UNIVERSITY OF EDUCATION, WINNEBA- KUMASI

COLLEGE OF TECHNOLOGY EDUCATION

INVESTIGATING THE HYGIENIC PRACTICES OF KITCHENS IN THE SENIOR HIGH SCHOOLS IN THE SEKYERE SOUTH DISTRICT

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DECLARATION

CANDIDATE'S DECLARATION

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

SIGNATURE: …….

DATE: ……..

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this dissertation were supervised by me in accordance with the guidelines on supervision of dissertation laid down by the University of Education, Winneba.

NAME OF SUPERVISOR: DR. GILBERT OWIAH-SAMPSON

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DATE: …….

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To all I say God richly bless you.

DEDICATION

This work is dedicated to the one and only true God whom I serve. Thank you father for how far you have brought me.

TABLE OF CONTENTS

LIST OF TABLES

PAGE

LIST OF FIGURES

PAGE

ABSTRACT

The main purpose of the study was to assess the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District. The researcher used descriptive research design for the study. Quantitative research approach was used. The population was made up of 6 Matrons, and 51 Kitchen staff of the selected Senior High Schools in the Sekyere South District totaling 57 in all. Census sampling technique was used to select all the fifty seven (57) participants for the study. Questionnaire was the main research instrument used to gather primary data. The statistical package for social scientist (SPSS version 16) was used to analyze the data. The study results revealed that 56.4% agreed that effective personal hygiene practices in the school kitchen prevented food contamination. Moreover, 65.5% agreed that effective hand washing practices prevented food contamination. To add more, 61.8% agreed that effective environmental hygiene prevented food contamination. The study findings revealed that 87.3% of the respondents agreed that they washed their hands properly and frequently. Moreover, 65.5% agreed that cooks covered wounds completely. Also, 67.3% agreed that cooks wore clean and proper uniforms. Moreover, 87.3% agreed that effective measures that prevented food contamination in the school kitchen were the frequent use of separate equipment and utensils such as knives and cutting boards for handling raw foods prevented food prevented food contamination in the school kitchen, storing food in containers to avoid contact between raw and prepared foods, washing fruits and vegetables, especially if eaten raw can prevent food from being contaminated, removing outer leaves of leafy vegetables, can also prevent contamination. Moreover, 78.2% indicated that cooking food thoroughly; making sure that the temperature has reached 70°C prevented food contamination. The study recommended that the Food and Drugs Authority should continue to enforce strict rules and regulations that can ensure the compliance to food safety standards in school catering.

CHAPTER ONE

Introduction

1.0 Background to the Study

Adequate knowledge of food hygiene essentially entails the handlers' awareness of things to be done or things to be put in place, in the course of either acquiring raw food materials, preparing food or serving food to consumers, so that food safety is achieved to ensure students safety (Malcolm & Bronwyn, 2011).This hygienic conditions and practices involves obtaining raw materials (perishable and non-perishable food items) for food preparation from good sources. Also, providing the correct storage methods for different food items, proper separation of raw food items from ready-to-eat food, the need to wash hands correctly after being exposed to certain contaminants. Moreover, proper waste management, the importance of cooking food at the right temperature and for the correct duration, the importance of proper dressing and observance of personal hygiene, the importance of proper washing of fruits and vegetable, availability of wholesome portable water for drinking etc all have critical roles in ensuring the safety of food/drink for the consumers (Alapati, 2011).

Food hygiene deals with the prevention of contamination of food stuffs at all stages of production, collection, transportation, storage, preparation, sale and consumption (Alapati, 2011). Unhygienic conditions and practices in the school kitchen lead to food borne diseases. Food borne illness is defined as a disease, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food. This process of kitchen safety includes proper storage of food items prior to use,

maintaining a clean environment when preparing the food, and making sure that all serving dishes are clean and free of bacteria that could lead to some type of contamination (Omemu & Aderoju, 2008).

The food storage aspect of food hygiene is focused on maintaining the quality of the food, so that it will be fresh when used in different recipes. Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent foodborne illnesses. This includes the number of routines that should be followed to avoid potentially severe health hazards. Food can transmit diseases from one person to the other as well as serve as a growth medium for bacteria that can cause food poisoning (Akonor & Akonor, 2013).

Food sanitation also extends to keeping the preparation area clean and relatively germ-free. Mixing bowls, spoons, paring knives and any other tools used in the kitchen should be washed thoroughly before use (Nigusse & Kumie, 2012). Kitchen counter-tops and cutting boards should also be cleaned and sterilized from time to time. Keeping a sanitary workplace will also cut down on the chances of some type of foodborne illnesses from developing when people consume a prepared food (Nigusse & Kumie, 2012). Students in Senior High Schools have a reasonable expectation that the foods they purchase have been produced and processed under hygienic condition and that the food has not been adulterated by addition of any biological, chemical, or physical hazard. These expectations are regularly enforced by regulations that govern production, processing, distribution and retailing of foods and drugs in any country. So much emphasis is placed on food safety that necessitated the World Health Organization (WHO) formulating a general principle of food hygiene which basically is to prevent

contaminating food with pathogens spreading from people, pets and pests (Margaret, Judith, & Paul, 2013). Separate raw from cooked foods to prevent contaminating the cooked food. Cook food for the appropriate length of time and at the appropriate temperature to kill pathogens. Store food at the proper temperature and use safe water and raw materials are safe kitchen practices (Margaret *et al.,* 2013).

Food contamination occurs most commonly from excreta on people's fingers, flies etc (i.e. faeco-oral transmission). Food contamination may also occur by skin infection especially the hands of food-handlers (staphylococcal food poisoning), consumption of diseased animals (tape worm, brucellosis etc) or chemicals used as pesticides on crops. Every person is at risk of foodborne illness. It is a widespread and growing public health problem both in developed and developing countries; the effect being more devastating in developing countries (Musa & Akande, 2013).

The research gap of this study is that, there is a lack of empirical evidence concerning an assessment of the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District. Therefore, this study assessed the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District to provide empirical evidence of this gap.

1.2 Statement of Problem

Food and water borne diseases are prevalent among students in the Sekyere South District and empirical examination has indicated large proportion of these diseases which results from poor food sanitation and unhygienic handling practices of kitchens in the Senior High Schools in the district. Again, there is lack of proper monitoring and

supervision by food safety officers and enforcement of food hygiene regulations in the school kitchens. This shows the low level of awareness among food handlers on possible diseases that one could get when hygiene is not practiced in the school kitchen. An unhygienic practice of school kitchens eventually causes diseases, absenteeism, low productivity and decline in academic performance among students in the Sekyere South District. Furthermore, unhygienic kitchen practices in the school kitchen causes food poisoning and thereby causing discomfort, cost of pain, grief and suffering, hospitalization and disruption to academic work in the school. To this effect, this study would assess the unhygienic conditions and practices of kitchens in the Senior High Schools in the Sekyere South District.

1.3 Main Objective of the Study

The main purpose of the study was to assess the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District.

1.4 Specific objectives of the Study

The specific objectives of the study include;

1. To investigate the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District.
2. To assess the level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District;

1.5 Research Questions

The following research questions were used for the study;

1. What are the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District?
2. What is the level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District?

1.6 Significance of the Study

This study highlighted the need for greater improvement in overall kitchen hygiene and food safety knowledge and condition. Given that kitchen staffs are the main food contamination vehicles, this study aims at contributing with proposals for health promotion, adoption of legislation and use of appropriate tools to increase knowledge, and changing wrong beliefs concerning food habits and changing kitchen staffs practice that increase the risk of food borne diseases in the selected Senior High Schools in the Sekyere South District. Further, this study offered new insight and examination of this important area and thus make an original contribution to the literature.

1.7 Scope of the Study

The main purpose of the study was to assess the hygienic conditions and practices of kitchens in the Senior High Schools in the Sekyere South District. The geographical scope of the study was limited to selected Senior High Schools in the Sekyere South District in the Ashanti Region of Ghana. Therefore, the study was conceptually limited in scope to the research objectives stated above.

1.8 Organization of the Study

The entire research were organized into five parts and the outline of each chapter is given as follows:

Chapter One: This chapter discusses the Introduction, Background of the Study, Objectives of the Study, Statement of the problem, Objective of the Study, Research Question, scope of the Study, Significance of the Study and organisation of the study.

Chapter Two: This was on Literature reviewed from relevant textbooks, journals, websites and other referenced sources. It also included the theoretical framework used for the study.

Chapter Three: This chapter covered the company profile and research methodologies used for the study.

Chapter Four: This chapter covered the presentation, analysis of data and discussion of main findings by way of figures, graphical presentation and statistics.

Chapter Five: This chapter comprised a summary of the research, conclusion and recommendation on food safety and the practice of good hygiene in the school kitchen.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

2.1 Food Safety Knowledge and Hygienic Attitudes among Kitchen Staff

The National School Lunch Program and the School Breakfast Program provides approximately 33 million meals daily to America's children (ASFSA, 2009). School foodservice professionals are partially responsible for the well-being of these children through the foods they serve, making food safety training and education an important component of the school foodservice program. The knowledge and attitudes of foodservice employees towards food safety is critical to a successful food safety program. According to Howes, McEwen, Griffith, & Harris (2016) attitudes, knowledge, and monitoring are important factors for decreasing foodborne illness outbreaks in foodservice. A positive behavior and attitude as well as training in food safety are important for maintaining safe food handling practices (Howes et al., 2016). Green and Frame (2008) conducted a food safety study among nine elementary, middle and, high school kitchens.

The study was designed to determine existing food safety knowledge and behaviors of foodservice employees in pre and post-training sessions. The training curriculum was a 15-hour workshop adapted from the Educational Foundation of the National Restaurant Associations' program. Upon completion of the training, there were improvements observed in hand washing before and after eating, but a decline in hand washing after using the bathroom and before starting work in the kitchen. There also

were improvements observed in product handling such as washing fruits and vegetables before processing and labeling and dating stored foods. Further, work surfaces were cleaned more frequently and dishwashing procedures improved. A decrease in compliance was demonstrated in the use of serving line temperature logs. The three critical areas where knowledge and compliance were not correlated were hand washing procedures, proper thawing procedures, and the use of thermometers. An increase in food safety knowledge did not lead to a positive change in behavior according to this study (Green & Frame, 2008). Sneed and White (2013) conducted a study among school foodservice managers and directors/supervisors to determine their perceptions of continuing education needs of managers. A national mailing was distributed to 1200 managers and 1200 directors/supervisors. Managers and directors/supervisors rated health and safety laws, inspection, and enforcement as high continuing education needs. Perceived needs for continuing education were positively correlated with education level as well as years of foodservice experience and school foodservice experience. In general, school foodservice employees demonstrate a positive attitude towards learning about food safety as well as a desire to receive further knowledge in this area. However, research has shown that these factors do not always result in increased food safety compliance in the school kitchen.

