

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF SCIENCE

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

KNUST

**FOOD SAFETY PRACTICES IN FOOD SERVICE ESTABLISHMENTS: A CASE
STUDY OF THE GREATER ACCRA REGION**

**A THESIS SUBMITTED TO THE DEPARTMENT OF FOOD SCIENCE AND
TECHNOLOGY, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE AWARD OF MASTER OF SCIENCE DEGREE IN FOOD QUALITY
MANAGEMENT**

By

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DECLARATION

I do hereby declare that this project is my own work and that, to the best of my knowledge and belief, it contains no materials which to a substantial extent has been accepted for the award of any other degree or diploma in Kwame Nkrumah University of Science and Technology (KNUST) or other institution of higher learning, except where due acknowledgement has been made in the text.

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Finally to my husband and parents for their tremendous interest in my development and coaching throughout my studies.



DEDICATION

I dedicate this work to Mr. Bruce Apegyine, Mrs. Margaret Apegyine, Loretta Apegyine and my husband, Emmanuel B. Bukari.

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ABSTRACT

There is an upsurge in the number of Food Service Establishments (FSEs) in most cities in Ghana. FSEs generally provide ready to eat (RTE) foods for all categories of people. Food safety practices of these FSEs can have far reaching implications for the health and wellbeing of most people since the FSEs can serve as media for transferring diseases. The perennial incidence of deaths due to Cholera in Ghana gives cause for concern. Yet there is limited systematic study conducted to test the effect of activities of food providers on food contamination and their level of knowledge on food safety issues in Ghana.

This study assessed the food safety practices of ninety-seven (97) FSEs, conveniently selected from eleven communities within the Greater Accra Region. The Food and Drugs Authority Code of Hygienic Practice for FSEs was used as a benchmark to guide development of the data collection instruments for the study. The data was obtained through a face-to-face interview, using a structured but partially open-ended questionnaire. The findings of the study revealed that more females than males worked in food service establishments. Awareness of food safety was generally high amongst food handlers in the study area. However more than half (60 %) of those who were aware had not been trained on food hygiene. Additionally, nearly three quarters (71%) of food handlers indicated they had undergone the mandatory food handler's test.

The study thus concluded that there were inadequate food safety practices exhibited by food handlers within the study area. The study recommends the increase and sustained provision of tailored sensitization and training programmes on food safety for FSE operatives by key stakeholders responsible for ensuring food safety in the Country.

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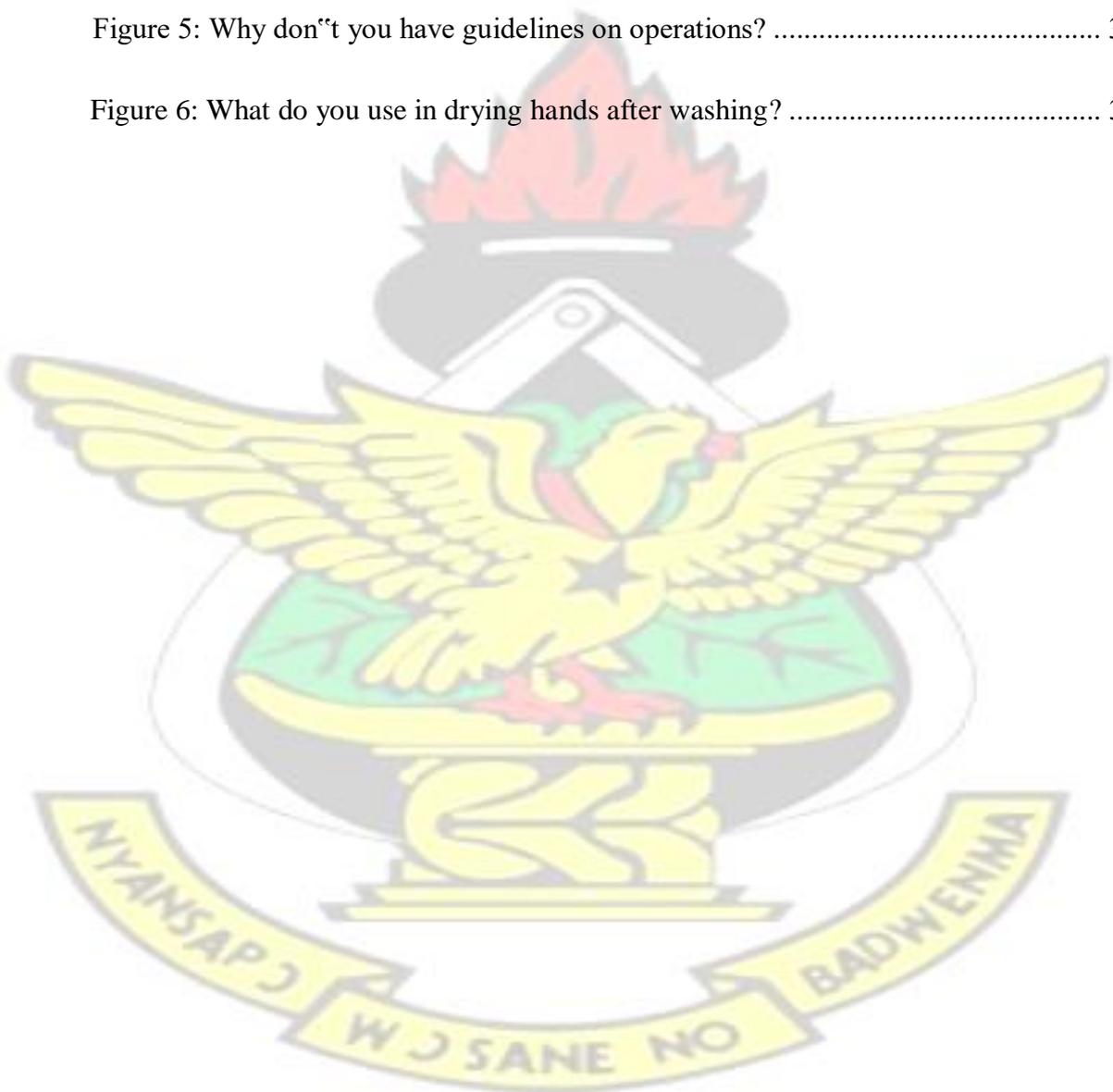
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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Good health and safety for all humans and animals are not negotiable. They are issues that must be constantly pursued to ensure adequate provision in every society. The issue of whether a substance (food) is safe or not points to the innate characteristics or composition of that substance. A substance can acquire unsafe properties by association with other substances; this has the propensity to cause harm to a user. Admittedly there is a degree of tolerable limit to which contaminated food can be put to use. The limits vary largely with the kind and quantity of residue of the contaminant as well as the length of time of its association with the food.

Inasmuch as food is required for all human sustenance, primarily it is for the acquisition of nutritive properties for maintenance, growth and development. Incidentally food is likely to be exposed to biological, chemical or physical hazards at any stage within the stages the food goes through and this could lead to foodborne illnesses. Paramount among the food related hazards are the biological hazards which include disease-causing bacteria, viruses, parasites, molds, yeast and other naturally occurring toxins that have the ability to cause harm to humans. Primarily the risk posed by these hazards are dependent on the type of food, the method of preparation and the manner in which it is held before consumption (WHO, 1996).

Food safety is the assurance that when a food is consumed in the usual manner it does not cause harm to human health and wellbeing (WHO, 2002). Over the past decades, there has been significant increase in foodborne illnesses which has led to foodborne diseases becoming a significant concern for public health professionals.

More importantly foodborne microorganisms such as; *Salmonella spp*, *Campylobacter spp*, etc. have become serious threats to human health in recent years.

The operations of Food Service Establishments (FSEs) are designed to prepare, store, package, serve, vend, or otherwise provide food for human consumption in a mobile, stationary, temporary, semi-permanent or permanent facilities or locations. Food services establishments occupy one of the important stages of the process of getting food ready for consumption. Of significance is the fact that in whatever way they operate, their activities involve coming into contact with food. On account of this, food handlers could act as vectors of disease pathogens for contamination and sometimes cross-contamination of food. According to Forsythe *et al* (1988), epidemiological data suggests that cross-contamination is the main cause of food borne diseases. Consequently, to ensure that food is microbiologically safe, the handlers or processors and the food itself needs to be carefully observed and supervised (Gilling *et al.*, 2001).

Foodborne disease is caused mainly by the oral ingestion of viable microorganisms (infection) or of the toxins they produce (intoxication) in sufficient amounts to create disease conditions (Do Carmo, 2004). Incidentally, the global incidence of foodborne disease is difficult to estimate. However, the World Health Organization (WHO) estimates that in year 2005 alone 1.8 million people died from diarrhoeal diseases primarily due to contamination of food and drinking water. Food and Agricultural Organisation (FAO) data indicates that in year 2006, the government of Ghana spent US\$17 million for treatment of food borne illnesses. There is, therefore, an indication that the issue of foodborne diseases if not appropriately handled both by regulators and other stakeholders, who have the responsibility of ensuring food safety at all levels within the food chain, may become a recurrent cost to the government. This would

adversely affect labour, and in some cases lead to needless deaths. Food safety is essential for sustainable development, more so in developing countries where the poverty rates are very high constraining their ability to seek medical care when infected by foodborne diseases (WHO, 2002).

Incidentally Ghana has had its share of food contaminant epidemics, with fatal consequences in some cases. Monney, *et al.*, 2013, indicated that a cholera outbreak in Atebubu in the BrongAhafo Region claimed nine (9) lives, whilst a similar one in Obuasi in the Ashanti Region claimed one (1) life and hospitalized more than fifty (50) people. It has been estimated that nine (9) million children under five years of age die from diarrhoea worldwide (UNICEF, *et al.*, 2009), five thousand of which occur in Ghana each year (GEMS, 2013). These statistics are generally worrying, given the fact that these disease conditions are avoidable if standard food safety measures are constantly adhered to.

1.2 Statement of Problem

Most people in developed countries depend on Food Service Establishments (FSEs) to provide them with at least one meal daily. With the growing trend in globalization, developing countries like Ghana are gradually adopting the lifestyle of eating meals outside the home. This has led to the upsurge in the number of Food Service Establishments in most cities in Ghana. FSEs generally provide ready to eat (RTE) foods for all categories of people.

There is however a general perception that foods served by Food Service Establishments (FSEs) especially those of the traditional catering services are unsafe, mainly because of the environment under which food is prepared, handled and served, which could expose foods to numerous contaminants (Rheinlander, 2008). It is

therefore imperative to evaluate the food safety practices employed by these Food Service Establishments as all people need nutritious and safe food if they are to be healthy and contribute to family, national, economic and social development. Despite the significant role of perceived risk in determining consumer purchase of foods from Food Service Establishments, limited studies have tested the effect of activities of food providers on food contamination and their level of knowledge on food safety issues.

Educating food handlers is an imperative objective for both industry and government. The inability of stakeholders with the responsibility of ensuring the provision of safe food to the public to deliver the requisite knowledge on food safety, proper food handling and hand-washing to food handlers could be detrimental to the health of consumers.

1.3 Research Objectives

The main objective of the study was to assess food hygiene practices of Food Service Establishments in the hospitality industry in selected areas in the Greater Accra Region.

