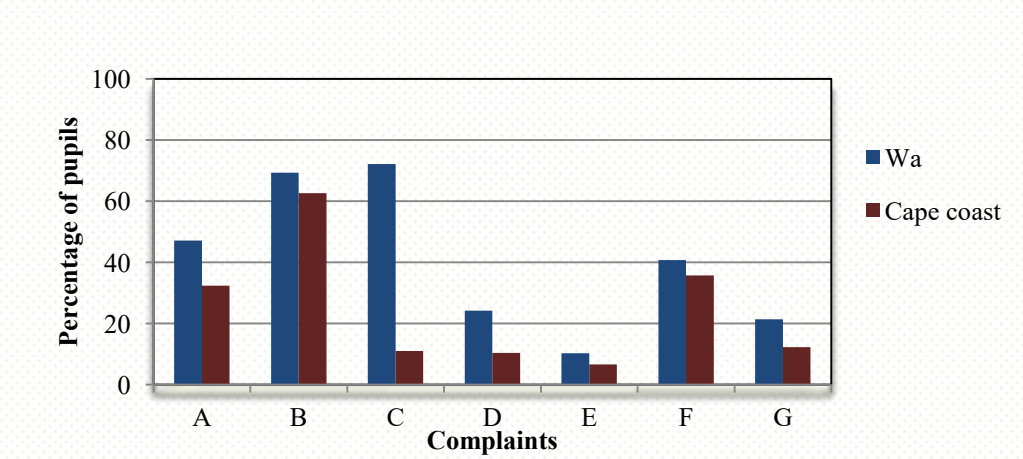


Figure 11: Challenges experienced by the pupils in schools with GSFP.

A. food delays;
B. kitchen staff shouts and insults;
C. smoke emanates from the kitchen;
D. parents no more provide lunch;
E. school surrounding become dirty
F. parents give no more money
G. kitchen staff extorts money.

From *Figure 13* the problem of kitchen staff shouting and insulting was highly rated 70% which does not auger well with the implementation of the programme. The problem of parents' ill-preparedness to provide their wards with lunch was rated a low second 26% as a major challenge to the school feeding programme. Once more the question of parents not giving monies to their wards because they are provided with lunch at school also came up as true with the indication that 40% of the entire pupils alluded to that. One other perceived problem regarding the implementation of the programme was the extent to which kitchen staff extorted money from the pupils. To this, 78% of the pupils objected to its existence. The problem of smoke emanating from the kitchen which turns out to disturb academic work was also dismissed by the pupils. With this particular challenge the researcher had a personal observation where two of the shed kitchens in Wa municipal schools were emitting so much smoke into the classrooms occupied by primary one and two pupils. The researcher observed that the rest of the kitchens were sited quite a distance from the classrooms.

4.5.4 Challenges teachers faced with GSFP

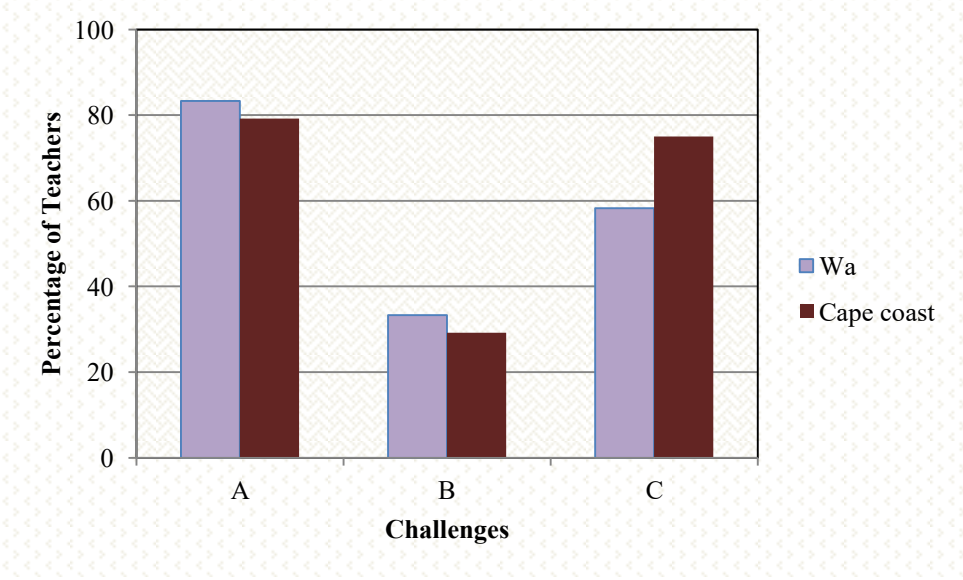


Figure 12: Challenges teachers faced regarding the GSFP

A. irregular payment of feeding grants; B. unavailability of cooking facilities; C. increase in pupils' population but limited infrastructure.

Challenges teachers faced regarding the GSFP. More than 80% of the teachers stated that irregular payment of feeding grant and the fact that the money was meager was a major challenge facing the caterers who are helping in the implementation of the GSFP. Most of the respondents 86.7% accepted that there was "astronomical" increases in pupil population but very limited instructional materials and infrastructure were provided.

4.5.5 Challenges kitchen staff faced with the GSFP

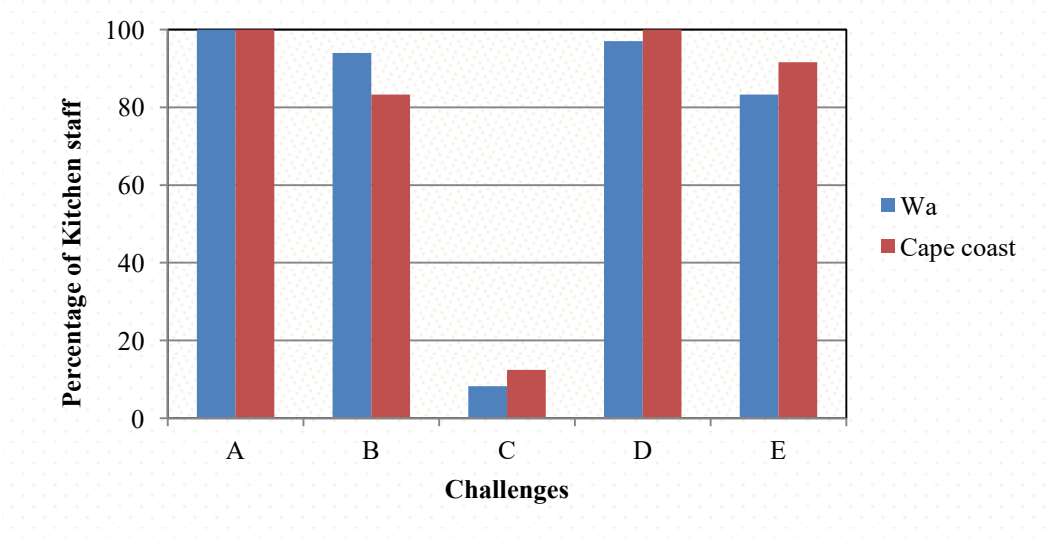


Figure 13: Challenges Kitchen staff face with GSFP

A. irregular payment of feeding allowance;
B. irregular payment of monthly allowance;
C. lack of cooking facilities;
D. low unit price rate per child;
E monthly allowances are too small.