2.2 Food Safety Practices among Foodservice Employees

The potential for a foodborne illness outbreak is possible in any educational institution. In May of 1990 in Rhode Island, a staphylococcal outbreak occurred in an elementary centralized school foodservice system. Of the 600 lunches served, 100 children reported becoming ill after consuming the lunch. The cause of the outbreak was

a foodservice employee who was infected with S. aureus. The employee had "removed the casings from two of nine warm ham rolls hours prior to service. Because of improper refrigeration, prolonged handling, and inadequate re-heating, the ham was held at temperatures estimated at 50-120 degrees F for a minimum of 15 hours" (Richards et al., 2013).

In another study, data were collected in 10 school foodservices that prepared food in a central kitchen and transported meals to satellite kitchens. The conditions and practices that might affect the safety of the food were observed. Hand washing facilities were available in the food production areas in most of the kitchens. However, poor hand washing practices were observed among most of the food handlers at the school kitchen. Picking up food with hands to eat was observed as well as eating and drinking during food preparation (Brown et al., 2012). Food safety abuses related to time-temperature procedures also were observed. Five entrees in four of the school systems were held over one hour between preparation and the start of transportation. The transportation time for three entrees in two large foodservice systems exceeded one hour. In seven school systems, some of the entrees were held more than one hour between the end of transportation and the start of service. Two entrees, "macaroni and cheese and charbroiled beef, were held for 4.29 and 3.85 hours respectively from end of production to end of service." However, the holding temperatures for these entrees were 140 degrees F or above. Nine of the 20 entrees showed internal temperatures between 40-140 degrees F during hot holding (Brown et al., 2012).

In a study by Connors, Bednar, Imhran, & Czajka-Narins (2009) a HACCP inspection was conducted to determine milk handling practices in 32 elementary schools

in Texas. The results indicated that the milk temperatures were generally within the recommended 32 to 41 degree F range. However, inspection of individual kitchens found milk temperatures that were above 41 degrees F. Milk was ordered from an approved source for all schools. Many of the schools did not inspect the milk received or record temperatures upon delivery (Connors et al. 2009).

Gilmore, Brown, & Dana (2008) conducted a study in which data collection forms for measuring food quality were developed. Four schools with enrollments ranging from 862 to 40,265 students provided the data. Sanitation practices were evaluated in each kitchen where food was prepared. They found that hair was not fully restrained and hand washing was infrequently observed. However, when hand washing was performed it was done thoroughly. Hand washing and changing of gloves was evident in 50% of the observations. Frozen foods were thawed properly and foods were handled with utensils, clean hands, or gloves. Sanitizing of surfaces, small equipment, utensils, and thermometers tended to be performed consistently or not at all. Work surfaces were cleaned between uses and surfaces of small equipment appeared clean (Gilmore et al., 2008).

In a study by Spencer (2016), hazard analyses were conducted in six food preparation sites and 16 school canteens in the State of Bahrain. Hazards were primarily associated with the "preparation of foods too far in advance of service, bare handling of food items, and holding food items at room temperature for extended periods of time. Re-heating of foods was not observed" (Ali & Spencer, 2016). Raccach, Morrison, & Farrier (2015) conducted an analysis of public health hazards in a centralized school foodservice operation. "Food handling, personnel, equipment, storage, preparation, holding,

distribution, serving, cleaning, and sanitation were observed." The researchers found that foods were stored at appropriate cold storage conditions and were rotated on a "first in first out" basis. Stored foods also were covered to protect them from overhead contamination. However, employees did a large amount of handling during food preparation. Employees used bare hands to prepare foods and only two employees were observed using gloves. Further, hair restraints were not used by employees. Cooking equipment was scraped from food items and hand cleaned, but not sanitized. During service, students picked up uncovered silverware from trays and sneeze guards were not used (Raccach et al. 2015).

2.3 Increasing Food Safety Knowledge and Practices among Food Handlers

In a study conducted by Neill, (2010), the aim of school kitchen staff is to serve acceptable, safe, and nutritious meals to satisfy students and consumers. To achieve this aim, foods must be handled appropriately in the kitchen to ensure maximum quality and safety, which is the responsibility of all food handlers in the kitchen. This review of literature will focus on four main areas: incidence and causes of foodborne illness, food safety practices and enhancing food safety knowledge and strategies to ensure food safety. Correct handling of food during all stages of its preparation and storage is vital in reducing the incidence of foodborne illness (NACMCF, 2013). However, between 10 and 20% of foodborne illness are caused by poor consumer food handling behaviour (Food Authority NSW, 2008). A systematic review of food safety studies identified that consumers commonly implement unsafe food-handling behaviours during domestic food preparation (Redmond & Griffith, 2013). Therefore increasing knowledge of correct food hygiene practices may be an important factor in changing behaviour. People may believe

they are already implementing hygienic behaviours when in fact they are not. For instance; Research in Australia and the USA has suggested that young adults aged 18-29 in particular have less knowledge about food safety and are more likely to engage in risky food hygiene behaviours than other groups (The Food Safety Information Council, 2008).

In addition, there has been little support that knowledge alone can change behaviour, although the research does suggest that increasing knowledge can make it possible for the consumer to make more informed choices with regard to changing behaviour. Although there have been numerous calls for the development of interventions based on social cognition theory in the area of food safety (Seaman & Eves, 2010), there have in fact been very few theory based studies with the goal of changing consumer‘s behaviour. One intervention that did target changing behaviour was an observational study by Redmond and Griffith (2016). The authors used a social marketing intervention (leaflets, posters, TV documentary, and newspaper articles) with the target behaviours including adequate hand washing and changing/washing chopping boards between preparation of raw chicken.

Although the intervention was effective immediately after the implementation, food safety behaviours had decreased at follow-up 4-6 weeks later. This supports the idea that increasing knowledge alone is not enough to change and maintain desired behaviours. Kretzer and Larson (2008) recommended that when planning a theoretically based intervention for improving infection control practices, factors that have been shown to consistently predict or influence behaviour need to be incorporated into the design, in order to increase the likelihood of success.

2.4 Knowledge and Practice of the Food Handlers

A study by Rodríguez and Gregory (2015) revealed that an effective training programme assessed whether participants acquired new skills during the training, and whether the newly acquired skills were transferred to the job setting. The report further indicated that food safety training was recommended for all cadres of staff including junior food-service staff, supervisors and managers who needed to know the dangers of food-borne illnesses and their prevention. Another study by (Egan et al. 2016) also observed that effective training depended on both attitude of the management and their willingness to provide resources needed for implementation of food safety systems. According to Birchenough (2010), there was a strong correlation between knowledge and food handling practices. Earlier studies on performance of individuals indicated that food safety knowledge increased with age and practice. Nurul (2008) suggested that training and motivation needed to be provided to encourage food handlers to practice appropriate attitude and procedures when working in the food arena.

By the same token, another study conducted by Coleman and Roberts (2015) observed that for food safety delivery systems to be effective, the prevailing food safety beliefs, knowledge and practices of food handlers had to be assessed, to determine what was needed to change their attitude. More importantly, Howells, Roberts, Shankling, Pilling, Branson and Berret (2008) postulated that there was a correlation between positive behaviours (attitudes) and continued education of food handlers towards sustenance of safe food handling practices. Howells et al. (2008) indicated that approximately 97.0% of foodborne outbreaks were as a result of improper food handling practices in food service outlets.

On the other hand, Ehiri and Moris (2011) pointed out that knowledge alone was not sufficient to promote positive attitudes and safe behaviour among food handling personnel in the school kitchen. Ehiri and Moris (2011) also observed that attitude was an important factor that could not be ignored if food borne diseases (FBDs) were to be minimized.

2.5 Food Safety and Employee-Related Characteristics

Bertin (2009) also observed that certain employee-related characteristics such as poor educational level, low socio-economic level, rapid staff turnover, literacy barriers and poor motivation due to low pay also contributed to poor professional performance at work. Bertin (2009), found that food handlers had a very important role in preventing contamination during food preparation and distribution and this responsibility became even greater in schools. Other studies used for testing effectiveness of hygiene education pointed out that hygiene knowledge alone was not sufficient in improving hygienic attitude and practices of food handling personnel. The studies further indicated that discrepancies still existed between hygiene, knowledge and practices (Park, Kwak and Chang, 2010).

One explanation for the discrepancy between food safety knowledge and practice was the barriers experienced in the food-service establishment that could prevent food handlers from implementing practices such as good hand washing in the school kitchens (Green and Selman, 2015). The duo observed that availability and accessibility of hand washbasins was a major concern followed by peak time pressure during operations. Moreover, high volume of business, stress, lack of accountability, lack of equipment,

type of kitchen and inadequate food handler training were considered as critical barriers mentioned by participants in other studies (Pragle, Harding, and Mack, 2007). Another significant contribution by Clayton, Griffith, Price and Peters (2012) recorded that time was a major factor that barred correct practices of food safety.

2.6 Barriers to Food Safety Practices

Pragl et al. 2007 asserted that food-service establishments were expected to address emerging issues of barriers to food safety practices to narrow the gap between food safety knowledge and practice. Consequently, they argued, food safety training could incorporate strategies that eliminated barriers to proper handling practice in order to improve compliance and reduce the incidence of food-borne related disease outbreak. The report further asserted that training was only valuable if its importance was translated into performance. Transfer of training was viewed as the core issue that linked individual change to an organization's requirements. To realize the difference on food handlers in the organizational performance, Yamnill and McLean (2011) recorded that the transfer of knowledge must be clear to ensure it is translated into practice.

Seaman and Eves (2009) gave strength to that argument by adding that the managers had to be on the frontline in training and the management had to support food safety training and reinforce the adoption of safe food handing behaviours. Education and training were expected to enable trainees to perform the given tasks effectively and with understanding. It is on these premises that this study saw the need to cover the three types, which included personal, environmental and food hygiene.

2.7 Effective Personal Hygiene Practices in the School Kitchen

Regulation (EC) No 853/2004 stated that "Every person working in a food handling area shall – maintain a high degree of personal cleanliness and wear suitable clean and appropriate protective clothing." Personal hygiene was defined as the maintenance of personal health, particularly by cleanliness (McLauchlin and Little, 2007). Rippington (2008) recorded that personal hygiene was achieved through daily bathing or showering, wearing clean underwear, caring for the hair, mouth, teeth, hands and nails. Green and Selman (2015) reiterated that good hygiene was the foundation for preventing the spread of food-borne illnesses, as human beings were said to be the major source of food contamination.

On the same breath, McSwane, Rue and Linton (2015) postulated that if a food handler was not clean, any food handled by dirty hands could contaminate the food with organisms from their gastrointestinal tract. In another observation, Collins (2011) shared the same sentiments and asserted that lack of personal hygiene amongst food handlers were likely to contribute to food-borne illnesses. Sneed et al. (2014), in addition, argued that good personal hygiene prevented incidences of cross-contamination to a reasonable level. The same was noted by Angellilo, Viggiani, Rizzo, and Bianco (2010) who observed that personal hygiene could be a source of cross contamination. Elson (2016) cited personal hygiene of food handlers as the most important aspect in the prevention of food poisoning. According to (FAO/WHO, 2016), components of personal hygiene included the cleanliness of the hands and body and maintaining good personal cleanliness, wearing clean and appropriate uniforms, and by following hygienic sanitary habits in addition to maintaining good health and reporting any ill health to medical personnel.

