

UNIVERSITY OF EDUCATION, WINNEBA
COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

ASSESSING THE KNOWLEDGE AND PRACTICES OF FOOD SAFETY
MANAGEMENT SYSTEMS IN RESTAURANT: A CASE STUDY IN THE WA
MUNICIPALITY



**A Dissertation in the Department of HOSPITALITY AND TOURISM
EDUCATION, Faculty of VOCATIONAL EDUCATION, submitted to the School
of Graduate Studies, University of Education, Winneba, in partial fulfilment of the
requirements for award of the Master of Technology (Catering and Hospitality)
degree**

AUGUST, 2016

DECLARATION

STUDENTS DECLARATION

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

SIGNATURE:

DATE:

SUPERVISOR'S DECLARATION

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

NAME OF SUPERVISOR: DR. GILBERT OWIAH SAMPSON

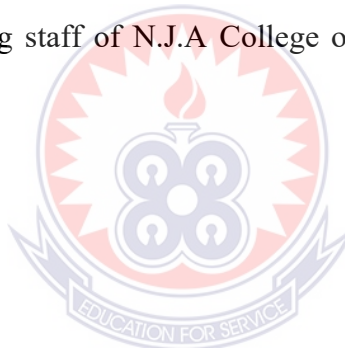
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Furthermore, my thanks go to the Karbo and Akurugu families for their relentless contributions and moral support to the successful outcome of this research work. Finally, I thank the entire Teaching staff of N.J.A College of Education for their co-operation. May God bless us all!!!



DEDICATION

I dedicate this work to my husband Mr. Gordon Kwabena Akurugu and my daughter

Natie Mbinge Akurugu as well as my entire family and friends.



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ABSTRACT

In the Wa Municipality, food related diseases are prevalent and empirical examination has indicated that large proportion of these diseases are caused by poor food sanitation and unhygienic handling of foods in the restaurants and other eating outlets in the municipality. To this effects, the aim of the study was to assess the knowledge and practices of food safety management systems in the hospitality industry with regards to restaurant operations in the Wa municipality. The study used a cross-sectional descriptive survey. The population consisted of cooks and Restaurant operators in the Wa municipality. Systematic random sampling technique was used to select 150 respondents for the study. Structured questionnaire was the main instrument of data collection. Data obtained from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS) version 16. The study revealed that 93.4% of the respondents agreed that personal hygiene practices are properly adhered to, in order to improve the quality of the food. Also, 93.3% of the respondents agreed that handwashing signs are posted to enhance consumer safety. Moreover, 93.4% of the respondents agreed that to ensure food safety cooks must wash their hands properly and frequently and appear in good health because of possibility of transfer of food borne diseases. The study also revealed that inadequate regulatory authorities to monitor the food preparation and storage process, inadequate storage facilities, lack of effective training and development programmes regarding food safety issues, poor food sanitation and unhygienic handling of foods in the restaurants were some problems faced by restaurant operators. The study concluded that there is the need to monitor the food preparation and storage processes of the restaurant operators in the Wa Municipality.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

In a study conducted by the World Health Organization food safety has become a key public health priority due to the increasing number of consumers who take their meals outside homes (WHO (2007)). As a result, foods are exposed to food borne illnesses that originate from food stalls, restaurants and other food outlets. In line with this, food service employees are a crucial link between food and consumers. The World Health Organization (WHO) has developed five thematic pillars to safer food, which include keeping clean, separating raw and cooked food, cooking thoroughly, keeping food at safe temperatures, and using safe water and raw materials (WHO, 2007). These pillars are of immense importance in developing countries, and equipping food handlers with such information could impact significantly on food safety and boost consumer health.

Between 1998 and 2002, an average of 1,329 food borne disease outbreaks were reported to the Center for Disease Control and Prevention (CDC) each year. Approximately 52% of these were attributed to food service establishments (Jones 2006; Lynch 2006). During the same period, the Oregon Public Health Division reported 62 food borne outbreaks or approximately 5% of the national total (Emilio, 2009). Another study conducted in Malaysia also showed that approximately 10-20% of food-borne disease outbreaks are due to Contamination by the food handlers (Zain 2002). According to World Health Organization, contaminated food contributes to 1.5 billion cases of diarrhoea in children each year, resulting in more than three million premature deaths (WHO, 2005). However, these deaths and illnesses are shared by both developed and

developing nations. Food poisoning bacteria *Salmonella*, *Listeria*, and *Toxoplasma*, which are estimated to cause 1,500 deaths each (WHO, 2005). In Africa regular surveillance of food borne diseases is weak, despite the awareness on the economic importance of diarrheal diseases and a limited number of studies have been undertaken. According to Molbak (1989), 40 - 80% of stored water samples and 19 to 32% of food samples contained significant number of enterobacteria. The levels of contamination were even greater in infant foods that were stored at room temperature. Similarly, in Ethiopia, the Ministry of Health (MOH, 2004) stated that among the ten leading causes of outpatient visits to health institutions were due to all forms of diarrheal diseases and intestinal parasites which may directly or indirectly be related to food (Todd, 1997)

It is important to evaluate actual microbiological performance of end products in order to check the effectiveness of a food safety management system and to appraise performance of critical control points, good hygienic practices and standard operating procedures (Walker, et al., 2002). The microbial quality of food has been identified as a useful indicator for control of the critical points related to the procedures of cleaning and disinfection. The human hands are also considered as a critical source of cross contamination according to other studies that have found contamination with *Campylobacter* and *Staphylococcus aureus* microorganisms coming from hands (Fisseha et al., 1999). Sometimes food handlers may be a major source of contamination and ultimate sources of health risks either as carriers of pathogens or through poor hygienic practices (Kaferstein, 2003). Workers can carry microbial pathogens on their skin, hair, hands, digestive systems or respiratory tracts and unless they have a thorough understanding and follow basic food hygiene principles, they may unintentionally

contaminate foods, water supplies and equipment there by creating favorable conditions for an outbreak of foodborne illnesses (Dugassa, 2007).

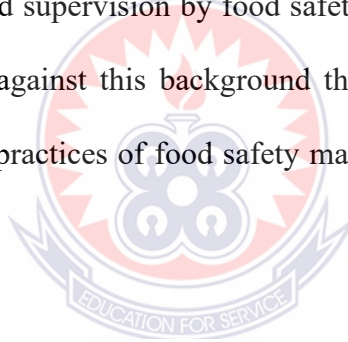
Food safety remains a critical issue among professionals in the food service sector as well as consumers (Griffith, 2000). This is basically due to outbreaks of foodborne diseases resulting in substantial costs to individuals and the economy of the country. The high incidence of food-borne illnesses especially in developed countries where statistics are compiled has led to an increase in global concern about food safety and has been associated with poor personal hygiene of food handlers. An estimated 76 million foodborne illnesses occur annually in the United States. These foodborne illnesses result in an estimated 325,000 hospitalizations and 5,000 deaths every year in the United States (Tonder, 2007).

In developing countries like Ghana, where it is more difficult to separate water and foodborne illness, approximately 2.2 million people die from these causes (Rocourt et al. 2003; WHO 2002). Such a level of illness and mortality drains productivity, imposing an in-kind of tax on human energy (FAO/WHO 2014). Anderson, (2004) concluded that cross-contamination due to badly washed hands, inappropriate procedures used for the preparation of raw and thermally processed food stuffs and badly cleaned vegetables represented the biggest problem during the preparation of food at home and restaurants. For example, Angelillo, (2001), conducted a survey to investigate the knowledge, attitudes and related behaviour on food borne diseases and food handling practices among consumers and pointed out that so many people in Ghana lack food safety practices and knowledge. Adding that both men and women needed educational programmes and counselling by physicians to adopt hygienic food handling practices.

Therefore there is the need to assess the knowledge and practices of food safety management systems in restaurants in Wa Municipality.

1.2 Statement of the Problem

In the Wa Municipality, food related diseases are prevalent and empirical examination has indicated that large proportion of these diseases are caused by poor food sanitation and unhygienic handling of foods in the restaurants and other eating outlets in the municipality. Moreover, most restaurants operators lack the adequate knowledge and practices of food safety management systems in the restaurants. This has eventually caused poor monitoring and supervision by food safety officers and enforcement of food hygiene regulations. It is against this background that this study will be conducted to assess the knowledge and practices of food safety management systems in restaurants in the Wa municipality.



1.3 Purpose of the Study

The main purpose of the study was to assess the knowledge and practices of food safety management systems in the hospitality industry with regards to restaurant operations in the Wa municipality.

1.4 Specific Objectives of the Study

The specific objectives of this study are:

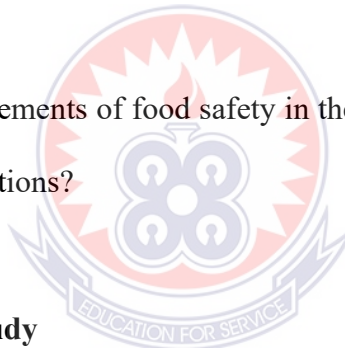
- To assess the knowledge and practice of food safety management systems in the restaurants.

- To examine food safety control measures applied in restaurants in Wa municipal
- To identify major problems facing the restaurants with regards to food safety and the requirements of food safety in the restaurants.

1.5 Research Questions

The study was guided by the following research questions:

- What is the level knowledge with regards to implementation food safety managements systems in hospitality industry?
- What are the major problems facing the hospitality industries with regards to food safety?
- What are the requirements of food safety in the hospitality industries with regards to restaurants operations?



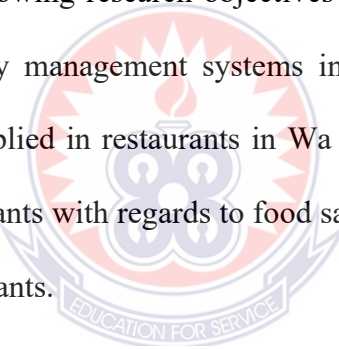
1.6 Significance of the Study

First, the management of restaurants will find the information on the analysis of the manufacturing practices such as food preparation, production and service useful in identifying the critical stages of contamination that require systematic control. Health regulatory authorities and the urban council will have the information to establish policies for implementing good manufacturing and hygiene practices. Influence policy decision regarding the regulation of restaurants in Wa Municipality, help improve upon the quality of food sold by these outlets in the Municipality and as well help streamline their activities. Further, policy-makers will also be able to identify factors that influence slow application of food safety management systems in the restaurants and also the main resource groups

that are required to disseminate the information in the form of training, legal application and research study to the consumer at a time when demands for food safety are increasing and confidence in services of restaurants falling.

1.7 Delimitations of the Study

The research is focused on assessing the knowledge and practices of food safety management systems in the hospitality industry in the Upper West Region of Ghana. Thus the study is geographically limited in scope to the hospitality industries in the Wa municipality of Ghana. The study is however, theoretically, empirically and conceptually limited in scope to the following research objectives including to assess the knowledge and practice of food safety management systems in the restaurants, to examine food safety control measures applied in restaurants in Wa municipality, to identify the major problems facing the restaurants with regards to food safety and to assess the requirements of food safety in the restaurants.



1.8 Organization of the Study

This study consists of five Chapters, Chapter one deals with the background to the study, the statement of the problem, research questions and objectives of the study, significance, delimitation and organization of the study. In Chapter two the researcher reviewed related literature regarding food safety practices whiles chapter three deals with the research methodology used in the study. Chapter three also describes the research design, the population sample and sampling procedures, data gathering instruments and data collection techniques of the study, methods of data analysis. Chapter four describes

the research findings and the discussion of the main findings and chapter five presents the summary of the findings, conclusions and recommendations and suggestions for further research.



CHAPTER TWO

LITERATURE REVIEW

Introduction

The chapter reviewed theoretical, empirical and conceptual literature regarding food safety and the theory of planned behavior.

2.1 Theoretical Literature

The section reviewed literature regarding the Knowledge and Practice of Food Safety Management Systems in the Restaurants and the theory of planned behavior.

2.1.1 The Knowledge and Practice of Food Safety Management Systems in the Restaurants

The goal of restaurant operators is to serve acceptable, safe, and nutritious meals to satisfy consumers. To achieve his goal, foods must be handled appropriately to ensure maximum quality and safety, which is the responsibility of all restaurant operators (Neill, 1980). This review of literature will focus on four main areas: incidence and causes of foodborne illness, food safety practices and enhancing food safety knowledge and strategies to ensure food safety. Correct handling of food during all stages of its preparation and storage is vital in reducing the incidence of foodborne illness (NHMRC, 2003). However, between 10 and 20% of foodborne illness are caused by poor consumer food handling behaviour (Food Authority NSW, 2008; Ryan, Wall, Gilbert, Griffin, & Rowe, 1996). A systematic review of food safety studies identified that consumers

commonly implement unsafe food-handling behaviours during domestic food preparation (Redmond & Griffith, 2003).

For example, in 2002, the USA Home Food Safety... It's in Your Hands' survey on consumer food hygiene knowledge, found that consumers had large gaps in their knowledge regarding what factors affected foodborne disease and that they were unaware of specific recommendations to prevent foodborne illness (Cody & Hogue, 2003). Therefore increasing knowledge of correct food hygiene practices may be an important factor in changing behaviour. People may believe they are already implementing hygienic behaviours when in fact they are not. For instance; Research in Australia and the USA has suggested that young adults aged 18-29 in particular have less knowledge about food safety and are more likely to engage in risky food hygiene behaviours than other groups (Altekruse et al., 1999; Byrd-Bredbenner et al., 2008; The Food Safety Information Council, 2008).

An observation study carried out on undergraduate university students found that participants performed less than 50% of the food safety behaviours recommended to prevent foodborne illness (Byrd-Bredbenner et al., 2007). Approximately 20% of the Australian population are enrolled in tertiary education, and approximately 60% of school leavers go on to some form of higher education (Australian Bureau of Statistics, 2009). Consequently young adults are at high risk yet there is a paucity of research in this group. In addition, a previous study investigating food hygiene in Australian undergraduate students found that almost half reported preparing food everyday over a 4 week period indicating that this group are also regular food handlers (Mullan & Wong, 2009).