Ninety three percent (93%) of kitchen staff indicated that monthly allowances given to the kitchen staff was too small which ardently demotivates them in their quest to help in the implementation of the GSFP. An interview with most of the caterers indicated that the caterers were paid between GH₵40.00 and GH₵60.00 per month in both Wa and Cape Coast municipal schools. This amount mentioned was paid quarterly. It was also evident that low unit price rate per child which until recently was 50 Ghana pesewas but now 80 Ghana pesewas was very disincentive to their operations. Another challenging feature here has to deal with irregular payment of feeding grant to the caterers. According to 58.3% of caterers some of the payments took as long as one year before the government paid them and this delayed and hindered their operations. The problem of inadequate cooking facilities resulted in a split decision as 50% could not differentiate the existence or non-existence of the cooking facilities in most of the schools studied.

CHAPTER FIVE
DISCUSSION OF FINDINGS

5.0 Overview

This chapter discusses the findings based on specifics objectives in the study. A comparative analysis of the ages of pupils in the study areas apparently indicates that the pupils in Cape Coast schools were younger than those in Wa municipal schools.

5.1 Nutritional quality of meals served under the GSFP in Wa and in Cape Coast schools.

Findings in relation to nutritional quality of meals served to upper primary schools revealed that the meals served, as of 2015, in schools in both Wa and Cape Coast municipals did not meet the nutrient intake recommendation based on FAO/WHO/UNO (2004), with the exception of carbohydrates and vitamin A which far exceeded the limits. This implies that the meals that were served to the pupils were energy dense but lacked other nutrients such as protein and vitamins. These findings were consistent with findings by Abdul-Rahman and Agble (2012) who revealed that the meals at some schools in Accra and the Northern Regions of Ghana provided less than 30% of the daily RNI. These findings also agree with Owusu (2013) who confirmed that various nutrients in meals under the GSFP at Suburban. The results of this study again, reveal that energy, carbohydrates, vitamin A, and iron contents were higher in Wa schools than in Cape Coast schools. Parish and Gelli (2013) pointed out that meals in Tamale and in cosmopolitan area close to Wa had similar socio-environmental characteristics contained more calories than meals in Accra. But other findings reveal that calcium, protein, thiamin, and zinc were higher in Cape Coast than in Wa municipal schools.

In terms of food sizes, meals served in Wa schools were bigger than those in Cape Coast schools. This implied that the nutrients in meals prepared in schools in Cape Coast and Wa were higher in Wa municipal schools meals than in Cape Coast metro school meals. Another finding was that, the meals in Wa had more soup, which made the pupils more able to completely consume their meals. Furthermore, kitchen staff often added green leaves to the soups in Wa municipal schools which was unlike in Cape Coast metro schools where the meals served were mostly solid with oily stew.

In Wa, groundnut soup was usually thickened with soya bean powder besides the green leaves. It was therefore not surprising that the vitamins in the meals in Wa were relatively higher than those in Cape Coast metro schools. However, minerals like calcium were higher in meals in Cape Coast. This may be due to the kitchen staff using powdered fish and tuna flakes and a lot more fish in Cape Coast than in Wa. The study also revealed that varieties of meals were served in both schools. According to Wardlaw *et. al*. (2004), eating a variety of diets is essential to meeting the nutritional needs of an individual. This is because the required nutrients are scattered among the different foods.

One critical observation made was that the menus at both places of study were fundamentally the same but the meals served differed in terms of added stew and soup. The main meals served at both places were mainly from maize, cassava or rice which consistent with staple food, generally eaten by Ghanaians along the coastal and the middle belts. These people included the Ashantis, Fantis, Bono Ahafos, and Ewes in the Volta Region. Meals made from the same staples were also noted by Okae – Adjei *et al.* (2016) to be served at Akuapem North Municipality. It is however surprising to note that in most parts of the Northern Region of Ghana including Wa the staple food of the people is made from kokonte (dried cassava), maize, millet and

sorghum. Cisse *et al.* (2014) noted that the indigenous staple grains of millet and sorghum were more beneficial than non-traditional grains. However, millet and sorghum-based meals were absent from the menu in Wa. This suggests that the menus were possibly designed outside Wa munucipal which did not consider the culture of meals taken in by the indigenous pupils.

Information also gathered from the kitchen staff and teachers in Cape Coast revealed that jollof rice which ought to be served regularly under the prescribed menu of the school was rather served during special days or sporting activities. Gari and beans and rice was among the most frequently served meals in Wa and Cape Coast municipal schools and which suggests that *gari*, beans and rice are cheaper and more easily acquired by caterers in Ghana. In Wa meals usually contained green leaves and vegetables like baobab leaves, cassava leaves, pumpkin leaves, *ayoyo* leaves, and spinach which are minerals and vitamins rich. The frequent use of green leaves may account for the increase in micro-nutrient contents in the meals in Wa schools than Cape Coast schools.

Another observation made was that the schools in Wa municipality strictly adhered to the menu given by the GSFP secretariat while caterers in Cape Coast did not. An interview with a caterer in Cape Coast revealed irregularity in the payment of the feeding grant which compelled them to prepare meals from ingredients that were available and more easily accessible with their limited purchasing resources. Nonetheless, by the end of the week all the meals that were on the menu had been prepared when the ingredients were available and acquired. A survey by Abdul-Rahman and Agble (2015) showed that availability of the ingredients used in meals were also dependent on farming seasons, procurement procedure and availability of

funds. In the dry seasons when many vegetables were unavailable caterers resorted to dried vegetables for the meals.

The mean daily energy and nutritional value intake of the meals served in the schools studied were below the RNI values for all nutrients apart from carbohydrates and vitamin A in agreement with Abdul-Rahman and Agble (2012). This means that the pupils were not acquiring the needed nutrients that the programme ought to supply to the SAC in both Wa and Cape Coast schools. Comparing the nutrition contents of the meals, the results revealed that although the daily nutrients of the meals in both areas were below the RNI values the quality of the meals in Wa were higher than those in Cape Coast because the food sizes in Wa were bigger with constituted green leaves. The meals were taken more with soup in Wa than in Cape Coast metro schools. The use of processed ingredients like canned tomatoes may also increase the risk of safety of the meals especially when the sources and shelf lives of the canned ingredients were unknown.

For fish as a source of protein, the results revealed that the pupils in Wa were deprived more than those in Cape Coast metro schools which is a coastal city and therefore more likely to access cheaper marine fish. For this reason the meals in Cape Coast had higher protein contents than in Wa with very few rivers and streams where the kitchen staff had little fish in the meal preparations and might be responsible for the differences in the calcium contents of their meals.

The type of animal food products that were used to prepare the meals in the Wa schools were fish (anchovies) and in Cape Coast metro schools, tuna, anchovies and chicken. Fish eating is considered a healthy protein choice and fatty fish from cold water is known to contain significant amount of heart-healthy and muscle friendly omega-3 fatty acids. Fish, like salmon, is known to contain substantial

amount of omega-3 fatty acids. However, smoking and drying of fish drains out much of the oil and which reduces the amount of heart-healthy and muscle friendly omega-3 fatty acids. Therefore, the use of smoked dried fish in the preparation of the meals implies less fish oil and omega-3 fatty acids in the meals served. Furthermore, fish caught in polluted water may be toxic. In Wa, anchovies were usually used in preparing the meals but in Cape Coast powdered fish of both anchovies and herrings and occasionally chicken were used to prepare the meals. It is not surprising that the protein content of the meals in Cape Coast were higher than in Wa municipal. Without the skin, chicken is considered to be a high protein meat. The choice for the use of fish or chicken is dependent upon the caterers. Chicken in many parts of the country is considered a delicacy and is eaten only on special occasions. However the proliferation of imported chickens on the market-whose protein content and wholesomeness are questionable- has made it possible for poorer families to access and eat chicken.

