

UNIVERSITY OF EDUCATION, WINNEBA

**HYGIENE PRACTICES OF HOTEL RESTAURANTS IN TAMALE
METROPOLIS, GHANA**

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SEPTEMBER, 2022

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METROPOLIS, GHANA**

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A thesis in the Department of Hospitality and Tourism Management, Faculty of
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of the requirements for the award of degree of Master of Philosophy
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SEPTEMBER, 2022

DECLARATION

STUDENT’S DECLARATION

I, MOHAMMED YUSSIF ALHASSAN, declare that this thesis, with the exception of 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 work was supervised in accordance with the guidelines for supervision of thesis/dissertation/project as laid down by the University of Education, Winneba.

DR (MRS) DOREEN DEDO ADI (PRINCIPAL SUPERVISOR)

SIGNATURE:

DATE:

DEDICATION

This work is dedicated to my father.

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ABSTRACT

Hygienic standards of eateries in Ghana are critical issues to stakeholders. Food handling in restaurants that goes contrary to outlined hygienic standards lead to foodborne illnesses. The study investigated hygiene practices in restaurants of hotels in Tamale Metropolis of the Northern Region, Ghana. Purposive Sampling technique was employed to draw 96 restaurant staffs from six (6) hotels in the Tamale Metropolis for the study. Hygienic practices, knowledge on use of restaurant facilities to enhance hygiene in hotel restaurants, comparative analysis of hygienic practices at pre and post certification status and hygienic standards compliance challenges were assessed. Majority of the respondents that participated in the study were in their youthful ages; 20-39 constituted 80% with females being dominant (59%). Descriptive survey design was adopted in analyzing results of the study. Temperature values of foods (2.53) were poorly handled with working surfaces not cleaned as required. The study reveals that HACCP at post certification status had improved from a mean score of (1.25) to (4.34). Inadequate cooking utensils as agreed on mean (4.36), hand gloves worn (2.37) throughout the operations and poor hand washing (2.36) habits were some threats to good hygienic practices. Instituting an award scheme for best hygienic restaurant and availability of resources could help enhance good hygienic practices in hotel restaurants.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Food hygiene basically aims to stop foodborne illnesses brought on by improper food handling. Evidence that food safety has been an international issue includes the hospitalization and occasionally death of restaurant patrons around the world (Meleko et al., 2015).

Foodborne infections affect one in ten individuals worldwide, with developing and low-income nations accounting for the majority of these instances (F. Käferstein & Abdussalam, 1999; Stratev et al., 2017). One of the main pillars of Ghana's economy is the country's hospitality sector (Odonkor & Odonkor, 2020). It has accommodations, dining options, historical castles and forts, as well as game reserves. The variety of dining services that these tourist locations provide is one of their standout qualities. Foodborne illnesses impact 1 out of 40 or more persons, according to estimates (Ababio & Lovatt, 2015a; Lagerkvist et al., 2018).

Furthermore, formal reports or research to track its execution seem to be hard to come by ever since the national food safety policy was adopted the Food and Drugs Authority in 2015. Additionally, the focus of several related research is limited to certain food establishments, scarcely highlighting the hygienic standards of hotel restaurants in the hospitality sector. For instance, several studies (AOVARE et al., 2022; Odonkor & Odonkor, 2020) mostly concentrated on street food vendors, which make up a tiny portion of the numerous food industries that support the hospitality business. In Tamale Metropolis,

hospitality business now has a significant deficit in food safety practice and certification studies. The present study will fill this gap. as

1.2 Problem Statement

Due to the prevalence of preventable foodborne illness in developing nations (Gemedo et al., 2018) as well as the poor personal hygiene of food handlers (Worsley & Lea, 2008), food poisoning has caused significant financial losses to the state (Lagerkvist et al., 2018).

Researchers in Ghana have become interested in related topics. In the Ghanaian hospitality sector, (Odonkor & Odonkor, 2020) investigated knowledge and hygienic practices related to food service of chop bars and food vendors in Cape Coast. The survey did not examine the hygienic standards in hotel eateries. There has been no investigation into the hygiene standards used in hotel restaurants in Tamale Metropolis. Their hygienic standards are not independently accessed and communicated to potential clients. Therefore, this study looks on the hygienic standards of hotel restaurants in Tamale Metropolis.