A systematic review of food safety interventions (Milton & Mullan, 2009) found that they have been predominantly educational, using persuasive messages and targeting knowledge, for example the 'Fight Bac' intervention (www.fightbac.org, 2002) and 'Now You're Cooking... using a Food Thermometer' (Takeuchi, Hillers, Edwards, Edlefsen, & McCurdy, 2005). The Fight Bac intervention was successful at increasing knowledge of food hygiene compared to non-exposed counterparts, however it only increased actual behaviours, such as defrosting meat in the refrigerator, by approximately 7% (Dharod, Pérez-Escamilla, Bermúdez-Millán, Segura-Pérez, & Damio, 2004).

Few of these previous interventions have based their outcome measures on constructs from theoretical models, which weaken their methodological strength and foundations. In addition, there has been little support that knowledge alone can change behaviour, although the research does suggest that increasing knowledge can make it possible for the consumer to make more informed choices with regard to changing behaviour. Although there have been numerous calls for the development of interventions based on social cognition theory in the area of food safety (Griffith, Mullan, & Price, 1995; Seaman & Eves, 2010), there have in fact been very few theory based studies with the goal of changing consumer's behaviour. One intervention that did target changing behaviour was an observational study by Redmond and Griffith (2006).

The authors used a social marketing intervention (leaflets, posters, TV documentary, and newspaper articles) with the target behaviours including adequate hand washing and changing/washing chopping boards between preparation of raw chicken. Although the intervention was effectively immediately after the implementation, food safety behaviours had decreased at follow-up 4-6 weeks later. This supports the idea that

increasing knowledge alone is not enough to change and maintain desired behaviours. Kretzer and Larson (2008) recommended that when planning a theoretically based intervention for improving infection control practices, factors that have been shown to consistently predict or influence behaviour need to be incorporated into the design, in order to increase the likelihood of success.

2.1.2 Theory of Planned Behavior

As such, it is important to choose a theoretical model that has been successful in predicting the target behaviour, (Kretzer & Larson, 1998), however only very few studies have taken this into consideration (eg. Seaman, 2010; Seaman & Eves, 2010). One such model, the Theory of Planned Behaviour (TPB), has received much attention in the health domain and has been previously shown to successfully predict food hygiene behaviour. The TPB (Ajzen, 1991) is an extension of the earlier Theory of Reasoned Action (TRA) which posits that behaviour is proximally determined by behavioural intention.

Intention to act is assumed to capture the motivational factors that influence a behavior and are indications of how much of an effort an individual is planning to exert, in order to perform the behavior (Ajzen, 1991). In turn, intention is predicted by three variables –attitude, the overall evaluation of the behaviour; subjective norm, which represents the perceived pressure from significant others to perform the behaviour; and perceived behavioural control (PBC). PBC is a component that represents the individual's perceptions of the ease or difficulty of performing the behaviour of interest. Ajzen (2001) contended that PBC directly influences both intention and behaviour for behaviours that are under volitional control. Meta-analyses of the TPB (Armitage & Connor, 2001) have

found the model to predict 39% of the variance in behavioural intention, and 27% of the variance in behaviour for a variety of different behaviours. The predictive validity of the model has led to an interest in developing TPB based interventions that target intentions, which will then lead to behaviour change. A systematic review of TPB based interventions (Hardeman, et al., 2002) found that although the studies had many limitations, out of 30 studies, half were effective in changing intentions and two-thirds in changing behaviour.

In the area of hygiene, the TPB has been used to predict 79% of intention and 87% of self reported hand hygiene practice in hospitals (Jenner, Watson, Miller, Jones, & Scott, 2002) and 34% of hand hygiene malpractices in catering establishments (Clayton & Griffith, 2008). Mullan and Wong (2009) found that the TPB predicted 66% of the variance in intention to handle food hygienically in a population of undergraduate students who cooked at home, and 21% of the variance in behaviour over a 4 week period. PBC was found to be the strongest predictor of intention to handle food hygienically; however, it did not directly predict behaviour. As aforementioned, PBC was the most significant predictor of safe food handling intention (Mullan & Wong, 2009) and a significant predictor of intention for hand hygiene practices (Clayton & Griffith, 2008).

This suggests that food handling behaviour is not wholly within volitional control and people perceive that there are salient barriers which prevent them from achieving the behaviour. Similarly, studies using the Health Action Process Approach model found that action self-efficacy was the strongest predictor of intentions to perform hygienic food practices (Chow & Mullan, 2010; Mullan, Wong, & O'Moore, in press). There is

evidence that an individual's self-efficacy beliefs are positively related to the goals they set and their commitment to engage in the intended behaviour, even if failure occurs (Schwarzer, 2012). An intervention that targeted self-efficacy in increasing fruit and vegetable consumption showed that the group which increased self-efficacy alone benefited equally from the intervention compared to the group that also made plans to increase behaviour (Luszczynska, Tryburcy, & Schwarzer, 2007).

Change in self-efficacy was able to predict change in behaviour at a 6 month follow-up, which indicates that enhancing perceptions of control may result in long term behaviour change. Therefore, interventions aimed at increasing PBC, which includes both a self-efficacy and a controllability component, may assist in increasing both intentions and safe food handling behaviour. Although the TPB can be utilised to develop interventions that target intention, the fact remains that not all intentions are translated into behaviour. This leaves what is often termed the intention-behaviour gap and Ajzen (2001) supported the contention that additional predictors could be included in the model to increase the prediction of behaviour.

Past behaviour is often included as a variable as it has often been found to be the strongest predictor of future behaviour. Frequency of past behaviour is often thought to be a measure of habit, as well practiced behaviours that are repeatedly performed in a stable context eventually become automatic (Ouellette & Wood, 2008). In previous research, past behaviour was found to explain an additional 18% of the variance in safe food handling behaviour (Mullan & Wong, 2009) and was the strongest predictor of behaviour, suggesting that hygienic food handling may be habitual. There is evidence to suggest that undesirable habits can be changed by using implementation intentions or

plans to create specific links between cues in the environment and individual responses (Gollwitzer, 2009), or by using positive reinforcement to strengthen the association between the behaviour and health benefits (Honkanen, Olsen, & Verplanken, 2005).

A TPB intervention aimed at increasing children's fruit and vegetable consumption found that attempting to change behaviour by developing implementation intentions to assist in planning out the behaviour, significantly increased fruit and vegetable intake compared to a control group (Gratton, Povey, & Clark-Carter, 2007). The implementation intention group was also more successful in increasing behaviour than the group that only targeted salient beliefs about fruit and vegetable consumption. Additionally in other research, implementation intentions have been shown to successfully increase exercise behaviours, cancer screening behaviours and dental flossing (Brickell, Chatzisarantis, & Pretty, 2006a; Lavin & Groarke, 2005; Steadman & Quine, 2004).

The research suggests that implementation intentions may assist in translating intentions into behaviour through creating cues in a stable environment or facilitating retrieval of intentions in memory (Gollwitzer, 2009). Once these plans are formed, they no longer require conscious control which eventually leads to behaviour becoming habitual (Ouellette & Wood, 2008).

2.2 Empirical Literature

2.2.1 The Major Problems Facing the Restaurants with Regards to Food Safety

According to (FAO/WHO, 2005), food safety systems in developing countries and Africa in particular are weak and unable to protect human health. In Ethiopia, 2004,

the ten leading causes of outpatient visits to their health institutions were due to all forms of diarrheal diseases and intestinal parasites which may be directly or indirectly related to food, (MOH, 2004). However, health institutions that compile monthly morbidity statistics do not identify if the cause for such illnesses is due to food or other. In addition, no systematic surveillance system is in place due to weak structural organization and insufficient resources allocated to food-borne surveillance. Occurrence of such diseases is rarely reported and exchange of information between regulatory bodies is virtually absent. As a result, the prevalence and magnitude of the problem inflicted by food-borne illnesses is not known (FAO/WHO, 2005).

Food safety is directly related to the harmful substances present in it. Thus any substance that is reasonably and likely to cause harm, injury or illness, when present above an established acceptable level is a food safety hazard and these hazards arise from different sources. They can be natural components of the food itself, they can arise from contamination of the food during any stage of the production, processing, storage and distribution or can be a result of decomposition and deterioration of the food items. In most countries regulatory bodies have established acceptable limits for all types of hazards (Ali, 2000). Food hazards are grouped into three main categories: microbiological hazards chemical and physical hazards According to the Canadian Food Inspection Agency (1998), prerequisite programs are universal steps or procedures that control the operational conditions within a food establishment allowing for environmental conditions that are favorable for the production of safe food. The Codex International Code of Practice and General Principles of Food Hygiene is believed to be the basis for these programs. The wide range of activities and events included in prerequisite programs

may have an impact on Hazard Analysis and critical Control Point (HACCP) system for a specific food product even though they are not parts the HACCP system. Prerequisite programs include concerns and aspects of the entire food environment before the HACCP system is initiated. They include the suitability of facilities, control of suppliers, safety and maintenance of production equipment, cleaning and sanitation of equipment and facilities, personal hygiene of employees, controls of chemicals, pest control and the like. These programs include good manufacturing practices and should be brought up to acceptable standards before the HACCP system is initiated (Ali, 2000).

Food establishments working with ready-to-eat (RTE) food products should understand the importance of developing and implementing procedures to reduce the potential for contamination with microorganisms. Therefore, it is extremely important that anyone involved with ready-to-eat food products develop and implement effective Good Manufacturing Practices (GMPs) and Standard Operating Procedures (SOPs) as the foundations of a successful HACCP program (North American Meat Processors, 1995). As the matter of fact, prior to application of HACCP to any sector of the food chain, that sector should have in place prerequisite programs such as good hygienic practices according to the Codex General Principles of Food Hygiene, the appropriate Codex Codes of Practice and appropriate food safety requirements. All prerequisite programs must be initially verified and validated and appropriate preventive measures and a monitoring system should be in place. Whereas a deviation from the limits set for the monitoring of prerequisites occurs, a proper corrective action should be applied and addressed under the HACCP plan (Codex Alimentarius Commission, 1997).

Effective hygiene control is vital to avoid the adverse effects to human health and economic consequences of foodborne illness, foodborne injury, and food spoilage. Everyone, including farmers and growers, manufacturers and processors, food handlers and consumers have a responsibility to assure that food is safe and suitable for consumption (FAO/WHO, 2005). The availability of safe food improves the health of people and is a basic human right (WHO, 2002). Safe food contributes to health and productivity and provides an effective platform for development and poverty alleviation. People are becoming increasingly concerned about the health risks posed by microbial pathogens and potentially hazardous chemicals in food. It is against this background that the study will be conducted to assess the knowledge and practice of restaurant operators in upper west region. The improper food handling practices have been attributed to lack of adequate food safety knowledge.

According to World Health Organisation (WHO, 2005), contaminated food contributes to 1.5 billion cases of diarrhoea in children each year, resulting in more than three million premature deaths. However, these deaths and illnesses are shared by both developed and developing nations. For example, in the United States, according to Centre for Disease Control and Prevention (CDC) it estimates that foodborne diseases cause approximately 76million illnesses annually among the country's 290 million residents, as well as 325,000 hospitalizations, and 5,000 deaths of known pathogens account for about 18% of the illnesses and 36% of the deaths, while unknown agents account for the rest. However the three most common pathogens include Salmonella, Listeria, and Toxoplasma, which are estimated to cause 1,500 deaths each year.

FAO/WHO (2002) main objective is to ensure nutritional and safe food for all people at all times for productive and healthy life. Food service operators have a major responsibility since their actions can affect the health of many people. Food-borne diseases are major public health problem estimated to affect up to 10% or more of the population in the industrialized countries (WHO, 2005). Food and water-borne diseases in the developing countries are prevalent and epidemiological examinations have indicated large proportions of food-borne diseases which result from poor food sanitation and unhygienic handling of foods in restaurants and other eating outlets (Antoria, 2002).

Griffith (2000) reported that, at the time, up to 70 % of food-borne illness outbreaks in the UK were associated with food service functions such as restaurants, hotels, institutions and caterers. A common denominator in these sectors of the food chain (often collectively referred to as the food service sector), is the reliance on many manual processes resulting in large numbers of food handlers. In attempting to determine the reasons for these outbreaks, researchers have focused on the role of the food handler and findings would suggest that the food handler does indeed play a significant role. In one such study, poor personal hygiene has been identified as a contributing factor in some outbreaks as identified by the Center for Disease Control (Mead *et al.*, 1999). In two US Food and Drug Administration studies, inadequate hand washing practices by food handlers were found in all types of retail food services (Strohbehn *et al.*, 2008). Inadequate hand washing was also cited as a contributory factor in 31 % of outbreaks occurring in Washington State.

In Africa regular surveillance of food borne diseases is weak, although there is awareness on the importance of diarrheal diseases and a limited number of studies have

been undertaken. According to Molbak (1989) indicates that 40 to 80% of stored water samples and 19 to 32% of food samples contained significant number of enterobacteria. The levels of contamination were even greater in infant foods that were stored at room temperature. Similarly, in Ethiopia, the Ministry of Health (MOH, 2004) stated that among the ten leading causes of outpatient visits to health institutions were due to all forms of diarrheal diseases and intestinal parasites which may directly or indirectly be related to food (Todd, 1997)

In developing countries like Ghana, it has been suggested that lack of knowledge and skills on the good manufacturing practices (GMPs), have contributed to poor hygienic practices in food service establishments. The paucity of the studies on food safety among academics, in food science, has led to health administrative departments taking the evaluation of food safety and hygienic practices of food establishments (WHO/ GoK, 1999). These reports show that about 80% of all diseases and more than 1/3 of all deaths in developing countries are caused by contaminated food and water (WHO, 2004). This study attempted to establish whether the scenario is the same in Thika District. HACCP has been endorsed by the National Academy of Sciences, the Codex Alimentarius Commission which is an international food standard setting organization, and the National Advisory Committee on microbiological criteria for foods (ICMSF, 1980). It is the best system available for designing programmes to assist food firms in producing foods that are safe to consume (Food Codex, 1995). The biggest advantage of HACCP over the other systems is that it pre-empts all the activities in the food process thus reducing risks in food-borne diseases. According to Taber (1993), the hazard of any material is determined by chemical, physical and biological properties. The significant role of food safety management systems in the economic and health development of the nation, in enhancing tourism, national and international trade is

acknowledged (FAO/WHO, 2001). While food safety systems have been successfully applied in food service operations industry around the world, little is known of the knowledge and practice of food safety management systems of upper west restaurants operators

2.2.2 Causes of Foodborne Illness

The Educational Foundation of the National Restaurant Association (2009) places the greatest causes of foodborne illness into three categories: "time-temperature abuse, cross-contamination, and personal hygiene." Time-temperature abuse occurs when food has been allowed to stand for an extended period of time at temperatures favorable to bacterial growth. Cross-contamination occurs when bacteria is transferred from one source to another that was previously uncontaminated, particularly food or food contact surfaces. Persons who exhibit poor personal hygiene such as failing to wash their hands after using the restroom, coughing, and sneezing are a potential source of contamination to food (Educational Foundation of the National Restaurant Association, 2009).