The specific objectives of the study were to:

- i) To assess handling and storage practices within the FSEs.
- ii) To assess personnel's awareness and knowledge of food safety issues.

1.4 Significance of the Study

This study is important to the extent that it documents the gaps in food safety practices employed by food service establishments in order to inform regulators on inappropriate food safety employed at FSEs. This would help the regulators tailor their regulatory activities to, for instance, increase public awareness education on food safety and educate FSEs on food safety practices to be implemented to avoid the

incidences of foodborne illnesses. It would contribute to additional knowledge on food safety practices in the country and proffer better and easier ways of ensuring that food is safe for consumption at food service establishments.

Conclusions drawn from this study would guide policy formulation in the health sector regarding food safety, including the operations of food service establishments.



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Food Safety

The human body thrives on some basic components in order to sustain life and to function in good health. One of such basic components“ is food. In most jurisdictions, food is mostly defined in terms that enable the determination of safety procedures, regulations and taxes depending on the perspective it is being looked at. According to Hasselberger (2004), Codex Alimentarius gives a working definition of food to be “any substance, whether processed, semi-processed or raw, which is intended for human consumption, and includes drink, chewing gum and any substance which has been used in the manufacture, preparation or treatment of

“food” but does not include cosmetics or tobacco or substances used only as drugs. Food, as well as safe food, is a basic human necessity for creating a world without hunger and achieving poverty reduction worldwide (WHO, 2013).

Notwithstanding the fact that humans need food for the sustenance of life, there should be the assurance that food when consumed in its usual manner does not cause harm to human health and wellbeing (WHO, 2002). As a result, food safety is of utmost concern in the twenty-first century. The concept of food safety encompasses all aspects and processing of food before consumption; in essence, food safety principles utilize various resources and strategies to ensure that all types of foods are properly stored in their unprocessed state, prepared and preserved for consumption in the safest manner; eliminating or reducing all contaminants in the process. These contaminants could come from three main sources; physical, chemical and microbial sources, the most significant of these being contaminants from microbial sources.

Microbial contaminants include disease-causing bacteria, viruses, parasites, molds, yeast and naturally occurring toxins that have the ability to cause infections in humans. Primarily, the risk posed by these contaminants is usually dependent on the type of food, the method of preparation and the manner in which it is held before consumption (WHO, 1996).

2.2 Physical Contaminants

These are substances that become part of food, whether raw or cooked but may not change the food itself. Notwithstanding, their presence could create health hazards for the consumer. Examples include materials such as broken pieces of glass, strands of hair, or metal filings that have occasionally gotten into foods which do not necessarily spoil the foods but rather could cause injury if swallowed.

2.3 Chemical Contaminants

Toxic substances and any other compounds that may render a food unfit for human consumption are in the category of chemical contaminants. Pesticide residues are chemical contaminants that are by-products of pesticides and insecticides used to improve crop yields by reducing losses due to insects. Mercury, cadmium, lead, chloroform, benzene and polychlorinated biphenyls (PCBs) are chemical contaminants that are among toxic substances that may get into water supplies. These substances are toxic because they are harmful in low concentrations.

2.4 Microbial Contaminants

Microbial contaminants could come from several sources. Food handlers could be good mediums in the transportation of microbial contaminants. These are microorganisms that could cause both desirable change for instance, in the case of yoghurt production and also undesirable change in food resulting in food spoilage.

Bacteria, viruses and parasites are microorganisms that can contaminate food and subsequently cause foodborne illness. Disease-causing bacteria are more serious because they usually do not make the food smell or taste bad, but they can cause illness (Dewallet *et al*, 1999).

The table below shows in descending order of occurrence, the four (4) common causes of food-borne infections.

Table 1: Food-Borne Infection

Pathogen	Sources	Symptoms
<i>Campylobacter jejuni</i>	Raw or undercooked meat or poultry, raw milk, raw vegetables	Abdominal pain, bloody diarrhea, fever, chills, headache; within 2-11 hours, can last 7-14 days
<i>Escherichia coli</i> 0157H7	Raw or undercooked ground beef, uncooked fruits and vegetables, raw milk, unpasteurized apple juice	Diarrhea, severe cramping, nausea, vomiting, fever, kidney damage in children; within 1-8 days of exposure
<i>Salmonella enteritidis</i>	Eggs, poultry, unpasteurized milk, fruits, vegetables, seafood	Diarrhea, severe cramping, nausea, vomiting, fever, kidney damage in children; within 1-8 days of exposure
<i>Salmonella enteritidis</i>	Eggs, poultry, unpasteurized milk, fruits, vegetables, seafood	Fever, nausea, vomiting, diarrhea, severe abdominal pain; within 12 hours to 3 days
<i>Listeria monocytogenes</i>	Unwashed fruits and vegetables, soil, water, cold cuts, hot dogs	Flu-like symptoms, encephalitis, meningitis

Other microorganisms such as fungi which are yeast and molds may cause food to spoil but not cause foodborne illnesses. Signs of food spoilage may include; discoloration, off odor, fuzzy growth on the surface, slimy feel on the surface, foaming or gas bubbles in the product, off-flavor and soft spots or breaks in the skin on fruits and vegetables.

Food safety issues have attracted a lot of attention around the world in the past and continue to be a driving force to contend with in ensuring public health. Food safety is inextricably connected to the general wellbeing of people in communities; this connection is seen more as promoting community health than just maintaining sanitation in the community. Morbidity and mortality from foodborne pathogens is a significant global health concern (Rocourt *et al.*, 2003; WHO 2002). Food safety risks impinge veritably on populations and the general welfare of people especially in developing countries in most parts of Africa, such as Ghana. This is so on account of the fact that a singular outbreak of a foodborne disease due to any lapse in ensuring food safety could wipe away an entire community.

Most modern food safety policies came into being at the turn of the twentieth century in response to widespread scandals involving large food service companies whose main preoccupation shifted from providing good and safe food to customers to profits for their shareholders (Sinclair, 1906). Besides, different academics or scholars have written extensively on the different aspects, types and consequences of non-adherence to basic food safety for individuals and communities.

Though it is generally difficult to directly attribute illnesses to food consumption, the

Centre for Disease Control in the USA¹ estimates that foodborne pathogens cause approximately 76 million illness, and 5000 deaths among a population of 273 million people each year (Mead *et al.*, 1999).

According to WHO (1989), food handling personnel play an important role in ensuring food safety throughout the chain of food production and storage. A United States based study suggested that improper food handling practices contribute to about ninety-seven percent (97%) of foodborne illnesses in food service establishments and homes (Howes *et al.*, 1996)

A classic example is the case of the cook, Mary Mallon known in history as “Typhoid Mary”, the first typhoid carrier identified in the United States who never displayed a single symptom of the disease herself. However, before she was captured and quarantined for life, she directly infected at least fifty-one (51) people, three (3) of whom died and indirectly infected countless others (FDA, 1989). Carmo *et al.*, (2004) report that one food borne disease outbreak in Brazil recorded 4000 patients experiencing acute gastroenteritis. A trace-back investigation indicated that food processors and handlers were culture positive for enterotoxigenic as a result of *Staphylococcus aureus* contamination.

2.5 The Role of Food Handlers in Providing Food Needs and Ensuring Food Safety

Research has shown that food prepared with satisfactory hygienic standards is one of the essential conditions for promoting and preserving health, and inadequate control is one of the factors responsible for the occurrence of foodborne disease outbreaks (Oliveira, Goncalves, Shinohara, & Stamford, 2003)

¹ United States of America

It is clearly established that rapid urbanization of cities in Sub-saharan Africa cannot be ignored; this is one of the greatest challenges of the twenty-first Century

(Amponsah-Doku, 2010). In Ghana, food service establishments especially those of the street food vending category, sprang up in the early 1990s. Industrial development brought about new sources of employment, with people increasingly working in places away from their home environment (Ackahet *al.*2011). These employees still have food needs that have to be satisfied. Further, the perennial ruralurban migration that has been instrumental to the population increase in most parts of the urban centres in the country, especially Accra, makes the demand for and patronage of foods prepared outside the home common place. Food service establishments are operations that store, prepare, package, serve, vend, or otherwise provide food for human consumption in a mobile, stationary, temporary, semipermanent or permanent facility or location. Typically, these are places where food is prepared and intended for „individual portion service“ and include the sites at which the individual portions are provided, whether consumption occurs on or off the premises.

Undoubtedly, consumers expect that the food they obtain and consume outside their homes are prepared and handled with an acceptable food hygiene level, which reduces the risk of any foodborne illness. In most cases, improper food handling which includes inappropriate use of temperature during food preparation and preservation, cross contamination, poor personal hygiene and inadequate equipment accounts for the occurrence of foodborne diseases (Goncalves, 1998). Food handlers are likely to become vehicles of microorganisms through their hands, cuts, sores, mouth, skin, hair, among others, if they do not practice proper personal hygiene or correct food preparation (Silva, Germano, &Germano, 2003). Nonetheless, the Codex Alimentarius (2003) states that all individuals coming into direct or indirect contact with food must

be qualified and must recognize their role and responsibility in protecting food against contamination and deterioration.

As the importance of food hygiene cannot be overemphasised, Food Laws, policies and industrial guidelines across the globe are structured to help the food industry comply with safe food practices, so as to protect consumers from food hazards/contaminants in their communities. It is therefore the responsibility of food operators at all levels of the food production chain to ensure food acquired and consumed by consumers are safe (EU 2004). According to Regulation (EC) No. 852/2004 (EU 2004), all food business operations have to implement a written food safety system based on hazard analysis and critical control point (HACCP) principles.

Primarily, the HACCP system is based on systematic scientific approach to identifying specific hazards and measures for their control to ensure the safety of food. HACCP is therefore a tool employed for the prevention of hazards rather than finished product inspection and can be used at all stages of a food chain. Despite the legal requirements for the implementation of good hygiene practice and HACCP across the globe, there are pieces of evidence of cross-contamination as the main cause of outbreaks in restaurants, take-away and fast food places (Severiet *al*, 2012; Giraudonet *al* 2009). For this reason countries such as Denmark, the United Kingdom, United States, parts of Canada, New Zealand and Singapore introduced food hygiene rating system (Jinet *al.*, 2003; Simon *et al*, 2005). Food hygiene rating represents a score (lower score reflecting a higher standard) of regular inspections conducted by health authorities of restaurants, bars, fast food and other food establishments selling foods and drink that are clearly displayed at business premises and/or via the internet for public viewing. Mostly, a food hygiene rating is a numerical expression of a business in relation to its

hygiene compliance, confidence in management/control systems and structural hygiene.

The use of food hygiene rating indirectly forces food operators to operate within acceptable food hygiene practices and helps to improve the awareness of management of eating out of home. Wright *et al* (2008) indicates that “scores on the door” schemes motivated food businesses to improve their hygiene standards and might have led to measurable improvements in hygiene inspection scores.

Similarly, the Danish government launched what is known as the “Smiley Scheme” in 2001 (Nielsen 2006). A smiley face ranging from big smile to sad face is displaced at the entrance door of food establishments indicating food hygiene inspections results status of the food services establishment. This makes it easier for customers to identify hygiene conditions of specific food establishments.