1.3 General objective

The general objective of this study is to investigate hygiene practices in selected restaurants of hotels in Tamale Metropolis with regards to its hospitality industry.

1.4 Specific Objectives

1. To assess hygienic practices of Hotel Restaurants' staff.
2. To evaluate staff knowledge and utilization of restaurant facilities to maintain hygiene practices in Hotel Restaurants.
3. To compare hygienic hygiene practices at pre and post certification status.
4. To examine the challenges of hotel restaurants compliance with hygiene.

1.5 Significance of the Study

By assessing the existing hygienic methods used by food handlers in urban restaurants, the study intends to contribute to a growing field of study. This initiative offers a significant chance to apply hygienic concepts in hotel eateries. The Tamale Metropolis restaurant inspectorate will use the document on cleanliness procedures at pre- and post-grading as a resource and a manual.

It provides a solid foundation of knowledge for learning about and comprehending the significance of sanitary practices and sanitation procedures in the food service sector.

This study will produce an effective and trustworthy source of knowledge that will aid students in developing a better understanding of the significance of sanitation and hygienic procedures in a food service industry.

Information from this study will help people understand food safety, sanitation, and hygiene better. In order to prevent food contamination, food spoilage, and food poisoning, school administrators of boarding schools and overall institutions may learn more about sanitary practices and sanitation rules.

It will educate managers of food service operations on how to maintain hygienic conditions in any facility that provides food service. The management of the food service has a duty to protect the health of the patrons and the workers. Staff employees need to be instructed in proper sanitation and hygiene procedures. Food safety greatly depends on a person's personal hygiene and living arrangements.

It provides a foundation for undertaking additional research in relation to this topic, and more significantly, it will instruct those employed in the food service sector on how to be accountable for their job as they serve customers and contribute to food safety.

1.6 Scope of the Study/delimitations

Geographically, the study was carried out in Ghana's Northern Region, in the Tamale Metropolis. The study, which was theoretically conducted in Tamale Metropolis in the Northern Region of Ghana's hospitality business, looked into sanitary practices in a few hotel restaurants. It evaluated the hotel restaurants' knowledge of hygiene standards in Tamale Metropolis. It also looked at the restaurant equipment that helps Tamale Metropolis hotel restaurants' staff members practice good hygiene. It once more assessed how restaurant amenities connect to the hygienic standards followed by hotels' restaurants in Tamale Metropolis. In the end, it evaluated the degree of variation in cleanliness standards between hotel restaurants in Tamale Metropolis at both the pre- and post-grading stage.

1.7 Organization of the Study

There are five chapters in the thesis. The study's history was covered in Chapter 1 of the book. The second chapter examined a survey of the relevant literature on numerous major ideas and theories. The methodological approach and research design are covered in Chapter 3. The results of the data analysis are discussed in Chapter 4. The main overview of the findings, the conclusion, and the recommendation were covered in Chapter 5.

1.8 Operational Terms

Control: To control an operation's environment in order to ensure compliance with predetermined criteria or the circumstance where the right processes and standards are complied with.

Critical control point: A critical stage in a process that can be controlled in order to avert, eliminate, or minimize a risk to acceptable levels for food safety.

Good hygiene practices: In the food chain, this refers to all procedures pertaining to the circumstances and steps required to provide assurance of the appropriateness and safety of food at all points.

Hazard: A physical, chemical, biological or agent that, when used in the method and quantity suggested, is fairly anticipated to result in disease or harm.

HACCP: Using a systemic manner, Hazard Analyses Critical Control Point identifies, assesses, and manages risks associated with the safety of food served.

Food-service establishment: Establishments that prepare and serve food to clients or customers, as well as other consumable products.

Hazard analysis: The procedure of gathering and analyzing data on potential food risks to determine which ones are important enough to have an impact on food safety.

Restaurant: A restaurant that has been authorized by the Ghanaian Food and Drugs Authority.

Risk: It is the measure of how likely and severe it is that exposure to a risk will have a negative impact on the consumer's health.

Sanitation: It involves creating and maintaining a sanitary and healthy environment as it relates to the food industry.

Severity: The gravity of a hazard's effect or effects.