Data collected to determine the cause of food borne illness outbreaks in foodservice establishments in the United States from 1973-1982 found that certain practices contributed to these outbreaks. The most contributory factors included "improper cooling (56%), lapse of 12 hours or more between preparation and eating (31%), infected persons handling food (24%), inadequate re-heating (20%), improper hot holding (16%), contaminated raw foods/ingredients (9%), foods from unsafe sources (6%), improper cleaning of equipment and utensils (6%), cross-contamination from raw to cooked foods (5%), and inadequate cooking (4%)" (Bryan, 2010; Neumann, 2008).

From 1983-1987, approximately two-thirds of the foodborne illness outbreaks reported to the CDC involved foodservice operations and were caused by poor food handling practices. Poor food handling practices cited include "improper holding temperatures, poor personal hygiene, inadequate cooking, contaminated equipment, and food obtained from an unsafe source" (ADA, 2007). Further, a report by the CDC in which surveillance of foodborne illness outbreaks was conducted in the United States (1988-1992) found that bacterial contamination was the leading cause of these confirmed outbreaks.

The main reasons for these outbreaks were "improper holding temperatures, poor personal hygiene, improper cooking temperatures, foods from unsafe sources, and contaminated equipment" (FDA, 2008). Certain categories of foods present the greatest risks to foodborne illness because they promote the rapid growth of microorganisms (Bryan, 2010). These foods are termed potentially hazardous foods (PHF's) and include high protein foods, and foods with a pH above 4.6 (FDA Food Code, 2009). According to the FDA Food Code (2009) potentially hazardous foods include "foods that consists in whole, or in part, of the following:

- milk or milk products,
- shell eggs,
- meats, poultry, and fish,
- shellfish and edible Crustacea,
- baked or boiled potatoes,
- tofu or other soy-protein foods,
- garlic-and-oil mixtures,
- plant foods that have been heat treated,

- raw seeds and sprouts,
- sliced melons,
- synthetic ingredients (such as soy protein in hamburger supplements).

Ready to eat foods also pose a potential hazard because they are intended to be eaten without re-heating or preparation" (Reed, 2013).

2.2.3 The Incidence and Causes of Foodborne Illness in the International

Perspectives

In general, the United States is excellent in providing a safe and nourishing food supply to the public. However, millions of Americans each year are affected by foodborne illness caused by the food they consumed (USDA Economic Research Service, 2009; FDA, 2008). The CDC estimates that foodborne disease causes "approximately 76 million illnesses, 325,000 hospitalizations, and 5000 deaths in the United States each year. Known pathogens account for 14 million illnesses, 60,000 hospitalizations, and 1800 deaths. Three pathogens, Salmonella, Listeria, and Toxoplasma, are responsible for 1500 deaths each year, more than 75% of those caused by known pathogens, while unknown agents account for the remaining 62 million illnesses, 265,000 hospitalizations, and 3200 deaths" (Mead et al., 2009). Many foodborne illness outbreaks are caused by pathogens that have not yet been identified. Many of the pathogens that are of concern today were not recognized several years ago (Mead et al., 2009). Further, an unknown proportion of foodborne illness caused by microorganisms is not recognized as such and, therefore, goes unreported (ADA, 1997). These factors complicate the surveillance of foodborne illness and impact the accuracy of reporting. While there is concern about

chemicals and other substances in food, microbiological contamination of food is the primary cause of foodborne illness (Snyder & Poland, 1990). Biological contamination presents the highest risks to the largest number of people (Reed, 2013). In a study conducted by the U.S. General Accounting Office (GAO) in which nine federal agencies were surveyed, the largest cluster of concerns by the federal agencies were foodborne microorganisms and pathogens (Wolf, 1992). Microbiological contamination of foods can include viruses, bacteria, and parasites and symptoms can range from gastrointestinal problems to renal and hepatic complications to death (Snyder & Poland, 2010).

Certain segments of the population are more susceptible to foodborne illness than others. Individuals at increased risk include infants and young children, pregnant women, elderly people, people taking certain medications, and people with compromised immune systems. Children are at increased risk because of immature immune systems. The elderly are at increased risk because their immune system may diminish with age (Educational Foundation of the National Restaurant Association, 2009). Ensuring consumption of safe foods is particularly important for these segments of the population. On January 25, 1997, President Clinton announced his food safety initiative in which he directed government agencies to identify ways to further improve the safety of the food supply (USDA, Department of Health and Human Services {DHHS}, Environmental Protection Agency {EPA}, & Department of Commerce, 2009).

The report from these agencies was entitled Food Safety from Farm to Table: A National Food Safety Initiative and was presented to the President in May, 1997. The goal of this initiative was to reduce the incidence of foodborne illness as much as possible. In August, 1998, the President's Council on Food Safety was established. The

Council will develop a strategic plan in which it will consult with interested parties to discuss short and long-term issues including emerging threats to food safety, and consider the special needs of susceptible populations such as children and the elderly (USDA, DHHS, EPA, & Department of Commerce, 2009).

The CDC stated that despite progress made in improving food safety, foodborne illness remains one of the most common causes of illness and death in the United States (Wolf, 1992). According to Alysworth (2008) the issue of food safety is not something that will disappear anytime soon. For instance the American School Foodservice Association (ASFSA) is the advocate for child nutrition programs. The association strives to ensure that children are served nutritious and safe meals under the school lunch and breakfast programs through the following:

- ASFSA's "Keys to Excellence" provides guidelines to develop standards of excellence for foodservice programs. These guidelines provide standards of practice for the safe handling of food including food safety certification requirements for school foodservice employees.
- Most school districts conduct routine food safety self-inspections of their foodservice operation.
- Most school districts implement HACCP as their food safety control system (ASFSA, 1999c). According to the United States General Accounting Office (GAO, 2000), 20 outbreaks of foodborne illness in schools were reported to the CDC in 1997. However, the health departments from the states in which these reports were recorded stated that only 8 of the 20 outbreaks were associated with foods served in the school programs. The other 12 were related to foods

consumed at the schools but brought from another source. In 1998, nine outbreaks of foodborne illness were associated with school prepared meals. Two of the nine outbreaks were associated with USDA commodity ground beef and potato rounds (GAO, 2000).

2.2.3 The Requirements of Food Safety in the Restaurants

In a study conducted by Holdt (2012), 27 university foodservice managers participated in a six-day certification program. The intent of the study was to determine the effectiveness of the certification program for improving food safety knowledge and assessing the manager's attitudes towards food safety. Prior to the implementation of the certification exam, pre and post-tests were distributed to assess food safety knowledge. Effectiveness of the certification program was measured using a three-part questionnaire. Part one measured the attitudes of managers towards food safety. The second part of the questionnaire asked managers to rate eight job functions in order of importance. Part three related to the demographics of the managers (Holdt, 2012). Overall, managers rated food safety as an important job function and believed learning about food safety was worthwhile. Managers felt more familiar with food safety principles after training than before. The number of years in the foodservice position correlated positively with attitudes towards food safety. Managers with eleven years or more of foodservice experience demonstrated a more positive attitude towards food safety compared to managers with less experience. An increase in food safety knowledge was demonstrated in the post-test and certification exam scores. Managers who finished their formal education at high school had significantly lower food safety knowledge scores post-test

than did those with more education. No differences were found in the certification exam scores as related to education (Holdt, 2012). Moreover, according to Holdt, (2012), customers from different educational background have different expectations or perceptions of food safety. Therefore, it is believed that restaurant operators should pay attention to educational background when they are recruiting personnel to work in the restaurant.

In a study conducted by Custer (2009), 40 non-commercial foodservice directors were surveyed regarding their opinion as to their primary sanitation concerns. These concerns were maintenance of the foodservice facility (38%), time and temperature control (38%), pest control (26%), and food handling practices (17%) (Custer, 2009).

One hundred hawkers (street food vendors) in Malaysia were interviewed to determine the impact of culture and environment on knowledge and attitudes about food safety and foodborne illness (Toh & Birchenough, 2000). Hawkers were chosen based on their willingness to participate and interviewed at their business. The results showed that hawkers with higher education had increased knowledge and attitude scores. Further, as education level increased, the attitude score increased. Hawkers in more developed sites demonstrated a better knowledge of HACCP than those situated by the roadside. Pearson bivariate correlation demonstrated a strong relationship between knowledge and attitude scores ($r=0.00$, $p<0.01$) (Toh & Birchenough, 2000).

Cochran-Yantis, Belo, Giampaoli, McProud, Everly, & Gans (2006) studied the attitudes and knowledge of 300 foodservice operators of restaurants with favorable and unfavorable records of health inspections in Santa Clara, CA. The sample of restaurants

for this study was selected randomly using health department criteria for determining favorable and unfavorable health code records. To classify restaurants as having favorable or unfavorable health code records, the three most critical violations attributed to a foodborne illness investigation were first identified. These violations included food storage, hand washing, and equipment condition. Restaurants with favorable health code records were identified as "those having an environmental health code status of excellent or good, less than seven total violations, no more than one minor violation and no major violations within the three established critical violations." (Cochran-Yantis et al., 2006).

Restaurants with unfavorable health code records were identified as "those having a fair or poor status with the Department of Environmental Health and the Consumer Protection Division, at least two out of the three established critical violations, and no limit to the total number of violations." According to this study, 69% of the restaurants with unfavorable health code records reported providing food handler training to employees as opposed to 72% of the restaurants with favorable records. Upon performing a student's f-test comparison, a higher level of knowledge and an increased positive attitude towards food safety were revealed among restaurants with favorable health code records (Cochran-Yantis et al., 2006).

In a survey conducted by Sawyer (2010), among convenience store employees, food safety practices related to fresh prepared take-out foods were investigated (Sawyer, 2010). Sawyer found that neither food items nor delivery vehicles temperatures were taken by employees. Foods items were left unrefrigerated from 15 minutes to 2 hours until an employee found the time put them in refrigerated storage. Food thermometers were not available in any of the stores. Several violations in cross-contamination were

observed such as adding fresh products to old products and using a wiping cloth for multiple purposes (Sawyer, 2010).

2.3 The Importance of Hand Washing in Food Preparation

In a study conducted by Emery (2010), employees were observed preparing food without previously washing their hands. Items necessary for hand washing were absent in many of the convenience stores. Hand washing is the single most important means for controlling foodborne illness. Many types of bacteria are transmitted from contaminated hands (Emery, 2010). It is estimated that unclean hands are the cause of approximately one-quarter of all foodborne illnesses (Lydecker, 2013). However, knowledge of the relationship between hand washing and foodborne illness has not shown a positive increase in hand washing practices. Supervision and the ease of using hand washing facilities seems to have the greatest impact on hand washing compliance (Emery, 2010).

A study by deWit and Kampelmacher (2004) found that 60% of male foodservice employees did not wash their hands after using the toilet while 80% of females washed their hands after using the toilet. Over the past quarter century, women have joined the labor market in increasing numbers, partially closing the gender participation gap. Between 1980 and 2009, the global rate of female labor force participation rose from 50.2 percent to 51.8 percent, while the male rate fell from 82.0 percent to 77.7 percent. Consequently, gender differentials in labor force participation rates declined from 32 percentage points in 1980 to 26 percentage points in 2009. Another study conducted by Ecolab (2006) in which hand washing practices of employees at a managed care facility and two foodservice facilities were monitored found that the employees at the managed

care facility had the best hand washing compliance. It was suggested that the increased compliance was due to the emphasis placed on hand washing by management as well as the training provided for employees. Further, the study found that monitoring hand washing practices increased compliance among foodservice employees. Although hand washing is a simple task, motivating foodservice employees to properly wash their hands is challenging for several reasons. "Good personal hygiene is not learned at an early age, most hand washing is not adequately performed, and hands are easily re-contaminated." Some steps to help motivate foodservice employees to correctly wash their hands are to "teach them the how and why of hand washing, identify situations where hand washing is necessary, make hand washing easy, and monitor their hand washing practices" (Lydecker, 2013).

2.3.1 Food Safety Knowledge and Attitudes among Restaurant Operators

The National School Lunch Program and the School Breakfast Program provides approximately 33 million meals daily to America's children (ASFSA, 2009). School foodservice professionals are partially responsible for the well-being of these children through the foods they serve, making food safety training and education an important component of the school foodservice program. The knowledge and attitudes of foodservice employees towards food safety is critical to a successful food safety program. According to Howes, McEwen, Griffith, & Harris (2006) attitudes, knowledge, and monitoring are important factors for decreasing foodborne illness outbreaks in foodservice. A positive behavior and attitude as well as training in food safety are important for maintaining safe food handling practices (Howes et al., 2006). Green and

Frame (2008) conducted a food safety study among nine elementary, middle and, high schools.

The study was designed to determine existing food safety knowledge and behaviors of foodservice employees in pre and post-training sessions. The training curriculum was a 15-hour workshop adapted from the Educational Foundation of the National Restaurant Associations' Sen/Safe program. Upon completion of the training, there were improvements observed in hand washing before and after eating, but a decline in hand washing after using the bathroom and before starting work. There also were improvements observed in product handling such as washing fruits and vegetables before processing and labeling and dating stored foods. Further, work surfaces were cleaned more frequently and dishwashing procedures improved. A decrease in compliance was demonstrated in the use of serving line temperature logs. The three critical areas where knowledge and compliance were not correlated were hand washing procedures, proper thawing procedures, and the use of thermometers. An increase in food safety knowledge did not lead to a positive change in behavior according to this study (Green & Frame, 2008). Sneed and White (2013) conducted a study among school foodservice managers and directors/supervisors to determine their perceptions of continuing education needs of managers. A national mailing was distributed to 1200 managers and 1200 directors/supervisors. Managers and directors/supervisors rated health and safety laws, inspection, and enforcement as high continuing education needs. Perceived needs for continuing education were positively correlated with education level as well as years of foodservice experience and school foodservice experience. In general, school foodservice employees demonstrate a positive attitude towards learning about food safety as well as a

desire to receive further knowledge in this area. However, research has shown that these factors do not always result in increased food safety compliance.