The major types of legumes and nuts used for meal preparation were beans and groundnuts. These are two vital ingredients which are of good benefit to human health. The beans are a super healthy, versatile and affordable food high in antioxidants, fiber, protein, B vitamins, iron, magnesium, potassium, copper and zinc. Eating beans regularly may decrease the risk of diabetes, heart disease, colorectal cancer, and helps with weight management (Messina, 1999). Groundnuts are also known to contain health benefit nutrients such as minerals, antioxidants, vitamins, oleic acid and mono-saturated fatty acids. Consumption of mono-saturated fatty acids helps to prevent risk of coronary artery disease and stroke.

Respondents in Wa municipal schools revealed that *dawadawa* was used to prepare meals for them and was used far more than *agushie* and soyabeans. This is

possibly because *dawadawa* is an indigenous food ingredient which *agushie* and soyabeans are not. Furthermore *dawadawa* contains significant amounts of major and minor nutrients needed by the human body. *Dawadawa* serves as a flavouring agent imparts sensory appeal to foods and possesses medicinal value in addition. The preference for *dawadawa* however is contrary to preference for sorghum, millet, rice and cassava which are equally indigenous. Soya bean been the least used legume.

The pupils, teachers and kitchen staffs identified maize and rice as the main cereals used in food preparation. This was not surprising as because they were the main staples of the schools' menu. It is surprising since millet and sorghum which are popular grains in the northern part of the country could not find their place in the school feeding programme. The reason for the absence of these cereals in the menu is unclear but it can only be speculated that their absence suggests that the menu was designed from the southern part of Ghana by officials who might not be accustomed to the use of the said grains or it may be that their prices were higher than the other staple foods.

The use of okro in meal preparations was a typical practice of the indigenes of Wa municipality. Okro, spinach, cassava leaves, pumpkin leaves, and baobao leaves are staple vegetables used by Wa indigenes regularly for their meals. This is contrary to indigenes of Cape Coast who do not actually have a staple vegetable except some occasional use of okro and green leaves in their diets.

From these results a variety of ingredients are used to prepare meals for pupils in both Wa and Cape Coast schools. According to Whitney and Rolfes (2004) using a variety of ingredients in diets contribute immensely to achieving the RNI. It was observed that most of the ingredients, like tomatoes, pepper, and other vegetables were canned or powdered okro and green leaves were sometimes also dried and

powdered. The issue with such processed products is that they tend to lose their nutritional contents during the processing. There are also added preservatives and additives that are added to the processed ingredients to give them long shelf lives but these additives and preservatives may have unknown effects on the pupils.

Dried cassava or *konkonte* and *gari* were the starchy roots in a processed form that were used to prepare meals for the school children. It is not a surprise that gari is one of the most used starchy food ingredient for the meal preparations. Similar report has been made by Parish and Gelli (2013) on gari and beans as being the most eaten meals in most Ghanaian schools. The combination of beans and gari as a meal is very satisfying when ingested and it is easier to prepare and cheaper than most meals. In Wa majority of the respondents indicated that *Konkonte* was the most used starchy product for the preparation of meals but in Cape Coast it was not used at all.

The main oils used in the meal preparations were plain vegetable cooking oil and palm oil according to kitchen staff. These two oils were used both in Wa and in Cape Coast. Shea nut oil which was also identified to be used in preparing vegetable soup for Tuo Zaafi, was used only in Wa but not in Cape Coast probably because the shea nut tree is found only in the Wa area. The oil from the nut is rich in vitamin C and has anti-inflammatory and anti-oxidant properties. Kao *et. al.* (2016) described its application and healing potency on attenuating knee osteoarthritis of rats and its use to cure arthritis in humans.

Palm oil also contains antioxidant, carotenes, *vitamins E* and *A*, vital nutrients for sight. Lack of *vitamin A* leads to blindness and lowering of cognitive functions. Palm oil is a regular component of gari and beans meal which was observed to be the most frequent eaten meal in the GSFP across the country. It is therefore not surprising that vitamin A was the only vitamin that met the RNI of the meals.

5.2 Conditions under which food ingredients of the GSFP were procured and stored in Wa and Cape in Coast schools.

The MDGs aimed at achieving poverty reduction and improving academic enrollment through provision of energy and nutrient-dense meals to SAC using locally grown foods which meant that the food ingredients ought to be cheaper and of higher quality in terms of nutrients and energy. To acquire this required that the ingredients be bought at farm gates at lower costs rather than in the open markets where they were more expensive. The research findings however revealed that the food ingredient were not bought from the farm gate and therefore were more expensive. This defeated the MDG goal upon which the GSFP was built. Again, contrary to expectations that the foodstuff used in the feeding programme be bought from local farmers the bulk of foodstuff in both Wa and Cape Coast schools were bought from the open markets in and outside the various districts. Although in some cases certain ingredients for the program were not locally available or produced in sufficient quantities, the programme failed to buy from farmers in cases even when foodstuffs were available. This attitude defeated one of the intended goals of the GSFP program (De Hauwere, 2008) which was to directly provide market for the farmers produce to eliminate middle men. The purchasing of processed and imported items also defeats one of the purposes for which the GSFP was instituted, which was to access fresh products from the local farmers. Buying from the market and not the farm gate is as a result of food insecurity in the Northern Regions of Ghana leading to unstable food production according to FAO (2010).

In Wa, dry ingredients like beans, rice, and dried okro were stored in sacks or basins or on wood on the floor in stores. In Cape Coast the dry ingredients were

stored on roofed stores with pallet. In the case of fresh vegetables they got spoiled in a few days due to lack of proper storage facilities in both Wa and Cape Coast.

Generally, post-harvest losses of vitamin C are very high in green leaves a few days after harvest. *Vitamins A* and *C* were easily destroyed when sun dried and this is a method of preservation commonly used in both Wa and Cape Coast. Other methods such as periodic chemical spraying of sacks were also used in Wa, but this posed health risks to consumers. However in Cape Coast no chemical spraying was used by the kitchen staff who rather applied periodic drying and regular sweeping.

5.3 Hygiene of food cooked, served and eaten in Wa and in Cape Coast schools.

Some of the activities investigated for the purpose of health and safety in meal preparations as well as in feeding were bowls and hand washing techniques by the pupils, and the sources of potable water for their activities. The findings indicated that the feeding bowls were washed by the school pupils but the kitchen staff also claimed that they washed the bowls. To resolve the contradiction field observation revealed that some of the pupils washed their bowls during break time but there were other schools where kitchen staff were also seen washing the bowls. One intriguing observation made was that in most schools in Wa and Cape Coast the feeding bowls were provided by the pupils except three schools in Wa where the school provided feeding bowls bought by contributions made by the pupils. Most of the pupils brought their own bowls from the house and therefore washed the bowls after eating.