In Ghana, however, hygiene principles are not necessarily mandatory but are guidelines for the operation of the food industry (Ghana Standard Authority, 2013). This, therefore, might explain the reported 77% of traceable food borne diseases result from improper handling in food service establishments (Alale, 2013). Nonetheless, the Public Health Act 2012, (Act 851) of the Food and Drugs Authority prohibits the sale of unwholesome food, and the sale of food under unsanitary conditions. Failure of food service establishments to comply with the Law could lead to the imposition of penalties and ultimately the closure of these business establishments. The Food Safety Management Department of the Food Division of the Food and Drugs Authority plays the role of inspecting food service establishments and certifying them with food hygiene permits when they comply (FDA, 2013).

In addition, staff of food service establishments directly involved in food preparation and serving are required to undergo a food handler's test. This is an important way of regulating the transmission of communicable diseases through food by food handlers (Musa, *et al* 2002). Indeed global health and safety organisations such as the WHO and FAO² have deemed medical examination of food handlers a necessity in most developing countries. Additionally, Section 286 of the Criminal Code (Amendment), 2003 (Act 646) of Ghana provides for all food vendors to be examined to ensure they do not infect consumers with communicable diseases. However, Ackah *et al* (2011), found in Koforidua (Ghana) that majority of respondents, 60% had no health certificates, whilst a good proportion of these people had not received training on food hygiene.

2.6 Training Needs of Food Handlers

Food handlers are expected to have substantial knowledge and skills for handling foods hygienically (FAO, 1997). However, this is usually not the case because several studies have shown discrepancies between knowledge and actual practices among food handlers (Zeruet *al*, 2007; Omenuet *al*, 2008; Sun Y *et al*, 2012). Studies have also shown that food handlers do not mostly translate their knowledge into practice (Howeset *al*, 1996). Campos *et al* (2008) in their study on the assessment of personal hygiene and practices of food handlers in municipal public schools in Natal (Brazil) found that 74.1% of food handlers do not receive periodic training. The conduct of food handlers coupled with adequate training is absolutely instrumental in the application of good practices that will ensure production of safe food.

² Food and Agricultural Organisation

2.7 Food Safety Situations around the Globe

The growing evidence of the interconnectedness of the world order cannot be discounted; this phenomenon is generally referred to as a global village. For example, advances in Information Technology has made it possible for the transmission of information from one part of the world to another by the click of a button and largely the cross-border exchange of goods and services including food.

The Liberalization of trade as well as globalization of the world's economies has resulted in food becoming an international commodity that could be traded across borders. Incidentally, the increase in international movement of both people and food in recent years has brought in its wake the introduction of hazards or diseases that hitherto were not experienced in some continents. These hazards could be microbiological, chemical or physical though microbiological hazards are the most significant. Microbiological hazards pose a greater challenge because of their potential to increase exponentially in food or when ingested (Tent, 1999; WHO, 2009).

Over the past few years, many countries have reported significant increases in diseases caused by microorganisms that are spread mainly through food. Examples of such microorganisms are *Salmonella* spp. and *Campylobacter* spp. The WHO estimates that more than 200,000 people die of food poisoning annually in Nigeria from foodborne pathogens (especially *E. coli* and *Salmonella*) (WHO, 2009). These deaths are attributed to or would be attributed to the intake of contaminated foods through improper processing, preservation and service (WHO, 2009).

Importantly, matters related to the globalization of food cannot be underestimated. A compromise in any food safety system at any stage within the food chain could lead to a food borne disease outbreak. Inasmuch as everyone is susceptible to foodborne

diseases, infants and young children, pregnant women, immunocompromised persons, the elderly, etc are more likely to be contaminated by foodborne pathogens with severe consequences. In addition to the effect on the personnel in the health sector who are affected when they come in contact with foodborne pathogens, the situation has economic consequences for individuals and families. This imposes substantial burden on healthcare systems and markedly reduces economic productivity (WHO, Global Food Safety Strategy, 2011).

Interestingly, the developed and developing countries are similarly affected. However, the extent to which a country could be affected differs from one country to the other, depending on several factors. These factors could range from the income level of a population to the general infrastructure put in place by governments.

A report in 2006 by the Centre for Science in Public Interest elaborates on food safety issues in various regions across the globe. The regions are Western Pacific, South East Asian, East Mediterranean, Africa, Europe, Central and South-America and North America. For the purpose of this study, we only reviewed sections on Africa, Western Pacific and South East Asian Regions. However, each Region battles with specific but related food safety concerns:

2.7.1 Africa Region

The report indicates five major food safety concerns in the Africa Region which are poverty, street foods, mycotoxins, food safety emergencies and economic impact of foodborne diseases.

i) Poverty

Poverty is cited as the major root cause of foodborne diseases within the Africa Region which disproportionately affects women and children. Poverty exacerbates food safety problems by contributing to issues relating to insanitary conditions in rapidly growing

urban centres, lack of access to clean water, unhygienic transportation and storage of foods amongst many others.

ii) Street Foods

It is noted that numerous programs have been put in place by the FAO and WHO to improve the quality and safety of street foods in African countries; for example the project in South Africa that provides vendors and handlers with health education and training in acceptable food preparation and handling practices (Codex, June,2003) and also the Guinea Bissau funded project set out to identify practical actions to improve the quality and safety of street foods to protect consumers and reorganize the street food sector. However, street foods still pose a greater challenge in the Africa Region primarily because they do not often meet proper hygiene standards in part because of weak regulatory systems, inadequate food safety laws, lack of financial resources to invest in safer equipment, and lack of education for food handlers.

iii) Mycotoxins

Aflatoxins, naturally occurring fungal toxins, pose profound challenges to food safety in the Africa Region. They are mycotoxins of public health concern because they contaminate various agricultural commodities either before harvest or under post-harvest conditions. Generally, tropical conditions such as high temperatures and moisture, monsoons, unseasonal rains during harvest, and flash floods lead to fungal growth and production of mycotoxins. Poor harvesting practices, improper storage, and less than optimal conditions during transport and marketing can also contribute to fungal growth and increase the risk of mycotoxin production. The chronic incidence of aflatoxin in diets is evident from the presence of aflatoxin M1 in human breast milk in Ghana, Nigeria, Sierra Leone, and Sudan and in umbilical cord blood samples in

Ghana, Kenya, Nigeria, and Sierra Leone. Together with the hepatitis B virus, aflatoxins contribute to the high incidence of primary liver cancer in tropical Africa. Recent studies carried out in West African countries, such as Benin, Gambia, and Togo, indicate chronic exposure of population groups and foetuses to dietary aflatoxins. Moreover, children exposed to aflatoxins may experience stunted growth or be chronically underweight and thus be more susceptible to infectious diseases in childhood and later life. (WHO, fact sheet 5) iv



iv) Food Safety Emergencies

The African Region in recent times is reported to have had high frequency and magnitude of humanitarian emergencies with enormous effect on food safety. Natural disasters such as floods, droughts and earthquakes or intense civil war or border conflicts often lead to the destruction of food supplies or contamination which has deep consequences for the health of survivors. Outbreaks of foodborne diseases in refugee camps are common particularly because of unsanitary conditions, environmental contaminants, and improper food handling. For example, in 1994, Rwandese refugee camps near Goma, Zaire (Democratic Republic of Congo) were devastated by a major outbreak of cholera where an estimated 70,000 cases of diarrheal disease occurred with a high fatality rate. Similarly, during 1992, 772 cases of abdominal cramps and bloody diarrhoea were documented in the Lisungwi camp in Malawi that housed 60,000 refugees from Mozambique. (WHO, Fact Sheet 4)

v) Economic impact of foodborne diseases

Foodborne diseases have many adverse economic consequences within the African Region. For example, the 1998 outbreak of cholera in Tanzania cost US \$36 million. In Nigeria, the Food and Drug Administration destroyed aflatoxin-contaminated food worth more than US\$200,000. WHO has documented numerous food safety and quality problems that have affected food exports and imports in African countries.

These include:

- Spoilage
- substandard/fake products
- failure to provide production dates
- improper or deceitful labelling of food imports
- poor product quality and packaging of food exports

- expired food
- exceeding levels for preservatives/additives
- lack of harmonization of food safety regulations
- fraud

2.7.2 Western Pacific

The report cites a number of factors that contribute to foodborne illnesses in the Western Pacific Region. They include:

- The need for increase in production due to increase in demand has led to active animal husbandry which has influenced farmers to subscribe to intensive farming practices which include the use of both slaughter by-products and animal waste as feed. Antibiotics, pesticides and growth hormones are being misused in order to meet increased population demands.
- Unsafe aquaculture activities which include harvesting fish from polluted water and illegal use of poisons and dynamite.
- Larger processing operations with extensive distribution systems which could inadvertently lead to widespread distribution of contaminated foods.
- Consumer demand for: (1) reductions in the use of food additives, including preservatives, and (2) increased access to ready-to-eat and fast food.
- Increasing international trade in food and feed, and large-scale movements of people across national borders as tourists, refugees, and workers.(WHO Food Safety, 2005)

2.7.3 South East Asian Region

In the South East Asian Region food safety concerns were found to include inadequate access to clean water, increased use of pesticides and other chemicals in agriculture, food processing and lack of producer and consumer education. Food safety problems

have even aggravated due to rapid urban population growth in many countries because, people live in conditions of extreme poverty, filth, overcrowding and poor sanitation. Street food vendors and food service premises are an essential and an increasingly important part of the food supply system in nearly all of these countries. In the absence of strict controls over preparation, storage, distribution, etc those foods have the potential to become a major source of foodborne disease. Many countries, like India and Nepal, lack critical enforcement of health and food safety regulations against street food vendors due to a shortage of health inspectors. In most countries of the South East Asian Region, laboratories with the capacity to detect common foodborne hazards are rare, and where they do exist, the high cost of testing is an obstacle. In summary, ensuring food safety in relevant food sectors is essential for food related diseases prevention and efficient safe food assurance.

2.8 Food Safety Standards

Regulatory standards for ensuring the safety of foods are a necessary first step for measuring practices or actuals against the standards. Food regulatory standards are found in many countries (FAO, 2004) besides the internationally accepted body such as CODEX Alimentarius Commission which develops harmonized international food standards, guidelines and codes of practice to protect the health of the consumers, the level of implementation of standards differ markedly from one country to the other. Over the years, standards developed by CODEX on food safety serves as the bedrock for most food safety standards. It prescribes the guiding principles based on a set of thematic areas around which countries develop their bespoke regulatory standards.

In Ghana, the Public Health Act, 2012 (Act 851) mandates the Food and Drugs Authority (FDA) to develop and implement a set of food safety standards capable of safeguarding the public against unwholesome foods (FDA, 2013). The “Code of

Hygienic Practice for Food Service Establishment in the Hospitality Industry” (FDA/FSMD/CP-FSE/2013/03), the regulatory standard published by the Food and Drugs Authority, states clearly in its introduction that this standard should be adhered to in addition to the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4-2003) (FDA, 2013). This is particularly so in view of the importance attached to food safety by the FDA, in order that the shortcomings of the FDA regulations maybe addressed by the Recommended International Code of Practice.