2.3.2 Food Safety Practices Among Foodservice Employees

The potential for a foodborne illness outbreak is possible in any restaurant operations system. In May of 1990 in Rhode Island, a staphylococcal outbreak occurred in an elementary centralized school foodservice system. Of the 600 lunches served, 100 children reported becoming ill after consuming the lunch. The cause of the outbreak was a foodservice employee who was infected with *S. aureus*. The employee had "removed the casings from two of nine warm ham rolls hours prior to service. Because of improper refrigeration, prolonged handling, and inadequate re-heating, the ham was held at temperatures estimated at 50-120 degrees F for a minimum of 15 hours" (Richards et al., 2003).

In another study, data were collected in 10 school foodservices that prepared food in a central kitchen and transported meals to satellite kitchens. The conditions and practices that might affect the safety of the food were observed. Hand washing facilities were available in the food production areas in most of the kitchens. However, poor hand washing practices were observed among most of the employees. Picking up food with hands to eat was observed as well as eating and drinking during food preparation (Brown et al., 2012). Food safety abuses related to time-temperature procedures also were observed. Five entrees in four of the school systems were held over one hour between preparation and the start of transportation. The transportation time for three entrees in two large foodservice systems exceeded one hour. In seven school systems, some of the

entrees were held more than one hour between the end of transportation and the start of service. Two entrees, "macaroni and cheese and charbroiled beef, were held for 4.29 and 3.85 hours respectively from end of production to end of service." However, the holding temperatures for these entrees were 140 degrees F or above. Nine of the 20 entrees showed internal temperatures between 40-140 degrees F during hot holding (Brown et al., 2012).

In a study by Connors, Bednar, Imhran, & Czajka-Narins (1999) a HACCP inspection was conducted to determine milk handling practices in 32 elementary schools in Texas. The results indicated that the milk temperatures were generally within the recommended 32 to 41 degree F range. However, inspection of individual kitchens found milk temperatures that were above 41 degrees F. Milk was ordered from an approved source for all schools. Many of the schools did not inspect the milk received or record temperatures upon delivery (Connors et al., 1999). Gilmore, Brown, & Dana (1998) conducted a study in which data collection forms for measuring food quality were developed. Four schools with enrollments ranging from 862 to 40,265 students provided the data. Sanitation practices were evaluated in each kitchen where food was prepared. They found that hair was not fully restrained and hand washing was infrequently observed. However, when hand washing was performed it was done thoroughly. Hand washing and changing of gloves was evident in 50% of the observations. Frozen foods were thawed properly and foods were handled with utensils, clean hands, or gloves. Sanitizing of surfaces, small equipment, utensils, and thermometers tended to be performed consistently or not at all. Work surfaces were cleaned between uses and surfaces of small equipment appeared clean (Gilmore et al., 2008).

In a study by Spencer (2006), hazard analyses were conducted in six food preparation sites and 16 school canteens in the State of Bahrain. Hazards were primarily associated with the "preparation of foods too far in advance of service, bare handling of food items, and holding food items at room temperature for extended periods of time. Re-heating of foods was not observed" (Ali & Spencer, 2006). Raccach, Morrison, & Farrier (2005) conducted an analysis of public health hazards in a centralized school foodservice operation. "Food handling, personnel, equipment, storage, preparation, holding, distribution, serving, cleaning, and sanitation were observed." The researchers found that foods were stored at appropriate cold storage conditions and were rotated on a "first in first out" basis. Stored foods also were covered to protect them from overhead contamination. However, employees did a large amount of handling during food preparation. Employees used bare hands to prepare foods and only two employees were observed using gloves. Further, hair restraints were not used by employees. Cooking equipment was scraped from food items and hand cleaned, but not sanitized. During service, students picked up uncovered silverware from trays and sneeze guards were not used (Raccach et al., 2005).

Kim and Shanklin (2009) conducted a study in three Midwestern elementary schools which were converting their food production system from centralized conventional to a centralized cook-chill system. Time and temperature histories were taken for three days for the two food production systems for spaghetti with meat sauce. They found that for both systems food items were re-heated several hours before service and held in a steam table or hot cart until service due to time and equipment constraints.

The average temperatures for the spaghetti with meat sauce served for lunch ranged from 118F to 143F.

2.4 Food Safety Control Measures Applied in Restaurants

2.4.1 Strategies to Ensure Food Safety in Foodservice

The Educational Foundation of the National Restaurant Association (2009) lists four key areas of food handling practices to ensure food safety. These four areas are: "controlling time and temperature, practicing good personal hygiene, preventing cross-contamination, and purchasing from approved suppliers." Further, training of foodservice employees in food safety and the application of HACCP principles can further ensure safe food handling practices are followed.

2.4.2 Training/Certification of Foodservice Employees

The FDA and the Educational Testing Service (ETS) began offering a food safety certification examination in 1985 for foodservice managers. There are several reasons why the certification process was established. The incidence of foodborne illness outbreaks in foodservice establishments had been increasing and the efficiency of restaurant food safety inspections was being questioned. Further, the rapid growth of the foodservice industry did not show an increase in surveillance measures conducted by regulatory health agencies due to budget cuts. A more effective method to control food safety was needed (Speer & Kane, 2010). The certification process was established to upgrade management's knowledge of food safety and emphasized the need for training of foodservice employees in food safety. Specific topics in the certification courses included "basic principles of food safety and sanitation, personal hygiene, facilities construction,

regulatory codes and inspection reports, motivating employees, and others" (Kneller & Bierma, 1990; Metts & Rodman, 2013).

Certification training courses are intended to provide information necessary to train employees in food safety and implement a food safety system. The goal of certification is to establish minimum standards of food safety practice. Certification can also provide foodservice operations with the "reasonable care" defense in the event of a lawsuit (American Food Safety Institute {AFSI}, 2000). Food manager certification is mandated in many states including California, Connecticut, District of Columbia, Delaware, Florida, Idaho, Illinois, Louisiana, Minnesota, North Dakota, Pennsylvania, Utah, and Wisconsin and also may be required by local county or city authorities. The requirements for certification may vary slightly among different authorities, but most require some type of formal training and the passage of a nationally recognized exam to become certified. Many authorities require a certified food manager on site to renew the foodservice establishments' license. Re-certification is required every three to five years (AFSI, 2000).

For example, in California (CA), steps have been taken to improve the food safety within foodservice establishments. Assembly Bill (AB) 1978, which became effective January 1, 2000, mandates that "every food establishment, catering truck, and commissary that handles unpackaged food must have an owner or employee who has been certified and is knowledgeable in food safety. New technologies, scientific advances, and emerging pathogens make recertification necessary every three years" (CA State Department of Education, Nutrition Services Division {CDOE-NSD}, 2009). The minimum level of knowledge as established by the FDA Food Code has been

incorporated into the California Uniform Retail Food Facilities Law (CURFFL) as a standard for California food safety requirements. Certification is granted upon passage of a nationally recognized exam (CDOE-NSD, 2009).

However, certification is not a guarantee that safe food handling techniques will be followed. Speer and Kane (2010) conducted a study to determine the opinions of state food protection directors in 51 states toward certification. Many believed certification was not effective in improving food safety practices. While over 73% did think certification improved food safety practices in their state, many believed otherwise. The directors who responded negatively stated that many training programs had been tried in their state with little success. It was further stated that managers did not appear to be motivated to put food safety practices into effect, and certification would not change these practices. Although they felt the managers had basic food safety knowledge, they did not follow through. Motivation is the problem, and unless foodservice employees want to practice safe food handling techniques, the current situation will show no improvement (Speer & Kane, 2010).

According to this study, barriers to certification were time and money due to tight budgets and the perceived burden of certification programs. Also, the ruralness of a state was a barrier to certification. The ability to coordinate a statewide program in these states would be difficult due to sparse populations and distances between towns. Penninger and Rodman (2014) found certification of managers improved food safety conditions in 20 foodservice facilities surveyed. Nine had voluntary certification programs in which 28.6% of managers were certified. Eleven had mandatory certification programs in which 83.6% of managers were certified. "Ninety-one percent of the directors from the

mandatory programs stated that inspection scores improved with certification of managers, as opposed to only 33.3% of directors from voluntary programs who stated this." Failure to monitor or follow standard procedures in food safety is a principal cause of foodborne illness today. However, a shortage of qualified foodservice personnel throughout the nation makes this task even harder. The increasingly complex task of preventing foodborne illness often is encumbered upon employees who are younger than in years past, less experienced, and less motivated (Zuckerman, 2008). Regardless, foodservice managers and employees are responsible for ensuring that safe food handling practices are followed in their facilities (ADA, 2007).

The evidence linking the training of foodservice personnel in food safety to improved sanitation scores and food safety compliance is tenuous. Through educating foodservice employees about food safety, at least a common framework of food safety protocol will be established. Training and certification, along with other food safety activities, have the potential for improving foodservice operation sanitation (Metts & Rodman, 1993). According to Custer (2009) the steps to improving food safety, such as training programs, may initially cost money but the benefits should outweigh the costs.

2.4.3 The Importance of the Hazard Analysis and Critical Control Point (HACCP)

Hazard Analysis and Critical Control Point (HACCP) in the Foodservice Industry
HACCP is a management system developed to identify and monitor foodborne hazards that can affect the safety of food. The identification of hazards serves as a basis for establishing critical control points (CCP's). CCP's are those points in the process that must be controlled to assure the safety of food. CCP's include areas such as receiving,

storage, preparation, and others. Further, critical limits are established that document the appropriate parameters that must be met for each CCP. Monitoring and verifying the system also are included as part of HACCP to ensure potential risks are controlled (FDA, 1999; FDA, 1998; FDA, USDA, & National Advisory Committee on Microbiological Criteria for Foods {NACMCF}, 1997).

2.4.4 Background

HACCP was developed by Pillsbury in the 1960's in conjunction with the National Aeronautic and Space Administration (NASA), Natick Laboratories of the U.S. Army, and the U.S. Air Force Space Laboratory Project Group. HACCP was used to develop foods for the space program that were virtually 100% contamination free and safe for astronauts' consumption. HACCP uses a preventative approach to food safety as opposed to a reactive approach, which was a common practice in the past, and has widespread applications for the foodservice industry (FDA, 1999).

2.4.5 Prerequisite Programs

To be successful, HACCP must be based on sound prerequisite programs that provide the framework for an effective HACCP program (FDA, 1998; FDA, USDA, & NACMCF, 1997). Prerequisite programs detail the basic operating conditions that are essential for the safe production of food. Common prerequisite programs may include operating conditions for "facilities, supplier control, specifications, product equipment, cleaning and sanitation, personal hygiene, training, chemical control, receiving, storage,

and shipping, traceability and recall, and pest control" (Educational Foundation of the National Restaurant Association, 1999; FDA, USDA, & NACMCF, 1997; FDA, 1998).

2.4.6 Developing a HACCP Program

The development of a HACCP program will vary from each facility and is product and process specific. Generic HACCP programs may be used as a guideline for facilities to establish control measures, but the unique needs of each facility must be considered in the development of an effective HACCP program (FDA, USDA, & NACMCF, 1997). In the initial development of a HACCP program, five preliminary steps need to be taken before the actual HACCP principles are applied. The five steps include "assembling a HACCP team, describing the food and its distribution, describing the intended use and the consumers of the food, developing a flow diagram that describes the process, and verifying the flow diagram."

After these five preliminary steps have been taken, the seven principles of HACCP can be applied. "These seven principles are:

- perform a hazard analysis,
- identify critical control points (CCP's),
- establish critical control limits for each CCP,
- establish monitoring procedures for the CCP's,
- establish corrective action,
- establish verification procedures, and
- establish record-keeping and documentation procedures"

(Educational Foundation of the National Restaurant Association, 1999; FDA, USDA, & NACMCF, 1997; FDA, 1998).

Although the food supply today is probably safer than it has ever been, there is still a need to implement a HACCP program. The food supply has become more global and we now import more foods into the United States today than ever before. These foods come from countries where the sanitation practices may be less stringent. Also, new and emerging pathogens are continually being identified. These pathogens were not recognized several years ago and present new challenges to food safety. Finally, a HACCP program provides documentation of the operation's sanitation practices (King, 1992).

2.5. Trade in Street Foods

Due to socioeconomic changes in many countries, the street food sector has experienced phenomenal growth in the past few decades. Urbanization and population growth are expected to continue and street-vended foods, which are largely but not exclusively an urban phenomenon, will expand accordingly (Atkinson, 1992). Street food trade has emerged as an economic activity and a source of income for the poor in many developing countries. Street foods are also considered essential for maintaining the nutritional status of the population (Maxwell, 2000). In a longitudinal study conducted in Ghana, street foods accounted for 19-27% of food expenses and provided 134-417 kcal per day per person (Ag Bendech, 2000).

Street food vending assures food security for low-income urban populations and provides a livelihood for a large number of workers who would otherwise be unable to

establish a business. The benefits of this trade extend throughout the local economy as often vendors buy their ingredients locally (Winarno & Allain, 2011). Various projects have shown that street food trade generates a large volume of business, involving large amounts of money and provides a competitive source of employment and income to millions of people. The FAO estimates that there are approximately 100,000 vendors in Malaysia whose collective total annual sales amount to over \$2 billion (FAO, 1995). In a survey conducted in Accra, Ghana, the street food sector was shown to employ over 60 000 people with an estimated turnover of US\$ 100 million (Tomlins, 2002).