A good hand washing technique is considered to be hand washing with soap under running water. From this definition, majority of the pupils in both Wa and Cape Coast schools did not practice good hand washing technique. While some washed their hands under running water without soap others washed their hands in basins of water with soap. Others washed their hands in basins of water without soap. There

was significant number who did not wash their hands at all. However some pupils correctly washed their hands under running water with soap.

Findings of the sources of water for their hand washing and meal preparations, revealed that the regular source was pipe-borne water, while others used local dug out wells. According to pupils, teachers and kitchen staff other sources of water included ponds and rivers. The kitchen staff normally resorted to these when pipe borne water was unavailable.

Health certificate verification was also done to ascertain if the kitchen staff were healthy to qualify them to cook for the pupils. Results showed that they were mostly healthy. However, quite a sizeable number of the kitchen staff did not have the health certificates. Further analysis revealed that more than half of the number of caterers in Wa Municipality had non-formal education, and one third had basic education, and the rest had secondary or vocational training. This was contrary to the observations made in Cape Coast metropolis where all of the caterers had secondary or vocational education. The education level disparity between the caterers at the two centers is probably a contributing factor to the flexibility gained by the staff in Cape Coast who do not strictly follow the menu given them from the GSFP office. The conditions under which the meals were prepared for the pupils were generally good, according to the teachers and kitchen staff. Forty percent of teachers stated that the conditions under which meals were cooked were either good or fair.

5.4 Challenges facing the implementation of the GSFP in Wa and in Cape Coast schools.

Findings revealed that quite a significant number of the pupils in Wa said their meals were not tasty, and therefore could not eat them all. But at Cape Coast, the situation was different. Fewer number of the pupils claimed that their meals were not

tasty and were unable to eat. There were others too who claimed their meals were not tasty but ate it them all. Again, many of the pupils in both places complained that the meals had an offensive smell but rather interestingly the teachers did not have any problem with the smell of the meals. They believed the meals were good and sweet smelling. There was also a split decision by the teachers on whether the food was partially cooked but the pupils claimed the meals served were sometimes not properly cooked. Teachers sometimes found foreign materials in the food served to pupils but pupils did not find foreign materials in the food served. It is possible that the pupils who thought that there were no foreign materials in the meals served have come from very poor homes. Another concern expressed by both the pupils and teachers was that the soups served to them were watery. These complaints made by both teachers and pupils concerning the meals served in their schools ought to be of concern to all.

One striking complaint made by the pupils was a problem of kitchen staff shouting and insulting and sometimes, extorting money from the pupils was repeatedly said by many of the pupils and this did not auger well with the implementation of the programme. Another problem related to parents of pupils cutting down on the meals served to them at home as a result of the GSFP. This was also a major challenge to the school feeding programme.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND SUGGESTION FOR FURTHER STUDIES

6.0 Overview

This chapter summarizes key findings, concludes and recommends on research work of the nutritional value and safety meals served under the Ghana School Feeding Programme in upper primary in Wa and Cape Coast municipal schools.

6.1 Summary of findings

School Feeding Programme is critical for cognitive development in School Age Children and is practiced by both developed and developing countries. In developing countries it is used as an instrument for achieving the Millennium Development Goals which aim to achieve poverty reduction and to improve academic enrollment through provision of energy and nutrient-dense meals to SAC. In Ghana SFP was instituted in 2005 to supplement the needed daily food nutrients SAC many of whom have been identified with wasting and stunting.

Thus this study evaluated nutritional values, and safety of meals served under GSFP within Wa and Cape Coast schools instituted since 2005. Perceptive and quantitative information was collated from questionnaire responses and by observation by the researcher and her team in Wa and in Cape Coast schools. The major observations that were derived from the study were: Pupils in the upper primary schools in Wa were older than those in Cape Coast schools, meals served in schools at both places were about the same in terms of staple foods. Meals in Wa had more soup than in Cape Coast. The schools in Wa also strictly followed the prescribed menu while those in Cape Coast were more flexible. The mean daily energy and nutritional value intake of the meals served to the schools did not meet the RNI value requirements. The weights of the meals at both places did not meet the recommended

portions per head as prescribed by FAO, although the weights of the meals in Wa were heavier than those in Cape Coast. All ingredients at both places were procured from open markets instead of from the farm gate. This is because farm produce bought directly from farmers were more expensive than from the open markets.

In meal preparations, varieties of ingredients were used. The caterers chose ingredients from almost all the six food groups, although some of the ingredients like fish were woefully inadequate and others that were nutritious like soya beans were not used much. Again, more processed ingredients were used instead of fresh ingredients, in terms of vegetables.

Most schools did not have storage facilities and caterers used their houses as store houses. The foodstuffs were also kept mostly in sacks on wood boards on the floor. Fresh ingredients not treated were not stored for more than one week.

Most pupils brought their own bowls to school and washed them themselves. The majority of the pupils did not practice good hand washing by washing hands with soap under running tap water. There were also no washing centers in most of the schools for the pupils to wash their hands. Although almost all of the schools involved in the study used pipe borne or treated water to cook the meals. In a few schools drinking water was unavailable and the pupils had to buy water to drink.

The majority of the cooks did not have health certificates and had neither attended any in-service training in two years. Furthermore, the majority of the caterers in Wa had no formal education unlike those Cape Coast. The general hygienic conditions under which the meals were cooked and served were however fair. But the majority of the pupils complained that their meals were poor and foreign materials were occasionally found in their meals. Hence a majority of the pupils in a particular school in Wa rejected their meals.

Other challenges were that the pupil population had increased astronomically while the instructional materials and school infrastructure remained the same. The price rate per meal prescribed by the government was inadequate and the payments of the caterers were irregular and inadequate.

6.2 Conclusions

In conclusion, meals served under the GSFP in Wa and Cape Coast Municipal schools contain almost all the major nutritional contents which are calories, protein, carbohydrates, vitamins, iron, calcium, and zinc. This is so because varieties of meals were served at the schools. However, the total nutritional contents of meals served in both Wa and Cape Coast did not meet the recommended dietary intake prescribed by WHO.

All the ingredients were acquired from open market rather than directly from the farm gate. Most of the food ingredients bought were stored at caterer's homes. A few schools stored their ingredients in rented store houses in towns.

The conditions under which the meals were cooked, served and eaten were generally fair but for a couple of schools in Wa the conditions were poor.

The challenges faced by the pupils were that the pupils got scolded by the kitchen staff and most parents had stopped giving feeding money to pupils for treats. Challenges from the point of view of the kitchen staff were that money allocation per child by the government for the meals was small and payments of money to the staff was irregular and inconsistent.

6.3 Recommendations

The nutritional quality of meals served the study schools did not meet the recommended nutrient intake of WHO (2014). Therefore, it is recommended that

government should consult experts in food and nutrition in each region to draw menu which has nutritional benefit to the pupils using locally grown foods in each region. It is again recommended that district officers should ensure menus provided for the schools are strictly adhered to.

The research findings revealed that the food ingredients were not bought from the farm gates and therefore were more expensive. This defeated the MDG goal upon which the GSFP was built. It is therefore recommended that government enact policies for all caterers to buy directly from the farm gate at cheaper prices. It is again recommended that proper store rooms be built for each school under the GSFP. Additionally, food quality analysis should be done periodically by school inspectors to identify food ingredients that have been contaminated with toxic contaminants, either naturally or accidentally, and be destroyed and to check the quality of meals served to pupils.