Prerequisite programs: The HACCP system is built on procedures, including GMPs, that address operating conditions.

Food safety – Assurance of food goods against dangers that, when used in the manner and quantity suggested, could subject the customer to a health issue.

Analyze hazards – There are identified potential risks related to eating and ways to control those risks. It's possible that the dangers are biological, like a bacterium, chemical, like a poison, or physical, like pulverized glass or metal pieces.

Identify critical control points – The potential hazard can be regulated or removed at these times in the preparation of food, starting from procurement of raw produce and products, then handling and preparation to delivery to customer for consumption, such as during food preparation, refrigeration, metal detection, and packaging.

For each control point, create procedures that prevent risks establishing critical thresholds– This will involve determining the least possible temperature and duration for food preparation necessary to guarantee the eradication of any hazardous bacteria inside cooked food.

Create methods of monitoring the critical control points – It can be done, among other methods, by way of assigning personnel to monitor temperature and duration for food preparation.

Create corrective actions – these are actions that are employed to be taken when the food prepared is lacking in a critical parameter observed after monitoring. Disposal of such foods is an example of a corrective action.

Create methods that can test the effectiveness of the system. An example of such is by the testing devices that measure time and temperature of food preparation in a cooking unit.

Create an efficient system of keeping records that documents the HACCP system – observing safety requirements, identification, recording and control methods of hazards, and actions used to prevent hazards from occurring again.

HACCP monitors restaurant food flow. This includes the following stages:

Delivery of products – Products delivered ought to be in acceptable form. Products that need to be delivered cold (-18 °C) must be. Dry items must be undamaged and must be at 4.4 °C. Examine the expiration dates and reject any products that don't adhere to these requirements.

The Storage of products – Remember to rotate and FIFO rule. Frozen items must be kept at -18 °C with appropriate space for circulation while refrigerated goods should be kept below 4.4 °C.

Food Preparation – Utilize sterilized and spotless tools and equipment. All frozen items should be thawed in the fridge and kept cool until you are ready to use them. All hot dishes must be swiftly prepared, brought to the proper temperature of 73.9 °C, and maintained at 60.8 °C. Never combine new and old items. All employees must practice good hygiene practices, including thorough hand washing. Just the food you'll consume that day should be prepared, and everything should be given a date.

Serving customers – All staff members must practice excellent personal hygiene due to the risk of disease or illness transmission (Stratev et al., 2017). They must be well-trained in proper hand washing practices, have clean hands, neat uniforms, and styled hair.

CHAPTER TWO

LITERATURE REVIEW

2.1 Definitions and Concepts

2.1.1 The Concept of Food hygiene

The requirements and precautions for certifying the safety of food from manufacturing to consumption are known as food hygiene. At any moment during the process of processing, storing, distributing, transporting, or preparing food, food can get contaminated. Food hygiene is described by the WHO (2012) as the requirements and actions necessary during food production, processing, storage, distribution, and preparation to ensure that it is secure, healthful, and suitable for human consumption. Foodborne infections and consumer death can result from inadequate food hygiene.

According to one definition, food hygiene is a branch of hygienic science that aims to produce food that is safe for consumption, has a good keeping quality, and is devoid of microorganisms (BECKER et al., 2013). The preparation of food to be consumed by the customer with a low probability of getting food-related illness is known as food hygiene. By following decent hygiene procedures in the process of food preparation and delivery, this was to be accomplished. In addition, it involved keeping an atmosphere free from pest infestation and washing dishes, work surfaces, and correct trash disposal techniques. According to (Ababio & Lovatt, 2015b) adequate separation of raw and cooked foods as well as the cleanliness of the facility are all aspects of food hygiene.

In order to safeguard food safety for consumption by customers, certain conditions and actions must be taken during food preparation and delivery. The food produced must be safe

for consumption as a fundamental requirement of any food processing. Food safety is a fundamental requirement, but there is a chance that it could be neglected in the creation of effective and efficient processes. With outbreaks of foodborne illness costing people, the food industry, and the economy significantly, food safety is still a major concern (F. K. Käferstein et al., 1997). Food safety refers to every action and condition required to preserve the quality of food and avert illnesses due to consumption. The primary goals of heating food were to make it easy to consume and digest, tasty, and microorganism-free. Additionally, well-cooked food tends to raise expectations for the restaurant and encourage return business.