Street foods are defined by the Food and Agricultural Organization (FAO) as ready to-eat foods and beverages prepared and sold by vendors and hawkers in streets and other similar public places (FAO, 2007). The central characteristic of street foods in this definition is their retail location, namely, that they are sold on the street and it is this that categorizes them as part of the informal sector. To differentiate street food vendors from formal sector food establishments, such as restaurants, Tinker (2007) adds a further qualification that street foods are sold on the street from "pushcarts or baskets or balance poles, or from stalls or shops having fewer than four permanent walls" (Tinker, 2007). Thus those who manufacture and/or sell street foods are micro-entrepreneurs forming part of the so-called informal sector. In light of this, the informal sector is not enumerated by official data collecting agencies, and thus official statistics on the street food trade are virtually non-existent (Tinker, 2007).

Street foods are a heterogeneous food category, encompassing meals, drinks, and snacks. They are mass consumer foods that are normally eaten without further processing or cooking. Street foods show variation in terms of ingredients, methods of processing,

and consumption (Ekanem, 2008). Street food trade usually involves both retail and production activities, although the sale of street foods is the most visible part of the trade. Most street foods have been processed to some extent, much of which may have occurred unseen off-street. Because of this, the trade should be seen as part of the whole food system, rather than just as a service or retail activity (Cohen, 2005; Weber, 2007).

2.5.1 Street Food Vendors

A number of studies have examined the characteristics of vendors and have found that street food vendors do not form a homogenous group, but differ according to various socio-economic and demographic criteria. With regard to mode of selling, vendors can be broadly classified into stationary and ambulatory. It has been found that stationary vendors, who sold their wares from small stalls, kiosks, and so forth, were the predominant type in most of the countries studied (Powell, Brodber, Wint & Campbell, 2010; Tinker, 2007). Ambulatory vendors refer to those that push carts around selling their products. Most vendors operate from selected strategic locations, including bus and train stations, markets and shopping areas, commercial districts, outside schools and hospitals, residential suburbs, factories, and construction sites. In some places, it appears that vendors have a regular clientele (Nasinyama, 2012). A common perception is that street food vendors tend to concentrate in downtown commercial areas, but various country studies have shown this to be the exception in all locations except in Bangladesh and Thailand (Tinker, 2007; FAO, 1989). In Nigeria, 23 percent of vendors were located in residential areas (FAO, 2012). It is also postulated that street-food vendors, owing to their lack of or no education as well as being poor, lack an appreciation for safe food

handling. Consequently, this together with the surroundings that they are prepared and sold in, street food is perceived to be a major public health risk. (WHO, 1996; Leus, Mpeli, Venter, Theron, 2006).

2.5.2 Safety of Street Foods

The main health hazard associated with street foods is microbial contamination, although pesticide residues, transmission of parasites, the use of unpermitted chemical additives, environmental contamination and limited access to safe water have also been identified as possible hazards (Abdussalam & Kaferstein, 2013; Arambulo, Almeida, Cuellar & Belotto, 2004). The potential for the contamination of street foods with pathogenic micro-organisms has been well documented and several disease outbreaks have been traced to consumption of contaminated street foods (Abdussalam & Kaferstein, 2013). The risk of microbial contamination is dependent on the type of street food and how the food is prepared. Food risk is influenced by food type, pH, and method of preparation, water availability, handling, exposure temperature, and holding time (Mathee *et al*, 2006). In general, cereal and bakery products with low moisture content, products that have been adequately sugared, salted, or acidulated, and some fermented products are less likely to support bacterial growth as opposed to dairy, egg, and meat products. Dishes containing raw ingredients or made with ice are also high risk items (Arambulo, *et al*. 2004). Foods that are cooked immediately prior to consumption are safer than those which have been cooked and stored at ambient temperature (WHO, 2004). Other factors implicated in causing microbial contamination include poor food preparation and handling practices, inadequate storage facilities, the personal hygiene of

vendors, and a lack of adequate sanitation and refuse disposal facilities (Abdussalam & Kaferstein, 2013). In Ghana, in a study that investigated the microbial quality of street foods sold in Accra, *Shigella sonnei*, enteroaggregative *Escherichia coli* and *Salmonella arizonae* were the pathogens isolated from some food samples (Mensah, Yeboah-Manu, Owusu-Darko & Ablordey, 2002). In Ethiopia, a similar study isolated *Bacillus spp.*, *staphylococci* and *micrococci* as the dominant groups in some foods (Muleta & Ashenafi, 2001).

Much of the work done in South Africa has focused on the microbiological quality of street foods as health risk is related to the potential of food to support microbiological growth or the microbiological contamination. Martins (2006) conducted a formative assessment on 200 street food vendors and 800 consumers in greater Johannesburg investigating the socioeconomic background of vendors and their customers, as well as vendors' facilities and aspects relating to the quality and safety, including microbiological testing, of foods. The author found that street vendors did observe good hygienic practices in preparing, cooking and handling foods, even though they were not aware of the reasons for doing so (Martins, 2000). Additionally, food was not kept overnight (a potential opportunity for contamination) due to the lack of refrigeration facilities (Martins, 2000). In 1997, Mosupye and von Holy compared the microbiological quality and safety of street foods involving 51 ready to eat street foods, 18 dish water and 18 surface swab samples taken in Johannesburg to those sampled and tested in other countries. The authors concluded that the bacterial counts in Johannesburg were lower than that of other countries (Mosupye & von Holy, 2009).

The health risk from street foods may be no greater than that posed by foods or dishes from other sources such as in restaurants (Abdussalam & Kaferstein, 2013). Two studies conducted in India found that the microbial quality of street foods was equivalent to, if not better, than that of foods bought from hotels and restaurants (Bapat, 1992; Chakravarty, 2004). In South Africa, a comparative study found no significant difference between 116 formal and informal food vendors regarding microbiological food quality. With regard to potential risks, formal vendors had more vending experience, used some precautions in food preparation and had better hygiene practices (Mathee *et al*, 2006). However, whilst food from the informal vendors was hot, food from formal food vendors tended to be cool and 73% stored leftovers for sale the next day, both of which are potential risks for microbiological contamination (Mathee *et al*, 2006).

2.5.3 Impact of Education of Food Industry Personnel in Hygiene Matters

Education of food industry personnel in hygiene matters has been recommended as a means of improving food handling practices, and thus, the safety of food (WHO, 2006; FAO 2007). This is attributed to the fact that human handling errors have been responsible for most outbreaks of food poisoning in developing and developed countries (Clayton, Griffith, Peters & Price, 2002; Todd, Greig, Bartleson, & Michaels, 2007). For example, the hepatitis A virus can be introduced by unwashed hands of food handlers who are themselves infected. Therefore, good personal hygiene, as well as, sanitary handling practices in the food processing area are essential components of any prevention programmes for food safety (Clayton *et al*, 2002; Todd *et al*, 2007). The Centers for Disease Control (CDC) has identified five risk factors related to the human factor and

preparation methods that contribute to the high prevalence of foodborne illness. These are improper holding temperatures, inadequate cooking, contaminated equipment, food from an unsafe source and poor personal hygiene (Incidence of Foodborne Illness, 2010).

The WHO has developed the five keys to safer foods, a tool to enhance food safety behaviours that if followed, or adopted, can reduce foodborne illness occurrence. The five keys are specific behaviours each linked to these five risk factors that will likely reduce foodborne illness. The 5 Keys to Safer Foods are: keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperature, use safe water and raw materials (WHO, 2007). There is, however, lack of documented evidence of improvements in food hygiene standards which can be directly related to education or training (Rennie, 2004). Furthermore, there is very limited information or studies conducted to assess the impact of education in the informal sector.

Evaluations of the effectiveness of formal food hygiene education courses in the United Kingdom, United States, Saudi Arabia and Romania prior to 1994, have identified increased knowledge levels of course participants, and improvements in the relationship between food industry and enforcement personnel due to a resultant common understanding (Rennie, 2004). However, despite the increased knowledge, evidence of consequential improved food handling behaviour was not clearly demonstrable (Rennie, 2004). Regulatory agencies utilize inspections and education of food handlers as two methods of ensuring food safety in the formal sector. The effectiveness of food handler education and inspections in ensuring food safety has, however been questioned owing to the variation in implementation of these two measures in the United States of America (Riben, Mathias, Wiens, Cocksedge, Hazelwood, Kirchner & Pelton, 2008).

Riben *et al.*, (2008) reviewed the training and inspection reports of the Boston Inspectional Services Department (ISD) in order to assess the effectiveness of inspections and training. The inspection records reflected scores obtained by restaurants that were inspected, or risk assessed using a standardized form that identified 42 types of violations including items defined as “critical” - likely to be associated with foodborne illness or “non-critical” – likely to play a minor role in causing illness. Scores were calculated by deleting points from a perfect inspection score of 100 (no noted violations). Thus inspection scores could range from 0 to 100. In 1988, a training program was initiated by the Boston ISD. Participation was mandatory for managers of restaurants with suspended licenses due to conditions found on inspection that constituted an immediate threat to health and for restaurants linked epidemiologically to cases of foodborne illness. Participation by restaurant managers outside these categories was voluntary. Riben and colleagues (2008) then analyzed the routine inspection records, following the training from 1989 to 1992 for three groups of restaurants: a mandatory group, a voluntary group and a control group (no staff attended the training). The authors looked at records before the training (baseline), one year after training and two years after training (Riben *et al.*, 2008). The evidence regarding the effectiveness of food handler training in improving food safety was weak, but it appeared that some training resulted in improved inspection scores (Riben *et al.*, 2008). It also appeared that inspections were beneficial as worse inspection scores were noted where no inspections were previously conducted (Riben *et al.*, 2008).

A systematic review to investigate the effectiveness of food safety training as an intervention was conducted by Campbell and colleagues in Canada (Campbell, Gardener,

Dwyer, Isaacs, Kruger & Ying Jy, 2008). The inclusion criteria for the studies were multiple; including study design (controlled trials, cohort, case-control, pre-test/post-test without control, cross-sectional, ecological and time series); studies with specific interventions (inspection-based, food handler training and community based education); study selection of participants (food handlers working in the formal environment) and study outcomes (changes in inspection scores, knowledge of food safety practices and violation of inspection criteria). Quality assessment of the 34 studies included on the basis of the inclusion criteria categorized and rated 1 study as strong, 14 were moderate and 19 were weak. Therefore, only 15 studies were included in the systematic review. Interventions from the 15 studies were grouped into three categories of public health interventions regarded as important to enhance food safety: inspections, food handler training, and community-based education (Campbell *et al*, 2008).

Findings from the systematic review suggest that these multiple public health interventions are effective in assuring food safety, since routine inspection of food service premises (at least one inspection per annum) was effective in reducing the risk of food-borne illness as determined through improved inspection scores; food handler training can improve the knowledge and practices of food handlers, particularly if combined with certification; and selected community based education programs can increase public knowledge of food safety (Campbell *et al*, 2008).

In the United Kingdom, a time-series experimental study was conducted as a result of the identification of unsatisfactory conformance to food safety standards following inspections (Rudder, 2006). The aim of the study was to identify barriers to compliance in the 40 food retail businesses. Environmental Health Officers (EHOs)

conducted risk assessments on food safety through inspections at the establishments and categorized the businesses according to their performance. Over a period of six months the businesses were offered advice, seminars and one to one support. Thereafter, a further risk assessment was done and Rudder (2006) reported that 65% of the businesses had improved their risk profile, 15% had remained the same, 10% had some deterioration and a further 10% had completely deteriorated (Rudder, 2006). The authors concluded that lack of knowledge and understanding of the principles of food safety coupled with language difficulties, were significant barriers to promoting food safety and that supportive activities can make a significant impact on practices (Rudder, 2006).

Aware of the lack of studies and clarity on the impact of training on food safety behaviours within the food industry, Nieto-Montenegro, Brown and LaBorde (2008) undertook a study that looked at developing and assessing a pilot food safety educational material and training strategy for Hispanic workers using the Health Action Model (HAM) (Nieto-Montenegro, Brown and LaBorde, 2008). HAM takes into account the social and environmental factors around the worker that may impact on adoption of behaviours (Tones *et al*, 1990; Nieto-Montenegro *et al*, 2006). Seaman and Eves indicate that the Health Action Model gives the most thorough description of factors that may influence behaviour change following hygiene training (Seaman & Eves, 2006). The study conducted by Nieto-Montenegro *et al* in 2008 using the HAM, found that the educational lessons alone produced a significant increase in knowledge and hand washing after using the restroom. With supervisor re-enforcement after training, hand washing before work and after breaks also increased significantly although there was no effect with the monetary incentive (Nieto-Montenegro *et al*, 2008). This study showed that

elements of knowledge and motivational systems are important and that training is enhanced by supervisory reinforcement of the behavioural rules with the personnel. Its premise is similar to the type of study needed to assess the effectiveness of training of street food vendor training.

2.5.4 Knowledge, Attitudes and Practices (KAP) on Food Safety and Foodborne Diseases

A study to assess knowledge, attitudes, and behavior concerning foodborne diseases and food safety issues amongst formal food handlers conducted in Italy found that the majority of food handlers who had attended a training course had knowledge and a positive attitude toward foodborne diseases control and preventive measures (Angelillo, Viggiani, Rizzo & Bianco, 2000). The positive attitude was not supported when asked about self-reported behaviours and when observed during food preparation for practice of hygienic principles. This was on the basis that only 21% used gloves when touching raw, unwrapped food. Predictors of the use of gloves were educational level and attending training courses. The authors suggested that emphasis should continue on improving knowledge and control of foodborne diseases amongst food handlers (Angelillo *et al*, 2000).

In Malawi, a study on the KAP on food hygiene of caregivers also showed a poor relation between knowledge, behavioural and sanitary practices, as swabs from caregivers' hands and food tested positive for coliforms and *E Coli*. (Kalua, 2002). Furthermore in a study conducted in Mauritius on 50 street food vendors, it was reported that despite the efforts of Health Inspectors in promoting the risks of poor hygiene

practices, and an awareness of hygienic conditions, the majority were not putting their knowledge into practice as they perceived their products to be of low risk. (Subratty, Beeharry, and Chan Sun, 2004). The authors attributed this to lack of knowledge and recommended a need to strengthen the educational programme (Subratty *et al.*, 2004).

