UNIVERSITY OF EDUCATION, WINNEBA

EVALUATING COMPLIANCE TO FOOD SAFETY AND THE PRACTICE OF GOOD HYGIENE IN SELECTED HOSPITALS IN THE CAPITAL CITY OF GHANA.

HARRIET AWO AMEZUYI OCLOO

7141180013

A DISSERTATION IN THE DEPARTMENT OF HOSPITALITY AND TOURISM, EDUCATION, SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, UNIVERSITY OF EDUCATION, WINNEBA IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF TECHNOLOGY DEGREE IN CATERING AND HOSPITALITY EDUCATION

DECEMBER, 2016

DECLARATION

STUDENT'S DECLARATION

I hereby declare that this dissertation with the exception of specified sources which have been identified and acknowledged is my own original work and that no part of it has been presented for another degree in the university or elsewhere.

STUDENT'S SIGNATURE..... DATE.....

NAME: **HARRIET AWO AMEZUYI OCLOO**

SUPERVISOR'S DECLARATION

I hereby declare that this work is the result of the student's own effort, and l supervised in accordance with the guidelines and supervision of thesis laid down by the University of Education, Winneba.

SUPERVISOR'S SIGNATURE..... DATE.....

NAME: DR. PATRICIA F. ABABIO

DEDICATION

This work is dedicated to the Glory of God Almighty. And to all Hospital Caterers.

ACKNOWLEDGEMENT

This work would not have come to a successful completion without the many people who encouraged, inspired and assisted me, and the sheer grace of God. During the course of this dissertation, l received excellent assistance, guidance, suggestions and correction from my supervisor, Dr Patricia F. Ababio. Thank you for the many helpful discussion and encouragement. Really, you have been amazing and an inspiration.

ABSTRACT

The main objective of the study was to evaluate compliance to food safety and the practice of good hygiene in selected hospitals in the capital city of Ghana. This study adopted the case study design. The researcher used both qualitative and quantitative research approach. The population for the study was three hundred and twenty (320). The population consisted of all hospital food handlers and supervisors in charge of the catering services in inpatient hospitals in the Trust hospital (Accra), Accra Psychiatric Hospital, 37 Military Hospital, Korle Bu Teaching hospital (Accra) and Ridge Regional Hospital (Accra). One hundred and seventy five (175) respondents were randomly selected for the study. The instruments used in this study were questionnaire and interview guide. The questionnaire data that was collected was then coded to enable the respondents to be grouped into limited number of categories. The SPSS version 16 was used to analyse the primary data. The study results concluded that as a consequence of effective training, the hospital food handlers complied with good hygiene in hospital catering in Ghana by paying attention to their personal hygiene because they believed that food safety is very important to consumer's health. The respondents used fresh and healthy raw materials in food preparation, they wore caps, masks and protective gloves during food preparation in order to prevent food-borne illnesses, they always kept their work area clean for safe food production. Moreover, the study concluded that the perceived barriers to compliance to food safety operating procedures among food handlers in the selected hospitals in Accra, Ghana, were inadequate storage facilities to store the food, lack of effective training and development programmes regarding food safety issues inadequate authorities to monitor the food preparation and storage process. These were challenges to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana. The study recommended that the Management of the hospitals 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 hospital catering.

TABLE OF CONTENTS

CHAPTER TWO: LITERATURE REVIEW

CHAPTER THREE: RESEARCH METHODOLOGY

CHAPTER FOUR: RESULTS AND FINDINGS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Food is an important basic necessity; it is a critical contributor to physical well-being and a major source of pleasure (Rozin *et al.,* 1999), its procurement, preparation and consumption are vital for sustenance of life. However, diseases spread through food are common and persistent problems that result in appreciable morbidity and occasionally in death (Scharff, 2009, Tomohide, 2010). Foodborne illnesses have been described as one of the most widespread problems of the contemporary world (Zotermans *et al.,* 1994, Wheelock, 2006) as it is an important and growing public health and economic problem in many countries.

Foodborne disease is attributed to consumption of contaminated food with a wide variety of bacteria, parasites and viruses. Cases of foodborne diseases occur daily throughout the world, from the most to the least developed countries. It is difficult to obtain accurate estimates of the incidence of microbiological foodborne disease. However, in developed countries, the percentage of people suffering from microbiological foodborne disease each year has been reported to be up to 30%, while the problem is likely to be even more widespread in developing countries (WHO, 2002).

Food handlers play an important role in ensuring food safety through the chain of production, processing, storage and preparation (Goh, 1997, Hedberg *et al.,* 1994). Approximately 10 to 20% of food-disease outbreaks are due to contamination by the handler. Mishandling of food and disregard of hygiene measures enable pathogens to come into contact with food and, in some cases, to survive and multiply in sufficient numbers to cause illness in consumers. Personal hygiene and environmental sanitation are key factors in the transmission of food-borne diseases. Investigations of outbreaks of foodborne disease throughout the world show that in nearly all instances, they are caused by failure to observe

satisfactory standards in the preparation, processing, cooking, storing or retailing of food (Tomohide, 2010).

The importance of safe food for hospitalized patients and the detrimental effect that contaminated food could have on their recovery has been emphasized (Kandela, 2004). Patients receiving foods from a single kitchen with poor food handling practices could suffer a foodborne infection which could result in an outbreak affecting the whole hospital (Ayliffe, 1992). Outbreaks of foodborne infection in hospitals are associated with high attack rates and disruption of services (Maguire, 2000). In 2002, hospitals in The Netherlands were implicated in 9% of 281 gastroenteritis outbreak (Van Duynhoven, 2005). In Poland, the annual outbreaks of food poisoning and foodborne infections in hospitals and sanatoria from 1985 to 1999 constituted from 1.5% to 6.3% of the total number of such outbreaks in the country (Przybylska, 2001). A foodborne outbreak of Salmonella infection at a private hospital in London in 1994 had an attack rate estimated to be 5% among the approximately 200 patients and staff at risk (Maguire, 2000). Outbreaks of foodborne infections in hospitals are preventable but are facilitated by several factors; these include staff carriers, poor hygiene conditions in the kitchens, carelessness, and lack of training of food handlers.

The Food Safety Development (FSD) strives to reduce the serious negative impact of food-borne diseases worldwide (Gessner & Beller, 2009). Food and waterborne diarrhoea 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. World Health Organisation (WHO) works closely with Food and Agriculture Organization (FAO), 2002) to address food safety issues along the entire food production chain by the use of Hazard Analysis Critical Control Points (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 endanger consumer health. Food can be contaminated by water used as an ingredient (Ilboudo & Traoré, 2005).

In Ghana, there are limited studies and documentation on foodborne nosocomial infection. However, the most recent studies (Githiri *et al.*, 2009b) indicate possible contamination of food served to patients by food handlers. The studies also raised concern from the common involvement of food handlers of nurses or domestic staff, who were not specifically trained about food hygiene standards and Hazard Analysis Critical Control Points (HACCP), but could be engaged in receipt, distribution and serving of ready-made foods and supervision of these services. Hence there is a great need for research, education and increased awareness among food services staff in hospitals regarding safe food handling practices. This study targets food handlers because they are directly responsible for the hygiene of the food served in hospitals.

1.2 Statement of the Problem

In Ghana the World Bank and Ministry of Food and Agriculture report indicated that food poisoning incident was 625,000 annually (World Bank/ ministry of Food and Agric) The food and Drug Authority also reported that hospitalisation due to food borne diseases was 297, 104 annually with a death rate of 90,692 annually (FDA 2008).

A retrospect review on trend of reported Food borne diseases on both in and out patient records from 2009-2013 at the ridge Hospital revealed that in 2009, 118 patients treated were from food borne diseases. In 2010 the foodborne related patients were 22. In 2011 the number was 608. In 2012 there was 498. In 2013 it was 346 (Osei Tutu and Anto 2016.)

In a research conducted by Annor and Baiden (2011), it was found that despite the efforts of the government to regulate the activities of vendors and other catering institutions, some hospital caterers in Accra were not compliant. The microbial count from the hospitals with the worst food hygiene checks (that is; no head gears or gloves worn by food handlers) were the highest but were least at the hospitals with the best observed food hygiene checks. This observation suggests that when food hygiene checks are strictly followed, contamination could be reduced and the efforts of the government in this regard could prove beneficial if adhered to. Most studies conducted in Ghana concerning various aspects of food hygiene in hospitals over the past decade, have revealed poor food hygiene knowledge and attitudes of hospital caterers, with personal hygiene least observed by the least educated (Acheampong, 2005). Most of the vendors have either no formal education or few years of schooling and therefore are simply ignorant of proper food handling and their tendency to transmit pathogens is high (*Mensah et al., 2002*). The recent food adulteration in Ghana raised national concern regarding food safety. Foodborne diseases present a serious challenge to public health in both developing and developed countries. Studies done in both developing and developed countries have indicated that the majority of reported foodborne diseases originate in food service establishments (Kaferstein, 2003, Jones and Lockwood, 2009), and studies on foodborne disease risk factors have indicated that most outbreaks associated with food service establishments can be attributed to food handlers‘ improper food preparation practices (Friedman *et al.,* 2004). Additionally, observational studies have shown that food handlers frequently engage in unsafe food preparation practices (Clayton and Griffith, 2004, Howes *et al*., 1996b, Manning and Snider, 1993). Worldwide, there were a total of 816 food borne disease outbreaks, with 80 682 reported cases, from 1927 until the first quarter of 2006, in which food handlers were implicated in the spread of the diseases (Greig *et al.,* 2007).

1.3 Objective of the Study

The main objective of the study is to evaluate compliance to food safety and the practice in selected hospitals in the capital city of Ghana. The specific objectives of the study are to:

1. Assess the extent to which hospitals in Accra conform to food safety standard operating procedures.
2. Determine perceived barriers to compliance to food safety operating procedures among food handlers in selected hospitals in the capital city Accra.
3. Evaluate the effectiveness of food safety training on food safety knowledge and practices among hospital food handlers.

1.4 Research Questions

The research would be guided by the following research questions,

1. To what extent do hospitals in the capital city Accra Ghana conform to standard food safety operating procedures?
2. What are the perceived barriers to compliance to food safety operating procedures among food handlers in the hospital environment?
3. What is the effect of food safety training on the knowledge and practices of food handlers in the hospital environment?

1.5 Significance of the Study

Ghana faces many challenges to providing quality public healthcare to its people, and high among these challenges is the provision of adulterated and contaminated foods and infections. In Ghana, as in many developing countries, nosocomial infection is a devastating problem that impacts many vulnerable groups. There is limited research concerning food handlers in the hospital environment and the risks they pose to patients. There have been no

documented efforts to increase food safety knowledge or improve safety practices of food handlers. This study therefore highlights the need for greater improvement in overall food safety knowledge and sets out to show how knowledge of food safety affects the behaviours being implemented specifically in the hospital environments Given that food handlers 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 food handlers‘ practice that increase the risk of food borne diseases in hospitals and in various food premises through health education programs. Further, this study would offer new insight and examination of this important area and thus make an original contribution to the literature.