As shown in Figure 1, cross-contamination between humans, dogs, cats, and other animals, as well as flies, cockroaches, and other insects, was the main way that food was likely to get contaminated. This was especially true if environmental hygiene was reduced. Contamination has also been linked to subpar fruit and vegetable transportation in unsuitable containers that weren't kept clean. Furthermore, it was thought that keeping proteins at a temperature danger zone posed a significant risk of contamination. Food contamination was significantly influenced by surfaces that came into touch with food, such as work tables, as well as by the instruments and equipment used in food preparation (Clayton & Griffith, 2004).

Food hygiene was essential in lowering contamination, which in turn assisted in lowering illness, in addition to personal and environmental cleanliness. In areas where fertilizers were used in the farm which were thought to be contamination-free, raw materials from these sources were still advised to be kept clean at all times. It was necessary to use dependable water sources for irrigation. Food should be cooked just before eating and served hot or cold,

respectively, according to the (Organization, 2001) . Additionally, fruits and vegetables should be well washed before eating or cooking, especially for salads, according to (Organization, 2001). It was further advised that tools, utensils and surfaces need to be kept in good sanitary conditions in order to decrease the amount of bacteria present. Also, covering food would protect it from insects like flies and cockroaches.

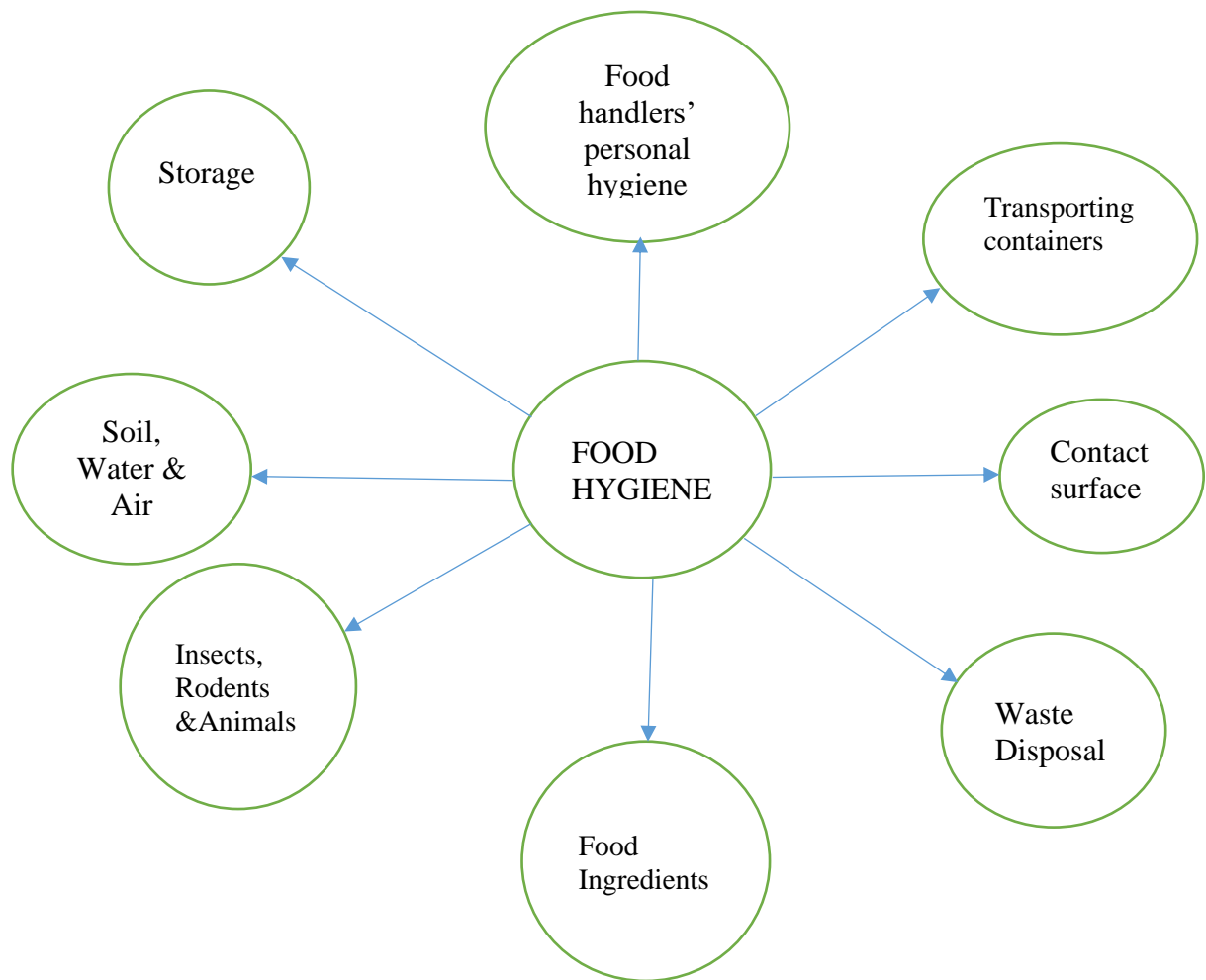


Figure 2.1: Food Hygiene Circle

Source: Adopted from (Muinde & Kuria, 2005).

2.1.2 Food Handlers' Hygiene Practices

Food handlers are individuals who are involved in the preparation, processing, or manufacture of food ((Isara & Isah, 2009). Thus, personal hygiene and cleanliness among food workers are crucial to reducing the probability of triggering food poisoning in customers due to food contamination. Those who handle food must take great care to handle health-related issues like diseases and limit their interaction with raw and ready-to-eat food (Ratnapradipa et al., 2011a). Food handlers have the ability to spread viruses and bacteria on the surfaces used in preparing food or the food itself. This can be prevented with the practice of good hygiene procedures while preparing raw and consumable food materials to provide quality and safe food, otherwise this could lead to food contamination and poisoning (Fisher et al., 2002).