Mukhola (2008) in assessing the factors influencing the safety and quality of street food in a rural area in Limpopo examined the knowledge, attitude and perceptions in both street food vendors and consumers. Her findings indicated that the majority of street food vendors and consumers had little information regarding the proper preparation and storage of food as well as environmental conditions that may be detrimental to health. Furthermore 64.4% of consumers thought that street food is sold under unacceptable conditions and these needed improvement (Mukhola, 2008).

Based on the literature reviewed, many of the studies have been conducted on the formal sector; there is limited information on the effectiveness of training conducted on street food vendors. It is therefore very important to explore the KAP of street food vendors in order to allow for a better understanding of these variables in street food vendors in relation to Food Safety.

2.6 Most Basic Operational Food Hygiene Requirements

Johnson and Weinstein (2004) maintain that customers seek value for money and this includes being served hygienic food. Customers also seek a guarantee that what they purchase to eat will not make them ill (Kandampully & Butler, 2001). There are a wide range of important aspects to consider and adopt in food hygiene practice. A few are

highlighted in what follows. All food premises must be kept clean and maintained in good repair and condition this is the most basic requirement. This means that the design of such venues must allow adequate maintenance, cleaning and/or disinfection (Foster, 1992). There must be adequate working space to allow for the hygienic performance of all food and beverage operations. Design should be such as to protect against the accumulation of dirt or any contact with toxic materials, corrosion or pests. Suitable facilities must be provided for the cleaning and disinfecting of working utensils and equipment and these must be resistant to corrosion and must be easily cleanable. An adequate supply of hot and cold water must be available. Personal hygiene measures must be enforced (including facilities for the hygienic washing and drying of hands, hygienic sanitary arrangements and changing facilities). All production surfaces must be corrosion resistant, smooth, and washable and made of non-toxic materials. Cleaning must be undertaken twice or more time daily working utensils and equipment must be disinfected. There must also be adequate arrangements and/or facilities for the hygienic storage and disposal of hazardous and/or inedible substances and waste (whether liquid or solid). Facilities and/or arrangements for maintaining and monitoring suitable food temperature conditions must be available and foodstuffs must be so placed as to avoid the risk of contamination so far as is reasonably practicable.

No raw materials or ingredients should be accepted by any food business if they are known to be, or might possibly be, contaminated with parasites, pathogenic micro-organisms or toxic, decomposed or foreign substances that, after normal sorting and/or preparatory or processing procedures hygienically applied by food businesses, they would still be unfit for human consumption. In addition, raw materials and all ingredients

stored in a food business should be kept in appropriate conditions which are designed to prevent harmful deterioration and protect them from possible contamination. Foods which are handled, stored, packaged, displayed and transported must be protected against any contamination which is likely to render the food unfit for human consumption. All raw materials, any ingredients, intermediate products and cooked meals that are likely to support the development of pathogenic microorganisms or the formation of toxins must be kept at temperatures which will not result in a health risk. Any processed foodstuffs must have suitable rooms large enough for the separate storage of raw materials from processed material, with sufficient separate refrigerated storage to prevent contamination. Where foodstuffs are to be held or served at chilled temperatures they must be cooled as quickly as possible following the heat processing stage.

Any thawing of foodstuffs shall be undertaken in such a way as to minimise the risk of development of pathogenic micro-organisms or the formation of toxins in the foods. During thawing foods must be subjected to temperatures which would not result in a risk to health. Where run-off liquid from the thawing process may present a risk to health it must be adequately drained. Following thawing, food must be handled in such a manner as to minimise the risk of development of pathogenic micro-organisms or the formation of toxins. Hazardous or inedible substances, including animal feedstuffs, should always be adequately labelled and stored in separate and secure containers.

2.7 Conceptual Literature

2.7.1 The Importance of Organizing Food Safety Education and Training Programmes for Restaurant operators

The success of a HACCP program is dependent on educating and training restaurant managers and employees on the importance of their role in maintaining food safety (King, 2012). An understanding of the HACCP plan and the prerequisite programs must be established to make HACCP effective. HACCP is applicable to all segments of the foodservice industry. To be successful, management must be committed to the implementation of HACCP. A commitment to HACCP by management demonstrates the importance of food safety among employees. Management in all segments of the foodservice industry must make concerted efforts to ensure the safety of the food they serve. HACCP principles, prerequisite programs, and the education and training of employees and managers can be effective in developing a successful food safety system. Unfortunately, HACCP consultants frequently encounter foodservice personnel who do not understand what HACCP is or how to apply it to their food service situation.

King (2012) believes this is because the spread of HACCP information from the foodservice industry has been slow. Further, misconceptions about HACCP continue to exist. Many foodservice personnel believe HACCP is equivalent to a Total Quality Management (TQM) program; if they have a TQM program they are practicing HACCP. The other misconception is that HACCP applies to only certain types of foodservice operations such as large or central kitchens. However, HACCP is applicable to any foodservice operation where there is a risk of a foodborne illness outbreak (King, 2012).

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

The methodology outlined in detail the research design, profile of the study area, population, sample size and sampling procedure, sources of data, methods of data collection, pilot study, and data processing and analysis.

3.1 Research Design

The study used a cross-sectional descriptive survey to assess the knowledge and practices of food safety management systems in restaurants. Moreover, the quantitative research design was used for the study. As a strategy, a survey method will be used to obtain information on selected restaurant operators to assess the knowledge and practice of food safety management in the industry. The study also used both quantitative and qualitative research and a combination of both approaches. These types of research approach were used because they eventually aid the researcher to make judgement about the effectiveness, relevance or desirability of the variables.

3.2 Profile of the Study Area

The Upper West Region, is situated in the north-western part of Ghana and lies between longitude 1° 25'' W and 2° 45'' and latitudes 9° 30'' N and 11°N (Refer Figure 1). It is bordered to the south by the Northern region, to the north and West by Burkina Faso and to the east by the Upper East region. With an area of 18,476 km², the region's population density stands at 40 persons per square kilometre. The study will be conducted

in the Wa municipality of the Upper West Region of Ghana. This Municipality is conveniently selected to allow the researcher obtain a representative data since it contains a larger proportion of the Hospitality industries in the Wa municipality of the Upper West Region of Ghana.

3.3 Population for the Study

The population comprised eating houses classified as restaurants which will be grouped into two strata; classified hotels and formal restaurants. This will be structured with a separate kitchen and dining place for serving meals within the municipality, the population for the study was 250, comprising cooks and restaurant operators in the selected hospitality industries in the Wa municipality of the Upper West Region of Ghana.

3.4 Sampling Technique and Sampling Size

Systematic random sampling method was used to select the primary study units i.e. food establishments and simple random technique or lottery method was employed to reach the secondary study units i.e. food handlers. A total of 150 cooks and restaurant operators were sampled for the study.

3.5 Instrument for Data Collection

Questionnaire is the main instrument of data collection which was self-administered. Face-to-face interview was conducted with the functional heads and the lower level employees as well as auxiliary staff using a semi-structured questionnaire with both closed and open-ended questions. Data were collected by face to face interview

and observation by using standardized questionnaire and observational check lists. The questionnaire consisted of three sections. The first section dealt with general information such type of establishment, license statues, age, educational qualifications and other demographic information. Section two contained questions that assessed the knowledge and practice of food safety management systems in the restaurants. Section three examined food safety control measures applied in restaurants in Wa municipal. Section four identified the major problems facing the restaurants with regards to food safety and section five assessed the requirements of food safety in the restaurants.

3.6 Pilot Testing

The researcher conducted a pilot study to assess the authenticity of the research instruments. The pilot questionnaires were given to 10 people (2 hotel managers and 8 customers) to answer to correct errors like repetition of questions and typographical mistakes and the avoidance of double questions.

3.7 Ethical Consideration

The researcher followed and maintained relevant ethical issues. All ethical issues were followed and maintained by the researcher include- honesty, integrity, acknowledgment, confidentiality, objectivity and fairness. The researcher has acknowledged all previous works that have been used in this research report. In similar ways, the researcher followed and maintained other relevant ethical during the collection of primary and secondary data and information from the parties involved in this study.

3.8 Data Analysis

Most of the data obtained from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS) version 18. Plausible checks were conducted and inconsistent data will be cleared appropriately. Statistical tests were run. Data was represented in tabular and graphical forms for better and explanation and understanding.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Demographic Data of the Respondents

Demographics defines data about the biological characteristics of a population. In the current study, demographic data was collected on gender, age and level of education of respondents.

Figure 4.1 shows the gender distribution of the respondents

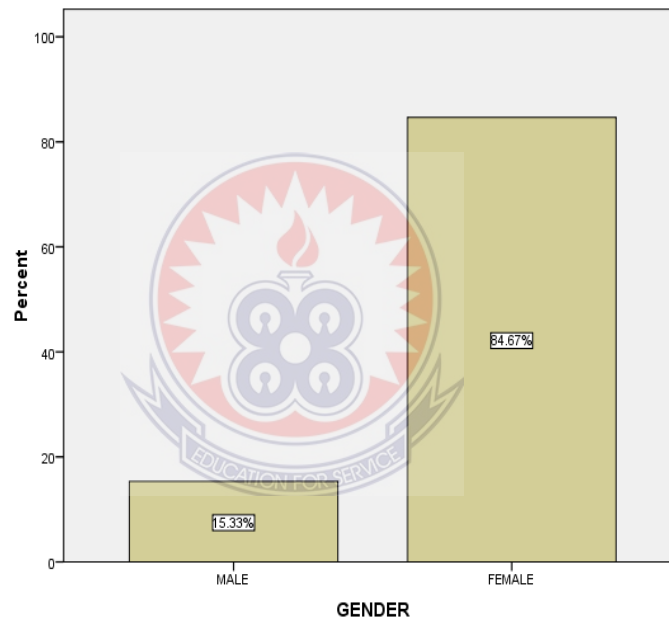


Figure 4.1: Gender distribution of the Respondents

The results indicates that majority, 84.7% of the respondents were females and 15.3% were males. The study concluded that female respondents dominated the sample for the study. A study by deWit and Kampelmacher (2004), over the past quarter century indicated that, women have joined the labor market in increasing numbers, partially closing the gender participation gap. Between 1980 and 2009, the global rate of female

labor force participation rose from 50.2% to 51.8%, while the male rate fell from 82.0 percent to 77.7 percent. Table 4.1 shows the age of respondents.

Table 4.1: Age of the Respondents

Age	Frequency (N)	Percent (%)
19-29 YEARS	35	23.3
30-39 YEARS	36	24.0
40-49 YEARS	29	19.3
50-59 YEARS	30	20.0
60-69 YEARS	20	13.3
Total	150	100.0

The results show that, 24% of the respondents were between the ages 30-39 years, 23.3% were between the ages 19-29 years, 20% were between the ages 50-59 years, 19.3% were between the ages 40-49 years and 13.3% were between the ages 60-69 years. The finding agrees with Lydecker, (2013), who asserts that, service has become an international business as a result of globalization and urbanization. Table 4.2 shows the educational background of respondents.

Table 4.2: Educational Background of the Respondents

Educational background	Frequency	Percent
	(N)	(%)
NO FORMAL EDUCATION	43	28.7
JHS	49	32.7
SHS	13	8.7
HND	32	21.3
DEGREE	13	8.7
Total	150	100.0

The results depicts that 32.7% of the respondents had JHS as their highest qualification, 28.7% never had any formal education, 21.3% had diploma and 8.7% had SSSCE/WASSCE and Bachelor's degrees respectively. This agrees with Holdt, (2012), who established that selling of food does not require any special qualification and that it is mainly an informal profession hence majority of the respondents having a maximum of JHS education or none. Through educating foodservice employees about food safety, at least a common framework of food safety protocol will be established. Training and certification, along with other food safety activities, have the potential for improving foodservice operation sanitation. According to Custer (2009) the steps to improving food safety, such as training programs, may initially cost money but the benefits should outweigh the costs.

4.1 The Knowledge and Practice of Food Safety Management Systems

Table 4.3 shows the knowledge and practice of food safety management systems.

It is important for food vendors to acquire knowledge regarding the safe food practices and how food contamination affects consumer's health.

Table 4.3: The Knowledge and Practice of Food Safety Measures

The knowledge and practice of food safety management systems	1 No. (%)	2 No. (%)	3 No. (%)	4 No. (%)	5 No. (%)	Total No. (%)
Cooks use disposable tissues	44 (29.3%)	98 (65.3%)	0 (0%)	3 (2%)	5 (3.3%)	150 (100%)
Cooks wear clean and proper uniforms	18 (12%)	124 (82.7%)	0 (0%)	5 (3.3%)	3 (2%)	150 (100%)
Handwashing reminder signs are posted	80 (53.3%)	60 (40%)	0 (0%)	6 (4%)	4 (2.7%)	150 (100%)
Personal hygiene practices are properly adhered to	16 (10.7%)	124 (82.7%)	0 (0%)	6 (4%)	4 (2.7%)	150 (100%)
Employees toilet are operational and clean	13 (8.7%)	128 (85.3%)	0 (0%)	5 (3.3%)	4 (2.7%)	150 (100%)
Hands are washed properly and frequently	43 (28.7%)	97 (64.7%)	0 (0%)	7 (4.7%)	3 (%)	150 (100%)
Cooks appear in good health	48 (32%)	82 (54.7%)	0 (0%)	16 (10.7%)	4 (2.7%)	150 (100%)
Restaurant operators are required wash their hands properly and frequently to avoid food contamination	7 (4.7%)	119 (79.3%)	0 (0%)	16 (10.7%)	8 (5.3%)	150 (100%)
Restaurant operators are required to wear clean and proper uniforms	14 (9.3%)	104 (69.3%)	0 (0%)	24 (16%)	8 (5.3%)	150 (100%)
Restaurant operators are required to provide hygienic food to customers	10 (6.7%)	118 (78.7%)	0 (0%)	17 (11.3%)	5 (3.3%)	150 (100%)
Restaurant operators are required to practice proper Personal hygiene practices to improve food safety and consumers health	15 (10%)	121 (80.7%)	0 (0%)	9 (6%)	5 (3.3%)	150 (100%)

1=Strongly agree, 2=Agree, 3=Neutral, 4=Disagree, 5=Strongly disagree

The study revealed that 94% of the respondents agreed that employees toilet are operational and clean to ensure cleanliness and personal hygiene while 6% disagreed. The Centers for Disease Control (CDC) has identified five risk factors related to the human factor and preparation methods that contribute to the high prevalence of foodborne illness. These are improper holding temperatures, inadequate cooking, contaminated equipment, food from an unsafe source and poor personal hygiene (Incidence of Foodborne Illness, 2010).