1.6 Scope of the Study

This study is focused on assessing the compliance to food safety and the practice in selected hospitals in the capital city of Ghana. The geographical scope of the study would be limited to hospitals in Greater Accra region. Therefore, the study is geographically limited to Greater Accra Region of Ghana. Moreover, the study is theoretically and empirically limited in scope to the compliance to food safety and the practice of good hygiene.

1.7 Overview of the Study

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

Chapter One: This chapter discussed 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 overview of the study.

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

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

Chapter Four: This chapter would cover the presentation and analysis of data by way of figures, graphical presentation and statistics.

Chapter Five: This chapter covered the discussion of main findings

Chapter Six: This chapter would comprise a summary of the research, conclusion and recommendation on compliance to food safety and the practice in selected hospitals in the capital city of Ghana.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Food is any material consisting essentially of protein, carbohydrate, and fat used in the body of an organism to sustain growth, repair, and vital processes and to furnish energy. However, food becomes contaminated when its consumption poses threat to consumers.

2.2 Hygienic Practices among Hospital Caterers

Nosocomial infections are a common problem that increases the length of hospital stay, hospital cost and often affects patients' quality of life, survival and response to treatment. To prevent nosocomial infection, the maintenance of a high degree of hygiene in hospital settings is necessary. Poor hygiene in the system of preparation and distribution of food, poor personal hygiene of food handlers as well as food safety pose significant risk of the development of food borne infections in hospital settings. Data from the literature indicated that poor hygiene practice in hospital kitchens may be the cause of outbreaks of infections in hospitals, some of them resulting in death of patients. Almost all of cases (88%) and deaths in outbreaks of listeriosis in Canada were people from the hospital or older people who were living in a long- term care home, because deli meats contaminated with listeria was distributed to hospitals. Listeria was found in niches deep inside two slicing machines. Food hygiene is the set of basic principles used to control environmental factors during production, preparation, selling and serving food in such a way to ensure that food eaten is of good quality. Food hygiene depends largely on the personal hygiene practices and habits of personnel working in a food establishment (Ifeadike *et al.,* 2014). Gordon – Davis (2011) also interprets hygiene as the preservation of health involving all measures that ensure the safety and quality of food during its handling and identifies these measures as adequate storage of both raw and cooked foods including the right preparation and cooking

procedures. Foods cooked under unhygienic conditions provide plenty of opportunity for transfer of bacteria as well as growth or survival of bacteria and other pathogens. The hygiene and sanitation aspect is the most important factor that could possibly have a negative impact on food quality (Gordon, 2011). According to Kok & Balkaran (2014) street food stands are made of simple structures where running water, toilets and washing facilities are rarely available in most countries around the world. Washing of hands, utensils and dishes are often done in bowls or pots of water. It is worth noting that disinfection is occasionally carried out and this eventually attracts pests to the vending sites especially when there is inadequate refuse disposal (Kok & Balkaran, 2014). Furthermore, foods prepared at these sites put consumers‟ health at risk as food is often not refrigerated at the right temperatures. In a research conducted by Annor and Baiden (2011), it was found that despite the efforts of the government to regulate the activities of vendors and other catering institutions, some hospital caterers in Accra were not compliant. The microbial count from the hospitals with the worst food hygiene checks, that is; no head gears or gloves worn by food handlers were the highest but were least at the hospitals with the best observed food hygiene checks. This observation suggests that when food hygiene checks are strictly followed, contamination could be reduced and the efforts of the government in this regard could prove beneficial if adhered to. Most studies conducted in Ghana concerning various aspects of food hygiene in hospitals over the past decade, have revealed poor food hygiene knowledge and attitudes of hospitals caterers, with personal hygiene least observed by the least educated (Acheampong, 2005). Most of the vendors have either no formal education or few years of schooling and therefore are simply ignorant of proper food handling and their tendency to transmit pathogens is higher (Mensah *et al.,* 2002).

According to Annor and Baiden (2011), there is strong statistical evidence that 70% of all bacterial food poisoning is caused by caterers. This is greater than occurrences reported from any other food sector. Most of these food poison outbreaks are due to the

inadequate time and temperature control of food, whereas the remaining thirty percent are as a result of cross contamination (Annor & Baiden, 2011). A number of studies have found that such foods are sometimes held at improper temperatures, or mishandled by food vendors and sold in dirty environs (WHO, 2001, 2003; Muinde and Kuria, 2005; Ghosh *et al.,* 2007). These all contribute to the infection of seemingly tasty food by different disease causing parasites. Multiple lines of evidence have shown that foods exposed along busy roads may become contaminated either by spoilage or pathogenic micro-organisms (Bryan *et al.,*1992; Ashenafi & Mehari, 1995).

2.2.1 Food Handling

In large scale cooking, many kitchen staff are usually employed to speed up the processes and ensure customers are served in good time. Thus, food passes through many hands, thereby increasing the chances of food contamination due to improper handling. As recommended by Annor and Baiden (2011) in their study, food must never be defrosted at room temperature (United States Department of Agriculture, 2006). Keeping meat and poultry cold while it is defrosting is essential to prevent the growth of harmful bacteria. There is greater danger of bacterial growth and food spoilage for food thawed at room temperature, hence the best way to safely thaw meat and poultry is in the refrigerator. In spite of these useful directives, food vendors in Ghana have been found to refrigerate food stuffs at inadequate temperatures exposing them to the risk of contamination (Annor and Baiden, 2011).

A consumer's chance of getting food borne illness depends largely on the health status of the food handlers, their personal hygiene, knowledge and practice of food hygiene. Infections can also be gotten through contaminated unwashed fingers, insects, and circulation of banknotes and by wind during dry conditions

(Isara, 2009). Personal hygiene is important because according to Odonkor et al., (2011), human beings are the largest contamination sources of food. Illness resulting from contaminated food has also been reported as the most widespread health problem in the modern world, and one of the main reasons for reduced economic productivity (Käferstein, 2003). This is not surprising, considering the advancements in technology and different lifestyles adopted in this twenty first century that do not allow enough time for the preparation of home cooked meals.

2.3 Training of Vendors

Lots of efforts have been made by health ministries of developing countries in the field of food safety and hygiene education amongst hospital caterers. Although these efforts have led to an increase in awareness and knowledge levels of food safety and hygienic practices, this knowledge is however not always translated into actual practice (Apanga *et al.*, 2014). Similarly, Annor and Baiden (2011) who conducted a research on the food hygiene in the health sector in Accra found through a microbial analysis though respondents were found to have satisfactory food hygiene attitudes it did not produce strict food hygiene practices. Likewise (Donkor *et al.* 2009) hold the same opinion about this relationship between education and food safety practices among hospital caterers.

A research conducted by some polytechnic students to assess the level of hygienic practices among street food vendors in Sunyani revealed that large numbers of the vendors practiced minimal hygiene. It was also found that most of the vendors did not receive any training on personal, food and kitchen hygiene. However, other scholars have proposed that even though training leads to increased knowledge of food safety, it does not necessarily imply positive food handling behavior (Howes *et al.*, 1996).

2.4 Food Safety

Food safety is a vital issue both in developed and developing countries; given that food borne illnesses cause a lot of distress and thousands of deaths each year (Pilling *et al,* 2008). In view of this, the issue of food safety is becoming a key public health priority considering the large number of people who take their meals outside the home. As a result of this change in lifestyle, many people are exposed to food borne illnesses that originate from food stands, restaurants and other food outlets. Food service employees are a very crucial link between food and consumers (Rahman *et al.,* 2012), as there are high contamination tendencies on their part. Considering the numerous people who patronize food from vendors worldwide, that is about 2.5 billion people (Nyarango *et al.,* 2008).The World Health Organization (WHO) has established five main keys to safer food including keeping clean hands, separating raw and cooked food, cooking thoroughly, keeping food at safe temperatures, and using safe water and raw materials (WHO, 2007). These five keys to safer food are of utmost importance in developing countries, and equipping caterers with such information could impact significantly on food safety.

Food poisoning occurs from different places, this could be from their homes, work places, schools, hospitals or other catering services patronized. Commercial catering services included hospital caterers, restaurants, hotels, finished products from retailers and food vendors. The Food and Drugs Authority (FDA) is the national regulatory body under the Ministry of Health with the responsibility of implementing food policies and ensuring the safety and wholesomeness of food for consumers. FDA roles include food manufacturing and processing site inspections, licensing, product registration and monitoring. They also provide good hygiene practices training for food handlers. In the light of these

efforts it appears that foods served within the canteens of some hospitals and educational institutions still do not meet healthy standards.

Attempts have been made severally to classify food-borne disease outbreaks into those contracted from home-made meals and those contracted from street food. In the United States for instance, research has implicated food from commercial or institutional establishments (79%) and 20% from homes. An estimated 25% of these reports could have been avoided by safe food handling practices (Haapala and Probart, 2004). However, as popularly proposed by researchers, identifying the exact number of cases has proven a difficult task as incidents of illnesses are usually underreported (McCarthy, 2007).

2.5 Food Borne Diseases

According to studies done in Africa on street foods, their tremendous unlimited and unregulated growth has placed a severe strain on city resources, such as water, sewage systems and interference with the city plans through congestion and littering adversely affecting daily life (Canet and N'diaye, 1996; Chaulliac and Gerbouin-Renolle, 1996). FAO states that, street foods raise concern with respect to their potential for serious food poisoning outbreaks due to improper use of additives, the presence of adulterants and environmental contaminants and improper food handling practices amongst food vendors (FAO, 1997).

The food handler has a vital role to play in food businesses, and that is to guarantee that meals served are hygienic for consumption. Conscious or inadvertent contamination of such foods, places buyers at risk of suffering from food- borne illnesses (Annor & Baiden, 2011). Foods that are usually related with food borne diseases include salads (potato, tuna, chicken, and macaroni), raw

vegetables, bakery products (e.g., cream-filled pastries), sandwich fillings, milk, dairy products and poultry. Most cases of food borne illness are caused by eating food or drinking water which is contaminated by feaces. In the case of food, the main cause of contamination is often poor personal hygiene among food handlers (Esena & Owusu, 2013). Reliable statistical evidence reveals that 70% of all bacterial food poisoning is caused by caterers whilst the remaining thirty percent can be attributed to cross contamination (Wilson, 1997).