One of the biggest risk factors for the occurrence of food borne illnesses was found to be poor personal cleanliness (Muinde & Kuria, 2005). Customers are hesitant to use businesses that present a low level of hygiene out of concern about potential food borne illnesses. According to the research, food workers' awareness and knowledge of the need for proper personal hygiene are crucial in averting contamination of food. Researchers have examined the effects of the practices used in preparing food by workers and have detected some impediments. The majority of the factors and obstacles are behavior-related, like routine washing of hands, poor usage of specific tools, and disregard for educative materials made available by companies (Miller & Brewer, 2003). The factors influencing food handlers' safe food handling practices, according to (Meyer et al., 2013), are multifaceted and go beyond food safety awareness. According to (Chapman et al., 2011) organizational characteristics can affect how food handlers behave in terms of food safety.

Effective food hygiene and safety measures can be improved with knowledge of organizational aspects including workplace culture. It helps to reinforce the beneficial effects of customer-contact workers, who are continually dealing with clients and influencing the quality of the service. Food handlers should dress neatly and appropriately, practice hand washing carefully with water and soap during the processes of handling food, after handling animals, unsanitary items, raw food, using the restroom, and after holding dangerous and toxic items, according to (Chung & Chen, 2011). Short fingernails, neat, covered hair, clean skin, and non-infected cuts entirely covered by a waterproof covering are all necessary. Smoking, chewing gum, cleaning one's ears, nose, while preparing or serving meals are all unsanitary habits. Environmental hygiene is ensured via clean areas, hygienic utensils, correct disposal of solid and liquid waste, and clean establishments for the sale of food (Meyer et al., 2013). According to a study by (Worsley & Lea, 2008), men and women with lower levels of education were more likely to have higher levels of food safety concern. This finding goes against the traditional idea that gender and educational level have an effect on cleanliness. Socioeconomic status is somewhat indexed by an individual's level of education (SES). Prior research has shown that less educated men and women were more concerned about the majority of food and health-related issues, which supports the findings of (Worsley & Lea, 2008) People with lower SES may be more concerned about food and health issues since they may lack social support and resources for their health, as well as feel more helpless.

Once more, (Ababio & Lovatt, 2015) research on the impact of education on food handlers' hygiene practices in Ghana indicated that respondents' education levels had an impact on respondents' hygiene practices. To help reduce food contamination during preparation of

food and delivery, it is advised to wear protective clothes (aprons, hand gloves, and hairnets). A bigger percentage of respondents—across all levels—used aprons as a single piece of clothing, while the percentages fell with increasing levels of education. Without the use of protective garments while serving food, both the population and educational level increased.