The Food and Drugs Authority deems it unlawful if any person operates a food service establishment without having complied with the Code of Hygienic Practice for Food Service Establishment which will enable the person obtain a food hygiene permit.

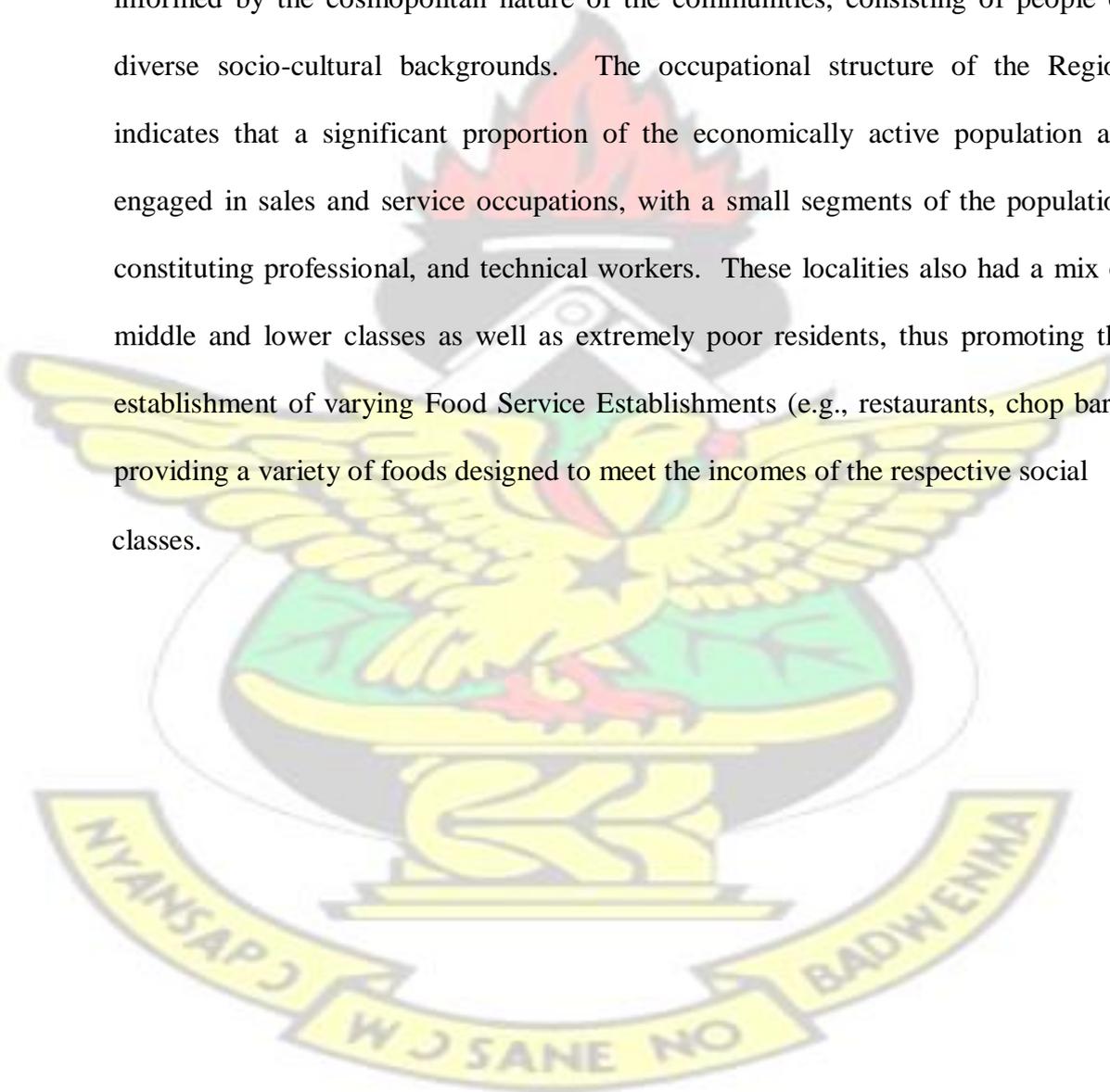
The Food and Drugs Authority’s Code of Hygienic Practice for Food Service Establishment in the Hospitality Industry has requirements with regard to Layout and fabrication, personnel hygiene, raw material acquisition, storage and control, Cold Storage facilities, Food process control, Equipment and Utensils, Food transportation, display and service, Water supply and storage, Waste Management, Controlling Pests and Record and Documentation. Sections of the requirements in the Code are relevant for this study.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Study Area

The study area consisted of eleven localities, namely, *Dansoman, East Legon, Osu, Odawna, Ayi Mensa, Adenta, Dome, Madina, Taifa, Haasto* and *Ashongman*, all in the Greater Accra Region as shown in the map below. The choice of these locations was informed by the cosmopolitan nature of the communities, consisting of people of diverse socio-cultural backgrounds. The occupational structure of the Region indicates that a significant proportion of the economically active population are engaged in sales and service occupations, with a small segments of the population constituting professional, and technical workers. These localities also had a mix of middle and lower classes as well as extremely poor residents, thus promoting the establishment of varying Food Service Establishments (e.g., restaurants, chop bars) providing a variety of foods designed to meet the incomes of the respective social classes.



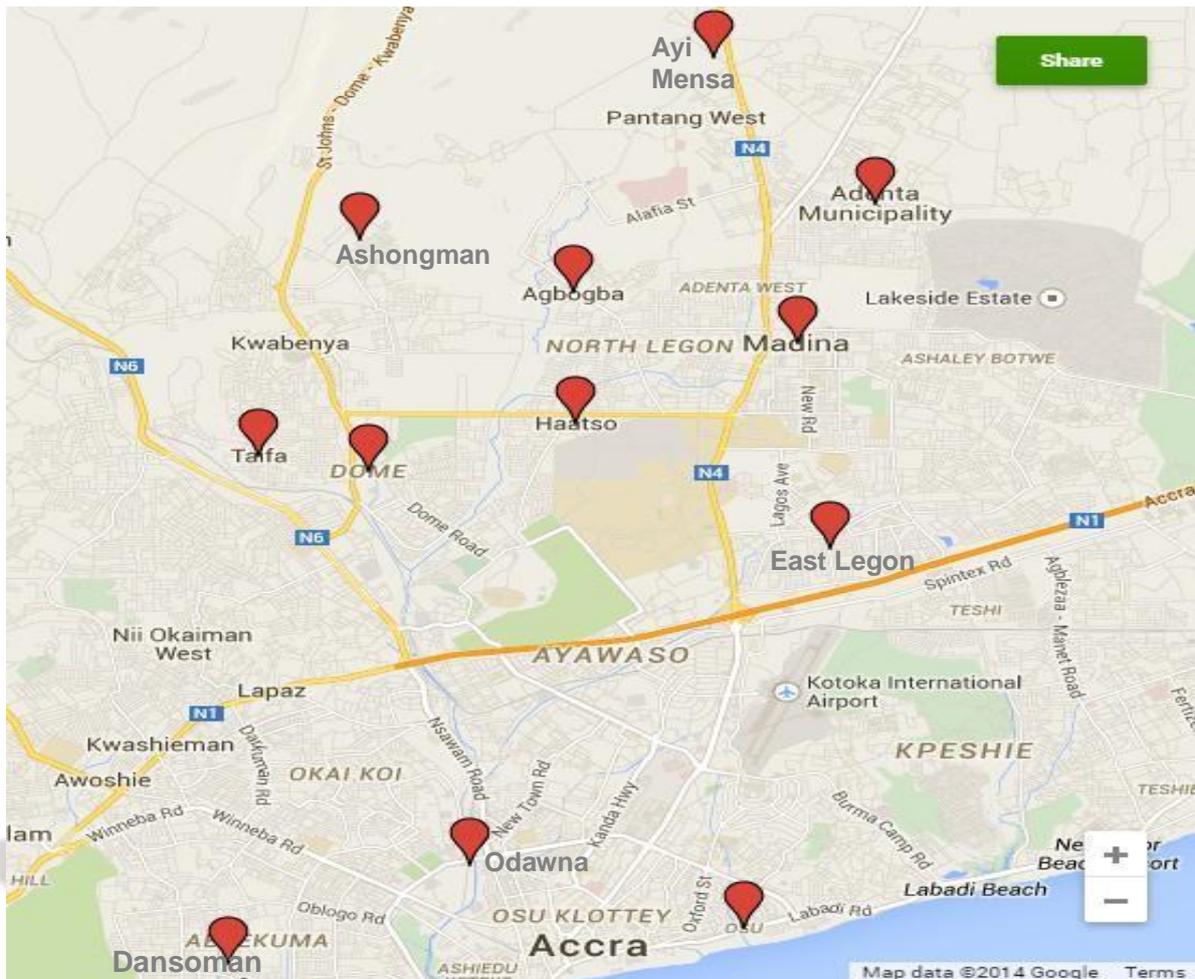


Figure 1: Map showing Areas within the Study Area

3.2 Sampling methods

A total of ninety seven (97) FSEs were selected from the eleven (11) localities within the Greater Accra Region using the purposive sampling technique. The ninety-seven (97) FSEs which were mainly restaurants and chop bars were identified in advance before the commencement of the survey. Both restaurants and chop bars were generally from middle and lower class residential areas in order to ensure adequate representation of the food needs of the diverse socio-cultural communities.

The respondents for each of the selected FSEs, who could be a Chef, Cook or Waiter/Waitress, were selected using convenience sampling technique, depending on who was readily available at the time and willing to respond to the face-to-face

interview. Although more scientific techniques, such as systematic random technique or stratified sampling technique would have been more appropriate to use in order to allow generalization of the findings of the study, this was not possible due to lack of data on the listing of all the elements of the sampling frame (i.e., the target categories of food handlers in each of the identified FSEs).

A breakdown of the respondents by locality and type of FSE is presented in Table 2 below:

Table 2: Breakdown of Respondents by Locality and Type

No	Locality	Type of FSE		Total	Percentage %
		Restaurant	Chop Bar		
1	Dansoman	8	5	13	13.40
2	East Legon	9	2	11	11.34
3	Osu	8	4	12	12.37
4	Odawna	6	4	10	10.30
5	Ayi-Mensa	3	2	5	5.16
6	Adenta	6	3	9	9.28
7	Dome	5	2	7	7.22
8	Madina	6	4	10	10.30
9	Taifa	5	2	7	7.22
10	Haasto	4	3	7	7.22
11	Ashongman	5	1	6	6.19
Total		65	32	97	100.00

3.3 Research Design

The study employed a cross-sectional design, which is also described as “one-time snap short” (Royce Singleton, Jr, Straits, Bruce C., and MaAllister, Ronald J. 1988). This design is one in which data on a cross-section of respondents chosen to represent a larger population of interest are collected at essentially one point in time on particular issues of research interest. The merit of this design is that it facilitates the collection of a considerable amount of rich data over a relatively short period.