Over two hundred different diseases have been found to be spread by food. Several factors have been identified as contributory to the transmission of such food borne diseases. The main ones are as proposed by Paiva de Sousa, (2008) include: i) inadequate food manipulation; ii) improper holding temperatures (failing to properly refrigerate food); iii) inadequate cooking; iv) contaminated equipment (failure to clean and disinfect kitchen or processing plant equipment) and v) poor personal hygiene. Other factors that may contribute to the food borne illness include: vi) preparing food a day or more before serving with improper holding and reheating; vii) cross contamination (from raw to cooked products) and viii) adding contaminated ingredients to previously cooked food. In rare cases where infected people seek medical care and submit specimens, bacteria are more likely than other pathogens to be identified as causative agents. Bacterial agents most often identified in patients with foodborne illness are *Campylobacter*, *Salmonella*, and *Shigella* species, with substantial variation occurring by geographic area and season. Testing for viral etiologies of diarrheal disease is rarely done in clinical practice, but viruses are considered the most common cause of foodborne illness (CDC, 2013).

A research conducted by medical students of the University of Ghana to investigate the prevalence of intestinal parasitic infections among food vendors in Accra revealed that the high prevalence was as a result of poverty or low socio-economic conditions, poor personal and environmental hygiene, over-crowding, limited access to clean water and limited knowledge about parasite transmission. The lavatories used by food vendors also played a role in the carriage and transmission of the parasites identified in the study. The researchers posited that since some food vendors had no access to adequate toilet facilities, they did not observe proper toilet manners. Also, those that had these facilities did not clean themselves properly after toilet use. These findings are similar to that of Stephenson (2002) who found that the relatively high presence of parasites transmissible by fecal matter are representative of high levels of environmental fecal contamination and poor sanitation standards.

Constantly hot weather conditions and poor environmental conditions in Ghana such as the dusty roads along which food vendors operate provide good conditions for bacterial growth. Several factors have been found to influence the risk of food contamination. According to Campbell, (2011) these include but are not limited to food type, pH, method of preparation, water availability, degree of handling, exposure temperature, and holding time (Campbell, 2011). A study conducted in Abeokuta, Nigeria, showed that different parasites and the degree of worm infections depended largely on the area in which food was sold (Idowu, 2006). Considering the similarity in environmental conditions between Ghana and Nigeria, it could be deduced that the high humidity levels may contribute to the transmission and maintenance of infective stages of these intestinal parasites in food in both communities (Ayeh-Kumi, 2009).

The presence of litter and domestic animals in and around vending areas have been observed in some of these areas where food tested showed parasitic contaminations. Food vendors who did not have adequate means of disposing of refuse dumped them in nearby gutters, the end result being the presence of flies at the vending site with inadequate food protection. Another source of contamination was the transfer of germs from money to food as vendors in an attempt to multi task ended up contaminating food with bacteria on currency notes and coins (Ayeh-Kumi, 2009).

Most of the time food vendors handle food equipment under highly unsanitary conditions. Utensils are washed in a container of water with soap. The water is rarely ever changed. Under such conditions, certain food borne organisms could be transmitted and cause cross-contamination. Schools located in the cities for example, usually have students eating from such serving plates placing them at high risk of contracting food borne diseases. On issues relating to the use of raw vegetables, it is known that some food vendors treat them with vinegar or salt solution; but most of the time these vegetables are washed with only water or cleaned with napkins. Under such conditions most of the disease causing organisms still remain on the fresh vegetables and cause food borne diseases once they are ingested. In most cases these food vendors usually do not have training in food handling and on hygienic ways of handling food. This trend of affairs might be attributed to the fact that majority of the food vendors were only trained at home from parents or guardians (Esena & Owusu, 2013).

2.6 Hand Hygiene as a Food Safety Tool in the Hospitals

Personal hygiene, hand washing, employee illness awareness and training are key factors in limiting the transfer of disease from known sources of contamination. Unwashed hands are considered the most significant pathway to pathogen transfer and food safety experts advise hand washing procedures should be implemented and strictly monitored.

Proper hand hygiene requires three components: 1) a proper protocol, 2) an appropriate hand washing or cleansing agent, and 3) compliance (execution at frequent enough interval to prevent infection). Hand washing, when done correctly, is the single most effective way to prevent the spread of communicable diseases (Schütz, 2009). Good hand washing technique is easy to learn and can significantly reduce the spread of infectious diseases. High risk areas such as food preparation require the highest level of compliance. There is the need to follow these steps when teaching handwashing to food vendors:

- Place your hands together under water (warm if possible)
- Apply soap
- Rub your hands together for at least 20 seconds
- Wash hands thoroughly, including wrists, palms, back of hands and under the fingernails
- Clean dirt from under the fingernails
- Rinse the soap from your hands
- Dry hands completely with clean toweling (good quality, absorbent paper towel helps to remove germs)
- Pat your skin rather than rubbing to avoid chapping and cracking
- If soap and water are not available, use alcohol-based hand sanitizer (Schütz, 2009).

Common sense indicates that hands should be washed before handling food, but there are many other occasions when hands must be washed when working in a food-processing environment.

- Immediately before food handling;
- After touching body parts';
- After using washrooms;

- After coughing, sneezing (into sleeve/crook of elbow and not into hands) or using a tissue;
- After changing tasks, especially if switching between working with raw meat and working with ready to eat or cooked foods;
- After handling money, garbage or tools/equipment;
- After touching dirty surfaces;
- After picking up something from the floor;
- After engaging in any activity that contaminates hands.

In many cases, food workers have specific symptoms of a communicable disease, but continue to work with exposed food. In fact, 30 to 50% of all persons, even healthy ones carry the bacteria staphylococcus aureus, usually on the skin or in the mouth. Most of the time these bacteria do not harm, however, a break in the skin, burn, or other injury may allow the bacteria to penetrate the body's defences and cause infection. Alcohol-based hand sanitizers can be used in place of hand washing if hands are not visibly soiled or if soap and water is not available (Taoukis, Bili, and Gianakourou, 1998). In addition to improved spreadability, foaming formulations have been shown to provide superior compliance and efficacy. The effectiveness of alcohol hand sanitizers combined with hand washing results in an average 20% to 40% reduction in infections (Taoukis, *et al.* 1998). Education and training are vital elements of a food safety program in all sectors of the food industry. In any organization, however small, the instruction provided should ensure that all employees understand the basic principles of food safety and their own responsibilities in that respect within an organization. Food-handling staff should receive instruction in food safety and personal hygiene and should be required to undergo a test of their knowledge of the subject. Refresher courses should be given periodically through employment. Particular attention should be drawn to the need to report illness to the supervisor as soon as it occurs. Although

most people recover, foodborne illnesses can result in chronic health problems in 2 to 3% of cases. The good news is that infection control practices and programs do not have to be difficult to implement and manage. When it comes to food safety and reducing the spread of foodborne illness, education and awareness remains our best defense (Taoukis, Bili, and Gianakourou, 1998).

2.7 The impact of staff training on food safety

To be effective for reducing foodborne illnesses, food handler food safety training must increase motivation, improve attitudes, and increase the frequency of safe food handling practices, such as hand hygiene practices. The implied assumption is that such training leads to changes in behavior based on the knowledge, attitudes, and practices model. However, this model has been criticized by Ehiri (2003), study results have indicated that increased knowledge does not necessarily lead to changes in behavior. Several studies on how training programs impact food safety behaviors within food production settings have been conducted. In most of these studies, researchers evaluated pre- and immediate post-intervention knowledge and behaviors among workers who attended food safety workshops (Taoukis, Bili, and Gianakourou, 1998), also concluded that training must involve a risk-based approach and that behavioral change will not occur merely as a result of training. The concept of risk is an important part of food hygiene training. Attitudes and company culture have an impact on behavior and therefore on foodborne outbreaks associated with food workers. Targeted training and risk communication should be used to change food handlers' behavior, implement safer food handling, and improve knowledge of food safety practices such as cross-contamination, temperature control, and personal hygiene.

2.8 The importance of using soap and detergents

Removal of microorganisms from skin is enhanced by the addition of soaps or detergents to water. The main action of soaps and detergents is to reduce barriers to solution, and increase solubility. Water is an inefficient skin cleanser because fats and proteins, which are components of organic soil, are not readily dissolved in water. Cleansing is, however, aided by a reasonable flow of water (Taoukis, Bili, and Gianakourou, 1998).

2.8.1 Water temperature

Hot water that is comfortable for washing hands is not hot enough to kill bacteria. Bacteria grow much faster at body temperature (37^0 C). However, warm, soapy water is more effective than cold, soapy water at removing the natural oils on hands which hold soils and bacteria. Contrary to popular belief however, scientific studies have shown that using warm water has no effect on reducing the microbial load on hands (Taoukis, Bili, and Gianakourou, 1998).

2.8.2 Solid soap

Solid soap, because of its reusable nature, may hold bacteria acquired from previous uses. Yet, it is unlikely that any bacteria are transferred to users of the soap, as the bacteria are rinsed off with the foam (Taoukis, Bili, and Gianakourou, 1998).

2.8.3 Antibacterial soap

Antibacterial soaps have been heavily promoted to a health-conscious public. To date, there is no evidence that using recommended antiseptics or disinfectants selects for antibiotic-resistant organisms in nature. However, antibacterial soaps contain common antibacterial agents such as triclosan, which has an extensive list of resistant strains of organisms. So, even if antibiotic resistant strains aren't selected for by antibacterial soaps,

they might not be as effective as they are marketed to be. For example, a comprehensive analysis from the University of Oregon School of public health indicated that plain soaps are as effective as consumer-grade anti-bacterial soaps containing triclosan in preventing illness and removing bacteria from the hands (Taoukis, *et al* 1998).

2.8.4 Hand Antiseptics

A hand sanitizer or handantiseptic is a non-water-based hand hygiene agent. In the late 1990s and early part of the 21st century, alcohol rub non-water-based hand hygiene agents (also known as alcohol-based hand rubs, antiseptic hand rubs, or hand sanitizers) began to gain popularity. most are based on isopropyl alcohol or ethanol formulated together with a thickening agent such as carbomer into a gel, or a humectant such as glycerin into a liquid, or foam for ease of use and to decrease the drying effect of the alcohol. Hand sanitizers containing a minimum of 60 to 95% alcohol are efficient germ killers. Alcohol rub sanitizers kill bacteria, multi-drug resistant bacteria, tuberculosis, and some viruses (including, herpes, rhinovirus, vaccinia, influenza, and hepatitis) and fungi. Alcohol rub sanitizers containing 70% alcohol kill 99.97% (3.5 log reduction, similar to 35 decibel reduction) of the bacteria on hands 30 seconds after application and 99.99% to 99.999% (4-5 log reduction) of the bacteria on hands 1 minute after application. Hand sanitizers are most effective against bacteria and less effective against some viruses. Alcohol-based hand sanitizers are almost entirely ineffective against norovirus or norwalk type viruses, the most common cause of contagious gastroenteritis. Enough hand antiseptic or alcohol rub must be used to thoroughly wet or cover both hands. The front and back of both hands and between and the ends of all fingers are rubbed for approximately 30 seconds until the liquid, foam or gel is dry. As well as finger tips must be washed well too rubbing them in both palms alternatively. The increasing use of these agents is based on their ease of use and rapid

killing activity against micro-organisms; however, they should not serve as a replacement for proper hand washing unless soap and water are unavailable.