The study shows that 93.4% of the respondents agreed that personal hygiene practices are properly adhered to, in order to improve the quality of the food while 6.7% disagreed. The WHO has developed the five keys to safer foods, a tool to enhance food safety behaviours that if followed, or adopted, can reduce foodborne illness occurrence. The five keys are specific behaviours each linked to these five risk factors that will likely reduce foodborne illness. The 5 Keys to Safer Foods are: keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperature, use safe water and raw materials (WHO, 2007). There is, however, lack of documented evidence of improvements in food hygiene standards which can be directly related to education or training (Rennie, 1994).

The study results revealed that 93.3% of the respondents agreed that handwashing signs are posted to enhance consumer safety while 6.7% disagreed. The study further shows that 94.7% of the respondents agreed that in order to ensure consumer safety cooks wear clean and proper uniforms while 5.3% disagreed. Table 4.3 shows that 94.6% of the respondents agreed that to ensure food safety cooks must use disposable tissues while 5.4% disagreed. From the results, the respondents practice fairly good hygiene practices and this must account for the low incidence of epidemics in the Wa

Municipality. Also, based on the results, the restaurants are practicing the pre-requisite program for a successful quality management system like HACCP to be implemented.

The results of the study indicates that 93.4% of the respondents agreed that to ensure food safety cooks must wash their hands properly and frequently and 6.6% disagreed. A study by deWit and Kampelmacher (2004) found that 60% of foodservice employees did not wash their hands after using the toilet. Another study conducted by Ecolab (2006) in which hand washing practices of employees at a managed care facility. Although hand washing is a simple task, motivating foodservice employees to properly wash their hands is challenging for several reasons. "Good personal hygiene is not learned at an early age, most hand washing is not adequately performed, and hands are easily re-contaminated." Some steps to help motivate foodservice employees to correctly wash their hands are to "teach them the how and why of hand washing, identify situations where hand washing is necessary, make hand washing easy, and monitor their hand washing practices" (Lydecker, 2013).

The results demonstrated that 86.7% of 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 while 13.3% disagreed. This agrees with Metts & Rodman, (1993), the evidence linking the training of foodservice personnel in food safety to improved sanitation scores and food safety compliance is tenuous. However, despite the increased knowledge, evidence of consequential improved food handling behaviour was not clearly demonstrable (Rennie, 1994). Regulatory agencies utilize inspections and education of food handlers as two methods of ensuring food safety in the formal sector. The effectiveness of food handler education and inspections in ensuring food safety has,

however been questioned owing to the variation in implementation of these two measures in the United States of America (Ribem, Mathias, Wiens, Cocksedge, Hazelwood, Kirchener & Pelton, 1998).

The study shows that 85.4% of the respondents agreed that restaurant operators are required to provide hygienic food to customers while 14.6% disagreed. The study depicts that 78.6% of the respondents agreed that restaurant operators are required to wear clean and proper uniforms while 21.4% disagreed. Table 4.6 shows that 84% of the respondents agreed that restaurant operators are required wash their hands properly and frequently to avoid food contamination while 16% disagreed. The knowledge and attitudes of foodservice employees towards food safety is critical to a successful food safety program. According to Howes, McEwen, Griffith, & Harris (2006) attitudes, knowledge, and monitoring are important factors for decreasing foodborne illness outbreaks in foodservice. A positive behavior and attitude as well as training in food safety are important for maintaining safe food handling practices (Howes et al., 2006).

The study shows that 90.7% of the respondents agreed that restaurant operators are required practice proper Personal hygiene practices to improve food safety and consumers health while 9.3% disagreed. Green and Frame (2008) conducted a food safety study among nine elementary, middle and, high schools. The study was designed to determine existing food safety knowledge and behaviors of foodservice employees in pre and post-training sessions. Upon completion of the training, there were improvements observed in hand washing before and after eating, but a decline in hand washing after using the bathroom and before starting work. There also were improvements observed in product handling such as washing fruits and vegetables before processing and labeling

and dating stored foods. Further, work surfaces were cleaned more frequently and dishwashing procedures improved.

Table 4.4 Cleanliness and personal hygiene

Cleanliness and personal hygiene	Frequency (N)	Percentage (%)
Extremely undesirable	7	4.7
Somewhat undesirable	7	4.7
Somewhat desirable	86	57.3
Extremely desirable	50	33.3
Total	150	100.0

4.2 Cleanliness and Personal Hygiene

The results of the study demonstrated that the 90.6% of the respondents said that the cleanliness and hygiene of the cooks are desirable and 9.4% said that the cleanliness and hygiene of the cooks are undesirable. Green and Frame (2008) conducted a food safety study among nine elementary, middle and, high schools. The study was designed to determine existing food safety knowledge and behaviors of foodservice employees in pre and post-training sessions. Upon completion of the training, there were improvements observed in hand washing before and after eating, but a decline in hand washing after using the bathroom and before starting work. There also were improvements observed in product handling such as washing fruits and vegetables before processing and labeling and dating stored foods. Further, work surfaces were cleaned more frequently and dishwashing procedures improved. Mukhola (1998) in assessing the factors influencing the safety and quality of street food in a rural area in Limpopo examined the knowledge, attitude and perceptions in both street food vendors and consumers. Her findings

indicated that the majority of street food vendors and consumers had little information regarding the proper preparation and storage of food as well as environmental conditions that may be detrimental to health. Furthermore 64.4% of consumers thought that street food is sold under unacceptable conditions and these needed improvement (Mukhola, 1998).

4.3 Problems Faced by Restaurants Operators with Regards to Food Safety

Table 4.5 indicates the major problems faced by restaurant operators with regards to food safety.

Table 4.5: The Major Problems Facing the Restaurants with Regards to Food Safety

The major problems facing the restaurants	1 No. (%)	2 No. (%)	3 No. (%)	4 No. (%)	5 No. (%)	Total No. (%)
Inadequate storage facilities to store the food	37 (24.7%)	99 (66%)	0 (0%)	9 (6%)	5 (3.3%)	150 (100%)
Inadequate authorities to monitor the food preparation and storage process	20 (13.3%)	95 (63.3%)	0 (0%)	19 (12.7%)	16 (10.7%)	150 (100%)
Lack of effective training and development programmes regarding food safety issues	28 (18.7%)	108 (72%)	0 (0%)	10 (6.7%)	4 (2.7%)	150 (100%)
Poor food sanitation and unhygienic handling of foods in the restaurants,	18 (12%)	124 (82.7%)	0 (0%)	5 (3.3%)	3 (2%)	150 (100%)
Lack of infrastructure- the structures used are not purposely built one, therefore can't guarantee food safety,	80 (53.3%)	60 (40%)	0 (0%)	6 (4%)	4 (2.7%)	150 (100%)
Poor drainage systems	16 (10.7%)	124 (82.7%)	0 (0%)	6 (4%)	4 (2.7%)	150 (100%)
Poor documentation systems-from the raw material to the finish food	13 (8.7%)	128 (85.3%)	0 (0%)	5 (3.3%)	4 (2.7%)	150 (100%)
Lack of professional caterers in the field - unprofessional nature affect food system management systems implementation thereby affecting food safety	43 (28.7%)	97 (64.7%)	0 (0%)	7 (4.7%)	3 (%)	150 (100%)
Poor pest control	130 (86.7%)	15 (10%)	0 (0%)	5 (3.3%)	0 (0%)	150 (100%)

1=Strongly agree, 2=Agree, 3=Neutral, 4=Disagree, 5=Strongly disagree

The study shows that 76.6% of the respondents agreed that inadequate authorities to monitor the food preparation and storage process is a problem facing the restaurant business while 23.4% disagreed. The results show that 90.7% of the respondents agreed that inadequate storage facilities is a major problem facing the industry while 9.3% disagreed. In developing countries like Ghana, it has been suggested that lack of knowledge and skills on the good manufacturing practices (GMPs), have contributed to poor hygienic practices in food service establishments. The paucity of the studies on food safety among academics, in food science, has led to health administrative departments taking the evaluation of food safety and hygienic practices of food establishments (WHO/GoK, 1999).

The study indicates that 90.7% of the respondents agreed that the major problems facing the restaurants with regards to food safety is the Lack of effective training and development programmes regarding food safety issues while 9.3% disagreed. This agrees with King, (2012), the success of a HACCP program is dependent on educating and training restaurant managers and employees on the importance of their role in maintaining food safety. An understanding of the HACCP plan and the prerequisite programs must be established to make HACCP effective. Education of food industry personnel in hygiene matters has been recommended as a means of improving food handling practices, and thus, the safety of food (WHO, 1996; FAO 1997). This is attributed to the fact that human handling errors have been responsible for most outbreaks of food poisoning in developing and developed countries (Clayton, et al, 2002; Todd, et al, 2007).

The study results indicate that 94.7% of the respondents agreed that Poor food sanitation and unhygienic handling of foods in the restaurants is a problem faced by food vendors while 5.3% of the respondents disagreed. Moreover, 93.3% of the respondents agreed that lack of infrastructure- the structures used are not purposely built one, therefore can't guarantee food safety while 6.7% of the respondents disagreed. The study shows that 93.4% of the respondents agreed that poor drainage systems affected food hygiene while 6.6% of the respondents disagreed.

Furthermore, 94% of the respondents agreed that poor documentation systems- from the raw material to the finish food also affected food safety while 6% of the respondents disagreed. The study finding revealed that 93.4% of the respondents agreed that lack of professional caterers in the field - unprofessional conducts affect food system management systems implementation thereby affecting food safety while 6.6% of the respondents disagreed. The study indicates that 96.7% of the respondents affirmed that poor pest control affects food safety while 3.3% disagreed.

For example, the hepatitis A virus can be introduced by unwashed hands of food handlers who are themselves infected. Therefore, good personal hygiene, as well as, sanitary handling practices in the food processing area are essential components of any prevention programmes for food safety (Clayton *et al*, 2002; Todd *et al*, 2007). The Centers for Disease Control (CDC) has identified five risk factors related to the human factor and preparation methods that contribute to the high prevalence of foodborne illness. These are improper holding temperatures, inadequate cooking, contaminated equipment, food from an unsafe source and poor personal hygiene (Incidence of Foodborne Illness, 2010).

The WHO has developed the five keys to safer foods, a tool to enhance food safety behaviours that if followed, or adopted, can reduce foodborne illness occurrence. The five keys are specific behaviours each linked to these five risk factors that will likely reduce foodborne illness. The 5 Keys to Safer Foods are: keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperature, use safe water and raw materials (WHO, 2007). There is, however, lack of documented evidence of improvements in food hygiene standards which can be directly related to education or training (Rennie, 2004).

4.4 The Requirements of Food Safety in the Restaurants

Table 4.6 shows the requirements of food safety in the restaurants

Table 4.6: The Requirements of Food Safety in the Restaurants

The requirements of food safety in the restaurants.	1 No. (%)	2 No. (%)	3 No. (%)	4 No. (%)	5 No. (%)	Total No. (%)
Food premises kept in good condition.	7 (4.7%)	119 (79.3%)	0 (0%)	16 (10.7%)	8 (5.3%)	150 (100%)
Suitable facilities must be provided for cleaning of working utensils and equipment.	10 (6.7%)	118 (78.7%)	0 (0%)	17 (11.3%)	5 (3.3%)	150 (100%)
Regular cleaning of premises	37 (24.7%)	99 (66%)	0 (0%)	9 (6%)	5 (3.3%)	150 (100%)
Adequate storage facilities	20 (13.3%)	95 (63.3%)	0 (0%)	19 (12.7%)	16 (10.7%)	150 (100%)
Temperature abuse controls	28 (18.7%)	108 (72%)	0 (0%)	10 (6.7%)	4 (2.7%)	150 (100%)
Verification of safety of raw materials	18 (12%)	124 (82.7%)	0 (0%)	5 (3.3%)	3 (2%)	150 (100%)
Proper storage for raw materials	80 (53.3%)	60 (40%)	0 (0%)	6 (4%)	4 (2.7%)	150 (100%)
Proper transportation of foods from source to the premises	16 (10.7%)	124 (82.7%)	0 (0%)	6 (4%)	4 (2.7%)	150 (100%)
Proper labeling of food products	13 (8.7%)	128 (85.3%)	0 (0%)	5 (3.3%)	4 (2.7%)	150 (100%)

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

The study shows that 84% of the respondents agreed that all food premises must be kept clean and maintained in good repair and condition to avoid possible contamination of food while 16% of the respondents disagreed. Moreover, 78.6% of the respondents agreed that design should be such as to protect against the accumulation of dirt or any contact with toxic materials, corrosion or pests while 21.4% disagreed. The study holds that 85.4% of the respondents agreed that Suitable facilities must be provided for the cleaning and disinfecting of working utensils and equipment and these must be resistant to corrosion and must be easily cleanable while 14.6% of the respondents disagreed. The study results show that 90.7% of the respondents agreed that Cleaning must be undertaken twice or more time daily working utensils and equipment must be disinfected while 9.3% of the respondents disagreed. The finding of the study revealed that 76.6% of the respondents agreed that there must also be adequate arrangements and/or facilities for the hygienic storage and disposal of hazardous and/or inedible substances and waste (whether liquid or solid) while 23.4% disagreed. Furthermore, 90.7% of the respondents agreed that facilities and/or arrangements for maintaining and monitoring suitable food temperature conditions must be available and foodstuffs must be so placed as to avoid the risk of contamination so far as is reasonably practicable while 9.3% of the respondents disagreed.