3.4 Data Collection Methods

A structured but partly open-ended questionnaire was used for the data collection. Some of the questions of the questionnaire were derived from the Food and Drugs Authority Code of Hygienic Practice For Food Service Establishment in the Hospitality Industry (FDA/FSMD/CP-FSE/2013/03), while others were developed based on the literature review of similar past studies(e.g. journal article on the Socio-Economic Profile, Knowledge of Hygiene and Food Safety Practices among StreetFood Vendors in some parts of Accra-Ghana published in the Internet Journal of Food Safety, Vol.13 (2011) by Ackah M., Gyamfi E.T., Anim A.K., Osei J., Hansen J.K., Agyemang O.) Essentially, the questionnaire covered four thematic areas, namely, Socio-demographic profile of food handlers, Food Equipment Handling, Food handling and Storage and Personnel Issues.

The socio-demographic profile of food handlers provided information on the type of FSEs, the number of years food handlers had worked, whether they had been trained, how they acquired knowledge on food preparation and whether they had taken the mandatory Food Handlers Test.

The section on food equipment handling by the food handlers sought to elicit responses on the manner in which food equipment (crookery) was handled in FSEs. The Food Handling and Storage provided information on how raw and cooked foods were handled to ensure the prevention of contamination,while the section on personnel issues revolved around the facilities provided to enhance safety practices.

The questionnaire was pre-tested to determine the appropriateness of the questions and comprehension by food handlers and all errors updated before the actual data collection started.

Five research assistants, consisting of three females with BSc. Consumer Science qualification background and a male and female with BSc. Food Science and Nutrition qualification, respectively, were recruited to assist in the data collection. They were trained by the researcher to understand the objective of the study as well as the questionnaire. The questionnaire was administered to the sample by the research assistants using face-to-face interview techniques. The data collection period spanned October 2013 to March 2014.

3.5 Data Analysis

Responses to primary data obtained were collated and analyzed using the Statistical Package for Social Sciences (SPSS) software, version 2013. Descriptive statistics, including frequencies, means and percentages were computed on the key variables of the thematic areas (socio-demographic, food handling and storage and food equipment handling) covered in the questionnaire.

The chi-square test was used for this analysis since the data obtained was squarely structured in the domain of its usage. The *null hypothesis was set as there shall be no significant difference* ($p < 0.05$) between the expected frequencies hypothetically taken as equal proportions among all the categories studied and the observed frequencies actually collected from the study. The alternative hypothesis was however, set as; *there shall be significant differences* ($p > 0.05$) between the expected and observed frequencies. The level of significance of this test was at 95% confidence level indicating that at this level, differences cannot be attributed to chance alone.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Demography

Approximately 83% of the respondents interviewed were females. The oldest among the respondents was 58 years and the youngest 20 years. The mean age was 33 years with a variability about the mean of 30%; also the median age was 30 years. Furthermore, the oldest age of among the female respondents was 58 years while that of male respondents was 46 years. On the other hand the youngest for the female respondents was 20 years and that for male respondents was 29 years.

Whilst half of the respondents interviewed indicated they were married (51%), nearly half also indicated they were single (46%). Three percent (3%) indicated they were widowed. Further, approximately 80% of respondents interviewed indicated they were cooks, 10% indicated they were chefs and the rest were waiters. In terms of educational status, most respondents were generally secondary level education (75%); 14% indicated primary level education; 6% tertiary level education, and finally 4% had „no formal education,“ as shown in Table 2 below.

Table 3: Socio-demographic Variables

Variable	<i>n</i> (%)
Gender	
Male	16 (17)
Female	81 (83)
Age	
Maximum	58

Variable	n (%)
Average	33.46
Minimum	20
Median	30
Std. Deviation	10.323
Type of FSE	
Restaurant	65 (67)
Chop bar	32 (33)
Occupation	
Cook	78 (80)
Chef	10 (10)
Waiter	9 (9)
Educational Status	
Primary	14 (14)
Secondary	73 (75)
Tertiary	6 (6)
No Formal Education	4 (4)
Marital Status	
Single	45 (46)
Married	49 (51)
Widowed	3 (3)
Trained on food hygiene	
Yes	39 (40)

No	58 (60)
Variable	<i>n</i> (%)
Are you aware of food safety	
Yes	88 (91)
No	9 (9)
Age in years	
<20	8(8)
21-40	62 (64)
41-60	27 (28)

The average number of years respondents had worked in food service establishments was 4 years, with the least being one (1) year and the longest being 25 years.

4.2 Awareness of Food Safety

An overwhelming majority (91%) of respondents indicated they were aware of food safety. The rest either could not understand the term or were not aware of it. However, more than half, 60% of those who were aware indicated they were not trained in food hygiene. Approximately 54% of respondents who received training were trained by the Food and Drugs Authority and the others were trained by companies like Nestle (38%) and Unilever (8%). Significantly, most respondents indicated they acquired knowledge on food preparation through observation (57%), school (24%) and talent 19% as shown in Figure2 below.

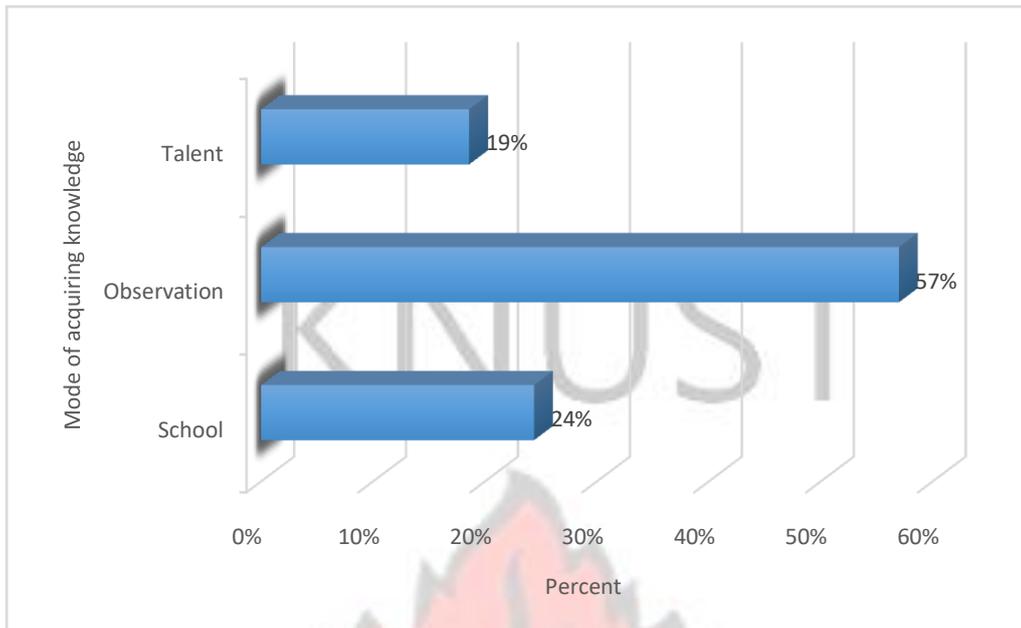


Figure 2: Mode of acquiring Knowledge on food preparation

4.3 Food Equipment Handling

Most respondents, 57% said they washed utensils with soap and water at ambient temperature, whilst 37 % indicated they washed with soap and warm water. The rest (6 %) indicated they washed dishes with warm water, lime and soap. Also there was a significant relationship between food safety awareness and how dishes were washed ($X^2 = 12.68$, $df = 2$, $p < 0.05$). Out of those who indicated they were aware of food safety, 58% washed dishes with water at ambient temperature, 39% said they washed with warm water and soap and 3% said they washed with warm water, lime and soap, as shown in Figure 3 below.

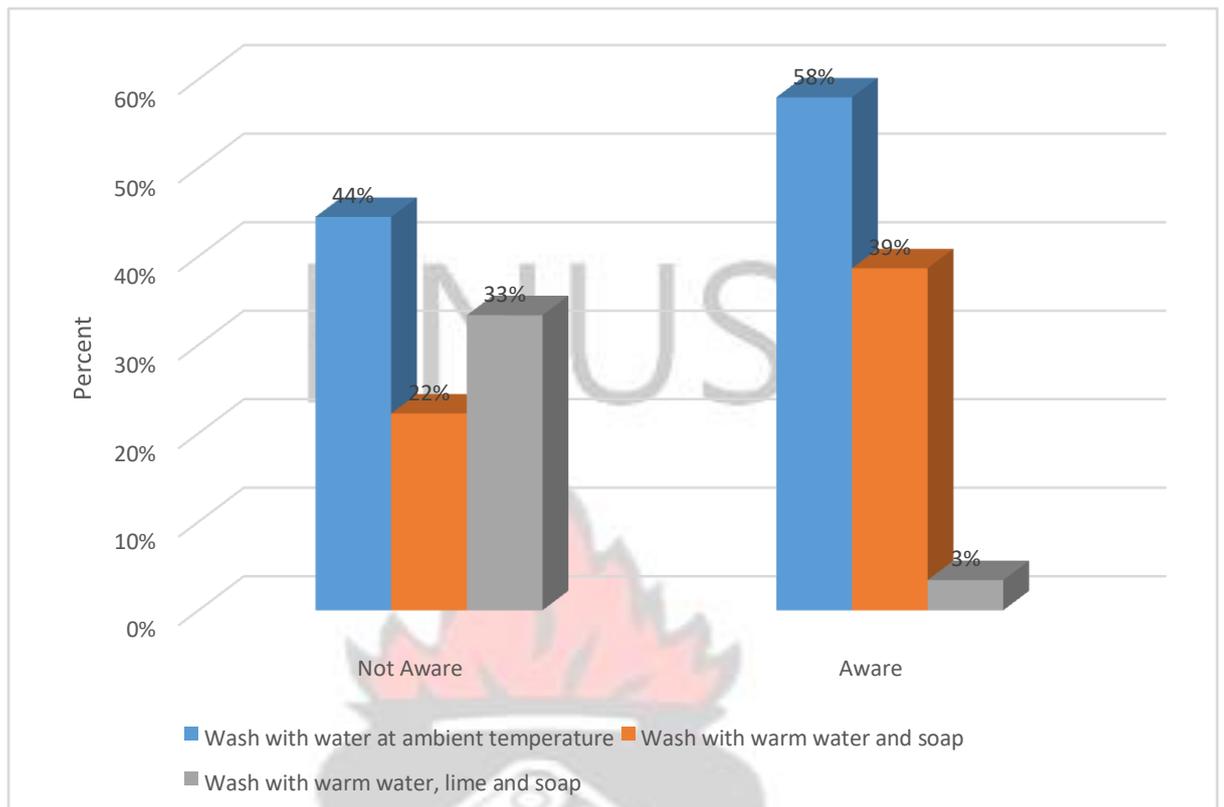


Figure 3: Awareness and dish washing methods

Importantly, most respondents, (60%) indicated they did not have constant water supply. For 50% of the respondents, municipal water was available through the taps within the week; 33% bought from vendors; whilst the rest indicated they obtained water from their neighbors (17%).

The condition of respondents' rinsing water after washing crockery before changing was; cloudy (53%), clean (28%) and foamy (19%). Approximately 50% of respondents indicated that they cleaned utensils after each use; others indicated they clean the utensils when they look unclean (37%); and the rest at the end of each day (13%).