The environments under which the meals were prepared were generally fair with exception of some few schools that had no kitchens at all, thus prepared meals in the open at the mercy of the weather. It is therefore recommended that designated and well-built kitchens as well as dining rooms be provided to those few schools. Education on environmental cleanliness and food hygiene as well as food safety ought to be impacted onto the cooks, caterers, and all the kitchen staff. It is again recommended that inspectors should be assigned to a cluster of schools to check the quality of the meals. Hand washing should also be incorporated in Ghana School Feeding Programme (GSFP).

Regarding the challenges observed, it is recommended that District Assemblies pre-finance the programme instead of leaving it on the caterers. The monetary value assigned to the meals should also be increased to reflect the true value

of meals taken by living being of age of SAC. Payment of the caterers by the responsible government agency should be prompt to alleviate the financial pressure put on them. It is again recommended that strict monitoring of the kitchen staff on their dressing codes be done to encourage them to dress accordingly so as to avoid food contamination.

6.4 Suggestions for further studies

Finally, it is recommended that further studies on nutritional values of the meals, the conditions under which the meals are stored, cooked and served as well as the hygienic and the safety of the meals be done to ascertain that all the recommendations are followed through.

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APPENDICES

Appendix 1

Questionnaire for Pupils under the School Feeding Programme

The department of Home Economics Education of the University of Education, Winneba, is conducting a research on the topic "Nutritional value and safety of meals served under the Ghana School Feeding Programme in Wa and Cape Coast municipal schools."

It would be most appreciated, if you could candidly respond to the questionnaire you have been given. You are therefore humbly requested to give accurate and true response, to the best of your knowledge. All information provided would be treated with strict confidentiality.

DEMOGRAPHIC DATA OF RESPONSE

What is the name of your school? .....

In which region are you located? .....

Since when have you been on the school feeding programme? .....

What is your age? ……

In which class are you? …….

SECTION A

Are you served with any of these meals under the GSFP? Please tick Yes or No.

	YES	NO	If YES, how many times in a week
1. Rice with beans stew			
2. Rice with tomatoes stew			
3. Rice with egg stew			
4. Jollof rice			
5.Rice with palm nuts soup			
6. Rice with groundnuts soup			
7. Rice and beans with tomatoes stew			
8. Banku with palm nuts soup			
9. Banku with groundnuts soup			
10. Banku with okro soup			
11. Gari with palava sauce			
12. Cassava with garden egg stew			
13. Gari with palm nuts soup			
14. Gari and beans			
15. Tuo zaafi with ayoyo soup			
16. Tuo zaafi with dry okro soup			
17. Tuo zaafi with groundnuts soup			
18. Yam and garden egg stew			
19. Gari with tomatoes stew			
20. Kenkey and palm nut soup			
21. Fried plantain with beans			
22. Kenkey with fried fish and red pepper			
23. Yam with palava sauce			
24. Yam with tomato stew			
25. Cassava with palava sauce			
26. Yam with beans stew			
27. Kokonte with palm nut soup			
28. Kokonte with ground nut soup			
28. Kokonte with okro soup			

7. Describe the taste of the meals served to you by the caterers by selecting **one** of the following responses.

a. Tasty. Hence I ate all my meals ( )

b. Tasty but unable to eat all my meals ( )

c. Not tasty but I ate my meals ( )

d. Not tasty hence unable to eat all my meals ( )

8. Is any of the following ingredients used in cooking meals for you? (Please tick Yes or No

FOOD INGREDIENTS	YES	NO	If YES, how many times in a week
a. ANIMAL AND ANIMAL PRODUCTS			
Meat			
Fish			
Eggs			
Poultry			
Others			
b. LEGUMES AND OILY SEEDS			
Beans			
Groundnuts			
Agushie			
Soya beans			
Dawadawa			
Palm fruits			
c. CEREAL AND GRAINS			
Maize			
Rice			
Millet			
Sorghum			
d. FRUITS AND VEGETABLES			
Banana			
Mango			
Leaves (all type of edible green leaves in Ghana)			
Okro			
Garden eggs			
Tomatoes			
Pepper			
Onions			
Cabbage			
Carrot			
e. STARCHY ROOT AND PLANTAIN			
Fresh cassava			
Konkonte			
Gari			
Cassava dough			
Others (specify)			

f. FATS AND OILS			
Vegetable cooking oil (frytol, Viking……..)			
Coconut oil			
Palm oil			
Palm kennel oil			
Shea butter			
Margarine			

SECTION C

9. What is the regular source of water for cooking your meals? Please tick from the following sources of water.

	YES	NO
Pipe borne water	( )	( )
Local well	( )	( )
Boreholes	( )	( )
Rivers	( )	( )
Ponds	( )	( )

Others…….

10. What do you think about the hygienic conditions under which meals are cooked? Please choose **one.**

Excellent ( )

Very good ( )

Good ( )

Fair ( )

11. What do you think about the hygienic conditions under which meals are served? Please choose one.

Excellent ( )

Very good ( )

Good ( )

Fair ( )

12. What do you think about the hygienic conditions under which meals are eaten? Please choose one.

Excellent ( )

Very good ( )

Good ( )

Fair ( )

13. Do you wash your hands before eating? If yes how? Choose **one** from the alternatives.

a. With soap under running water ( )

b. Bowl of water with soap ( )

c. Bowl of water without soap ( )

d. Running water without soap ( )

e. Do not wash hands ( )

14. Do you sometimes have to wait to use a plate after someone else has finished using it? Yes ( ) No ( )

15. If yes, is the plate washed with water and soap before using to serve you? Yes ( ) No ( )

16. The plate from which you eat is washed by?

(a) Ourselves (pupils) ( )

(b) Kitchen staff ( )

17. Are pests/animals/rodents seen in the cooking area during food preparation? (Please tick Yes ( ) or No ( ).

SECTION D

18. Do you have any complaint about the meals served? Choose Yes or No from the alternatives.

	YES	NO	If YES, how many times in a week
a. Offensive scent			
b. Partially cooked			
c. Foreign materials seen in foods			
d. Watery soup			
e. Colour not appealing			

19. Do you face any of these challenges as a pupil under the GSFP? Choose Yes or No to each challenge.

CHALLENGES	YES	NO
Food delays		
The kitchen staff shouts and insult us		
Kitchen staff favours some people more than others		
Smoke emanating from kitchen disturbs and affects us		
Parents no more provide lunch		
It makes our school surroundings very dirty		
Parents no more give money		
Kitchen staff extort money from us		

Measurement of meals of pupils

	Meal	Weight (gm)
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		

Appendix 2

Questionnaire for Teachers under the School Feeding Programme

The department of Home Economics Education of the University of Education, Winneba, is conducting a research on the topic "Nutritional value and safety of meals served under the Ghana School Feeding Programme in Wa and Cape Coast schools."

It would be most appreciated, if you could respond to the questionnaire you have been given. You are therefore humbly requested to give accurate or true responses, to the best of your knowledge. All information provided would be treated with strict level of confidentiality.

DEMOGRAPHIC DATA OF RESPONSE

What is the name of your school? .....

In which region are you located? .....

Since when have you been on the school feeding programme? .....