The study shows that 94.7% of the respondents agreed that no raw materials or ingredients should be accepted by any food business if they are known to be, contaminated with parasites, pathogenic micro-organisms or toxic while 5.3% of the respondents disagreed. The study finding affirmed that 93.3% of the respondents agreed that raw materials and all ingredients stored in a food business should be kept in

appropriate conditions which are designed to prevent harmful deterioration and protect them from possible contamination while 6.7% of the respondents disagreed. The study indicates that 93.4% of the respondents agreed that foods which are handled, stored, packaged, displayed and transported must be protected against any contamination which is likely to render the food unfit for human consumption while 6.6% of the respondents disagreed. The results revealed that 94% of the respondents agreed that hazardous or inedible substances, including animal feedstuffs, should always be adequately labelled and stored in separate and secure containers while 6% of the respondents disagreed. All food premises must be kept clean and maintained in good repair and condition this is the most basic requirement. This means that the design of such venues must allow adequate maintenance, cleaning and/or disinfection (Foster, 1992). There must be adequate working space to allow for the hygienic performance of all food and beverage operations. Design should be such as to protect against the accumulation of dirt or any contact with toxic materials, corrosion or pests. Suitable facilities must be provided for the cleaning and disinfecting of working utensils and equipment and these must be resistant to corrosion and must be easily cleanable. An adequate supply of hot and cold water must be available. Personal hygiene measures must be enforced (including facilities for the hygienic washing and drying of hands, hygienic sanitary arrangements and changing facilities). All production surfaces must be corrosion resistant, smooth, and washable and made of non-toxic materials. Cleaning must be undertaken twice or more time daily working utensils and equipment must be disinfected. There must also be adequate arrangements and/or facilities for the hygienic storage and disposal of hazardous and/or inedible substances and waste (whether liquid or solid). Facilities and/or arrangements for

maintaining and monitoring suitable food temperature conditions must be available and foodstuffs must be so placed as to avoid the risk of contamination so far as is reasonably practicable.

No raw materials or ingredients should be accepted by any food business if they are known to be, or might possibly be, contaminated with parasites, pathogenic micro-organisms or toxic, decomposed or foreign substances that, after normal sorting and/or preparatory or processing procedures hygienically applied by food businesses, they would still be unfit for human consumption. In addition, raw materials and all ingredients stored in a food business should be kept in appropriate conditions which are designed to prevent harmful deterioration and protect them from possible contamination. Foods which are handled, stored, packaged, displayed and transported must be protected against any contamination which is likely to render the food unfit for human consumption. All raw materials, any ingredients, intermediate products and cooked meals that are likely to support the development of pathogenic microorganisms or the formation of toxins must be kept at temperatures which will not result in a health risk. Any processed foodstuffs must have suitable rooms large enough for the separate storage of raw materials from processed material, with sufficient separate refrigerated storage to prevent contamination. Where foodstuffs are to be held or served at chilled temperatures they must be cooled as quickly as possible following the heat processing stage.

Any thawing of foodstuffs shall be undertaken in such a way as to minimise the risk of development of pathogenic micro-organisms or the formation of toxins in the foods. During thawing foods must be subjected to temperatures which would not result in a risk to health. Where run-off liquid from the thawing process may present a risk to

health it must be adequately drained. Following thawing, food must be handled in such a manner as to minimise the risk of development of pathogenic micro-organisms or the formation of toxins. Hazardous or inedible substances, including animal feedstuffs, should always be adequately labelled and stored in separate and secure containers.



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The chapter contains the summary, conclusions and recommendations. The chapter also provided suggestions for further research.

5.1 Summary

The main purpose of the study was to assess the knowledge and practices of food safety management systems in the hospitality industry with regards to restaurant operations in the Wa municipality. The study used a cross-sectional descriptive survey. Qualitative and quantitative research approach was used. The target population for the study was 250, consisting of cooks and Restaurant operators in the Wa municipality of the Upper West Region of Ghana. Systematic random sampling method was used to select the respondents for the study. A total of about 150 cooks and restaurant operators were sampled for the study. Questionnaire was the main instrument of data collection. Most of the data obtained from the questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS) version 18. Data was presented in tabular and graphical forms for better and explanation and understanding. The key findings of the study were summarized below;

1. The study shows that 93.4% of the respondents agreed that personal hygiene practices are properly adhered to, in order to improve the quality of the food.
2. The study results revealed that 93.3% of the respondents agreed that handwashing signs are posted to enhance consumer safety.

3. The study further shows that 94.7% of the respondents agreed that in order to ensure consumer safety cooks wear clean and proper uniforms and 94.6% of the respondents used disposable tissues.
4. The results of the study indicates that 93.4% of the respondents agreed that to ensure food safety cooks must wash their hands properly and frequently and appear in good health because of possibility of transfer of food borne diseases.
5. The problems facing the restaurants industry are inadequate authorities to monitor the food preparation and storage process, inadequate storage facilities, lack of effective training and development programmes regarding food safety issues, Poor food sanitation and unhygienic handling of foods in the restaurants, lack of infrastructure- the structures used are not purposely built one, therefore can't guarantee food safety and poor drainage systems affected food hygiene.
6. Furthermore, 94% of the respondents agreed that poor documentation systems- from the raw material to the finish food also affected food safety.
7. The study finding revealed that 93.4% of the respondents agreed that lack of professional caterers in the field - unprofessional conducts affect food management systems implementation thereby affecting food safety.
8. The study indicates that 96.7% of the respondents affirmed that poor pest control affects food safety.
9. The requirements of food safety in the restaurants are that all food premises must be kept clean and maintained in good repair and condition to avoid possible contamination of food.

10. The study holds that 85.4% of the respondents agreed that Suitable facilities must be provided for the cleaning and disinfecting of working utensils and equipment.
11. The study results show that 90.7% of the respondents agreed that regular cleaning must be undertaken. Also, 76.6% of the respondents agreed that there must be adequate storage facilities. Furthermore, 90.7% of the respondents agreed that temperature abuse and control monitoring are suitable for food temperature conditions.
12. The study shows that 94.7% of the respondents agreed that verification and safety of raw materials is a requirement for food safety.
13. The study finding affirmed that 93.3% of the respondents agreed that adequate storage facilities are essential for food safety and prevention from possible contamination.
14. The study indicates that 93.4% of the respondents agreed that foods must properly transported from source to the premises. The results revealed that 94% of the respondents agreed that proper labelling of food products can ensure food safety.

5.2 Conclusions

The study concluded that, personal hygiene practices are properly adhered to, in order to improve the quality of the food. Also, to ensure food safety, handwashing signs are posted, cooks wear clean and proper uniforms, cooks washed their hands properly and frequently, cooks appeared in good health. To add more, the study concluded that the efficiency of service, overall quality of the food, healthiness of the food, uniqueness of the food, cleanliness and hygiene of the cooks were desirable. Moreover, the major

problems facing the restaurants with regards to food safety were inadequate authorities to monitor the food preparation and storage process, inadequate storage facilities and lack of effective training and development programmes regarding food safety issues. To add more, the requirements of restaurant operators are to provide hygienic food to customers, wear clean and proper uniforms, washed their hands properly and frequently to avoid food contamination and improve proper personal hygiene practices to enhance food safety and consumers health. Moreover, Poor food sanitation and unhygienic handling of foods in the restaurants, lack of infrastructure- the structures used are not purposely built one, therefore can't guarantee food safety, poor drainage systems affected food hygiene, poor documentation systems-from the raw material to the finish food also affected food safety, lack of professional caterers in the field - unprofessional conducts affect food management systems implementation thereby affecting food safety, poor pest control affects food safety.

Furthermore, the requirements of food safety in the restaurants are, all food premises must be kept clean and maintained in good repair and condition to avoid possible contamination of food, design should be such as to protect against the accumulation of dirt or any contact with toxic materials, corrosion or pests, Suitable facilities must be provided for the cleaning and disinfecting of working utensils and equipment and these must be resistant to corrosion and must be easily cleanable, regular cleaning must be undertaken. Temperature control must be monitored properly, raw materials and all ingredients stored in a food business should be kept in appropriate conditions to prevent harmful deterioration and protect them from possible contamination, and food must be properly labeled.

5.3 Recommendations

According to the key findings and conclusions made, the researcher recommended that;

1. The food management authorities in the Wa Municipality must organise periodic seminars and conferences to improve restaurant operator's knowledge regarding the personal hygiene practices that can improve consumer's health.
2. Restaurant operators in the Wa Municipality should continue to wear clean and proper uniforms, wash their hands properly and frequently, appear in good health to improve the efficiency of service, overall quality of the food, healthiness of the food and uniqueness of the food.
3. Restaurant operators in the Wa Municipality should provide adequate storage facilities to enhance food preservation and safety.
4. There is the need to monitor the food preparation and storage processes of the restaurant operators in the Wa Municipality.
5. The authorities must intensify effective training and development programmes regarding food safety issues to enhance restaurant operators knowledge.
6. All food premises must be kept clean and maintained in good repair and condition to avoid possible contamination of food,
7. Design should be such as to protect against the accumulation of dirt or any contact with toxic materials, corrosion or pests,
8. Suitable facilities must be provided for the cleaning and disinfecting of working utensils and equipment and these must be resistant to corrosion and must be easily cleanable,

9. Cleaning must be undertaken twice or more time daily working utensils and equipment must be disinfected,
10. There must also be adequate arrangements and/or facilities for the hygienic storage and disposal of hazardous and/or inedible substances and waste (whether liquid or solid),
11. Facilities and/or arrangements for maintaining and monitoring suitable food temperature conditions must be available and foodstuffs must be so placed as to avoid the risk of contamination so far as is reasonably practicable,
12. No raw materials or ingredients should be accepted by any food business if they are known to be, contaminated with parasites, pathogenic micro-organisms or toxic, raw materials and all ingredients stored in a food business should be kept in appropriate conditions which are designed to prevent harmful deterioration and protect them from possible contamination,
13. Foods which are handled, stored, packaged, displayed and transported must be protected against any contamination which is likely to render the food unfit for human consumption and hazardous or inedible substances, including animal feedstuffs, should always be adequately labelled and stored in separate and secure containers.

5.4 Suggestions for Further Research

Based on the recommendations made, the researcher suggested that a similar study should be conducted to investigate the impact of training and development programmes on food safety in the Wa Municipality.

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Appendix A

Questionnaire for the Cooks and Restaurant Operators

The researcher is a product of UEW, Kumasi Campus conducting a piece of research to investigate the knowledge and practices of food safety management systems in the restaurant A case study in the Wa Municipality. I respectfully request that you form part of this research by completing the attached questionnaire. It is my fervent hope that you will be exonerated to participate in the study. May I thank you for your valuable cooperation.

Section A: Demographic Information of the Customers

1. Gender: female male

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

3. Education background:

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

Section D: The knowledge and practice of food safety management systems in the restaurants.

Please use the following Likert scale to evaluate the knowledge and practice of food safety management systems in the restaurants.

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

The effectiveness of food safety knowledge and practice	SA	A	U	D	SD
Hands are washed properly and frequently					
Cooks wear clean and proper uniforms					
Cooks use disposable tissues					
Cooks appear in good health					
Handwashing reminder signs are posted					
Employees toilet are operational and clean					
Personal hygiene practices are properly adhered to					

Section B: To examine food safety control measures applied in restaurants in Wa municipal

Please use the following Likert scale to examine food safety control measures applied in restaurants.

1=Extremely undesirable 2= Somewhat undesirable 3=Neutral 4=Somewhat desirable 5=Extremely desirable

Food safety control measures applied in restaurants	1	2	3	4	5
Uniqueness of the food					
Healthiness of the food					
Food presentation					
Overall quality of the food					

Freshness of the food (e.g. raw fish)					
Pleasant attitude of the cooks					
Efficiency of service					
Cleanliness & hygiene					
Variety of menu (e.g. vegetarian menu)					
Value for price					

Section C: Identify the major problems facing the restaurants with regards to food safety.

Please use the following Likert scale to identify the major problems facing the restaurants with regards to food safety.

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

The major problems facing the restaurants	1	2	3	4	5	Total
Inadequate storage facilities to store the food						
inadequate authorities to monitor the food preparation and storage process						
Lack of effective training and development programmes regarding food safety issues						
Poor food sanitation and unhygienic handling of foods in the restaurants,						
Lack of infrastructure- the structures used are not purposely built one, therefore can't						

guarantee food safety,						
Poor drainage systems						
Poor documentation systems-from the raw material to the finish food						
Lack of professional caterers in the field - unprofessional nature affect food system management systems implementation thereby affecting food safety						
Poor pest control						

SECTION D: The requirements of food safety in the restaurants.

Please use the following Likert scale to assess the requirements of food safety in the restaurants.

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

Table 4.6: The requirements of food safety in the restaurants

The requirements of food safety in the restaurants.	1	2	3	4	5	Total No. (%)
All food premises must be kept clean and maintained in good repair and condition.						
Design should be such as to protect against the accumulation of dirt or any contact with toxic materials, corrosion or pests.						
Suitable facilities must be provided for the cleaning and disinfecting of working utensils and equipment and these must be resistant to corrosion and must be easily cleanable.						
An adequate supply of hot and cold water must be available.						
Cleaning must be undertaken twice or more time daily working utensils and equipment must be disinfected.						

There must also be adequate arrangements and/or facilities for the hygienic storage and disposal of hazardous and/or inedible substances and waste (whether liquid or solid).						
Facilities and/or arrangements for maintaining and monitoring suitable food temperature conditions must be available and foodstuffs must be so placed as to avoid the risk of contamination so far as is reasonably practicable.						
No raw materials or ingredients should be accepted by any food business if they are known to be, contaminated with parasites, pathogenic micro-organisms or toxic.						
Raw materials and all ingredients stored in a food business should be kept in appropriate conditions which are designed to prevent harmful deterioration and protect them from possible contamination.						
Foods which are handled, stored, packaged, displayed and transported must be protected against any contamination which is likely to render the food unfit for human consumption.						
Hazardous or inedible substances, including animal feedstuffs, should always be adequately labelled and stored in separate and secure containers.						

1=Strongly agree, 2=Agree, 3=Neutral, 4=Disagree, 5=Strongly disagree

Thank you so much for your time and cooperation!

Appendix B: Interview Guide for the Restaurant Managers

1. What is the level knowledge with regards to implementation food safety managements systems in hospitality industry?

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2. What are the major problems facing the hospitality industries with regards to food safety?

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3. What are the requirements of food safety in the hospitality industries with regards to restaurants operations?

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