4.4 Food handling and Storage

Most respondents indicated they stored raw foods, representing 95%. The rest (5%) who did not store raw foods said they usually use all raw foods within the day's food

preparation and had no need for storing them. Of the respondents who stored raw foods, 85% indicated refrigeration and the rest indicated drying (15%) as the mode of storage. Respondents (42%) generally owned or used one refrigeration equipment. 37% of respondents used two refrigeration equipment, whilst 13 % used three refrigerators. Only 3% of respondents used the highest number of refrigeration equipment (four).

Approximately 90% of respondents did not know the average temperature of their refrigeration equipment. Of those who knew, approximately equal numbers mentioned 2°C (34%), 8°C (33%) and 10° C (33%). Most respondents stated the storage of “raw and cooked foods in the same fridge,” representing 65 % and 27 % indicated “raw foods only” as the kinds of food products they stored in refrigerators.

The others (8 %) stated “cooked foods only”.

There is a significant relationship between food safety awareness and nature of foods stored in refrigerators, ($X^2 = 7.67$, $df = 2$, $p < 0.05$). Out of the respondents who were aware of food safety, 23 % stored only raw foods in refrigerator, 9 % stored only cooked food and 67 % stored both raw and cooked foods in refrigerator, as shown in Figure 4 below.

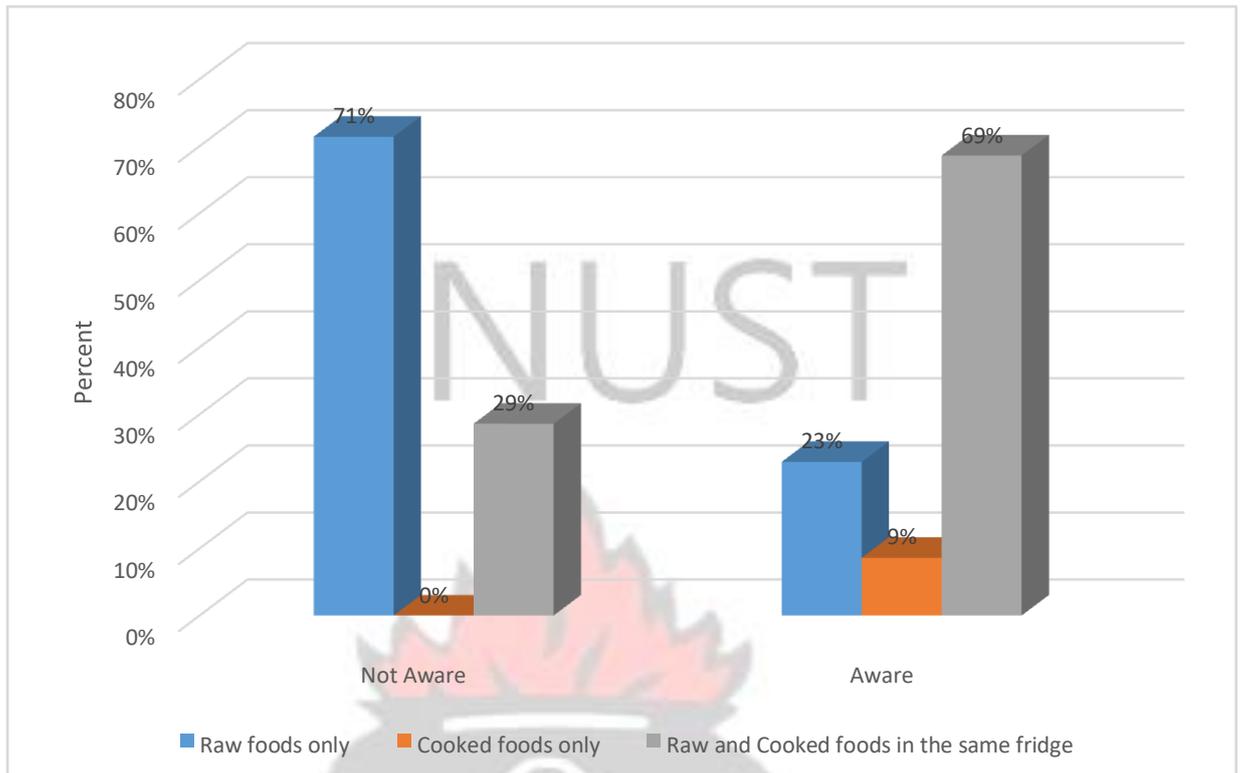


Figure 4: Relationship between food safety awareness and nature of foods stored in refrigerator

All respondents stated they cleaned their refrigerators regularly. When asked how many times in a week, 45% of respondents indicated once; 34% and 21% indicated twice and three times respectively. Most respondents (66%) stated that any of the kitchen staff could clean the refrigerator, whilst 34% indicated an assigned cleaner. 50% of respondents indicated the cleaning of the refrigerators was monitored; monitoring was done by manager (73%) and supervisor (27%).

Most respondents indicated they washed vegetables in a bowl of water (79%). The rest indicated vegetables were washed under running water.

Approximately, 46% of respondents indicated they handled food in a food warmer prior to serving customers, 28% said buffet dishes and the rest said sauce pans. Food was generally served with a ladle (97%); only 3% indicated bare hand.

4.5 Personnel Issues

More than half of the respondents indicated they had undergone the food handlers' test (71%) as indicated in Table 4 below.

Table 4: Food Handler's Test

	Frequency	Percent
No	28	28.9
Yes	69	71.1
Total	97	100.0

About 84% of respondents indicated they did not have written procedures to guide their operations. Of those who responded in the negative, 32% said they did not have written procedures because they had not been provided; 45% said they did not know how useful written procedures would be; and 23% said they knew the procedures so there was no need for it to be written for them, as shown in Figure 5 below.

There was no significant relationship between food safety awareness and whether FSEs had written procedures to guide their operations ($X^2 = 0.21, df=1, p>0.05$). Out of those who said they were aware of food safety, 83% did not have written procedures to guide their operations and only 17% had written procedures to guide their operations.

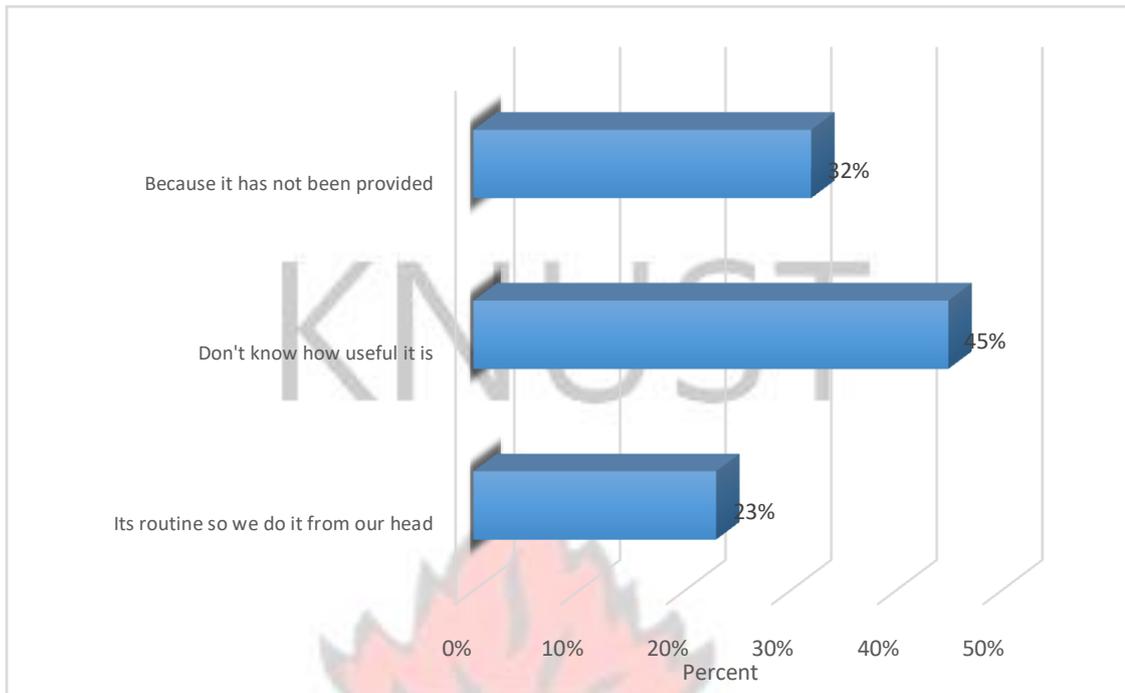


Figure 5: Why don't you have guidelines on operations?

However, of those who said yes to having written procedures, all of them indicated they do not regularly review the procedures.

More than half of the respondents (62%) indicated they had been provided hand washing stations. The rest indicated no hand washing stations had been provided. Of the respondents who had been provided hand washing stations, approximately 88% of the handwashing stations were not functional.

All respondents indicated they washed their hands with soap and water. Most respondents (45%) indicated they washed their hands 5 times in a day, 31% indicated 10 times a day, 22% indicated 2 times a day, and 2% indicated 15 times a day, as shown in Table 4 below.

Table 5: How often do you wash your hands in a day?

Frequency	Percent
-----------	---------

2 Times	11	22.4
5 Times	22	44.9
10 Times	15	30.6
15 Times	1	2.0
Total	49	100.0

Amongst the reasons cited by respondents for washing their hands, 37% stated „after visiting the washroom“, and 63% indicated „anytime I feel they are contaminated.“ Meanwhile, a number of respondents (34 %) said they dried their hands after washing with a napkin and 35 % indicated disposable hand tissue. The other respondents said personal towels, as shown in Figure 6 below.

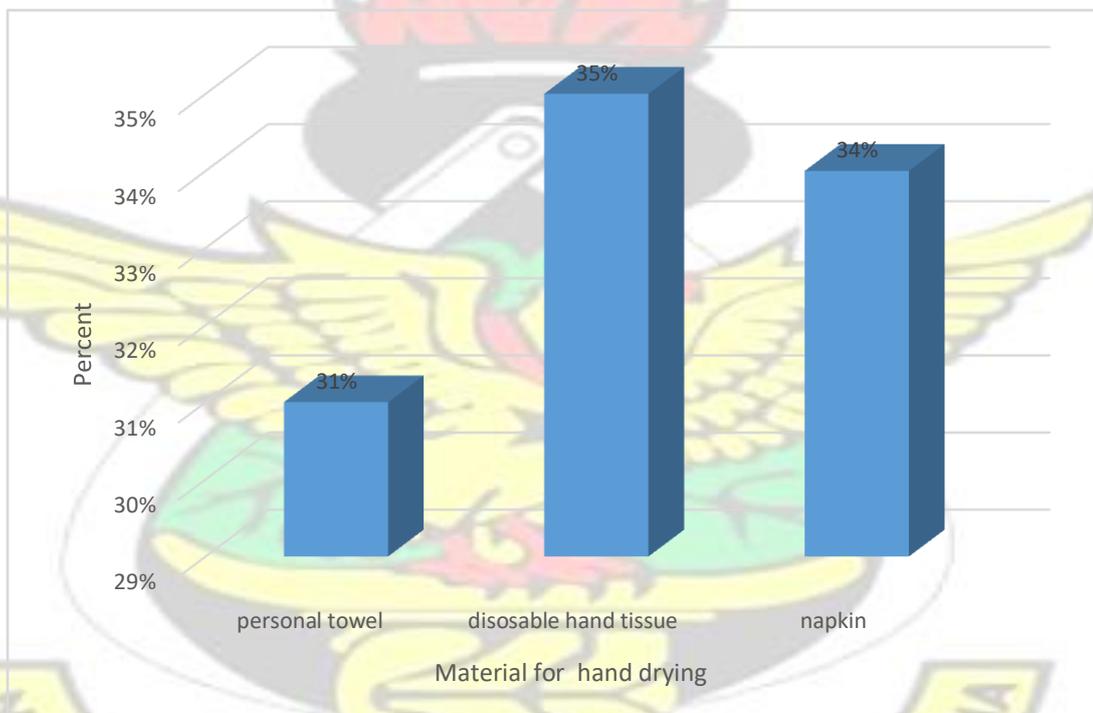


Figure 6: What do you use in drying hands after washing?