Moreover, frequent use of alcohol-based hand sanitizers can cause dry skin unless emollients and/or skin moisturizers are added to the formula. The drying effect of alcohol can be reduced or eliminated by adding glycerin and/or other emollients to the formula. In clinical trials, alcohol-based hand sanitizers containing emollients caused substantially less skin irritation and dryness than soaps or antimicrobial detergents (Schütz, 2009). Allergic contact dermatitis, contact urticaria syndrome or hypersensitivity to alcohol or additives present in alcohol hand rubs rarely occur. The lower tendency to induce irritant contact dermatitis became an attraction as compared to soap and water hand washing. Despite their effectiveness, non-water agents do not cleanse the hands of organic material, but simply disinfect them. It is for this reason that hand sanitizers are not as effective as soap and water at preventing the spread of many pathogens, since the pathogens still remain on the hands. Alcohol-free hand sanitizer efficacy is heavily dependent on the ingredients and formulation, and historically has significantly under-performed alcohol and alcohol rubs. More recently, formulations that use benzalkonium chloride have been shown to have persistent and cumulative antimicrobial activity after application, unlike alcohol, which has been shown to decrease in efficacy after repeated use, probably due to progressive adverse skin reactions (Taoukis, 2001).

2.9 Food Safety, Quality and Consumer Protection

The terms food safety and food quality can sometimes be confusing. Food safety refers to all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer. It is not negotiable. Quality includes all other attributes that influence a product's value to the consumer. This includes negative attributes such as spoilage, contamination with filth, discoloration, off-odours and positive attributes such as

the origin, colour, flavour, texture and processing method of the food. This distinction between safety and quality has implications for public policy and influences the nature and content of the food control system most suited to meet predetermined national objectives. Food control is defined as: a mandatory regulatory activity of enforcement by national or local authorities to provide consumer protection and ensure that all foods during production, handling, storage, processing, and distribution are safe, wholesome and fit for human consumption; conform to safety and quality requirements; and are honestly and accurately labelled as prescribed by law (Jay, 2006).

The foremost responsibility of food control is to enforce the food law(s) protecting the consumer against unsafe, impure and fraudulently presented food by prohibiting the sale of food not of the nature, substance or quality demanded by the purchaser. Confidence in the safety and integrity of the food supply is an important requirement for consumers. Food borne disease outbreaks involving agents such as *Escherichia coli, Salmonella* and chemical contaminants highlight problems with food safety and increase public anxiety that modern farming systems, food processing and marketing do not provide adequate safeguards for public health. Factors which contribute to potential hazards in foods include improper agricultural practices; poor hygiene at all stages of the food chain; lack of preventive controls in food processing and preparation operations; misuse of chemicals; contaminated raw materials, ingredients and water; inadequate or improper storage, etc. Specific concerns about food hazards have usually focused on:

1. Microbiological hazards;
2. Pesticide residues;
3. Misuse of food additives;
4. Chemical contaminants, including biological toxins; and
5. Adulteration.

The list has been further extended to cover genetically modified organisms, allergens, veterinary drugs residues and growth promoting hormones used in the production of animal products. Consumers expect protection from hazards occurring along the entire food chain, from primary producer through consumer (often described as the farm-to-table continuum). Protection will only occur if all sectors in the chain operate in an integrated way, and food control systems address all stages of this chain. As no mandatory activity of this nature can achieve its objectives fully without the cooperation and active participation of all stakeholders e.g. farmers, industry, and consumers, the term Food Control System is used in these Guidelines to describe the integration of a mandatory regulatory approach with preventive and educational strategies that protect the whole food chain (Adesiyun, 2003).

Thus an ideal food control system should include effective enforcement of mandatory requirements, along with training and education, community outreach programmes and promotion of voluntary compliance. The introduction of preventive approaches such as the Hazard Analysis Critical Control Point System (HACCP), have resulted in industry taking greater responsibility for control of food safety risks. Such an integrated approach facilitates improved consumer protection, effectively stimulates agriculture and the food processing industry, and promotes domestic and international food trade (Adesiyun, 2003).

2.10 Responsibility of Government in Ensuring Food Safety

Effective national food control systems are essential to protect the health and safety of domestic consumers. They are also critical in enabling countries to assure the safety and quality of their foods entering international trade and to ensure that imported foods conform to national requirements. The new global environment for food trade places considerable obligations on both importing and exporting countries to strengthen their food control systems and to implement and enforce risk-based food control strategies. Consumers are taking unprecedented interest in the way food is produced, processed and marketed, and are

increasingly calling for their Governments to accept greater responsibility for food safety and consumer protection. The Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) have a strong interest in promoting national food control systems that are based upon scientific principles and guidelines, and which address all sectors of the food chain. This is particularly important for developing countries as they seek to achieve improved food safety, quality and nutrition, but will require a high level of political and policy commitment.

In many countries, effective food control is undermined by the existence of fragmented legislation, multiple jurisdictions, and weaknesses in surveillance, monitoring and enforcement. These guidelines seek to provide advice to national authorities on strategies to strengthen food control systems to protect public health, prevent fraud and deception, avoid food adulteration and facilitate trade. They will enable authorities to choose the most suitable options for their food control systems in terms of legislation, infrastructure and enforcement mechanisms (WHO, 2005).

2.11 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 Food Control Management Strategies

Effective food control systems require policy and operational coordination at the national level. While the detail of such functions will be determined by the national legislation, they would include the establishment of a leadership function and administrative structures with clearly defined accountability for issues such as: the development and implementation of an integrated national food control strategy; operation of a national food control programme; securing funds and allocating resources; setting standards and regulations; participation in international food control related activities; developing emergency response procedures; carrying out risk analysis; etc. Core responsibilities include the establishment of regulatory measures, monitoring system performance, facilitating continuous improvement, and providing overall policy guidance (Gessner and Beller, 2004).

2.12.1 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 Responsibility of the Industry in Ensuring Food Safety

A food control system must be developed and implemented in a transparent manner. The confidence of consumers in the safety and quality of the food supply depends on their perception of the integrity and effectiveness of food control operations and activities. Accordingly, it is important that all decision-making processes are transparent, allow all stakeholders in the food chain to make effective contributions, and explain the basis for all decisions. This will encourage cooperation from all concerned parties and improve the efficiency and rate of compliance. Food control authorities should also examine the manner in which they communicate food safety information to the public. This may take the form of

scientific opinion on food safety matters, overviews of inspection activity, and findings on foods implicated in food borne illnesses, food poisoning episodes, or gross adulteration. All this could be considered as a part of risk communication to enable consumers to better understand the risks and their responsibilities for minimizing the impact of food borne hazards (Kapperud, (2007).

2.14 Regulatory Impact Assessment

When planning and implementing food control measures, consideration must be given to the costs of compliance (resources, personnel, and financial implications) to the food industry, as these costs are ultimately passed onto consumers. The important questions are: Do the benefits of regulation justify the costs? What is the most efficient management option? Export inspection systems designed to assure the safety and quality of exported foods, will protect international markets, generate business and secure returns (Kapperud, 2007).

Animal and plant health measures improve agricultural productivity. In contrast, food safety is an essential public health goal and may impose costs on producers, yet investments in food safety may not be immediately rewarded in the market place. Regulatory impact assessments (RIA) are of increasing importance in determining priorities and assist food control agencies in adjusting or revising their strategies to achieve the most beneficial effect. They are, however, difficult to carry out. Two approaches have been suggested for determining cost/benefit of regulatory measures in food safety:

Theoretical models can be developed to estimate willingness to pay (WTP) for reduced risk of morbidity and mortality; and Cost of illness (COI) covering lifetime medical costs and lost productivity. Both approaches require considerable data for interpretation. COI estimates are perhaps easier for policy makers to understand and have been widely used to justify measures for food control, even though they do not measure the full value of risk

reduction. Not surprisingly, it is easier to perform a RIA for an export inspection intervention, than for regulatory policy which achieves a public health outcome (Kapperud, 2007).

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

In this chapter an attempt is made to look at the research design, target population, data sources, sampling procedures (size and technique), data collection instruments and data analysis.

3.1 Research Design

This study adopted the case study design. The researcher used the case study method because among the various research designs, case studies are frequently regarded as using both quantitative and qualitative research and a combination of both approaches (Bryman, 2004). These types of research approach were used because they eventually aided the researcher to make judgement about the effectiveness, relevance or desirability of the variables. Moreover, the researcher used closed and open ended questions because they helped the researcher to gather factual information from respondents. Qualitative research was useful for studies at the individual level, and to find out, in depth, the ways in which people think or feel. The researcher used both qualitative and quantitative approach because quantitative approach helped to gather information that could be easily analysed using statistical means whilst qualitative information can be easily evaluated using thematic analysis.

3.2 Population

The population for the study is three hundred and twenty (320). The population consists of all hospital food handlers and supervisors in charge of the catering services in inpatient hospitals in the Trust hospital (Accra), Accra Psychiatric Hospital, and Korle Bu Teaching hospital (Accra), 37 Military Hospital and Ridge Hospital. The researcher chose

the following hospitals in Accra as case study because she works in Accra as a health care personnel. The researcher used purposive sampling technique to select the hospitals.

3.3 Sample size and sampling method

The ever increasing need for a representative statistical sample in empirical research has created the demand for an effective method of determining sample size. To address the existing gap, (Krejcie & Morgan 1970) came up with a table for determining sample size for a given population for easy reference. According to the (Krejcie & Morgan 1970), table of determining sample size, a population of 320 requires a sample size of 175. Trust hospital 5 (Accra), Accra Psychiatric Hospital 20 respondent, Korle Bu Teaching Hospital 60 Respondent, Ridge Regional Hospital 30 Respondent, 37 Military Hospital 60 Respondent Therefore, one hundred and seventy five (175) respondents were randomly selected for the study.

3.4 Research instrument used

Two instruments were used in this study and these include; questionnaire and interview guide.