Please tick appropriately. Teacher ( ) Head teacher ( )

How many pupils do the kitchen staff cook for? ……

SECTION A

6. Do the kitchen staff have a menu? Please tick Yes ( ) or No ( )

7. If yes, do the kitchen staff follow the menu? Yes ( ) No ( )

8. If No then why? …….

……

9. Are the pupils served with any of these meals under the GSFP? Please tick Yes or No.

	YES	NO	If YES, how many times in a week
1. Rice with beans stew			
2. Rice with tomatoes stew			
3. Rice with egg stew			
4. Jollof rice			
5.Rice with palm nuts soup			
6. Rice with groundnuts soup			
7. Rice and beans with tomatoes stew			
8. Banku with palm nuts soup			
9. Banku with groundnuts soup			
10. Banku with okro soup			
11. Gari with palava sauce			
12. Cassava with garden egg stew			
13. Gari with palm nuts soup			
14. Gari and beans			
15. Tuo zaafi with ayoyo soup			
16. Tuo zaafi with dry okro soup			
17. Tuo zaafi with groundnuts soup			
18. Yam and garden egg stew			
19. Gari with tomatoes stew			
20. Kenkey and palm nut soup			
21. Fried plantain with beans			
22. Kenkey with fried fish and red pepper			
23. Yam with palava sauce			
24. Yam with tomato stew			
25. Cassava with palava sauce			
26. Yam with beans stew			
27. Kokonte with palm nut soup			
28. Kokonte with ground nut soup			
28. Kokonte with okro soup			

10. Is any of the following ingredients used in cooking meals for the pupils? (Please tick Yes or No)

FOOD INGREDIENTS	YES	NO
b. ANIMAL AND ANIMAL PRODUCTS		
Meat		
Fish		
Eggs		
Poultry		
Others		
b. LEGUMES AND OILY SEEDS		
Beans		
Groundnuts		
Agushie		
Soya beans		
Dawadawa		
Palm fruits		

g. CEREAL AND GRAINS		
Maize		
Rice		
Millet		
Sorghum		
h. FRUITS AND VEGETABLES		
Banana		
Mango		
Leaves (all type of edible green leaves in Ghana)		
Okro		
Garden eggs		
Tomatoes		
Pepper		
Onions		
Cabbage		
Carrot		
i. STARCHY ROOT AND PLANTAIN		
Fresh cassava		
Konkonte		
Gari		
Other (cassava dough, plantain……)		
j. FATS AND OILS		
Vegetable cooking oil (frytol, Viking……..)		
Coconut oil		
Palm oil		
Palm kennel oil		
Shea butter		
Margarine		

SECTION B

11. Do the kitchen staff give any of these treatments to any of the ingredients that they purchase? Please, tick (√) the appropriate response(s)

Ingredients	No treatment	Periodic spraying	Periodic drying	Regular sweeping
Fresh ingredients (eg. ayoyo, tomatoes, pepper, etc.)				
Dry ingredients (eg. rice, flour, beans, gari, etc.)				

12. Do the kitchen staff store the purchased food ingredients in a store room? Please tick Yes ( ) or No ( )

13. If No, please state where the food ingredients are stored? .....

14. If yes, how do the kitchen staff store ingredients?

Storage places	Yes	No
Roofed store with pallet		
Roofed store without pallet		
On tables in store rooms		
Kitchen cupboards in store rooms		
In sacks or basins on the floors of store rooms		

15. Do the communities help towards feeding of the pupils? Tick Yes ( ) No ( )

16. If yes, in what way do they help?

.....

SECTION C

17. What is the regular source of water for cooking your meals? Please tick the correct response for each source of water.

	YES	NO
Pipe borne water	( )	( )
Local well	( )	( )
Boreholes	( )	( )
Rivers	( )	( )
Ponds	( )	( )

Others…….

18. What do you think about the hygienic conditions under which meals are cooked? Please choose one.

Excellent ( )

Very good ( )

Good ( )

Fair ( )

Poor ( )

19. What do you think about the hygienic conditions under which meals are served? Please choose **one.**

Excellent ( )

Very good ( )

Good ( )

Fair ( )

Poor ( )

20. What do you think about the hygienic conditions under which meals are eaten? Please choose one.

Excellent ( )

Very good ( )

Good ( )

Fair ( )

21. Do the pupils wash their hands before eating? If yes how? Choose one from the alternatives.

a. With soap under running water ( )

b. Bowl of water with soap ( )

c. Bowl of water without soap ( )

d. Running water without soap ( )

e. Do not wash hands ( )

22. The bowls from which the pupils eat is washed by, please tick Yes or No.

Ourselves (pupils) ( ) Kitchen staff ( )

23. Are pests/animals/rodents seen in the store room? (Please tick Yes ( ) or No ( )

24. Are pests/animals/rodents seen in the cooking area during food preparation?

Yes ( ) or No ( ).

SECTION D

25. Do you have any complaint about the meals served? Choose Yes or No from the alternatives.

	YES	NO
a. Offensive smell		
b. Partially cooked		
c. Foreign materials seen in foods		
d. Watery soup		

26. Do you face any of these challenges as a teacher or head teacher under the GSFP? Choose Yes or No to each response.

CHALLENGES	YES	NO
Payment of feeding grant is irregular and meagre		
Facilities for cooking on the campus are unavailable		
It causes astronomical increases in the pupils' population but very limited infrastructure to accommodate them.		

Appendix 3

Questionnaire for Kitchen Staff under the School Feeding Programme

The department of Home Economics Education of the University of Education, Winneba, is conducting a research on the topic "Nutritional value and safety of meals served under the Ghana School Feeding Programme in Wa and Cape Coast schools."

It would be most appreciated, if you could respond to the questionnaire you have been given. You are therefore humbly requested to give accurate or true responses as far as possible. All information provided would be treated with strict level of confidentiality.

DEMOGRAPHY

What is the name of your school? .....

In which region are you located? .....

Please tick appropriately. Cook ( ) Matron ( )

How long have you worked as a caterer/ cook? ……

Since when have you been on the school feeding programme? .....

How much feeding grant is given per child? ……

How many pupils do you cook for? ……..

What is your level of education? Non-formal ( ) Basic Level ( ) Secondary/Vocational ( ) Tertiary ( )

Do you have any professional qualification in catering or foods and nutrition?

Yes ( ) No ( )

If yes what is your level? Please tick the highest. NVTI in Catering ( ).

SHS, in Foods and Nutrition. ( )

Dip, HND, Degree in catering or foods and nutrition ( ).

Others specify…….

SECTION A

Do you have a menu? Yes ( ) No ( )

If yes list the meals……

Days	Monday	Tuesday	Wednesday	Thursday	Friday
Meals					

Do you follow the menu? Yes ( ) No ( )

If No why? .....