4.6 DISCUSSION

4.6.1 Socio-Demographic Information of Respondents

The study found out that food handlers were mainly females, representing approximately 84% of the respondents, with males representing only 16%. These

results are similar to studies conducted by Tola *et al.* (1998), who found that majority of food vendors in Kampala (Uganda) were women (87.6%). Also, Ababio *et al.* (2012) found similar results on gender differences of food vendors in Kumasi, a region with similar characteristics relative to this study area. (1998). Ababio *et al.*, (2012) found that approximately 83% of food handlers or vendors in Kumasi were females. In Africa, the female gender is inclined to participate in activities of food preparation, particularly food preparation for commercial purposes. In Ghana, inasmuch as this study confirms the gender differences, anecdotal information suggests that the female gender more than the male gender engages in food preparation.

Age and educational status, which are cardinal to working in food service establishments, were similarly confirmed by Ababio *et al.* (2012). This current study found that the maximum age of respondents was 58 years whilst the study by Ababio *et al.* (2012) found the maximum age to be 60 years. Further, this study found that respondents above 50 years in food service establishments were relatively few (9%). Also, majority of respondents stated their educational status as secondary level, representing 75%; however, Ababio *et al.* (2012) found most respondents completing only basic level education. It is likely that the high numbers of food handlers with secondary level education in this study is the result of the increased number of Senior High Schools in Ghana. This has direct positive correlation with the number of students completing Senior High Schools who cannot further their education or find employment in typical white collar jobs. These students may settle for jobs in restaurants and “chop bars.”

About 90% of food handlers responded in the affirmative that they were aware of food safety. This is in line with the study conducted by Monney *et al.* (2013); they concluded

that about 77% of respondents had knowledge of the Food and Drugs Law, (PNDC Law 305 B), now incorporated in Part 7 of the Public Health Act, 2012, (Act 851). Act 851 provides the legal framework for food handling and food safety in Ghana. As such basic knowledge of this law, particularly the parts pertaining to food safety is an integral part of the curricula in food safety education. It can be inferred that the level of education of food handlers influenced their high level of awareness of food safety.

One of the common ways of regulating trade of food in developing countries is through medical examination of food vendors (Musa *et al* 2002). The FAO and WHO have also deemed medical examination of food handlers a necessity to ensure that people with communicable diseases are not unwittingly infecting other people through handling food. Accordingly, WHO requires all employees who come into contact with food in the course of their work shall be medically certified to handle food prior to employment and shall undergo the food handler's test at least every six (6) months (FDA, 2013).

Moreover, Section 286 of the Criminal Code, (Amendment) Act, 2003 (Act 646) of Ghana charges all food vendors to be examined to ensure they do not infect consumers with communicable diseases. More than half of respondents in this study exhibited a good food safety practice with regard to medical certification to declare them fit to handle food. Results indicate that 71 % had undergone the Food Handler's Test. Although this is not the optimum, it is relatively high compared to the 40% established in the study by Ackah *et al* (2011). In a similar study, Monney *et al* (2013) found that more than half of respondents had undergone medical certification to ensure they were fit to handle food. On the contrary, Ackah *et al* 2011, found in Koforidua (Ghana) that majority of respondents, 60%, had no health certificates; more importantly, a good proportion of these people had not received training in food hygiene. Campos *et al*,

2008 also found in Natal (Brazil) that 51.9 % of food handlers had not undergone health examinations to declare them fit to handle to food.

The Codex Alimentarius (2003) indicates that all individuals coming into direct or indirect contact with food must be qualified and must recognize their role and responsibility in protecting food against contamination and deterioration. This suggests that appropriate knowledge must be acquired even in the skill of cooking. In this study however, 57% of respondents indicated they acquired knowledge on food preparation through observation. Mulgeta K. *et al* 2012 found similar results in a study conducted in Barhir Dar Town (Ethiopia) where almost 90% of respondents indicated they acquired knowledge on food preparation through observation. It is possible for food handlers who do not have the requisite knowledge or training in food preparation to be susceptible to acquiring inappropriate or improper food safety knowledge depending on who they are observing or who their mentor is.

4.6.2 Food Equipment Handling

Cleaning of utensils/crockery was mostly done with water and soap. 57% indicated washing with water at ambient temperature and soap, whilst 37% washed went ahead to wash with warm water and soap. A few respondents (6%), however, indicated that aside the warm water and soap, lime was added; this evidently is a good practice in ensuring safety. Mensah *et al* (2002), indicates that the use of soap to wash utensils and crockery reduced the level of bacteria. They pointed out that most microorganisms die after coming into contact with soap though their susceptibilities vary. The Codex Committee on Food Hygiene CX/FH 12/44/1 June 2012 proposed that utensils be regularly cleaned by thoroughly washing them in warm water containing adequate amount of soap or other suitable detergents. There was a significant relationship

between food safety awareness and how dishes were washed. The study found that all food handlers washed utensils/crockery basically with soap and water which is a good practice in ensuring the safety of food.

However, the typical condition of rinsing water after washing crockery before the rinsing water was changed, was mostly cloudy (53%). This could stem from the fact that most respondents did not have constant supply of water; approximately half of respondents indicated water only flowed through the taps a few times within the week, others bought from vendors and some others indicated fetching from neighbours. As a result, food handlers could be tempted to economise the use of water to minimize cost incurred on water at the expense of adequate food hygiene.

Nearly half of respondents cleaned utensils after each use unlike in the study conducted by Ababioet *al* (2012), where more than half of respondents cleaned their utensils before and after each use. However, the study found a worrying observation where 13% of respondents indicated that the cleaning of utensils was done at the end of each day.

4.6.3 Food handling and storage:

The Food and Drugs Authority Code of Practice for Food Service Establishments indicates that refrigeration facilities or insulated facilities shall be provided to assure the maintenance of perishable and potentially hazardous food at required temperatures during storage. In this study, most respondents (85%) generally owned refrigeration equipment. However, about 90% of food handlers did not know the average temperature of their refrigeration equipment. Annoret *al* (2011) in their study indicated that out of the 42 food handlers interviewed; only 42.9% knew that 1°C - 5°C was the correct temperature for the refrigerator.

The study found that only 34% of respondents who indicated they knew the average temperature of their refrigeration equipment mentioned the correct temperature range. Foods that are not kept at the required temperatures in refrigeration equipment are capable of spoilage and possible cross contamination. Food handlers not knowing the average required temperature of their refrigeration equipment are likely to be storing foods at temperatures that could aid spoilage of food.

Respondents mostly stored raw and cooked foods in the same refrigerator; however, cleaning of the refrigeration equipment was not directly assigned to an individual in order to ensure effective work done. More than half of the respondents indicated that cleaning of the refrigerator could be done by any kitchen staff. Though more than half indicated monitoring was done by the manager, there is the likelihood that cleaning may not be done effectively. Tebbut *et al*'s (2007) investigation on the cleanliness of refrigerator door handles amongst other kitchen appliances revealed that majority of even visually clean surfaces failed to meet hygienic conditions.

This study found a significant relationship between food safety awareness and the nature of foods stored in refrigerators. Codex Alimentarius 2003 recommends raw, unprocessed food should be effectively separated, either physically or by time, from ready-to-eat foods, with effective intermediate cleaning and where appropriate, disinfection. However, in this study, though food handlers were aware of food safety, majority stored both raw and cooked foods together which, indicatively is not a good practice. This activity poses a risk of cross contamination thus can compromise the safety of foods stored in the refrigerators.

A significant number of respondents (79%) could not adequately wash vegetables. Only a small number of respondents washed vegetables under running water. Most of

the respondents washed vegetables in a bowl of water in their quest to economize the usage of water. Washing of vegetables with adequate water could aid in removing microorganisms. About 46% of respondents kept food hot during serving by keeping them in food warmers. Agboola, 2005 indicates in his study that nearly 44% of respondents kept food hot during service by keeping them in ice chests and also by the use of polythene bags in covering food.