3.4.1 Questionnaires

The main instrument that was used to collect information for the study were questionnaire and interview guide. The questionnaires were structured to consist of closed ended and open ended type of questions in order to elicit feedback from respondents. Other information that was collected include demographic information of the respondents. The questionnaires consists of four sections. Section 1 contains the demographic information of the respondents including the respondent's gender, age and educational qualification. Section

2 assessed the extent to which hospitals in Accra conform to food safety standard operating procedures. Section 3 determined perceived barriers to compliance to food safety operating procedures among food handlers in selected hospitals in Accra and section 4 evaluated the effectiveness of food safety training on food safety knowledge and practices among hospital food handlers.

Likert scale type was used as categories mainly ranging from strongly disagree, disagree, neutral, agree to strongly agree. Personal observations were also made throughout the data collection period. The researcher used the likert type scale because the scale has variables that could help the respondents provide responses suitable for the study. The data that was gathered was analysed statistically using Statistical Package for Social Sciences (SPSS) software version 16. Tables and figures were used to present the results of the study.

Data was collected through the use of a well-designed questionnaire and interview guide administered to participants in their kitchen and food vending base. Questionnaires were filled out by participants and the researcher had to go for the questionnaires in three days' time. However, the researcher interviewed supervisors at their free time.

3.4.2 Interview

The researcher obtained information from the hospital caterers using face to face interview. The researcher believed that using interview guide enhanced the outcome of the study by retrieving important data needed, of which satisfactory response would not be obtained through questionnaires. These interviewed participants were chosen purposively. However, the researcher used tape recorder to record what interviewee said and later coded the responses and analysed using thematic analysis.

3.5 Pilot Testing

The researcher conducted a pilot study to assess the authenticity of the research instruments. The pilot questionnaire were given to 15 people (10 food handlers and 5 senior caterers) to answer to correct errors which could take the form of repetition of questions and typographical mistakes and the avoidance of double questions. The pilot testing took place at the selected hospitals. The questions were read to them and the necessary corrections and omissions were made. The reliability co-efficient of the test was .85. The results from the pilot testing became clear evidence that the questionnaires and interview guide were accurate and grammatically good for distribution.

3.6 Data Collection Procedure

After permission from the authority concerned had been obtained, the researcher personally administered the questionnaires and the interview guide to the respondents during break time and collected them on the third day after they have finished.

3.7 Data Analysis

The data analysis involved reducing the raw data into a manageable size, developing summaries and applying statistical inferences. The following steps were taken to analyze the data for the study. The data collected was edited to detect and correct, possible errors and omissions that were likely to occur, to ensure consistency across respondents. Raw data obtained from a study is useless unless it is transformed into information for the purpose of decision making (Emery & Couper, 2003).

The questionnaire data that was collected was then coded to enable the respondents to be grouped into limited number of categories. The SPSS version 16 was used to analyse the primary data. Data was presented in tabular form, graphical and narrative forms. In

analyzing the quantitative data, descriptive statistical tools such as frequencies, percentages, tables and charts were used to present the results of the study.

3.8 Ethical considerations

The central ethical principle of a study is confidentiality and the participation of respondents to be voluntary and informed (Saharan, 2003) was followed by the researcher. The confidentiality of the sample way maintained, which is the responsibility of the researcher. There was no misrepresentation of the data gathered on behalf of the researcher. The self-respect of the respondents was maintained and thus, were not 'forced to respond to survey'. The researcher respected the protection of the respondents' privacy.

CHAPTER FOUR

RESULTS AND FINDINGS

4.0 Introduction

4.1 Response Rate

The study outcome revealed that out of 175 questionnaires sent out for primary data, 171 questionnaires were retrieved while 4 questionnaires were not retrieved. Therefore, the analysis of the study was based on 97.7% response rate.

Response Rate

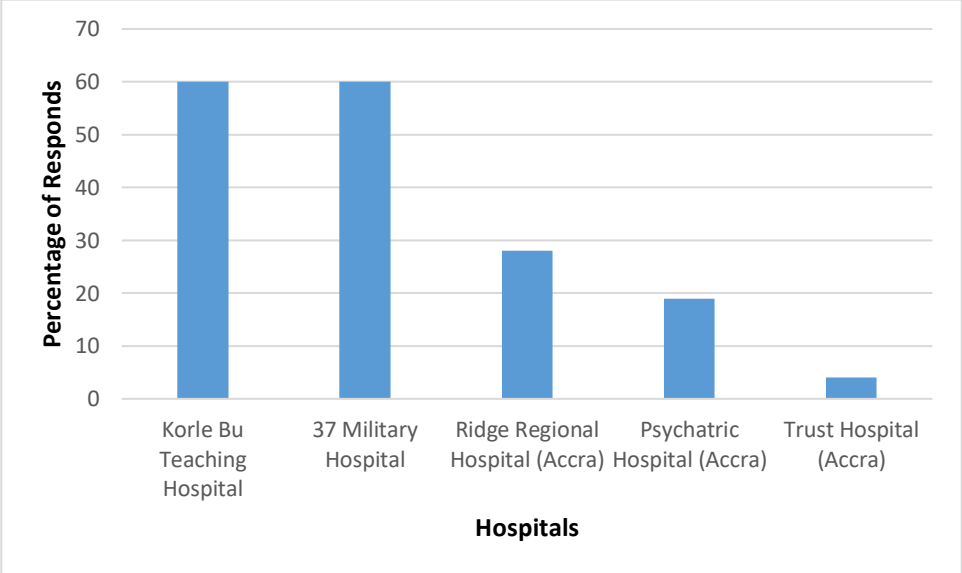

Figure 1

Source: Field survey, (2016)

4.2 Demographic Information of the Respondents

This section portrays the demographic information of the respondents including the respondent's gender, age and highest educational qualification.

Table 1: Gender of the Respondents

Gender of the Respondents	Frequency	Percent
Female	137	80.1
Male	34	19.9
Total	171	100.0

Source: Field survey, (2016)

Table 1 indicates that 80.1% of the respondents were females while 19.9% were males.

Gender of the Respondents

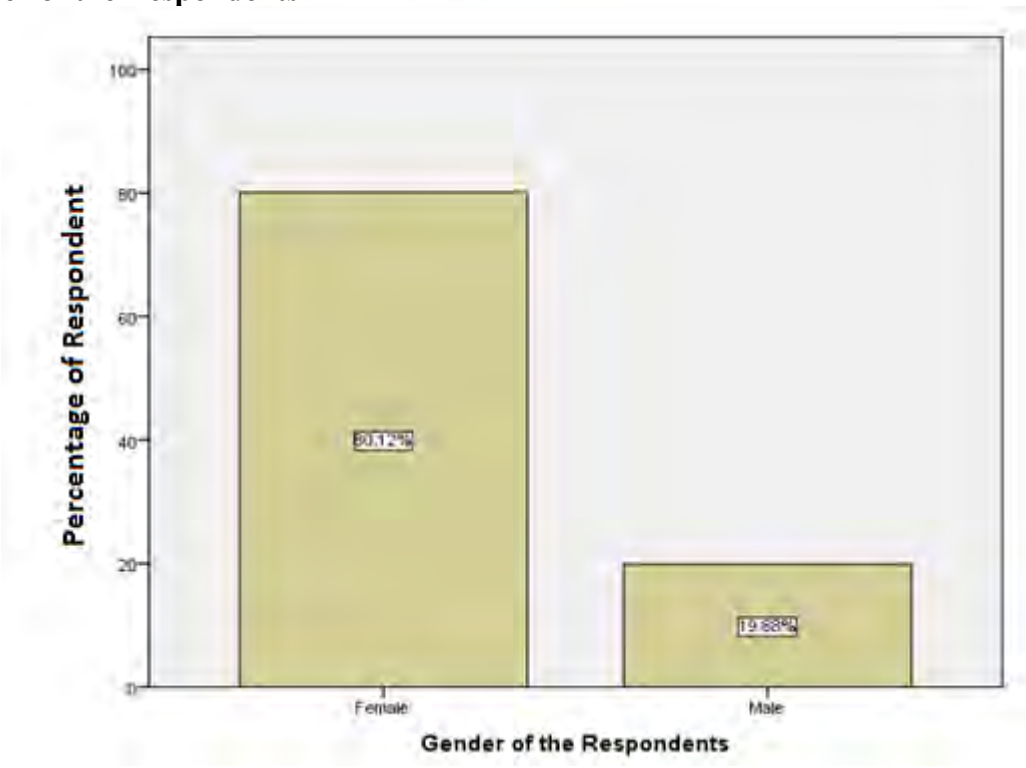

Figure 2

Source: Field survey, (2016)

Table 2 shows that 36.8% of the respondents were between the age ranges 50-59 years, 31% of the respondents were between the age range 30-39 years, 19.9% were between the age range 19-29 years while 12.3% were between the age range 40-49 years.

Table 2: Age range of the Respondents

Age range of the Respondents	Frequency	Percent%
19-29 years	34	19.9
30-39 years	53	31.0
40-49 years	21	12.3
50-59 years	63	36.8
Total	171	100.0

Source: Field survey, (2016)

Table 3 indicates that 38% of the respondents were possessing SSSCE/WASSCE as their highest qualification, 27.5% were possessing Diploma as their highest qualification, 19.3% were possessing BECE as their certificates, 11.1% were possessing Bachelor's degrees while 4.1% were possessing Master's degrees.

Table 3: Educational background of the Respondents

Educational background of the Respondents	Frequency	Percent%
BECE	33	19.3
SSSCE/WASSCE	65	38.0
Diploma	47	27.5
Bachelor's degree	19	11.1
Master's degree	7	4.1
Total	171	100.0

Source: Field survey, (2016)

4.3 The extent to which hospitals in Ghana conform to food safety standard operating procedures

Table 4 talks about the extent to which hospitals in Ghana conform to food safety standard operating procedures.