On the same note, Clayton et al. (2012) reiterated that inappropriate food handling practices alone led to 97.0% of food-borne diseases. Pragle, et al. 2007) recorded that food handling played an important role in the safety of the clients and therefore, the managers were expected to take an active "coaching-style" approach to promote hand washing. In a similar study on food handlers' perspectives of barriers to hand washing, participants stated that they wanted "hands-on" hand washing training to be included in pre and post- training as an element of motivation to food handlers in sustaining safe handling practices learnt during training (Seaman and Eves, 2009).

2.8 Effective Hand Washing Practices in the School Kitchen

Hand washing was said to be the most critical aspect of personal hygiene. Proper hand washing was very important in the prevention of transfer of *staphylococcus* from one surface area to another. Green (2016) noted that food worker hand washing practice was critical because pathogens from the hands to food were a major contributing factor to food-borne illnesses. Many food handlers failed to wash their hands as required especially where hand washbasins were not provided. Though hand washing took only twenty seconds, staff rarely practiced it. There was need to train in the five steps of washing hands: wetting, applying soap, scrubbing hands and arms for 10 to 15 seconds, rinsing thoroughly, then drying hands using disposable towels or hot air dryers.

The Food Standard Agency (2016) stipulated six steps of hand washing procedure that took the following sequence: Step 1: Wet hands thoroughly under warm running water and squirt liquid soap onto the palm of one hand. Step 2: Rub hands together to make a good lather. Step 3: Rub the palm of one hand along the back of the other and

along the fingers. Repeat with the other hand. Step 4: Rub in between each finger on both hands and around the thumbs, fingertips and nails. Step 5: Rinse off soap thoroughly with clean running water. Step 6: Dry hands thoroughly using a paper towel or a hand dryer. Turn off tap with the towel and dispose of the towel or turn off the tap using an elbow.

Another premise in support of proper hand washing came from The National Restaurant Association Education Foundation (NRAEF, 2014), which reiterated that hands were to be washed under running water of at least 1000F and be scrubbed for at least 20 seconds then dried under single use paper towels. Elson (2016) recorded that food handlers were to be trained to wash their hands before they started work, during preparation processes particularly after every procedure in operation. He added that nails were to be kept short, nail polish was not be worn and artificial nails were not be used. Elson (2016) continued to say that all cuts and wounds on the hands were to be covered and in case one had burns, boils, sore skin infection or infected wounds, one was not to work.

According to Angellilo et al. (2010), hands had to be washed before wearing gloves and more importantly, gloves were not be used before hand washing. The gloves were to be made from safe, durable and easy to clean materials. Disposable gloves and finger cots had to be worn on bandaged wounds and hands. Angellilo et al. (2010) also observed that food-handling personnel had to report health problems to the manager of the establishment before working.

2.9 Other Important Personal Hygiene Practices in the School Kitchen

Other personal hygiene practices, according to Richard (2016) included wearing a hat or other hair restraints, wearing clean clothing daily, removing aprons when leaving food preparation areas, removing jewellery from hands and arms and wearing appropriate shoes. In addition, policies regarding eating, drinking, smoking and chewing gums and tobacco, sneezing, coughing, using a tissue, taking out garbage or touching anything that could contaminate hands such as un-sanitized equipment or work surfaces had to be observed (Richard, 2016). Richard further argued that in case food was to be tasted during preparation; it had to be placed in a separate dish and tasted using a spoon and a saucer. In other words, as Richard so ardently put it, good personal hygiene was a critical protective measure against contamination and food-borne illnesses (Richard, 2016). The NRAEF (2014) synopsized the whole matter when they recorded that the success of personal hygiene depended on a well-trained food handler who had acquired knowledge, skills and attitude necessary for keeping food safe (NRAEF, 2014).

2.9.1 Effective Environmental Hygiene in the School Kitchen

According to European Union Food Safety Standards EC No.178/2002 regulation, food establishment had to comply with legal requirements covering constructions. The school kitchen premises had to be designed and constructed in ways that prevented contamination and access to pests. It considered the layout of the kitchen, equipment and other facilities in relation to hygiene in and around the food production premises. Becker (2013) defined a food premise as the building, structure, caravan, vehicle, or stand used for storage, preparation and service of food. It also included areas where equipment were washed and stored, lockers, washrooms and garbage disposal areas.

Fosket and Ceserani (2007) defined the term food premises to comprise the kitchen (where ingredients were brought, prepared and cooked according to the menu of the day), the dining hall (where food was served and consumed), and the storage area (where food materials were ordered, stored and issued for production) The FAO, HACCP board of experts (2012), the Kenya Public Health Act, Cap 242 of 1986; and FSA, (2016) advised that food premises had to be designed properly to ease cleaning.

2.9.2 Effective Cleanliness of the School Kitchen Premises

The FSA (2010) particularly recommended that all sections of the premises where food-related activities were carried out had to be kept clean, in good repair and well maintained. Specifically, kitchens and restaurants as the major areas of operations where food was prepared, had to be designed to separate "low risk" (uncooked product) from "high risk" (cooked product) areas. The premises were required to have adequate space, hygiene, design and construction, appropriate location and provision of adequate facilities to control the hazards. Food premises design as explained by Birchfield (2008), referred to the entire facility while the layout involved a consideration of each small unit or workspace in the facility.

Knowles (2012) and Mohini (2014) recorded that the size of the facility was supposed to be determined by the menu to be served and the workload expected, as well as the type of establishment and the purpose for its intended use. Besides, the facility was required to be large enough to accommodate all materials and equipment required, as well as to allow free movement during operation.

2.9.3 Location of School Kitchen

School Kitchen had to be ideally located for the proper practice of food hygiene. Basics such as adequate lighting, ventilation and portable water supply were essential (Paster, 2007). Hoffman (2007) argued that the surrounding area was not supposed to be potential breeding ground for mice, flies or harmful insects. Sanitary facilities such as hand wash basins, and rest rooms used by staff had to be conveniently located and the number adequate enough to serve the anticipated number of staff/students. Moreover, shower and changing rooms were to be made available if hygiene was to be taken into consideration.

Hoffman (2007) further argued that facilities of handling, transporting and carrying foodstuff on the way to establishments had to be properly cleaned, and the route used for waste disposal (refuse point) had to be well maintained. He added that refuse was not to be carried through the kitchen or dining rooms (Hoffman, 2007).

2.9.4 Size, Nature and Layout of School Kitchen Premises

According to the FAO/WHO (2007), food storage premises needed to be cool and dry. Walls needed to be built with damp proof material. Working premises needed to be large enough to allow employees to carry out their work comfortably without congestion on traffic lines. Working tables were not to be crowded and the queuing for the use of sinks was to be avoided. They further recorded that large gangs allowed free movement and good working environment and sufficient tables and shelf space needed to be available to allow used and unused utensils to be kept apart from each other and from food preparation areas (FAO/WHO, 2007).

Paster (2007) corroborated that a good design was needed to ensure that equipment and facilities were constructed in a way that contamination was minimized, by ensuring that school kitchen premises were located away from environmental pollution, flooding or pest infestations. Proper sanitation and maintenance of premises were recorded as important to permit continuous and effective control of food hazards, pests and other agents likely to contaminate food (FAO/WHO, 2007). The objective of good premises design also required that surfaces and materials, particularly those that came into contact with food were non-toxic, durable, and easy to maintain and clean. Walls and floors were to be made of impervious non-toxic materials and suitable materials for design to ensure an effective protection against pest, adequate supply of portable water, and other sanitary facilities. Also, monitored parts of the premises had to be sanitized and pest control procedures undertaken to prevent access or infestation (FSA, 2016).

The area surrounding the location of the kitchen was considered important in view of airborne contaminants that could have posed a risk to the food business. Besides, odors emanating from the surrounding areas and infestation with pests were reported as likely to lower the standards of operation (CDC, 2008) if the facility was located in a poor environment. Layout of kitchen was required to consider storage areas with goods' entrance clearly separated from customers' entrance. Stores arrangements were required to allow cool, well-ventilated and large enough vegetable storage rooms to allow for orderly storage. Stores were required to have a good drainage system to exit water.

In addition, FAO (2015) recommended that store walls and partitions had to be made with smooth surfaces that would ease cleaning and be treated with residual insecticides to prevent pest infestations. Besides, the storerooms were to be well lit,

ventilated and where possible the doors had to be fitted with glass panel. Cabinets were to comply with the standard specification and allow the rotation of stock. When planning for a kitchen, according to Griffin (2007), chief factors to be considered included the flow of work, the nature of various operations and the position of windows, doors and drainage. Kitchens were not to be used as thoroughfare to other parts of the building. The floors were to be constructed in such a way as to allow adequate drainage and cleaning. The windows were required to be easy to clean, constructed to minimize built-up dirt, while at the same time fitted with cleanable insect proof screens. The kitchen was required to have adequate natural and artificial lighting (Griffin, 2007).

Ceilings and overhead fixtures such as extraction hoods needed to be constructed to minimize the built-up of dirt, condensation of steam and the shedding of food particles. Built-in cupboards and other fixed kitchen units needed to be arranged to allow enough spacing. Free standing equipment were to be used as they were much more hygienic. Paster (2007) further recorded the several forms of kitchen organizations that existed, with the most common ones being the U- shape, L-shape and island arrangements. Paster (2007) asserted that an island layout made it easy to maintain and clean the equipment. Equipment may be fixed, wall mounted or mobile.

McLauchlin and Little (2007) recommended that for ease of cleaning, equipment had to be accessible or mobile. If fixed, the equipment may have a space of at least 300mm behind them, as moveable equipment and worktops facilitated cleaning. Island grouping of cooking appliances referred to an arrangement whereby all the cooking equipment were arranged in the middle of the kitchen, sometimes back-to-back and fitted with splash backs. McLauchlin and Little (2007) cited this system as convenient for the

extraction of steam and odours. Griffin (2007) argued that ideally, a good plan needed to have working tables against the walls between the sinks and the ovens, stores, mixing machines and ranges in the centre of the room. Working tables needed to be movable for easy cleaning. He added that cooking stoves and ranges required a canopy and exhaust fan system of ventilation (hoods) to draw off the fumes, and recommended small extract fans to draw steam and odours from small cooking ranges over a filter pad (Griffin, 2007).

Griffin (2007), further added that working surfaces coming into direct contact with food needed to be made of smooth non - absorbent durable materials that were easy to maintain and sterilize. Alli (2014) reiterated that design and layout of a food premise had to be constructed in such a way that it permitted good hygienic practices. These hygienic practices needed to be extended beyond the food itself to the environment in which the food was prepared to prevent contamination. The accumulation of dirt on surfaces, floors, walls and ceilings of food storage, preparation, production and service areas undermined food hygiene, hence the requirement for the cleaning and disinfection of floors**,** walls, ceilings and other surfaces.