……

Do you serve the pupils with any of these meals under the GSFP? Please tick Yes or No

	YES	NO	If YES, how many times in a week
1. Rice with beans stew			
2. Rice with tomatoes stew			
3. Rice with egg stew			
4 . Jollof rice			
5. Rice with palm nuts soup			
6. Rice with groundnuts soup			
7 . Rice and beans with tomatoes stew			
8. Banku with palm nuts soup			
9. Banku with groundnuts soup			
10.Banku with okro soup			
11.Gari with palava sauce			
12. Cassava with garden egg stew			
13. Gari with palm nuts soup			

14 .Gari and beans			
15. Tuo zaafi with ayoyo soup			
16. Tuo zaafi with dry okro soup			
17. Tuo zaafi with groundnuts soup			
18. Yam and garden egg stew			
19. Gari with tomatoes stew			
20. Kenkey and palm nut soup			
21. Fried plantain with beans			
22. Kenkey with fried fish and red pepper			
23. Yam with palava sauce			
24. Yam with tomato stew			
25. Cassava with palava sauce			
26. Yam with beans stew			
27. Kokonte with palm nut soup			
28. Kokonte with ground nut soup			
29. Kokonte with okro soup			

15. Is any of the following ingredients used in cooking meals for the pupils? (Please tick Yes or No)

FOOD INGREDIENTS	YES	NO
c. ANIMAL AND ANIMAL PRODUCTS		
Meat		
Fish		
Eggs		
Poultry		
Others		
b. LEGUMES AND OILY SEEDS		
Beans		
Groundnuts		
Agushie		
Soya beans		
Dawadawa		
Palm fruits		
k. CEREAL AND GRAINS		
Maize		
Rice		
Millet		
Sorghum		
l. FRUITS AND VEGETABLES		
Banana		
Mango		
Leaves (all type of edible green leaves in Ghana)		
Okro		
Garden eggs		
Tomatoes		
Pepper		
Onions		
Cabbage		
Carrot		
m. STARCHY ROOT AND PLANTAIN		
Fresh cassava		
Konkonte		
Gari		

Other (cassava dough, plantain……)		
n. FATS AND OILS		
Vegetable cooking oil (frytol, Viking……..)		
Coconut oil		
Palm oil		
Palm kennel oil		
Shea butter		
Margarine		

16. Have you had any training in catering or nutrition within the last 2 years?

SECTION B

17. Do you purchase the ingredients you use to cook for the pupils from any of these sources?

Sources from where ingredients are acquired	**Yes**	**No**
Market places		
Local farmers		
Others …….		

18. Do the communities help towards feeding of the pupils? Tick Yes ( ) No ( )

19. If yes, in what way do they help? .....

20. Do you give any of these treatments to any of the ingredients you purchase?

Ingredients	**No treatment**	**Periodic spraying**	**Periodic drying**	**Regular sweeping**
Fresh ingredients (eg. ayoyo, tomatoes, pepper …….)				
Dry ingredients (eg. rice, flour, beans, gari…….)				

21. Do you store the purchased food ingredients in a store room?

Tick Yes ( ) or No ( )

22. If No, please state where the food ingredients are stored.....

23. If yes, how do you store the ingredients? Please choose from the alternatives

Storage places	Yes	No
Roofed store with pallet		
Roofed store without pallet		
On tables in store rooms		
Kitchen cupboards in store rooms		
In sacks or basins on the floors of store rooms		

24. How long do food ingredients stay in storage before being used?

Storage duration

Food items	1 week	2 weeks	3 weeks	4 weeks
Fresh ingredients				
Dry ingredients				

SECTION C

25. What is the regular source of water for cooking the meals? Please tick from the following sources of water.

	YES	NO
Pipe borne water	( )	( )
Local well	( )	( )
Boreholes	( )	( )
Rivers	( )	( )
Ponds	( )	( )

Others…….

26. What do you think about the hygienic conditions under which meals are cooked? Please choose one.

Excellent ( )

Very good ( )

Good ( )

Fair ( )

27. What do you think about the hygienic conditions under which meals are served? Please choose one.

Excellent ( )

Very good ( )

Good ( )

Fair ( )

28. What do you think about the hygienic conditions under which meals are eaten? Please choose one.

Excellent ( )

Very good ( )

Good ( )

Fair ( )

29. Do the pupils wash their hands before eating? If yes how? Choose one from the alternatives.

a. With soap under running water ( )

b. Bowl of water with soap ( )

c. Bowl of water without soap ( )

d. Running water without soap ( )

e. Do not wash hands ( )

30. The bowls from which pupils eat is washed by?

Pupils ( )

Kitchen staff ( )

31. Do you have health certificate? Tick Yes ( ) No ( )

32. Have you had any in-service training in hygiene practices within the last 2 years?

Tick Yes ( ) No ( )

33. Do you come to work when ill? Yes ( ) No ( )

34. Do you go for health screening periodically? Yes ( ) No ( )

35. Are pests/animals/rodents seen in the store room? (Please tick Yes ( ) No ( )

36. Are pests/animals/rodents seen in the cooking area during food preparation? Please tick Yes ( ) or No ( ).

SECTION D

37. Do the teachers or pupils make any complaint about the meals served to them?

Yes ( ) No ( )

38. If yes choose the appropriate response

	YES	NO
a. Offensive scent		
b. Partially cooked		
c. Foreign materials seen in foods		
d. Watery soup		
e. Colour not appealing		

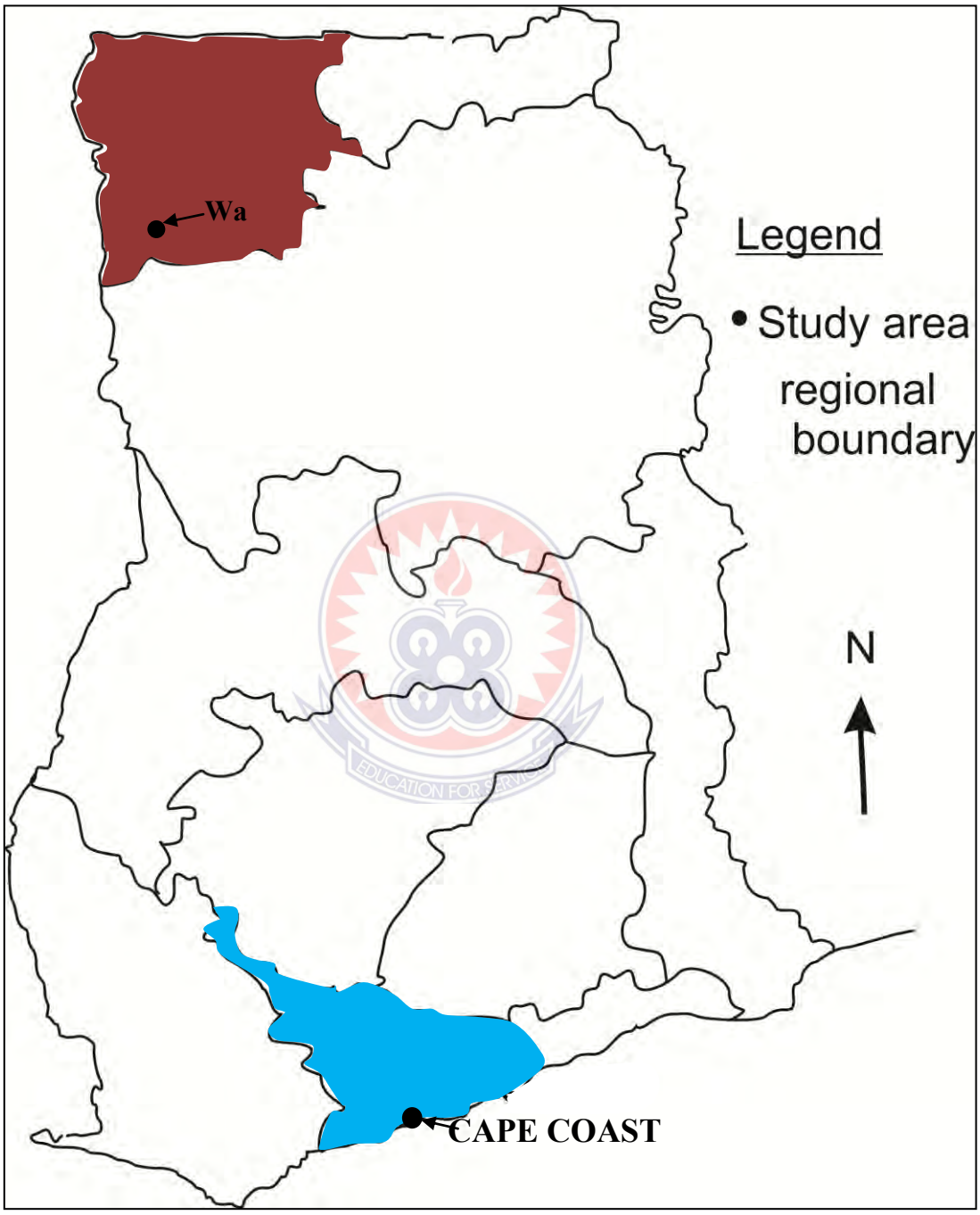
39. Do you face any of these challenges as a kitchen staff under the GSFP? Choose Yes or No to each response.