Table 4: Food safety standard operating procedures

Food safety standard operating procedures	1 Freq. (%)	2 Freq. (%)	3 Freq. (%)	4	5	Total Freq. %)
I pay attention to my personal hygiene because food safety is very important to consumers health	76 (44.4%)	89 (52%)	6 (3.5%)	-	-	171 (100%)
I care to use fresh and healthy raw materials in food production	63 (36.8%)	102 (59.6%)	6 (3.5%)	-	-	171 (100%)
I wear cap, masks and protective gloves during food production in order to prevent food-borne illnesses	87 (50.9%)	84 (49.1%)	-	-	-	171 (100%)
I do not touch food when my hand or fingers are cut	66 (38.6%)	96 (56.1%)	9 (5.3%)	-	-	171 (100%)
I always keep my work area clean for safe food production	58 (33.9%)	102 (59.6%)	11 (6.5%)	-	-	171 (100%)
I do not wear the same shoes and clothes both outside and inside of the food production area	77 (45%)	94 (55%)	-	-	-	171 (100%)
I do not touch raw food without wearing protective gloves	88 (51.5%)	83 (48.5%)	-	-	-	171 (100%)
I do not wear jewellery (ring, earrings, etc.) during food production	77 (45%)	90 (52.6%)	4 (2.3%)	-	-	171 (100%)
If I get flu or catch cold or have diarrhoea, etc. I do not participate in food production	60 (35.1%)	107 (62.6%)	4 (2.3%)	-	-	171 (100%)

1- Strongly agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly disagree

Source: Field survey, (2016)

4.3.1 The Respondents personal hygiene practices and consumer's health

The study revealed that 96.4% of the respondents agreed that they pay attention to their personal hygiene because food safety is very important to consumer's health while 3.5% were uncertain. This holds that personal hygienic practices like hand washing with cleansing agents can improve consumer's health. Unwashed hands are considered the most significant pathway to pathogen transfer and food safety experts advise hand washing procedures should be implemented and strictly monitored. Proper hand hygiene requires three components: 1) a proper protocol, 2) an appropriate hand washing or cleansing agent, and 3) compliance (execution at frequent enough interval to prevent infection). Hand washing, when done correctly, is the single most effective way to prevent the spread of communicable diseases (Schütz, 2009). Good hand washing technique is easy to learn and can significantly reduce the spread of infectious diseases. High risk areas such as food preparation require the highest level of compliance. There is the need to follow these steps when teaching handwashing to food vendors:

- Place your hands together under water (warm if possible)
- Apply soap
- Rub your hands together for at least 20 seconds
- Wash hands thoroughly, including wrists, palms, back of hands and under the fingernails
- Clean dirt from under the fingernails
- Rinse the soap from your hands
- Dry hands completely with clean toweling (good quality, absorbent paper towel helps to remove germs)
- Pat your skin rather than rubbing to avoid chapping and cracking
- If soap and water are not available, use alcohol-based hand sanitizer (Schütz, 2009).

Common sense indicates that hands should be washed before handling food, but there are many other occasions when hands must be washed when working in a food-processing environment.

- Immediately before food handling;
- After touching body parts';
- After using washrooms;
- After coughing, sneezing (into sleeve/crook of elbow and not into hands) or using a tissue;
- After changing tasks, especially if switching between working with raw meat and working with ready to eat or cooked foods;
- After handling money, garbage or tools/equipment;
- After touching dirty surfaces;
- After picking up something from the floor;
- After engaging in any activity that contaminates hands.

Source: Schütz, (2009).

4.3.2 The importance of using fresh and healthy raw materials in food production

The study shows that 96.4% of the respondents agreed that they care to use fresh and healthy raw materials in food production while 3.5% were uncertain. The study indicates that 100% of the respondents agreed that they wear cap, masks and protective gloves during food production in order to prevent food-borne illnesses. A consumer's chance of getting food borne illness depends largely on the health status of the food handlers, their personal hygiene, knowledge and practice of food hygiene. Infections can also be gotten through contaminated unwashed fingers, insects, and circulation of banknotes and by wind during dry conditions (Isara, 2009). Personal hygiene is important because according to Odonkor *et al.*, (2011) human beings are the largest contamination sources of food. Illness resulting from

contaminated food has also been reported as the most widespread health problem in the modern world, and one of the main reasons for reduced economic productivity (Käferstein, 2003). This is not surprising, considering the advancements in technology and different lifestyles adopted in this twenty first century that do not allow enough time for the preparation of home cooked meals.

4.3.3 I do not touch food when my hand or fingers are cut

The study results depicts that 94.7% of the respondents agreed that they do not touch food when their hand or fingers are cut while 5.3% were uncertain. Food hygiene depends largely on the personal hygiene practices and habits of personnel working in a food establishment (Ifeadike *et al.,* 2014). Gordon –Davis (2011) also interprets hygiene as the preservation of health involving all measures that ensure the safety and quality of food during its handling and identifies these measures as adequate storage of both raw and cooked foods including the right preparation and cooking procedures. Foods cooked under unhygienic conditions provide plenty of opportunity for transfer of bacteria as well as growth or survival of bacteria and other pathogens. The hygiene and sanitation aspect is the most important factor that could possibly have a negative impact on food quality (Gordon, 2011).

4.3.4 Keeping the work area clean for safe food production

The study indicates that 93.5%of the respondents agreed that they always keep their work area clean for safe food production while 6.4% were uncertain. This means that keeping the work area clean for safe food production prevents food borne diseases in the hospital. Several factors have been identified as contributory to the transmission of such food borne diseases. The main ones are as proposed by Paiva de Sousa, (2008) include: i) Food adulteration; ii) improper holding temperatures (failing to properly refrigerate food);

iii) inadequate cooking; iv) contaminated equipment (failure to clean and disinfect kitchen or processing plant equipment) and v) poor personal hygiene. Other factors that may contribute to the food borne illness include: vi) preparing food a day or more before serving with improper holding and reheating; vii) cross contamination (from raw to cooked products) and viii) adding contaminated ingredients to previously cooked food. In rare cases where infected people seek medical care and submit specimens, bacteria are more likely than other pathogens to be identified as causative agents. Bacterial agents most often identified in patients with foodborne illness are *Campylobacter*, *Salmonella*, and *Shigella* species, with substantial variation occurring by geographic area and season. Testing for viral etiologies of diarrheal disease is rarely done in clinical practice, but viruses are considered the most common cause of foodborne illness (CDC, 2013).

4.3.5 Wearing protective gloves before touching raw food

The study indicates that 100% of the respondents agreed that they do not wear the same shoes and clothes both outside and inside of the food production area. The study depicts that 100% of the respondents agreed that they do not touch raw food without wearing protective gloves. The study shows that 97.6% of the respondents agreed that they do not wear jewellery (ring, earrings, etc.) during food production while 2.3% were uncertain. The food handler has a vital role to play in food businesses, and that is to guarantee that meals served are hygienic for consumption. Conscious or inadvertent contamination of such foods, places buyers at risk of suffering from food- borne illnesses (Annor & Baiden, 2011). Foods that are usually related with food borne diseases include salads (potato, tuna, chicken, and macaroni), raw vegetables, bakery products (e.g., cream-filled pastries), sandwich fillings, milk, dairy products and poultry. Most cases of food borne illness are caused by eating food or drinking water which is contaminated by faeces. In the case of food, the main cause of contamination is often poor personal hygiene among food handlers (Esena & Owusu, 2013).

Reliable statistical evidence reveals that 70% of all bacterial food poisoning is caused by caterers whilst the remaining thirty percent can be attributed to cross contamination (Wilson, *et al* 1997).

4.3.6 If I get flu or catch cold or have diarrhoea, etc. I do not participate in food production

The study shows that 97.7% of the respondents agreed that if they get flu or catch cold or have diarrhoea, etc. they do not participate in food production while 2.3% were uncertain. In many cases, food workers have specific symptoms of a communicable disease, but continue to work with exposed food. In fact, 30 to 50% of all persons, even healthy ones carry the bacteria staphylococcus aureus, usually on the skin or in the mouth. Most of the time these bacteria do not harm, however, a break in the skin, burn, or other injury may allow the bacteria to penetrate the body's defences and cause infection. Personal hygiene, hand washing, employee illness awareness and training are key factors in limiting the transfer of disease from known sources of contamination. Unwashed hands are considered the most significant pathway to pathogen transfer and food safety experts advise hand washing procedures should be implemented and strictly monitored (Schütz, 2009).

4.3.7 Perceived barriers to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana.

Table 5 deals with the perceived barriers to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana.

Table 5: Perceived barriers to compliance to food safety operating procedures

Perceived barriers	1 Freq. (%)	2 Freq. (%)	3 Freq. (%)	4 Freq. (%)	5 Freq. (%)	Total Freq. (%)
Inadequate storage facilities to store the food	57 (33.3%)	108 (63.2%)	6 (3.5%)	-	-	171 (100%
Lack of effective training and development programmes regarding food safety issues	116 (67.8%)	55 (32.2%)	-	-	-	171 (100%)
Inadequate authorities to monitor the food preparation and storage process	23 (13.5%)	148 (86.5%)	-	-	-	171 (100%)

1- Strongly agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly disagree

Source: Field survey, (2016)

4.4.1 Inadequate storage facilities to store the food

The study results indicates that 96.5% of the respondents agreed that inadequate storage facilities to store the food is a challenge to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana while 3.5% were uncertain. As recommended by Annor & Baiden (2011) in their study, food must never be defrosted at room temperature (United States Department of Agriculture, 2006). Keeping meat and poultry cold while it is defrosting is essential to prevent the growth of harmful bacteria. There is greater danger of bacterial growth and food spoilage for food thawed at room temperature, hence the best way to safely thaw meat and poultry is in the refrigerator. In spite of these useful directives, food vendors in Ghana have been found to refrigerate food stuffs at inadequate temperatures exposing them to the risk of contamination (Annor & Baiden, 2011).

4.4 Observation Report

4.4.1 The Effectiveness of Food Safety Training on Food safety Knowledge and Practices among Hospital food handlers.

The research observed that as a result of effective food safety training, the knowledge and practices of the hospital food handlers improved. The study revealed that the respondents agreed that employee's toilet facilities are operational and clean to ensure cleanliness and personal hygiene. Moreover, personal hygiene practices are properly adhered to, in order to improve the quality of the food. The study results revealed that majority of the respondents agreed that handwashing signs are posted to enhance consumer safety. The study further shows that the respondents agreed that in order to ensure consumer safety cooks wear clean and proper uniforms. Furthermore, the results of the study indicates that all the respondents agreed that to ensure food safety cooks must wash their hands properly and frequently. The results demonstrated that the respondents agreed that in order to provide healthy foods to customers, cooks appear in good health because of possibility of transfer of food borne diseases. Also, the respondents agreed that hospital food handlers are required to provide hygienic food to customers by wearing clean and proper uniforms. Finally, the study shows that the respondents agreed that hospital food handlers are required to practice proper personal hygiene practices to improve food safety and consumers health. Effective national food control systems are essential to protect the health and safety of domestic consumers. They are also critical in enabling countries to assure the safety and quality of their foods entering international trade and to ensure that imported foods conform to national requirements. The new global environment for food trade places considerable obligations on both importing and exporting countries to strengthen their food control systems and to implement and enforce risk-based food control strategies. Consumers are taking unprecedented interest in the way food is produced, processed and marketed, and are increasingly calling for their Governments to accept greater responsibility for food safety

and consumer protection. The Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) have a strong interest in promoting national food control systems that are based upon scientific principles and guidelines, and which address all sectors of the food chain. This is particularly important for developing countries as they seek to achieve improved food safety, quality and nutrition, but will require a high level of political and policy commitment.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The main objective of the study was to evaluate compliance to food safety and the practice in selected hospitals in the capital city of Ghana. This study adopted the case study design. The researcher used both qualitative and quantitative research approach. The population for the study was three hundred and twenty (320). The population consists of all hospital food handlers and supervisors in charge of the catering services in inpatient hospitals in the Trust hospital (Accra), Accra Psychiatric Hospital, 37 Military Hospital (Accra), Ridge Regional Hospital (Accra) and Korle Bu Teaching hospital (Accra). One hundred and seventy five (175) respondents were randomly selected for the study. The instruments used in this study were questionnaire and interview guide. After permission from the authority concerned had been obtained, the researcher personally administered the questionnaires and the interview guide to the respondents during break time and collected them on the third day after they have finished. The questionnaire data that was collected was then coded to enable the respondents to be grouped into limited number of categories. The SPSS version 16 was used to analyse the primary data. Data was presented in tabular form, graphical and narrative forms. In analyzing the quantitative data, descriptive statistical tools such as frequencies, percentages, tables and charts were used to present the results of the study.