Sanitary facilities near work areas provided good personal hygiene, reduced loss of productivity and allowed proper supervision of food handler, asserted (Mc Swane, Rue & Linton, 2010). According to the Kenya Food, Drugs and Chemical Substances Act, cap254 of 1992 Regulation 11(K), adequate suitable and conveniently located change rooms, toilets and ablution facilities needed to be provided in all food establishments. (Regulation 8(2) of the Kenya building code section 150-166 and section 190 also stated that facilities needed to be well ventilated, well lit and were not to be opened directly onto food preparation areas.

2.9.5 Effective Waste Disposal Systems in the School Kitchen

Waste if not properly removed would potentially result into contamination of food, equipment and water and also attract breeding of pests. According to the Kenya Food, Drugs and Chemical Substances Act, cap254 of 1992, Regulation 7 (11), waste needed to be disposed in designated containers with covers for temporary collection of waste and garbage. The containers were to be properly identified and were to be made of durable impervious materials. Besides, the containers needed to be kept in sanitary condition. Cap 242 of 1972 sections 127 and 128 of Kenyan regulation further stated that no leakage from the waste containers was to be allowed, and that the containers needed to be well maintained so that they would not become sources of contamination or pest infestations.

During the course of preparation, waste products were recorded to be generated in the store, kitchen and dining hall. These waste products were either organic (waste food, used cooking oils) or inorganic (papers, plastics, cans). These waste products became breeding grounds for microbes and served as potential sources of contamination when allowed to accumulate, or became centres of attraction for rodents, pests and flies if not disposed of properly. McLauchlin and Little, (2007) recommended immediate waste disposal by sorting and destroying according to type. According to Blanch (2013), the method of waste disposal needed to be in line with the recommendation of the public health officers.

Fosket and Ceserani (2007) also maintained that accidents, contamination, pest infestation, unpleasant odours, fire hazard and pollution needed to be prevented with correct clearing and handling of wastes. According to Fosket and Ceserani (2007) and McLauchlin and Little (2007), food and other waste containers needed to be closed,

cleaned and disinfected, and all storage and waste disposal facilities needed to be designed and built with pest proof materials to allow easy cleaning. Pest infestations were recorded to occur as a result of inadequate cleaning, poor building maintenance, as well as suppliers' deliveries. Food pests included rodents (such as rats, mice, squirrels), birds and insects (such as cockroaches, flies, ants and wasps). Pests in food production areas were not only unsightly and repugnant; they also caused damage to food and building.

According to Blanch (2013) and McLauchlin and Little (2007), pests contaminated food products by their bodies or body parts, fur, eggs and droppings and were a potential source of infection. Infestation of pests as suggested by McLauchlin and Little (2007); Blanch (2003); Fosket and Ceserani (2007) was controlled by denying the pests access, harbor, warmth, sources of food and water in the premises. This was achieved through regular inspection of the premises, cleaning of the workshop, and immediate cleaning of spillage and food particles from the kitchen surfaces.

2.9.6 Providing Efficient Wash – Up Areas in the School Kitchen

Where possible, crockery, cutlery, and all dirt articles were to be taken to the washing-up room, sorted into various categories and sizes and stacked (FSS, 2007). Wash- up areas in any operation was a very important section although it was regarded as a menial task. During wash-up, Paster (2015) asserted that food residues needed to be scraped or tipped off into refuse containers. The aim of scraping was to keep the washing water as free as possible from food particles and germs. A three-sink method of washing –up was appropriate where the first sink with hot soapy water was used for washing, the

second for rinsing with plain warm water and the third with water heated to a temperature of about 600C (1400F).

The utensils were suitably arranged in wire baskets for immersion in the sterilizing rinse. No detergents or chemicals were to be added to the sterilizing sink but the water was to be maintained at a temperature of not less than 770C (1700F). The utensils were to be left in the hot water for at least two minutes. The hot temperature would also air – dry the utensils almost instantaneously. No further drying by clothe was recommended especially for crockery but could have been useful for cutlery (Paster, 2015).

Paster (2007) argued that thorough cleaning and effective sterilization of the utensils used in preparation and service was the manager's obligation to his/her customers. Sometimes dirty utensils were piled and allowed to accumulate until the end of the day, which created a possibility of a guest being served with dirty crockery or cutlery and particularly with cups stained with lipstick or over-running from previous fillings (Paster, 2007). To ensure wash – up was efficiently done, the kitchen staff were supposed to keep their hands meticulously clean, with no open wounds or sores on their hands and arms so as to avoid contaminating the utensils. Though most institutions washed their utensils manually by hands, some few institutions had washing machines. Whichever the methods applied, washing up should to be done promptly to prevent the accumulation of dirty utensils, which posed a risk of dangerous germs multiplying in the food residues. Efficient wash-up required suitable equipment to be followed by proper storage in a clean store. Indeed the rush hour practice of rinsing and washing in a basin of tepid water and washing a plate by holding it under cold water jet and then wiping with a

tea towel before placing it before a customer should not be tolerated in any establishment as practised in most of the hospitality restaurants.

Paster (2007) went on to argue that where chemical sterilizers were used, the usability, cost and availability were to be considered. The manufacturers' instructions needed to be carefully followed. The basin wash practised by many institutions was usually a greasy job and required ample supplies of clean and very hot water. Pan washing was done by hand and therefore, the use of special detergent and where possible scouring powder was recommended (Paster, 2007).

2.9.7 Providing Efficient Water Supply to the School Kitchen

Water being an essential commodity in the food industry used extensively for drinking, cleaning and preparing food, washing up, washing hands, equipment, utensils, containers, clothes, among others, it was imperative that the school kitchen got adequate supply of portable water for all the operations in the kitchens. There was also need for adequate supply of drinking water, and all ice consumed in food premises was supposed to be made from drinking water. Like food, water was a major source of contamination and infection leading to water-related diseases such as *diarrhoea, typhoid, cholera* and *salmonella typhimurium* Water used for washing food eventually became part of the food; therefore, it was necessary to ensure that contaminated water was not used in the kitchen. The sources of water used in food preparation determined the quality and safety of food prepared.

According to Knowles (2012), water acted as a vehicle for a number of micro-organisms other than those which caused typical food poisoning. Water contamination

needed to be controlled through boiling for small scale use and chlorination for large scale use. It was expected that all food establishments would source their water from government regulated main water pipes but where a food premises could not access the main drinking water supply, private water supply needed to be arranged. The sources of private water supply ranged from deep boreholes to springs, wells and harvesting of the rain water (McLauchlin & Little, 2007). It was advised that all sources of water, whether private or from the mains needed to be protected from being contaminated by sewage caused by poor drainage system.

2.10 Providing Hygienic Food to Students

Food hygiene was defined as a sanitary science which aimed at producing food that had good keeping quality, was safe to consumer, and free from micro-organisms (Hobbs and Robert, 2013; Becker, 2013). Food hygiene entailed the provision of food for consumption with minimal risk of contracting food poisoning. This was to be achieved by exercising good hygiene practices during production, preparation, storage and service. It also included sanitary washing of dishes, work surfaces, proper waste disposal methods and maintaining an environment that was free from pest infestation.

Mc Swane (2010) added that food hygiene was also concerned with cleanliness of the premise, vehicles used for transporting food, and proper separation of raw from cooked foods. Food safety encompassed all conditions and measures necessary for the safety of food and the prevention of potential causes of food poisoning. The cardinal aim of cooking food was to make it easy to eat and digestible, to kill microorganisms and to make it palatable. Besides, food that was well cooked was inclined towards setting standards for the establishment and ensuring a repeat of business.

2.11 Effective Measures to Prevent Food Contamination

In a study conducted by WHO, (2009), stated that simple measures such as washing and peeling the food may reduce the risk of contamination with microorganisms from raw food. Also, proper cooking kills almost all dangerous microorganism, thus, studies have shown that cooking food to a temperature of 70°Consumption can help ensure it is safe for Microorganisms can multiply very quickly if food is stored at room temperature. By holding at temperature below 5°C or above 60°C, the growth of microorganisms is slowed down or stopped but some dangerous microorganism will still grow below 5°C (WHO, 2009). Depending on the nature of the food operations undertaken, adequate facilities should be available for heating, cooling, cooking refrigerating and freezing food , for storing refrigerated or frozen foods, monitoring food temperatures, and when necessary, controlling ambient temperatures to ensure the safety and suitability of food (FAO, 2009).

Important hygienic aspects related to Food Safety as stated in WHO, (2009):

1. Separating raw meat, poultry and seafood from other foods.
2. Using separate equipment and utensils such as knives and cutting board for handling raw foods.
3. Storing food in containers to avoid contact between raw and prepared foods.
4. Washing fruits and vegetables, especially if eaten raw.
5. Removing outer leaves of leafy vegetables.
6. Cooking food thoroughly; make sure that the temperature has reached 70°C
7. Reheating cooked food thoroughly.
8. Avoid leaving cooked food at room temperatures for more than 2 hours.

9. Refrigerating promptly all cooked and perishable food (preferably below 5°C)

According to WHO, food handling personnel play an important role in ensuring food safety throughout the chain of food production, processing, storage and preparation. Mishandling and disregard of hygienic measures on the part of the food vendors may enable pathogens to come into contact with food and in some cases to survive and multiply in sufficient numbers to cause illness in the consumer. Some food handlers may introduce biological hazards by cross contamination after handling raw materials when they suffer from specific diseases and physical hazards by careless food handling practices (Rane, 2011).

2.12 Global Perspective on Food Safety and Sanitation

The food safety development (FSD) strives to reduce the serious negative impact of food-borne diseases worldwide through effective sanitation (Gessner &Beller, 2004). Food and waterborne diarrhoeal diseases are leading causes of illness and death in less developed countries, responsible for affecting 1.8 million people annually. Recent trends in global food production, processing, distribution and preparation are creating an increasing demand for food safety research in order to ensure a safer global food supply. WHO works closely with FAO (2002) to address food safety issues along the entire food production chain by the use of HACCP system. These methods provide efficient, science-based tools to improve food safety, thereby benefiting both public health and economic development. To improve food safety and strengthen consumer confidence, concerns over safety and quality for governments, food producers, industrial traders and consumer are increasing. The burden of food-borne diseases is significant in all parts of the world.

In the European region, some food safety and quality problems have endangered consumer health. Food can be contaminated by water used as an ingredient (Ilboudo & Traoré, 2015).

2.12.1 Food Law and Regulations

The development of relevant and enforceable food laws and regulations is an essential component of a modern food control system. Many countries have inadequate food legislation and this will impact on the effectiveness of all food control activities carried out in the country. Food law has traditionally consisted of legal definitions of unsafe food, and the prescription of enforcement tools for removing unsafe food from commerce and punishing responsible parties after the fact. It has generally not provided food control agencies with a clear mandate and authority to prevent food safety problems. The result has been food safety programmes that are reactive and enforcement-oriented rather than preventive and holistic in their approach to reducing the risk of food borne illness. To the extent possible, modern food laws not only contain the necessary legal powers and prescriptions to ensure food safety, but also allow the competent food authority or authorities to build preventive approaches into the system. In addition to legislation, governments need updated food standards (Garner& Nunn, 2009).