CHALLENGES	YES	NO
Irregular payment of feeding grant and monthly allowances		
Lack of cooking facilities		
Low unit price rate per child		
Monthly allowances too small		

MEASUREMENT OF FOOD INGREDIENTS		
Food Item	Quantity	Weight

Appendix 4

Map of Study Areas



Appendix 5

The Weights of Meals in the study schools

WEIGHT OF MEALS (IN GRAMS) IN SCHOOL (A) IN WA MUNICIPAL

Rice and beans with tomatoes stew	Tuo Zaafi with green vegetable soup	Gari and beans	Banku with groundnuts soup	Jollof rice
180	380	220	360	190
190	385	260	380	190
190	380	240	360	200
200	385	200	340	200
200	380	200	340	180
200	360	210	360	190
190	380	200	320	200
195	385	220	320	200
190	400	200	340	200
195	400	210	350	210
180	440	220	340	200
185	400	220	350	190
185	380	200	340	190
190	400	200	320	200
200	420	200	340	200
220	400	200	360	190
190	390	220	340	190
180	400	240	320	200
195	390	210	340	190
200	400	200	340	200
210	420	220	320	190
210	400	200	340	200
190	440	220	320	190
185	420	200	360	200
190	400	190	360	190
180	440	190	340	200
180	420	200	340	180
190	390	190	350	185
195	420	200	340	190
190	390	210	340	200

WEIGHT OF MEALS (IN GRAMS) IN SCHOOL (A) IN WA MUNICIPAL

Rice and beans with tomatoes stew	Tuo Zaafi with green vegetable soup	Gari and beans	Banku with groundnuts soup	Jollof rice
200	360	200	360	210
180	**360**	**200**	**320**	**200**
180	**380**	**230**	**360**	**190**
180	**375**	**195**	**310**	**190**
190	**400**	**200**	**330**	**200**
200	**365**	**210**	**340**	**200**
175	**400**	**230**	**340**	**190**
185	**400**	**200**	**360**	**190**
200	**400**	**190**	**350**	**190**
200	**420**	**195**	**320**	**200**
190	**430**	**200**	**345**	**220**
180	**400**	**250**	**355**	**210**
195	**380**	**200**	**300**	**200**
190	**365**	**230**	**340**	**195**
195	**365**	**220**	**370**	**205**
180	**400**	**220**	**360**	**210**
180	**410**	**210**	**370**	**200**
200	**430**	**185**	**380**	**195**
200	**420**	**190**	**390**	**190**
210	**410**	**210**	**360**	**200**
205	**400**	**200**	**340**	**210**
190	**380**	**220**	**340**	**210**
175	**365**	**220**	**330**	**220**
210	**370**	**240**	**325**	**205**
190	**375**	**260**	**340**	**190**
180	**375**	**260**	**350**	**200**
180	**380**	**205**	**360**	**220**
195	**400**	**210**	**350**	**195**
200	**420**	**265**	**350**	**190**
180	**430**	**250**	**370**	**200**

CAPE COAST METRO SCHOOLS: SCHOOL A

Gari balls and tomatoes stew	Beans and Gari	Rice and tomatoes stew	Banku and okro soup	Rice with palava sauce
165gms	190	190	200	175
175	165	180	190	180
190	170	170	190	180
170	180	175	195	185
165	185	185	200	170
170	185	180	210	170
170	190	185	200	180
180	190	180	220	175
185	190	180	190	190
175	200	180	195	190
185	190	170	220	200
180	200	175	220	200
180	210	170	195	190
190	190	170	190	190
180	180	180	195	180
175	180	170	200	180
185	185	180	200	190
180	180	180	220	190
180	185	185	210	185
180	175	175	190	200
175	180	175	210	200
200	180	180	200	200
180	175	180	200	190
180	180	185	210	190
170	170	180	210	190
170	190	185	215	190
180	190	180	190	185
170	180	185	195	190
180	190	180	200	190
170	170	185	190	200

CAPE COAST METRO SCHOOLS: SCHOOL B

Gari balls and tomatoes stew	Beans and Gari	Rice and tomatoes stew	Banku and okro soup	Rice with palava sauce
180	170	180	190	170
170	170	180	200	180
160	180	165	190	190
170	170	170	195	180
180	200	180	190	180
190	190	180	225	170
190	185	170	190	195
185	180	190	200	200
200	190	170	200	210
170	185	165	195	165
180	185	160	190	180
165	200	170	200	180
170	160	180	190	180
180	200	190	210	190
190	190	190	205	195
190	190	200	205	185
185	220	180	200	175
170	165	190	190	170
165	175	190	190	185
160	170	180	200	200
180	180	170	190	180
170	180	180	190	200
200	190	170	205	200
190	170	190	215	210
200	200	200	200	190
180	210	200	190	180
170	210	180	195	195
180	190	170	220	170
185	180	175	200	195
190	180	190	195	175

Appendix 6

School Feeding Programme Pictures




Kitchen Staff serving Pupils in both Wa and Cape Coast Schools




Types of meal served to pupils in both Wa and Cape Coast municipal Schools

Meals weighed by researcher in both Wa and Cape Coast municipal Schools

Pupils washing hands and bowls in both Wa and Cape Coast municipal Schools

Pupils eating in both Wa and Cape Coast municipal Schools

Appendix 7

Introductory Letter

University of Education, Winneba
P. O. Box 25,
Winneba

The District Director
Ghana Education Service
Wa/ Cape Coast

Dear Sir / Madam,

I am a student of the University of Education Winneba, pursuing a Master of Philosophy Degree in Home Economics.

As part of the requirement to earn the degree, I am conducting a research study on "Nutritional value and safety of meals served under the Ghana School Feeding Programme".

With this letter I am asking permission to use the pupils in your schools in the district as part of the survey.

I count on your co-operation.

Yours Faithfully,

…….
(BIGSON KATE)