5.2 Major Findings

5.2.1 The extent to which hospitals in Ghana conform to food safety standard operating procedures

The study revealed that 96.4% of the respondents agreed that they pay attention to their personal hygiene because food safety is very important to consumer's health. The study shows that 96.4% of the respondents agreed that they care to use fresh and healthy raw materials in food production. The study indicates that 100% of the respondents agreed that they wear cap, masks and protective gloves during food production in order to prevent food-borne illnesses.

The study results depicts that 94.7% of the respondents agreed that they do not touch food when their hand or fingers are cut. Moreover, 93.5%of the respondents agreed that they always keep their work area clean for safe food production. The study indicates that 100% of the respondents agreed that they do not wear the same shoes and clothes both outside and inside of the food production area. The study depicts that 100% of the respondents agreed that they do not touch raw food without wearing protective gloves. The study shows that 97.6% of the respondents agreed that they do not wear jewellery (ring, earrings, etc.) during food production. The study shows that 97.7% of the respondents agreed that if they get flu or catch cold or have diarrhoea, etc. they do not participate in food production.

5.2.2 Perceived barriers to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana.

The study results indicates that 96.5% of the respondents agreed that inadequate storage facilities to store the food is a challenge to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana. The study revealed that 100% of the respondents agreed that lack of effective training and development programmes regarding food safety issues is a challenge to compliance to food safety operating procedures

among food handlers in selected hospitals in the capital city, Ghana. Furthermore, 100% of the respondents agreed that inadequate authorities to monitor the food preparation and storage process is a challenge to compliance to food safety operating procedures among food handlers in selected hospitals in the capital city, Ghana.

5.2.3 The Effectiveness of Food Safety Training on Food safety Knowledge and Practices among Hospital food handlers.

As a result of effective food safety training, the knowledge and practices of the hospital food handlers improved. The study revealed that the respondents agreed that employee's toilet are operational and clean to ensure cleanliness and personal hygiene. Moreover, personal hygiene practices are properly adhered to, in order to improve the quality of the food. The study results revealed that majority of the respondents agreed that handwashing signs are posted to enhance consumer safety. The study further shows that the respondents agreed that in order to ensure consumer safety cooks wear clean and proper uniforms. Furthermore, the results of the study indicates that all the respondents agreed that to ensure food safety cooks must wash their hands properly and frequently. The results demonstrated that the respondents agreed that in order to provide healthy foods to customers, cooks appear in good health because of possibility of transfer of food borne diseases. Also, the respondents agreed that hospital food handlers are required to provide hygienic food to customers by wearing clean and proper uniforms. Finally, the study shows that the respondents agreed that hospital food handlers are required to practice proper Personal hygiene practices to improve food safety and consumers health.

5.3 Conclusion

The study concluded that as a result of effective training, the hospital food handlers complied with food safety and the practice of good hygiene in hospital catering in Ghana by paying attention to their personal hygiene because they believed that food safety is very important to consumer's health, the respondents used fresh and healthy raw materials in food production, they wore cap, masks and protective gloves during food production in order to prevent food-borne illnesses, they do not touch food when their hand or fingers are cut, they always keep their work area clean for safe food production, they do not wear the same shoes and clothes both outside and inside of the food production area, they do not touch raw food without wearing protective gloves, they do not wear jewellery (ring, earrings, etc.) during food production and if they get flu or catch cold or have diarrhoea, etc. they do not participate in food production. This improved the hygienic conditions of the hospital foods.

Moreover, the study concluded that the perceived barriers to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana were, inadequate storage facilities to store the food, lack of effective training and development programmes regarding food safety issues and inadequate authorities to monitor the food preparation and storage process is a challenge to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana.

Furthermore, the study concluded that as a result of effective food safety training, the knowledge and practices of the hospital food handlers improved because the researcher observed that the food handlers toilet were operational and clean to ensure cleanliness and personal hygiene, personal hygiene practices were properly adhered to, and this improved the quality of the food, handwashing signs were posted and this enhanced consumer safety, cooks wore clean and proper uniforms and this improved consumer safety, the cooks washed their hands properly and frequently and this improved the food hygiene, the cooks appeared in good health because of possibility of transfer of food borne diseases to customers, and the

food handlers practiced proper personal hygiene practices and this improved food safety and consumers health.

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 hospital catering.
2. The Management of the hospitals 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 hospital catering.
3. The Management of the hospitals 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 hospitals should institute an independent authority in a form of food safety compliance committee to monitor the food preparation and storage process.
5.

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 hospital food handlers on the quality of hospital catering.

REFERENCES

Ababio P. F, & Lovatt, P. (2015). A review on food safety and food hygiene in Ghana. *Food Control*, *47*, 92–97.

Acheampong, I. (2005). Food Hygiene of the Cafeteria Facilities of the University of Ghana. BSc Project Report, Department of Nutrition and Food Science, University of Ghana, Legon.

Adesiyun, A. A., (2003): Effect of storage and consumer handling on staphylococcal counts in dried beef and dried fish. Journal of Food Protection 47:352–353.

Ayliffe, G. A. (1992). *Control of hospital infection,* London, Chapman & Hall Medical.

Annor, G. A., & Baiden, E. A. (2011). Evaluation of Food Hygiene Knowledge Attitudes and Practices of Food Handlers in Food Businesses in Accra, Ghana.

Apanga, S., Addah, J., & Sey, D. R. (2014). Food Safety Knowledge and Practice of Street Food Vendors in Rural Northern Ghana. Food and Public Health, 4(3), 99103.

Ashenafi, M., & Mehari, T. (1995). Some microbiological and nutritional properties of Borde and Shamita, traditional Ethiopian fermented beverages. Ethiop. J. Health Dev, 9(1), 105- 110.

Ayeh-Kumi, P. F., Quarcoo, S., Kwakye-Nuako, G., Kretchy, J. P., Osafo-Kantanka, A., & Mortu, S. (2009). Prevalence of intestinal parasitic infections among food vendors in Accra, Ghana. The Journal of Tropical Medicine and Parasitology, 32(1), 1-8.

Bryan, F. L., Teufel, P., Riaz, S., Roohi, S., Qadar, F., & Malik, Z. U. R. (1992). Hazards andcritical control points of vending operations at a railway station and a bus station in Pakistan. Journal of Food Protection®, 55(7), 534-541.

Bryman, A. (2004). A Social Research Methods. (2nd edition). Oxford University Press.

Campbell, J. (2011). Myths to live by. Joseph Campbell Foundation.

Canet, C., & N'diaye, C. (1996). [Street food in Africa]. Food, Nutrition and Agriculture (FAO).

CDC (2013). Attribution of Foodborne Illness, hospitalizations and deaths to food commodities by Outbreak Data, United States,Vol (19) 3

Chaulliac, M., &Gerbouin-Renolle, P. (1996). Children and street foods. Foods, Nutrition and Agriculture. 17/18. FAO, Rome, 28.

Clayton, D.A & Griffith, C. (2004). Observation of food safety practices in catering using notational analysis. 106:211– 227. *British Food Journal,* 106, 211- 227.

Cooper, D.R. & Emory, C.W. (2003). Business Research Methods. Newman Publications.

Dhariwal, N. (2007). Delhi Street Snacks Face the Chop, http://news.bbc.co.uk/go/pr/fr/-/1/hi/world/southasia/6340391.stm, accessed 8 June 2015.

Donkor, Y., & Singh, S. (2009). Effect of structured teaching programme on knowledge and practices related to hand washing technique among food handlers. *Nursing Journal of India,* 95, 125-126.

Esena, R. K., & Owusu, E. (2013). Quality of cooked foods in urban schools in Ghana: Review of food borne diseases and health implications. Int. J. Sci. Technol. Res, 2, 267-275.

Ehiri, J. E., Morris, G. P. & Mcewen, J. (1997). Evaluation of a food hygiene training course in Scotland. *Journal of Food Control,* 8, 137-147.

Friedman, C., Hoekstra, M., Samuel, R., Marcus, J. & Bender, B. (2004). Emerging Infections Program Food-Net Working Group. Risk factors for sporadic

Campylobacter infection in the United States: A case-control study in FoodNet sites. Clin. Infect. Dis. 38:S285–S296.

FAO, F. Agriculture Organization. (1997). State of the World's Forests. FAO, Rome.

FAO/WHO (2002). Sharing information on national experiences in the general field of risk management (Paper submitted by the delegation of France) Global forum of food safety egulators (Agenda item 4.4) 1-4.

Food and Drug Authority (2008). A report on contaminated food. Global forum of food safety regulators, p. 1-4.

Garner C & Nunn, (2009). The Australian National Animal Health Information System, Epidemiology. Sanitation of Animals, 27:143–160.

Gessner, B. D. & Beller, M. (2004). Protective effect of conventional cooking versus use of microwave ovens in an outbreak of salmonellois. *American Journal of Epidemiology*, 1994, 139:903-909.

Ghosh, M., Wahi, S., Kumar, M., & Ganguli, A. (2007). Prevalence of enterotoxigenic Staphylococcus aureus and Shigella spp. in some raw street vended Indian foods. *International Journal of Environmental Health Research*, 17(2), 151-156.

Gordon D. L. (2011). The hospitality Industry Handbook on Hygiene and safety for South African Students and Practicers, Juta & Company Ltd.

Githiri, M., Okemo, P. & Kiminywe, J. (2009). Hygiene practices and occurrence of coliform and staphylococcus on food at a public hospital in Kenya. *Journal of Applied Biosciences,* 27, 1727 - 1731.

GOH, K. (1997). Information related to food and water-borne disease in Penang. *Medical Journal Penang Hosp,* 2, 42 - 47.

Greig, J. D., Todd, E. C., Bartleson, C. A. & Michael, B. S. (2007). Outbreaks where food workers have been implicated in the spread of foodborne disease. *Journal of food protection,* 70, 1752 - 1761.