In recent years, many highly prescriptive standards have been replaced by horizontal standards that address the broad issues involved in achieving food safety objectives. While horizontal standards are a viable approach to delivering food safety goals, they require a food chain that is highly controlled and supplied with good data on food safety risks and risk management strategies and as such may not be feasible for many developing countries. Similarly, many standards on food quality issues have been

cancelled and replaced by labelling requirements. In preparing food regulations and standards, countries should take full advantage of Codex standards and food safety lessons learned in other countries. Taking into account the experiences in other countries while tailoring the information, concepts and requirements to the national context is the only sure way to develop a modern regulatory framework that will both satisfy national needs and meet the demands of the SPS Agreement and trading partners (Garner& Nunn, 2009).

Food legislation should include the following aspects:

1. it must provide a high level of health protection;
2. it should include clear definitions to increase consistency and legal security
3. it should be based on high quality, transparent, and independent scientific advice following risk assessment, risk management and risk communication;
4. it should include provision for the use of precaution and the adoption of provisional measures where an unacceptable level of risk to health has been identified and where full risk assessment could not be performed;
5. it should include provisions for the right of consumers to have access to accurate and sufficient information;
6. it should provide for tracing of food products and for their recall in case of problems;
7. it should include clear provisions indicating that primary responsibility for food safety and quality rests with producers and processors;

8. it should include obligation to ensure that only safe and fairly presented food is placed on the market;
9. it should also recognise the country's international obligations particularly in relation to trade; and
10. it should ensure transparency in the development of food law and access to information.

2.12.2 Inspection Services

The administration and implementation of food laws require a qualified, trained, efficient and honest food inspection service. The food inspector is the key functionary who has day-to-day contact with the food industry, trade and often the public. The reputation and integrity of the food control system depends, to a very large extent, on their integrity and skill. The responsibilities of the inspection services include:

1. Inspecting premises and processes for compliance with hygienic and other requirements of standards and regulations;
2. Evaluating HACCP plans and their implementation;
3. Sampling food during harvest, processing, storage, transport, or sale to establish compliance, to contribute data for risk assessments and to identify offenders;
4. Recognizing different forms of food decomposition by organoleptic assessment ; identifying food which is unfit for human consumption; or food which is otherwise deceptively sold to the consumer; and taking the necessary remedial action;
5. Recognizing, collecting and transmitting evidence when breaches of law occur, and appearing in court to assist prosecution;

6. Encouraging voluntary compliance in particular by means of quality assurance procedures;
7. Carrying out inspection, sampling and certification of food for import/export inspection purposes when so required;

2.13 Empirical Framework

2.13.1 Highlights: Food Safety Hazards and Effect in Schools- Ghanaian Senior High Schools Students' Report

1. Seventy seven percent (77 %) of the sampled students ate school provided meals all or most of the time and 52 % had experienced foodborne infections between 3 to 12 times per academic year.
2. Foodborne illness affected students both academically and financially as 12% of students spent more than 5 days off school when sick and 10% spent between GHC 30.00->50.00 on medication.
3. A higher percentage of students who only sometimes ate school meals and supplemented with home meals, own stored food or bought from vendors on campus significantly ($p<0.05$) paid more or medication for food borne diseases (FBD).
4. Food allergy and physical contaminants in food were predominant among hazards reported by students though poorly managed.
5. Effectively cleaned utensils, hand washing facilities with detergents in dining halls and kitchens and hot food were highly recommended by students.

Source: Ababio and Lovat, (2015).

2.13.2 Impact of Food Hazards in School Meals on Students' Health, Academic Work and Finance

The provision of safe food for children and adolescents of school going age is of great concern to governments and other stake holders as it improves health, growth and development of beneficiaries and encourages continued education in developing countries (Santana *et al* 2009, Oranusi *et al*, 2007, Afoakwa, 2015). In Brazil approximately 37 million children from state elementary and middle schools are covered by the National School Feeding programme (Santana *et al*, 2009). In Italy, the estimated number of children benefiting from state school catering services is 2,700,000 (Marzano and Balzaretti, 2013), in Wales 77,627 pupils out of 495,000 are entitled to free school meals and the aim is to provide best health care possible through the provision of safe drinking water and adequate and nutritious meals in a safe environment (Meldrum *et al* 2009).

The National school feeding scheme in South Africa equally aims at alleviating poverty and to improve learning capacity of children (Nhlapo *et al*, 2014). Whilst an estimated 1,000,000 pupils in basic education from poorest areas in Ghana are given one hot meal (lunch) per day in school through the Ghana School Feeding Programme (GSFP) to supplement breakfast and dinner from home, boarding students from Senior High Schools (SHS) in the country are given three (3) square meals per day in school. SHS students thus highly depend on school communal feeding programmes for their growth, wellbeing and general healthy lifestyle (Afoakwa, 2005). These good intentions by the government and stakeholders are challenged with increasing foodborne infection report from schools.

Foodborne diseases (FBD), an outcome of poor hygiene practices (Dablool *et al* 2014, Sumner *et al*, 2011, Panisello *et al*, 2000) are reported internationally in schools which tends to defeat the aims of quality food provision. The confined nature of the school environment favours direct transmission of diseases among individuals and may last for up to 3 to 5 days (Nhlapo *et al* 2014). This interrupts education and affects growth and development with persistent occurrence in children (Rodriguez-Caturla *et al* 2012). In Korea, 47% of the cases of FBD were from schools (Ryu *et al*, 2011). In Japan within seven months in the year 2016, 11,826 cases with 12 deaths from *E. coli* 0157: H7 infection were reported in schools, whilst in Brazil 11.6% of documented FBD in 2015 were from school catering services (Santana *et al* 2009). School children (157) in South Wales experienced *Escherichia coli O157* outbreak in 2015 due to cooked sliced meats supplied to schools (Meldrum *et al* 2009).

In the year 2010, 544 adolescents had *Salmonella* food poisoning in France whilst 11,200 students in Germany from several hundreds of schools were affected with norovirus in the year 2012 (Marzona and Balzeratti 2013). Although the Ministry of Health (MoH) in Ghana reported that 1,348 children suffered from food poisoning in schools in Accra the Regional capital alone in the year 2007 (MoH, 2007), there is low reporting culture (WHO, 2012) and lack of information from the other regions.

Malm *et al* (2015) however reported that food storage facilities in the affected schools were poor and there was lack of protocols to avoid FBD from reoccurring in the schools in Ghana. Food poisoning reports are mainly from the media in Ghana and these have predominantly occurred in secondary schools (Ababio and Lovat, 2015). Foodborne diseases in Ghana were generally reported to have killed 90,692 people with 297,104

reported cases at Outpatient departments in hospitals costing the government GHC 594,208.00 and approximately 594,279 productive days in 2016 (Odame-Darkwa, 2018).

The Ministry of Food and Agriculture and World Bank (2007) also indicated that 1 in every 40 Ghanaians suffer serious FBD annually. The Food and Agriculture Organisation/World Health Organisation (2005) reported in 2005 that microbiological contaminants were the predominant hazard in street foods in Ghana and food vendors in the Ashanti Region are reported to be carriers of the enteric pathogen, *Salmonella* (Feglo and Sakyi, 2012) with most consumers not associating poor food hygiene with diseases (Tomlins *et al* 2002). The types of food hazards and their effect 79 in schools in Ghana are not known, physical contaminants and chemical hazards are not reported in the country whilst peanuts and pineapples alone have been reported to be sources of allergy in children between the ages of 5 and 16 years in the country (Obeng *et al* 2011 and Boye, 2012).

School feeding services in SHS are managed by the schools established catering system comprising of a domestic bursar (senior matron), a group of assistant matrons, cooks and pantry men and a procurement unit. The state agencies in charge of surveillance and monitoring include the Food and Drugs Authority and the Environmental Health Protection units of the Metropolitan, Municipal and District Assemblies in Ghana. The primary hygiene standard being Codex Alimentarius hygiene requirements (WHO/FAO, 2009). The School Health Education Programme (SHEP) Unit of the Ghana Education Service also foresee health and sanitation activities in schools (Ghana Education Service, 2012). However sanitation facilities are reported to be low in

secondary school kitchens in the country and matrons are reported not to consider their practices to be of risk to students (Afoakwa, 2015).

This lack of motivation to improve hygiene systems and practice indicates a probable weak surveillance and law enforcement systems in the country as indicated by WHO (2012) and Dwonfour- Asare (2015). FBD in schools have been reported to be due to poor hygiene standards internationally (Nhlapo *et al* 2014, Sourou-Bankole *et al* 2012, Adolf and Azis, 2012, Marzona and Balzaretti 2012) and affect the health, academic performance, growth and future wellbeing of children.

2.14 Recommended Hygiene Improvement Suggested by Students

In a study conducted by Ababio and Lovat, (2015), all the students responded on the affirmative on the need to improve food hygiene and kitchen hygiene practices in their schools. The listed needs were potable water, hand washing facilities, an enclosed kitchen, pest control, hot food, clean utensils and protective clothing for kitchen staff. Clean utensils were the single most mentioned recommendation by 52.5% of the students. This was followed by the need for hand washing facilities in both the kitchens and dining halls (44.5%). Hot food was the next recommended food hygiene practice by 33.3% of the students followed by portable drinking water (28.3%).

Pest control was next with 27.2% recommendations then enclosed kitchen (13.9%) before protective uniforms for staff (10.9) and a combination of all the listed needs (10.6%). As a Codex member country the General Principles of Food Hygiene by Codex Alimentarius (WHO/FAO, 2009) is applicable to the food industry in Ghana. The basics listed include facility design, process control, maintenance and sanitation, personal hygiene and training, transport control and information and consumer awareness. Hazard

Analysis and Critical control Point is also recommended by the body for good practice. These if adhered to and regularly monitored by the relevant state agencies including Food and Drugs Authority and Environmental and Health Protection Unites of individual Metropolis and District Assemblies could help with effective food safety control in schools.

The Schools Health Protection Programme units of the Ghana Education Service could also include kitchen matrons and staff in hygiene training and auditing to improve on food safety practices as currently their mandate and focus has been on students and pupils below tertiary education level only (Ghana Education Service, 2012).

2.15 SHS Boarding Students Recommended Improvements in GHP in School Kitchens

In Brazilian schools, Santana *et al* (2009) reported of poor temperature control in poor and medium hygiene category schools before intervention which negatively affected the microbiological quality of food. They reported that even in the presence of regulations set by the Health and Surveillance Committee, food safety measures were inadequate in schools as schools did not take into consideration the specific sanitation requirements needed. Thus in the presence of low FBD reporting culture, weak surveillance and law enforcement there is low motivation on the part of food handlers and managers to operate according to appropriate standards (WHO, 2012, Dwonfour- Asare 2015).