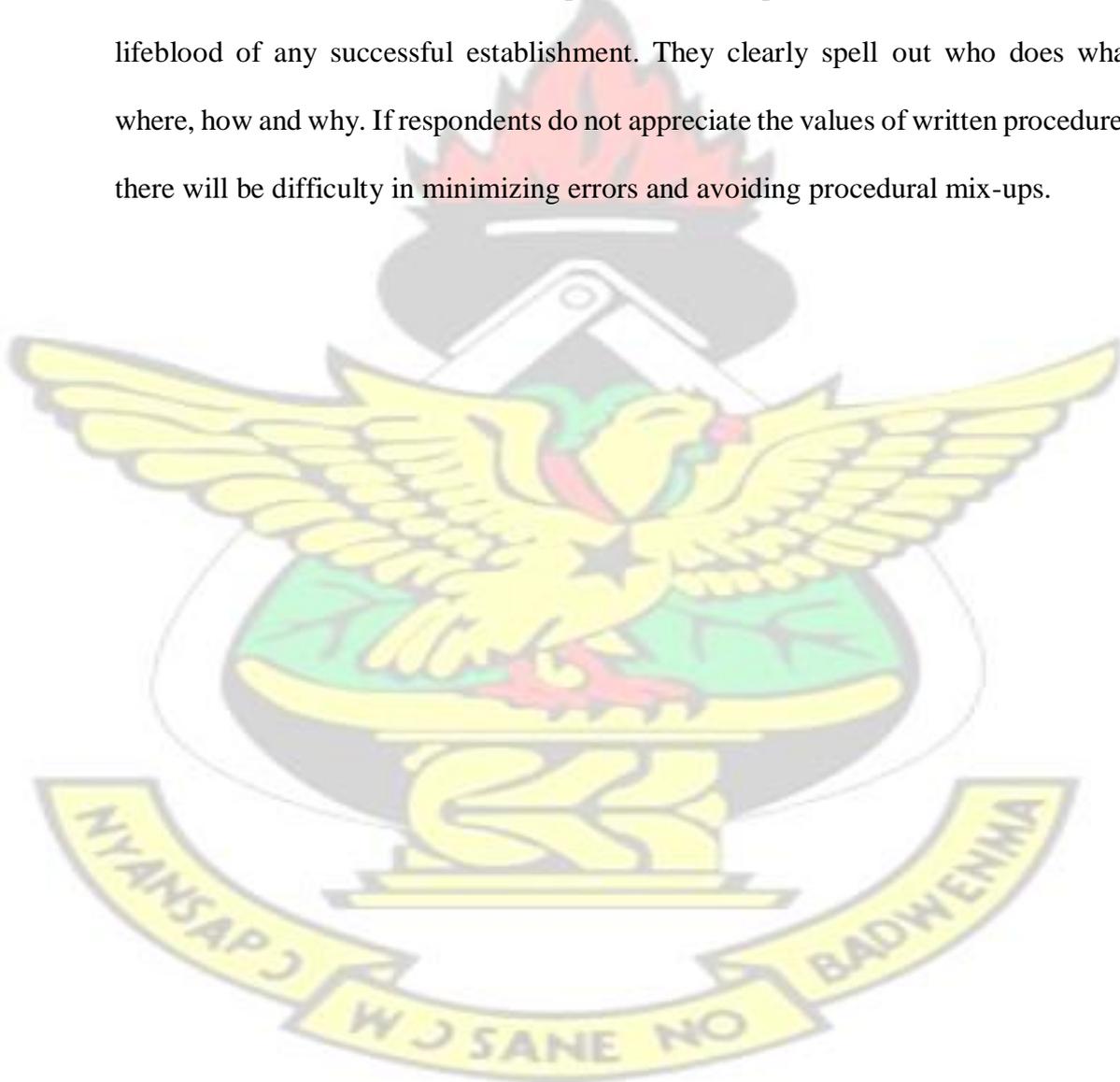
4.6.4 Personnel Issues

The transfer of germs from food handlers to food is one of the most significant causative factors of food contamination, leading to foodborne illness and in some cases disease epidemics. Proper handwashing can reduce germs that food handlers can transmit, thereby reducing the spread of germs from food handlers to food and from food to the unsuspecting public/people intending to satisfy their food need. In this study, all respondents indicated washing hands with soap and water which is significant to food hygiene practice. Also the study found that washing of hands was prevalent when food handlers felt their hands were contaminated in any way.

However, handwashing stations were mostly provided, albeit more than half of respondents indicated that they were not functional. It is worth noting that, though respondents may wash hands with soap and water, the adequacy of the washing could not be guaranteed owing to the fact that the handwashing stations were not functional.

According to the Food and Drugs Authority's Code of Hygienic Practices for Food Service Establishments in the Hospitality Industry, Food Service Establishment shall maintain records of all activities in the establishment that is of food safety concern over a two operational year's period (FDA, 2013). A worrying observation however

in this study was the response to the question as to whether there were written procedures to guide their operations. 84% of the respondents answered in the negative. The divergent reasons given by respondents indicated that they truly did not see the essence of written procedures; more than half indicated that the written procedures had not been provided, some (34%) did not know how useful it was; whilst 4% of respondents indicated they knew the procedures so there was no need for them to be written out for them. Written procedures of operations are known to be the lifeblood of any successful establishment. They clearly spell out who does what, where, how and why. If respondents do not appreciate the values of written procedures, there will be difficulty in minimizing errors and avoiding procedural mix-ups.



CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This study revealed inadequate food safety practices with respect to food hygiene and storage practices of food handlers in Food Service Establishments. Observations made indicated lack of basic infrastructural needs and utilities such as frequent water supply made handlers economise the use of water and hand washing was not adequately done primarily due to non-functioning handwashing facilities in various Food Service Establishments.

Food handlers within the study area did not have the requisite training on food preparation. More than half of respondents indicated observation (57%) as a mode in which they learnt food preparation. Implying that if inadvertently one observed wrongly, one is likely to execute questionable food preparation methods.

Food handling practices exhibited by Food handlers did not compliment their knowledge acquired from the training.

The relevance of standard operating procedures (SOPs) in any industry cannot be overemphasized. The study, however, revealed that most of the food handlers in the FSEs erroneously did not find need for guidelines on their operations (84%).

5.2 Recommendation

It is evident that food handlers need to go through training to acquire appropriate knowledge and skills in their field of work.

This suggests that though training is necessary for food handlers, it will be more appropriate if training is tailor-made to address the specific challenges of specific Food Service Establishments.

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APPENDICES

Appendix 1.0: Results of Crosstabulations and Chi Square Test

Appendix 1.1: Are you aware of food safety * How do you wash dishes Crosstabulation

	How do you wash dishes	Total
--	------------------------	-------

			Wash with water at ambient temperature	Wash with warm water and soap	Wash with warm water, lime and soap	
Are you aware of food safety	No	Count	4	2	3	9
		% within Are you aware of food safety	44.4%	22.2%	33.3%	100.0%
	Yes	Count	51	34	3	88
		% within Are you aware of food safety	58.0%	38.6%	3.4%	100.0%
Total	Count	55	36	6	97	
	% within Are you aware of food safety	56.7%	37.1%	6.2%	100.0%	

Chi-Square Tests			
	Value	df	Asymp. Sig. (2sided)
Pearson Chi-Square	12.676 ^a	2	.002
Likelihood Ratio	7.497	2	.024
Linear-by-Linear Association	4.080	1	.043
N of Valid Cases	97		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .56.

Table 1.2: Are you aware of food safety * What do you store in the refrigerator Crosstabulation

			What do you store in the refrigerator			Total
			Raw foods only	Left over food	Raw and left overs in the same fridge	
Are you aware of food safety	No	Count	5	0	2	7
		% within Are you aware of food safety	71.4%	0.0%	28.6%	100.0%
		% within What do you store in the refrigerator	23.8%	0.0%	4.0%	9.1%
	Yes	Count	16	6	48	70

	% within Are you aware of food safety	22.9%	8.6%	68.6%	100.0%
	% within What do you store in the refrigerator	76.2%	100.0%	96.0%	90.9%
Total	Count	21	6	50	77
	% within Are you aware of food safety	27.3%	7.8%	64.9%	100.0%
	% within What do you store in the refrigerator	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.673 ^a	2	.022
Likelihood Ratio	7.067	2	.029
Linear-by-Linear Association	5.713	1	.017
N of Valid Cases	77		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is .55.

Appendix 1.3: Are you aware of food safety * Do you have any written procedures to guide your operations Crosstabulation

		Do you have any written procedures to guide your operations		Total	
		No	Yes		
Are you aware of food safety	No	Count	8	1	9
		% within Are you aware of food safety	88.9%	11.1%	100.0%
	Yes	Count	73	15	88
		% within Are you aware of food safety	83.0%	17.0%	100.0%

Total	Count	81	16	97
	% within Are you aware of food safety	83.5%	16.5%	100.0%

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2sided)	Exact Sig. (1sided)
Pearson Chi-Square	.209 ^a	1	.648		
Continuity Correction ^b	.000	1	1.000		
Likelihood Ratio	.229	1	.633		
Fisher's Exact Test				1.000	.543
Linear-by-Linear Association	.207	1	.649		
N of Valid Cases	97				

- a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.48.
b. Computed only for a 2x2 table

Appendix 2.0: Questionnaire for Food Service Establishments

Introduction (to be done by the Interviewer)

Good morning/ afternoon/evening. I am a student of the Kwame Nkrumah University of Science and Technology. I am conducting a study on food safety practices in food service establishments in the Greater Accra Region and your establishment has been randomly selected for the exercise.

*I am here to administer the questionnaire and promise that the responses you give will be treated with **strict confidentiality**. Your responses will be added to those of other respondents for a general analysis so there will be no way of tracing your response back to you after the analysis. Do you agree to participate?*

- a) Yes [] b) No []

Questions

- What type of FSE do you operate?
(i) Restaurant [] (ii) Chop Bar []
- How long have you worked with this FSE?
.....
.....
- Are you aware of food safety?
(i) Yes [] (ii) No []
- Have you been trained in food hygiene?
(i) Yes [] (ii) No []

5. If YES, where did you receive your training?
.....
.....

6. Have you undergone the Food Handlers' Test?
(i) Yes [] (ii) No []

7. How did you acquire knowledge on food preparation
(i) Formal Training [] (ii) Informal Training [] (iii) Observation []

Food Equipment Handling

8. Do you have constant water for supply?
(i) Yes [] (ii) No []

9. How do you get water?
.....

10. When do you wash your dishes?
(i) After each single use [] (ii) Whenever a sizeable number is dirty []
(iii) After the whole days' use [] (iv) Any other (specify).....

11. What is the typical condition of the washing water before you change?
(i) Cloudy [] (ii) Foamy [] (iii) Any other (specify)
.....

12. At what point do you clean each cooking utensil? *(please tick as appropriate)*
(i) After each use [] (ii) When they are contaminated [] (iii)
At the end of each day []
(iv) Others (specify).....

Food Handling and Storage

13. Do you store raw foods?
(i) Yes [] (ii) No []

14. If YES, how do you store them?.....

15. How many food refrigerators do you have? (i) One [] (ii) Two [] (iii) Any other (specify).....

16. Do you know the average temperature of your refrigerator?
(i) Yes [] (ii) No []

17. What do you store in the refrigerator (s) ? *(please tick as appropriate)*
(i) Raw foods only [] (ii) Left-over foods only [] (iii) Both raw and cooked foods []
(ii) Any other specify []

18. Do you clean the refrigerator?
(i) Yes [] (ii) No []

14. How often do you clean the refrigerator(s)?

(i) Everyday [] (ii) Once a week [] (iii) Once a month []
(iv) Any other (specify)

15. Who does the cleaning?

(i) Assigned to a cleaner [] (ii) Kitchen Staff [] (iii) Anybody can clean it []

16. Is cleaning of the refrigerator monitored?

(i) Yes [] (ii) No []

17. Who monitors the cleaning of the refrigerator?

(i) Manager [] (ii) Supervisor [] Any other (specify).....

18. How do you wash your vegetables? *(please tick as appropriate)*

(i) In a bowl of water [] (ii) Under running water [] (iii) Any other (specify).....

19. How do you handle food prior to serving?

(i) Food-warmer [] (ii) buffet dishes []

20. How do you dish food to customers? *(please tick as appropriate)*

(i) Bare hand [] (ii) Ladle [] (iii) Self-serving []

Personnel Issues

21. Do you have a handwashing station?

(i) Yes [] (ii) No []

22. If Yes, is it functioning?

(i) Yes [] (ii) No []

23. Do you have any written procedures to guide your operations?

(i) Yes [] (ii) No []

24. If No, Why?

.....
.....
.....
.....

25. If Yes, is it operational/renewable?

.....
.....

26. How do you wash your hands? (*please tick as appropriate*) (i) Water and soap (ii) water only (iii) Any other (specify).....

27. How often do you wash your hands?

.....
.....

28. What determines when hands should be washed?

.....
.....

29. How do you dry your hands after washing?

(i) personal towel (ii) disposable hand tissue (iii) Hand dryer (iii) Any other (specify).....

Demography

30. Gender Male Female

31. Age

32. Occupation

33. Educational Status? Primary Secondary Tertiary No formal Education

34. Marital Status? Single Married Divorced Widowed

35. Socio-economic Status Urban Peri-Urban

THANK YOU