Hedberg, C., Macdonald, K. &Osterholm, M. (1994). Changing epidemiology of food-borne disease: A minesota perspective *ClinInfe Dis,* 18, 671 - 82.

Howes, M., Mcewen, S., Griffins, M. & Harris, L. (1996b). Food handler certification by home study: Measuring changes in knowledge and behaviour *Food and Environmental Sanitation,* 16, 737 - 744.

Haapala, I., & Probart, C. (2004). Food safety knowledge, perceptions, and behaviors among middle school students. Journal of Nutrition Education and Behavior, 36(2), 71-76.

Howes, M., McEwen, S., Griffiths, M., & Harris, L. (1996). Food handler certification by home study: Measuring changes in knowledge and behavior. Dairy, Food and Environmental Sanitation, 16(11), 737-744.http://www.foodsafety.gov/~fsg/fsghaccp.html

Idowu, O. A., & Rowland, S. A. (2006). Oral fecal parasites and personal hygiene of food handlers in Abeokuta, Nigeria. African health sciences, 6(3), 160-164.

Ifeadike, C. O., Ironkwe, O. C., Adogu, P. O., &Nnebue, C. C. (2014). Assessment of the food hygiene practices of food handlers in the Federal Capital Territory of Nigeria. Tropical Journal of Medical Research, 17(1), 10.

Isara, A. R., & Isah, E. C. (2009). Knowledge and practice of food hygiene and safety among foodhandlers in fast food restaurants in Benin City, Edo State. The Nigerian postgraduate medical journal, 16(3), 207-212.

Ilboudo A. & Traoré, S. (2006). Hygienic status assessment of dishwater, utensils, hands and pieces of money in street foods vending sites in Ouagadougou; Burkina Faso. African. Journal. Biotechnology., 5: 1107-1112

Jay, J. M. (2006). Modern Food Microbiology 3rded, Van Nostrand Reinhold Company, New York pp 409-508.

Jones, P. & Lockwood, A. (2009). Hospitality operating systems. *International Journal of Contemporary Hospitality Management* 7, 17-20.

Kandela, D. 2004. Hospital food. *Lancet*, 353 - 763.

Käferstein, F. K. (2003). Actions to reverse the upward curve of foodborne illness. Food control, 14(2), 101-109.

Kapperud, G., (2007). Outbreak of Shigellasonnei infection traced to imported iceberg lettuce**.** *Journal of Clinical Microbiology*, 33:609-614.

Kok, R., & Balkaran, R. (2014). Street Food Vending and Hygiene Practices and Implications for Consumers. *Journal of Economics and Behavioral Studies*, 6(3), 188.

Krejcie, R. V. & Morgan, D. W. (1970), *Determining Sample Size for Research Activities. Educational and Psychological Measurement*, 30, 607-610.

Manning, C. & Snider, S. (1993). Temporary public eating places: Food safety knowledge, attitudes, and practices. *Journal of Environmental Health* 56, 24-28.

McCarthy, M., Brennan, M., Kelly, A. L., Ritson, C., De Boer, M., & Thompson, N. (2007). Who is at risk and what do they know? Segmenting a population on their food safety knowledge Food Quality and Preference, 18(2), 205-217.

Mensah, P., Yeboah-Manu, D., Owusu-Darko, K., &Ablordey, A. (2002).Streed food in Accra, Ghana: how safe are they. Bulletin of the World Health Organization, 80, 114.

Muinde, O. K., & Kuria, E. (2005). Hygienic and Sanitary Practices of vendors of Street Foods in Nairobi Kenya.

Odonkor, S. T., Adom, T., Boatin, R., Bansa, D., &Odonkor, C. J. (2011). Evaluation of hygiene practices among street food vendors in Accra metropolis, Ghana, 41, 5807–5811.

Osei-Tutu, B. & Anto, F. Trends of football diseases at Ridge Hospital Accra.

Paliva de Sousa, C., (2008). The Impact of food manufacturing practices on food borne diseases. Impact Factor 1:45

Pilling, V. K., Brannon, L. A., Shanklin, C. W., Howells, A. D., & Roberts, K. R. (2008). Identifying specific beliefs to target to improve restaurant employees' intentions for performing three important food safety behaviors. *Journal of the American Dietetic Association*, 108(6), 991-997.

Przybylska, A. (2001). Outbreak of foodborne and waterborne infections and intoxications in hospitals and sanatoria in Poland *Przeglad epidemiologiczny,* 55, 217 - 229.

Rahman, F., Bird, C., & Devanbu, P. (2012). Clones: What is that smell?. Empirical Software Engineering, 17(4-5), 503-530.

Rahman, M., Arif, M. T., Bakar, K., & Tambi, Z. (2012). Food safety knowledge, attitude and hygiene practices among the street food vendors in northern kuchingcit,sarawak, (September), 95–103.

Rozin, P., Fischer, C., Imada, S., Surabin, A. & Wrzesniewski, A. (1999). Attitude to food and the role of food in life in the USA, Japan, Flemish, Belgium & France: Possible Implications for the diet-health debate *Appetite,* 33, 163 - 180.

Saharan, K. (2003). Prevalence and effectiveness of an education program on intestinal pathogens in food handlers. *Journal of medical association Thailand,* 88, S31 - S35.

Scharff, R. (2009). Health related costs from foodborne illness in the United States.

Schütz, V. (2009). *Modell zurPlanung von Dienstleistungenfür das überbetriebliche Gesundheitsmanagement in der Fleischwirtschaft.* Inaugural Dissertation an derRheinischen Friedrich-Wilhelms-Universität Bonn, Germany.

Stephenson, L. S., Latham, M. C., & Ottesen, E. A. (2002). Malnutrition and parasitic helminth infections. Parasitology, 121(S1), S23-S38.

Taoukis, P. S., Bili, M., & Gianakourou, M. (1998). Application of shelf life modeling of chilled salad products to a TTI based distribution and stock rotation system. *Acta Horticultura*, 476: 131-139.

Tomohide, Y. (2010). Food safety regulation in the United States: an empirical and theoretical examination. *In Independent Review,* 15, 210-226.

United States Department of Agriculture (USDA), (2006). Private Sector – Set Standards and Developing Countries Exports of Fresh Fruits and Vegetables: Synthesis of Country Case Studies in Africa (Ghana, Kenya, Uganda), Asia (Malaysia, Thailand, Vietnam), and Latin America (Argentina, Brazil, Costa Rica). Background Paper by UNCTAD Secretariat. *United Nations Conference on Trade and Development.*

Wilson, M., Murray, A. E., Black, M. A., & McDowell, D. A. (1997). The implementation of hazard analysis and critical control points in hospital catering. Managing Service Quality: An International Journal, 7(3), 150-156.

World Health Organization. (1996). Cancer pain relief: with a guide to opioid availability. World Health Organization.

World Health Organization. (2000). Foodborne disease: a focus for health education.

World Health Organization. (2003). Module a decentralization policies and practices: Case study Ghana. Participants Manual, Geneva.

World Health Organization. (2007). International Classification of Functioning, Disability, and Health: Children & Youth Version: ICF-CY. World Health Organization.

World Bank and Ministry of Food and Agriculture review of food safety in Ghana (2007)

WHO (1994). *Hygiene in food service and mass catering establishments. Important rules*, Geneva: WHO.

WHO (2005). *Hygiene in food service and mass catering establishments. Important rules*, Geneva: WHO. Revised edition

WHO (2001). *Foodborne Diseases: A Focus for Health Education.* Geneva, Switzerland, World Health Organization.

WHO (2002). Prevention of hospital-acquired infections: A practical guide. (2nd Ed). Department of Communicable Disease, Surveillance and Response, 12.

WHO (2007a). Consultation to Development a Strategy to Estimate the Global Burden of Foodborne Diseases

WHO. (2007b). Food safety and food-borne illness. Fact sheet No. 237.

WHO (2008). World Health Organization (WHO) Initiative to Estimate the Global Burden of Food-borne Diseases: A Summary Document. Geneva. 2008.

Zotermans, S., Zwietering, M. H. & Mead, G. C. (1994). Identification of Potentially Hazardous Microorganisms. *Food Microbiology,* 11, 203 - 214.

Questionnaire for the Cooks

The researcher is a product of UEW, Kumasi Campus conducting a piece of research to evaluate compliance to food safety and the practice of good hygiene in hospital catering in Ghana. I respectively request that you form part of this research by completing the attached questionnaire. This is seeking to solicit your opinion on the hygienic practices of hospital catering in Ghana. You do not need to necessarily write your name so that you will not be traced or identified. Anonymity and non-traceability are assured. 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. What is your gender? Female [ ] Male [ ]

2. What age range do you belong? Below 18 years [ ] 19-29 years [ ] 30-39 years [ ] 40-49 years [ ] 50-59 years [ ] 60-69 years [ ] above 70 years [ ]

3. What is your highest educational background?

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

Section B: Assessing the extent to which hospitals in Ghana conform to food safety standard operating procedures.

Please use the following likert scale to assess the extent to which hospitals in Ghana conform to food safety standard operating procedures.

1- Strongly agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly disagree

ITEM	1	2	3	4	5
6. I pay attention to my personal hygiene because food safety is very important to consumers health					
7. I care to use fresh and healthy raw materials in food production					
8. I wear cap, masks and protective gloves during food production in order to prevent food-borne illnesses					
9. I do not touch food when my hand or fingers are cut					
10. I always keep my work area clean for safe food production					
11. I do not wear the same shoes and clothes both outside and inside of the food production area					
12. I do not touch raw food without wearing protective gloves					
13. I do not wear jewellery (ring, earrings, etc.) during food production					
14. If I get flu or catch cold or have diarrhea, etc. I do not participate in food production					

Section C: Perceived barriers to compliance to food safety operating procedures among food handlers in selected hospitals in Ghana.

1- Strongly agree, 2-Agree, 3-Undecided, 4-Disagree, 5-Strongly disagree

Perceived barriers to compliance to food safety operating procedures	1	2	3	4	5
17. Inadequate storage facilities to store the food					
18. Lack of effective training and development programmes					

regarding food safety issues					
19. inadequate authorities to monitor the food preparation and storage process					

Section D: Evaluate the effectiveness of food safety training on food safety knowledge and practices among hospital food handlers.

20. What is the effect of food safety training on the knowledge and practices of food handlers in the hospital environment?

……

……

……

……..

Thank you so much for your time and cooperation!

INTERVIEW GUIDE FOR THE SENIOR MANAGERS

1. To what extent do hospitals in Ghana conform to standard food safety operating procedures?

……

……

……

2. What are the perceived barriers to compliance to food safety operating procedures among food handlers in the hospital environment?

……

……

……

3. What is the effect of food safety training on the knowledge and practices of food handlers in the hospital environment?

……

……

……

……