Meldrum *et al* (2009) reported of a relatively safer ready- to- eat meals in schools in Wales as there were no microbiologically unacceptable food. The schools in Wales had HACCP in place whilst in Korea, the microbiological quality of school meals sampled

were reported not to be adequate to ensure food safety (Ryu *et al*, 2011) hence the high rate of FBD from schools in the country. Ryu *et al* (2011) recommended the introduction of HACCP to improve food safety in Korean schools. Food stored out of recommended storage temperature and time could encourage spoilage and growth of pathogenic microorganisms 362 to cause disease.

Nhlapo *et al* (2014) equally reported on the absence of readily available hand washing facilities for kitchen staff in South African schools which they reported hindered good hand hygiene practice. Poor personal hygiene among staff could affect food safety and Sourou- Bankole *et al*, (2012) from Benin reported of high level of microbiological contaminants on staff hands in schools presenting risk to students. Marzano and Balzeratti (2013) recommended HACCP in schools as it improved cleaning practices and staff hygiene in Italian schools which was absent in all schools visited in Ghana.

Standard cleaning procedures with training, supervision and appropriate time schedules for entire kitchens and ancillary rooms was required to improve cleanliness in Ghana. Lack of properly designed kitchens causes the loss of access control to both unauthorised persons and animals with their related hazards to food. Thus most of the schools needed improvement even as suggested by the students. This goes to support the need for improved food safety management systems in our Senior High Schools as recommended by Afoakwa, (2005) in Ghana and Sourou Bankole *et al*, (2012) from Benin in order to provide safe food for students. The lack of motivation on the part of matrons and kitchen staff to improve hygiene practices with the illusion that current practices were not a risk to food safety as reported by Afoakwa (2005) could also be due to low foodborne disease reporting culture among students, lack of regular rigorous

surveillance with weak law enforcement in institutional kitchens and lack of knowledge of food hygiene requirements in the country and required improvement. A system to monitor and control the overall food chain in the country from farm to form, including suppliers of raw materials to SHS was required.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The main purpose of the study is to assess the hygienic conditions and practices of kitchens in the Senior High Schools in the Sekyere South District. Carrying out any desirable activity requires that an individual follows certain procedures or methods in order to achieve favorable results. This chapter intends to examine the methods used for the study, giving a vivid description of how the research will be carried out. This chapter will cover the research method that was adopted by the researcher in arriving at the findings. It describes the research design, research approach, the population, sampling and sample procedures, data gathering instruments, data collection measures, data analysis and ethical consideration are also dealt with in this chapter.

3.1 Research Design

The purpose of research design is to provide a framework for the collection and analysis of data. A choice of research design reflects decisions about the priority given to set of dimensions of the research process. The researcher used descriptive research design for the study. This refers to a research which specifies the nature of a given phenomena. It determines and reports the way things are done. Descriptive research thus involves collecting data in order to test hypotheses or answer research questions concerning the current status of the subject of the study (Bryman, 2004).

3.2 Population

The population was made up of Matrons, and Kitchen staff of the selected Senior High Schools in the Sekyere South District. The total population for the study was 6 matrons and 51 kitchen staff totaling 57 in all.

3.3 Sample Size and Sampling Technique

The census sampling technique was used to select all the fifty seven (57) participants for the study. Census method refers to the complete enumeration of a universe. A universe may be a place, a group of people or a specific locality through which we collected the data. Census method is necessary in some cases like population census, for gaining vast knowledge. But in contrary this method is not applicable as well as needed to some social problems because it is costly and time consuming. It is difficult to study the whole universe because financially aid requires for it to complete the study. For this purpose we used sampling method to pick up a simple from the whole universe. Census method is perplex and take more time in data collection.

Following are the advantages and disadvantages of census method of data collection

Data collection through census method gives opportunity to the investigator to have an intensive study about a problem. The investigator gathers a lot of knowledge through this method. In this method there would be higher degree of accuracy in data. No other method is accurate like census method when the universe is small. This method is also applicable for units having heterogeneity or difference. In certain cases this method is very important and suitable to be used for data collection. Without this method the study of a universe remains uncompleted.

Following are the demerits of census method

This method is inconvenient because it take much time, money and set of industrial organizations. This method is possible only in few cases of data collection. This method is possible only in limited universe it requires not vast area to study. It is much time and labour consuming. It requires a lot of people to involve in data collection. Data collected through this method would have more statistical errors. Census method of data collection is helpful only in an area where inquiry is limited, more time and finance available and data have high degree of accuracy otherwise not.

3.4 Methods of Data Collection

The researcher used the main primary data collection method that is structured questionnaire in soliciting data from the selected SHSs in the Sekyere South District.

3.4.1 Questionnaire

The questionnaire had three main sections, which were designed in line with the research questions. The first section contained socio-demographic characteristics of the respondents and included their age, gender, working experience and level of education. This was primarily to enable the researcher to have background information of respondents. A questionnaire was developed by the researcher to obtain relevant information on the topic. The questions were divided into sections that covered the research objectives and research questions. Section Two investigated the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District while section three assessed the level of knowledge of food hygiene practices among the

kitchen staffs in the selected Senior High Schools in the Sekyere South District. The analysis of the study is based on these research objectives of the study.

3.4.2 Interview

The study obtained information from the Matrons of the selected SHSs in the Sekyere South District using face to face interview, this was aimed at finding out from participants certain information needed, of which satisfactory response may not be obtained through written questionnaire. These interviewed participants were chosen purposively.

3.5 Data Collection Procedure

The researcher personally administered the questionnaire which required the respondent to choose based on the Likert scale from questions designed by the researcher for easy purposes. The researcher visited the matrons and kitchen staff at the school and administered the questionnaires to them. All the respondents were informed of the objectives and design of the study. Emphasis was placed on the fact that the findings are primarily for academic purposes. Respondents were familiar with answering of questionnaires. All the respondents had some experience in completing questionnaires and were generally not apprehensive. There was uniform question presentation and no middle-man bias. The researcher's own opinions did not influence the respondent to answer questions in a certain manner. There were no verbal or visual clues to influence the respondent.

3.6 Pilot Study

The questionnaire was given to 10 respondents to answer to correct errors which could take the form of repetition of questions and typographical mistakes and the avoidance of repetition of questions. The pilot study revealed that the questionnaire were correct and adequate for mass distribution.

3.7 Data Analysis

The data was organized into tables and figures based on the questionnaire given to respondents. The result was then analyzed and converted into percentages. Quantitative and qualitative methods were employed in the analysis of the data. The result was subsequently computed into percentages. Percentage (%) values, which were not round figures, were approximated to the nearest whole numbers. Diagrammatic representations of the statistical summaries of the result were presented in the form of frequency tables.

Computer data analysis such as SPSS and other relevant software such as Microsoft excel were the main tools employed to analyse the data in order to help interpret results. The statistical package for social scientist (SPSS version 16) was also used to analyze the pre-coded questions. This packaged was used to compute the percentages because it is easier to use. It can also be used to make tables needed for discussions of the results. The other questions that were open-ended were analyzed by listing all the vital responses given by the respondents. They were considered based on their relevance to the research.

3.8 Ethical Considerations

Ethical considerations in the study such as confidentiality, anonymity, access, betrayal, informed content was critically addressed. During the study, high ethical standards were maintained to ensure that no harm is caused to any of the participants. Steps were taken to keep information provided confidential and anonymous, seeking the participants consent were addressed.

CHAPTER FOUR

RESULTS AND ANALYSIS

4.0 Introduction

The main purpose of the study was to assess the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District. The specific objectives of the study include to investigate the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District and to assess the level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District. The analysis of the study was based on these research objectives of the study. The researcher sent 57 questionnaires to the field to gather primary data. Out of the 57 questionnaires sent out for primary data, 55 questionnaires were received while 2 questionnaires were not received. Therefore, the analysis of the study was based on 96% response rate.

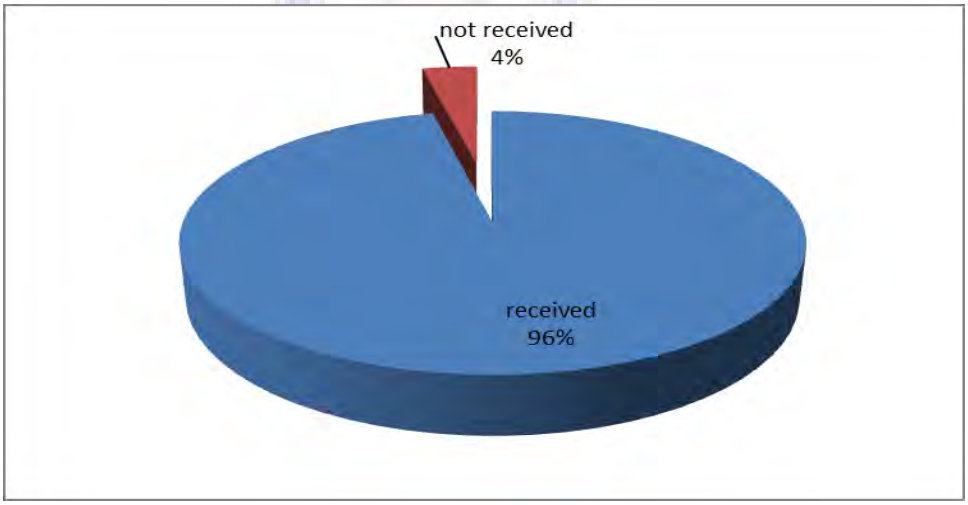

Figure 4.1: Response rate of the questionnaires

4.1 Demographic Information of the Respondents

Table 4.1 shows the demographic information of the respondents including their gender, age category, and educational qualification.

Table 4.1 Demographic Information of the Respondents

Gender	**Frequency**	**Percent**
Male	16	29.1
Female	39	70.9
Total	55	100.0
Age category		
19-29 years	5	9.1
30-39 years	13	23.6
40-49 years	19	34.5
50-59 years	7	12.7
60-69 years	5	9.1
above 70 years	6	10.9
Total	55	100.0
Educational background		
BECE	26	47.3
SSSCE/WASSCE	17	31
Diploma	5	9.1
Bachelor's degree	5	9.1
Masters' degree	2	3.5
Total	55	100.0

Table 4.1 shows that 39 respondents representing 70.9% were females while 16 respondents representing 29.1% were males. Moreover, 19 respondents representing

34.5% were between the age categories 40-49 years, 13 respondents representing 23.6% were between the age ranges 30-39 years, 7 respondents representing 12.7% were between the age ranges 50-59 years, 6 respondents representing 10.9% were above 70 years, while 5 respondents representing 9.1% were between 19-29 years and above 70 years respectively. Also, 26 respondents representing 47.3% were holding basic education certificates, 17 respondents representing 31% were possessing SSSCE/WASSSCE as their highest certificates, 5 respondents representing 9.1% were holding diploma and bachelor's degrees as their highest academic certificates, while 2 respondents representing 3.5% were master's degree graduates. This implies that most of the kitchen staff were not highly educated. This can affect the hygienic practices in the school kitchen.

4.2 The Hygienic Practices of Kitchens in the Senior High Schools in the Sekyere South District

The first objective of the study was to investigate the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District. Table 4.2 assessed the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District.

Table 4.2: The Hygienic Practices of Kitchens in the Senior High Schools in the Sekyere South District

Statement	SD	D	N	A	SA	Total
			f(%)	f(%)	f(%)	f(%)
Effective Personal Hygiene practices in the school kitchen	0	0	3 (5.5)	31 (56.4)	21 (38.2)	55 (100)
Effective Hand Washing practices in the school kitchen	0	0	2 (3.6)	36 (65.5)	17 (30.9)	55 (100)
Effective Environmental Hygiene in the School Kitchen	0	0	4 (7.3)	34 (61.8)	17 (30.9)	55 (100)
Effective Cleanliness of the school kitchen Premises	0	0	3 (5.5)	20 (36.4)	32 (58.2)	55 (100)
Size, Nature and Layout of School Kitchen Premises	0	0	4 (7.3)	31 (56.4)	20 (36.4)	55 (100)
Effective Waste Disposal systems in the school kitchen	0	0	2 (3.6)	42 (76.4)	11 (20)	55 (100)
Providing efficient Wash – Up Areas in the school kitchen	0	0	4 (7.3)	31 (56.4)	20 (36.4)	55 (100)
Providing efficient Water supply to the school kitchen	0	0	4 (7.3)	40 (72.7)	11 (20)	55 (100)

Number in brackets represents percentage (%)

Table 4.2 indicates that 31 respondents representing 56.4% agreed that effective personal hygiene practices in the school kitchen can prevent food contamination in the school kitchen, 21 respondents representing 38.2% strongly agreed, while 3 respondents representing 5.5% were neutral. Moreover, 36 respondents representing 65.5% agreed

that effective hand washing practices in the school kitchen can prevent food contamination, 17 respondents representing 30.9% strongly agreed, while 2 respondents representing 3.6% were neutral. To add more, 34 respondents representing 61.8% agreed that effective environmental hygiene in the School Kitchen can prevent food contamination, 17 respondents representing 30.9% strongly agreed, while 4 respondents representing 7.3% were neutral.

Furthermore, 32 respondents representing 58.2% strongly agreed that effective cleanliness of the school kitchen premises can prevent food contamination, 20 respondents representing 36.4% agreed, while 3 respondents representing 5.5% were neutral. Also, 31 respondents representing 56.4% agreed that size, nature and layout of school kitchen premises affect food safety, 20 respondents representing 36.4% strongly agreed, while 4 respondents representing 7.3% were neutral. Moreover, 42 respondents representing 76.4% agreed that effective waste disposal systems in the school kitchen can improve food safety in the school kitchen, 11 respondents representing 20% strongly agreed, while 2 respondents representing 3.6% were neutral.

The study results show that 31 respondents representing 56.4% agree that providing efficient wash – up areas in the school kitchen can prevent food contamination, 20 respondents representing 36.4% strongly agreed, while 4 respondents representing 7.3% were neutral. Moreover, 40 respondents representing 72.7% agreed that providing efficient water supply to the school kitchen can enhance personal hygiene,11 respondents representing 20% strongly agreed, while 4 respondents representing 7.3% were neutral.

These results are in agreement with the study conducted by Ababio and Lovat, (2015), they asserted that all the students responded on the affirmative on the need to improve food hygiene and kitchen hygiene practices in their schools. The listed needs were potable water, hand washing facilities, an enclosed kitchen, pest control, hot food, clean utensils and protective clothing for kitchen staff. Clean utensils were the single most mentioned recommendation by 52.5% of the students. This was followed by the need for hand washing facilities in both the kitchens and dining halls (44.5%). Hot food was the next recommended food hygiene practice by 33.3% of the students followed by portable drinking water (28.3%).

The Schools Health Protection Programme units of the Ghana Education Service could also include kitchen matrons and staff in hygiene training and auditing to improve on food safety practices as currently their mandate and focus has been on students and pupils below tertiary education level only (Ghana Education Service, 2012).

4.3 Effective Measures to Prevent Food Contamination in the School Kitchen

Table 4.3 assessed the effective measures that prevented food contamination in the school kitchen.

Table 4.3: Effective Measures to Prevent Food Contamination in the School Kitchen

Statement	SD	D	N f(%)	A f(%)	SA f(%)	Total f(%)
Using separate equipment and utensils such as knives and cutting board for handling raw foods.	0	0	2 (3.6)	48 (87.3)	5 (9.1)	55 (100)
Storing food in containers to avoid contact between raw and prepared foods.	0	0	2 (3.6)	43 (78.2)	10 (18.2)	55 (100)
Washing fruits and vegetables, especially if eaten raw.	0	0	3 (5.5)	44 (80)	8 (14.5)	55 (100)
Removing outer leaves of leafy vegetables.	0	0	4 (7.3)	46 (83.6)	5 (9.1)	55 (100)
Cooking food thoroughly; making sure that the temperature has reached 70°C	0	0	4 (7.3)	48 (87.3)	3 (5.5)	55 (100)
Reheating cooked food thoroughly.	0	0	7 (12.7)	37 (67.3)	11 (20)	55 (100)
Avoid leaving cooked food at room temperatures for more than 2 hours.	0	0	2 (3.6)	35 (63.6)	18 (32.7)	55 (100)
Refrigerating promptly all cooked and perishable food (preferably below 5°C)	0	0	2 (3.6)	42 (76.4)	11 (20)	55 (100)

Number in bracket represents percentage (%)

Table 4.3 indicates that 48 respondents representing 87.3% agreed that using separate equipment and utensils such as knives and cutting board for handling raw foods can prevent food contamination in the school kitchen, 5 respondents representing 9.1% strongly agreed, while 2 respondents representing 3.6% were neutral. The study results reveals that 43 respondents representing 78.2% agreed that storing food in containers to avoid contact between raw and prepared foods can prevent food contamination, 10 respondents representing 18.2% strongly agreed, while 2 respondents representing 3.6% were neutral. Moreover, 44 respondents representing 80% agreed that washing fruits and vegetables, especially if eaten raw can prevent food from being contaminated, 8 respondents representing 14.5% strongly agreed, while 3 respondents representing 5.5% were neutral.

Furthermore, 46 respondents representing 83.6% agreed that removing outer leaves of leafy vegetables, 5 respondents representing 9.1% strongly agreed, while 4 respondents representing 7.3% were neutral. To add more, 48 respondents representing 87.3% agreed that cooking food thoroughly; making sure that the temperature has reached 70°C can prevent food contamination, 4 respondents representing 7.3% were neutral, while 3 respondents representing 5.5% were neutral. Furthermore, 37 respondents representing 67.3% agreed that reheating cooked food thoroughly can prevent the food from contamination, 11 respondents representing 20% strongly agreed, while 7 respondents representing 12.7% were neutral. Moreover, 35 respondents representing 63.6% agreed that avoid leaving cooked food at room temperature for more than 2hours can prevent the food from contamination, 18 respondents representing 32.7% strongly agreed, while 2 respondents representing 3.6% were neutral. Moreover, 42

respondents representing 76.4% agreed that refrigerating promptly all cooked and perishable food (preferably below 5°C) can prevent food from contamination, 11 respondents representing 20% strongly agreed, while 2 respondents representing 3.6% were neutral. Food hygiene was defined as a sanitary science which aimed at producing food that had good keeping quality, was safe to consumer, and free from micro-organisms (Hobbs and Robert, 2013; Becker, 2013). Food hygiene entailed the provision of food for consumption with minimal risk of contracting food poisoning. This was to be achieved by exercising good hygiene practices during production, preparation, storage and service. It also included sanitary washing of dishes, work surfaces, proper waste disposal methods and maintaining an environment that was free from pest infestation.

Mc Swane (2010) added that food hygiene was also concerned with cleanliness of the premise, vehicles used for transporting food, and proper separation of raw from cooked foods. Food safety encompassed all conditions and measures necessary for the safety of food and the prevention of potential causes of food poisoning. The cardinal aim of cooking food was to make it easy to eat and digestible, to kill microorganisms and to make it palatable. Besides, food that was well cooked was inclined towards setting standards for the establishment and ensuring a repeat of business. Moreover, a study conducted by WHO, (2009), stated that simple measures such as washing and peeling the food may reduce the risk of contamination with microorganisms from raw food. Also, proper cooking kills almost all dangerous microorganism, thus, studies have shown that cooking food to a temperature of 70° can help ensure its safety. Microorganisms can multiply very quickly if food is stored at room temperature. By holding at temperature below 5°C or above 60°C, the growth of microorganisms is slowed down or stopped but

some dangerous microorganism will still grow below 5°C (WHO, 2009). Depending on the nature of the food operations undertaken, adequate facilities should be available for heating, cooling, cooking refrigerating and freezing food , for storing refrigerated or frozen foods, monitoring food temperatures, and when necessary, controlling ambient temperatures to ensure the safety and suitability of food (FAO, 2009).

Important hygienic aspects related to Food Safety as stated in WHO, (2009):

Separating raw meat, poultry and seafood from other foods, using separate equipment and utensils such as knives and cutting board for handling raw foods, storing food in containers to avoid contact between raw and prepared foods, washing fruits and vegetables, especially if eaten raw, removing outer leaves of leafy vegetables, cooking food thoroughly; make sure that the temperature has reached 70°C, reheating cooked food thoroughly, avoid leaving cooked food at room temperatures for more than 2 hours and refrigerating promptly all cooked and perishable food (preferably below 5°C).

According to WHO, food handling personnel play an important role in ensuring food safety throughout the chain of food production, processing, storage and preparation. Mishandling and disregard of hygienic measures on the part of the food vendors may enable pathogens to come into contact with food and in some cases to survive and multiply in sufficient numbers to cause illness in the consumer. Some food handlers may introduce biological hazards by cross contamination after handling raw materials when they suffer from specific diseases and physical hazards by careless food handling practices (Rane, 2011).

4.4 The Food Hygiene Practices Among the Kitchen Staffs in the Selected Senior High Schools in the Sekyere South District

The second objective of the study was to assess the level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District. Table 4.4 evaluated the level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District.

Table 4.4: The Food Hygiene Practices Among the Kitchen Staffs

Statement	SD	D	N f(%)	A f(%)	SA f(%)	Total f(%)
Hands are washed properly and frequently	0	0	3 (5.5)	48 (87.3)	4 (7.3)	55 (100)
Cooks cover wounds completely	0	0	0	36 (65.5)	19 (34.5)	55 (100)
Cooks wear clean and proper uniforms	0	0	4 (7.3)	37 (67.3)	14 (25.5)	55 (100)
Fingernails are short, unpolished and clean	0	0	3 (5.5)	42 (76.4)	10 (18.2)	55 (100)
Cooks use disposable tissues	0	40 (72.7)	3 (5.5)	40 (72.7)	12 (21.8)	55 (100)
Cooks appear in good health	0	0	2 (3.6)	33 (60)	20 (36.4)	55 (100)
Sinks are stocked with soap	0	0	0	42 (76.4)	13 (23.6)	55 (100)
Handwashing reminder signs are posted	0	0	3 (5.5)	39 (70.9)	13 (23.6)	55 (100)
Employees toilet are operational and clean	0	0	4 (7.3)	39 (70.9)	12 (21.8)	55 (100)
Personal hygiene practices are properly adhered to	0	0	4 (7.3)	39 (70.9)	12 (21.8)	55 (100)

Number in brackets represents percentage (%)

Table 4.4 revealed that 48 respondents representing 87.3% agreed that Hands are washed properly and frequently, 4 respondents representing 7.3% strongly agreed, while 3 respondents representing 5.5% were neutral. Moreover, 36 respondents representing 65.5% agreed that cooks cover wounds completely while 19 respondents representing 34.5% strongly agreed. The study results indicate that 37 respondents representing 67.3% agreed that cooks wear clean and proper uniforms, 14 respondents representing 25.5% strongly agreed, while 4 respondents representing 7.3% were neutral. Moreover, 42 respondents representing 76.4% agreed that fingernails are short, unpolished and clean, 10 respondents representing 18.2% strongly agreed, while 3 respondents representing 5.5% were neutral.

Moreover, 40 respondents representing 72.7% disagreed that cooks use disposable tissues, 12 respondents representing 21.8% strongly agreed, while 3 respondents representing 5.5% were neutral. Furthermore, 33 respondents representing 60% agreed that sinks are stocked with soap, 20 respondents representing 36.4% strongly agreed while 2 respondents representing 3.6% were neutral. To add more, 42 respondents representing 76.4% agreed that hand washing reminder signs are posted, while 13 respondents representing 23.6% strongly agreed. Also, 39 respondents representing 70.9% agreed that employees toilet are operational and clean, 13 respondents 23.6% strongly agreed, while 3 respondents representing 5.5% were neutral. The study results indicate that 39 respondents representing 70.9% agreed that personal hygiene practices are properly adhered to, 12 respondents representing 21.8% strongly agreed, while 4 respondents representing 7.3% were neutral.

In a study conducted by Neill, (2010), the aim of school kitchen staff is to serve acceptable, safe, and nutritious meals to satisfy students and consumers. To achieve this aim, foods must be handled appropriately in the kitchen to ensure maximum quality and safety, which is the responsibility of all food handlers in the kitchen. A systematic review of food safety studies identified that consumers commonly implement unsafe food-handling behaviours during domestic food preparation (Redmond & Griffith, 2013). Therefore increasing knowledge of correct food hygiene practices may be an important factor in changing behaviour. People may believe they are already implementing hygienic behaviours when in fact they are not.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The main purpose of the study was to assess the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District. The researcher used descriptive research design for the study. Quantitative research approach was used. The population was made up of Matrons, and Kitchen staff of the selected Senior High Schools in the Sekyere South District. The total population for the study was 6 matrons and 51 kitchen staff totaling 57 in all. Census sampling technique was used to select all the fifty seven (57) participants for the study. Questionnaire was the main research instrument used to gather primary data. The statistical package for social scientist (SPSS version 16) was used to analyze the data.

5.2 Major Findings of the Study

The first objective of the study was to investigate the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District. The study indicates that 31 respondents representing 56.4% agreed that effective personal hygiene practices in the school kitchen can prevent food contamination in the school kitchen. Moreover, 36 respondents representing 65.5% agreed that effective hand washing practices in the school kitchen can prevent food contamination. To add more, 34 respondents representing 61.8% agreed that effective environmental hygiene in the School Kitchen can prevent food contamination. Furthermore, 32 respondents representing 58.2% strongly agreed that effective cleanliness of the school kitchen premises can prevent food

contamination. Also, 31 respondents representing 56.4% agreed that size, nature and layout of school kitchen premises affect food safety. Moreover, 42 respondents representing 76.4% agreed that effective waste disposal systems in the school kitchen can improve food safety in the school kitchen. The study results show that 31 respondents representing 56.4% agree that providing efficient wash – up areas in the school kitchen can prevent food contamination. Moreover, 40 respondents representing 72.7% agreed that providing efficient water supply to the school kitchen can enhance personal hygiene.

The study results show that 48 respondents representing 87.3% agreed that using separate equipment and utensils such as knives and cutting board for handling raw foods can prevent food contamination in the school kitchen. The study result reveals that 43 respondents representing 78.2% agreed that storing food in containers to avoid contact between raw and prepared foods can prevent food contamination. Moreover, 44 respondents representing 80% agreed that washing fruits and vegetables, especially if eaten raw can prevent food from being contaminated. Furthermore, 46 respondents representing 83.6% agreed that removing outer leaves of leafy vegetables. Furthermore, 37 respondents representing 67.3% agreed that reheating cooked food thoroughly can prevent the food from contamination. Moreover, 35 respondents representing 63.6% agreed that avoid leaving cooked food at room temperatures for more than 2 hours can prevent the food from contamination.

The second objective of the study was to assess the level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District. The study findings revealed that 48 respondents representing 87.3% agreed that hands are washed properly and frequently. Moreover, 36 respondents

representing 65.5% agreed that cooks cover wounds completely. The study results indicate that 37 respondents representing 67.3% agreed that cooks wear clean and proper uniforms. Moreover, 42 respondents representing 76.4% agreed that fingernails are short, unpolished and clean. Moreover, 40 respondents representing 72.7% disagreed that cooks use disposable tissues. Furthermore, 33 respondents representing 60% agreed that sinks are stocked with soap. To add more, 42 respondents representing 76.4% agreed that handwashing reminder signs are posted. Also, 39 respondents representing 70.9% agreed that employees toilet are operational and clean. The study results indicate that 39 respondents representing 70.9% agreed that personal hygiene practices are properly adhered to.

5.3 Conclusion

The study results concluded that the practices that improved kitchen sanity and prevented food contamination were effective personal hygiene practices in the school kitchen, effective hand washing practices, environmental hygiene, effective cleanliness of the school kitchen premises, size, nature and layout of school kitchen premises, effective waste disposal systems in the school kitchen, providing efficient wash – up areas in the school kitchen, and providing efficient water supply to the school kitchen enhanced personal hygiene.

Moreover, effective measures that prevented food contamination in the school kitchen were the frequent use of separate equipment and utensils such as knives and cutting board for handling raw foods can prevent food contamination in the school kitchen, storing food in containers to avoid contact between raw and prepared foods,

washing fruits and vegetables, especially if eaten raw can prevent food from being contaminated, removing outer leaves of leafy vegetables, cooking food thoroughly; making sure that the temperature has reached 70°C prevented food contamination, and reheating cooked food thoroughly also prevented the food from contamination.

5.4 Recommendation

According to the major findings and the conclusions of the study, the following recommendations were made;

1. The Food and Drugs Authority should continue to provide strict rules and regulations that can ensure the compliance to food safety standards in school catering.
2. The Management of the selected Senior High Schools should organise periodic seminars, workshops and training programmes to equip matrons and cooks with the requisite knowledge regarding food safety issues to enhance the compliance to food safety standards in school catering.
3. The Management of the selected Senior High Schools should provide adequate storage facilities like deep freezers, microwaves, store houses, to store the food and protect the food from contamination.
4. The Management of the schools should institute an independent authority in a form of food safety compliance committee to monitor the food preparation and storage process in senior high schools.

5.5 Suggestion for Further Study

According to the recommendations of the study, the researcher suggested that a similar study should be conducted to investigate the impact of organising periodic training and development programmes for school caterers on the quality of school catering.

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APPENDIX A

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION

APPENDIX A: QUESTIONNAIRE FOR THE RESPONDENTS

The researcher is a product of UEW, Kumasi Campus conducting a piece of research to investigate the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District. I respectively request that you form part of this research by completing the attached questionnaire. It is my fervent hope that you will be exonerated to participate in the study. May I thank you for your valuable cooperation.

Section A: Demographic Information of the Customers

1. Gender: female [ ] male [ ]

2. Age: below 18 years [ ] 19-29 years [ ] 30-39 years [ ] 40-49 years [ ] 50-59 years [ ] 60-69 years [ ] above 70 years [ ]

3. Education background:

Never [ ] BECE [ ] SSSCE/WASSCE [ ] Diploma [ ] Bachelors' degree [ ] Masters' degree [ ]

Section B: The hygienic practices of kitchens in the Senior High Schools in the Sekyere South District.

Please use the following Likert scale to evaluate the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District.

SA-Strongly agree, A-Agree, N-Neutral, D-Disagree, SD-Strongly disagree

The effectiveness of hygienic practices in the school kitchen	**SD**	**D**	**N**	**A**	**SA**
4. Effective Personal Hygiene practices in the school kitchen					
5. Effective Hand Washing practices in the school kitchen					
6. Effective Environmental Hygiene in the School Kitchen					
7. Effective Cleanliness of the school kitchen Premises					
8. Size, Nature and Layout of School Kitchen Premises					
9. Effective Waste Disposal systems in the school kitchen					
10. Providing efficient Wash – Up Areas in the school kitchen					
11. Providing efficient Water supply to the school kitchen					
Effective Measures to Prevent Food Contamination in the school Kitchen					
12. Using separate equipment and utensils such as knives and cutting board for handling raw foods.					
13. Storing food in containers to avoid contact between raw and prepared foods.					
14. Washing fruits and vegetables, especially if eaten raw.					
15. Removing outer leaves of leafy vegetables.					

16. Cooking food thoroughly; making sure that the temperature has reached 70°C					
17. Reheating cooked food thoroughly.					
18. Avoid leaving cooked food at room temperatures for more than 2 hours.					
19. Refrigerating promptly all cooked and perishable food (preferably below 5°C)					

Section C: The level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District;

Please use the following Likert scale to evaluate the level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District.

SA-Strongly agree, A-Agree, U-Undecided, D-Disagree, SD-Strongly disagree

Statement(s)	**SA**	**A**	**U**	**D**	**SD**
20. Hands are washed properly and frequently					
21. Cooks cover wounds completely					
22. Cooks wear clean and proper uniforms					
23. Fingernails are short, unpolished and clean					

24. Cooks use disposable tissues					
25. Cooks appear in good health					
26. Sinks are stocked with soap					
27. Handwashing reminder signs are posted					
28. Employees toilet are operational and clean					
29. Personal hygiene practices are properly adhered to					

APPENDIX B

INTERVIEW GUIDE

What are the hygienic practices of kitchens in the Senior High Schools in the Sekyere South District?

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What is the level of knowledge of food hygiene practices among the kitchen staffs in the selected Senior High Schools in the Sekyere South District?

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