2.1.3 Food Hygiene Knowledge and Training

The most important factors affecting food safety, according to (G.-I. Lee et al., 2012) are kitchen sanitation, the temperature at which food is stored, and its quality. According to the study mentioned above, customers typically utilize these variables to gauge the safety and cleanliness of the food made and delivered at restaurants. The ability of those who handle food to ensure that the food provided by the establishments is fit for eating depends on their awareness of safety and hygiene issues. According to (Seaman & Eves, 2006), different food outlets have diverse food hygiene practices and processes that are also perceived differently by different customers.

A system of management known as HACCP used to address the safety of food by hazard analysis and control in all stages of the food flow in order to ensure the preparation of clean and safe food was suggested by the study as a way to harmonize the differences (Hald et al., 2016). According to W. J. Lee & Lucey, (2010), customers frequented restaurants that train their staff on food safety and hygiene more often than those that do not. The cleanliness level of the food outlets was seen to have improved as a result such measures, especially those training on decent behavior in handling food.

The evaluation, management, and measurement of trainee performance were the three parts of the model. The study found that in establishments with established training programs,

knowledge retention on new food safety practices was high. Additionally, these restaurants experienced significant levels of consumer traffic throughout the entire year as a result of favorable word of mouth and better ambiance and decor. Every worker working in the food service industry is responsible for maintaining food safety.

(AO et al., n.d.) noted that common food handling errors, in addition to providing contaminated raw food, also include eating food that has been consumed from hazardous sources, improper food cooling, and excessively long duration after food preparation. Food poisoning could result from those mistakes. There is a need for food handlers to be trained and educated on hygienic procedures regarding microbiological food dangers, refrigerator temperature ranges, cross contamination, and personal cleanliness, according to numerous studies (Wilfred & Fairoze, 2011). It was linked to the point that many personnel who handle food, particularly those employed in native cuisine establishments, lack operational training.

However, several earlier research found no differences between employees who took educational courses and those who did not between the two groups of personnel (Akbar & Alaudeen, 2012). Research by (McConnon et al., 2012) that suggest training may enhance a person's likelihood of having a favorable or unfavorable judgment of behavior are used to support this assertion. People who believe that handling and preparing food in a hygienic manner is vital and required are more likely to engage in the practice. According to (Wilfred & Fairoze, 2011) maintaining safe food handling techniques is correlated with food handlers' positive behavior, attitudes, and ongoing education.

2.1.4 Food contamination during food processing

Contamination is the presence of unwelcome substances like dust and particles during the manufacturing and transportation processes. Any undesired material identified in the product is referred to as a "contaminant." The quality of the product or the process is impacted by these pollutants. It has been established that customers are more concerned about food contamination, whether it is caused by microorganisms or chemicals. As effective instruments for food analysis, sample treatment devices such as micro extraction methods that may eliminate matrix interferences and concentrate the analyses from the sample have been created and proposed. It's crucial to know what contaminants are most likely to be present at each stage of the food processing process. The primary pollutants in each phase are described in the paragraphs that follow, along with methods for preventing or reducing their presence in food. The origin of the pollutants in the finished food must be determined using this information.

2.1.5 External raw food contamination

Contaminants in food can be brought on by industrial development, improvements in pesticide use, or urban activity. The usage of fertilizers and pesticides is a key area of concern for food contamination because ingesting these substances can have negative health effects. According to several research, fruits and vegetables contain pesticide residues (Kobayashi et al., 2011), as well as some derivatives that have negative consequences. For example, metabolites from organochlorine pesticides have been discovered in fatty foods (Chung & Chen, 2011). According to ([ATSDR] Agency for Toxic Substances and Disease Registry, 2011), harmful heavy metals like cadmium, lead, mercury, and arsenic can be found in air, soil, and water (Żukowska & Biziuk, 2008), which means they can contaminate food. Heavy

metals have been analyzed in a variety of foods, including honey, spinach, potatoes, salmon, and tea. Flame atomic absorption spectrometry (FAAS), graphite furnace atomic absorption spectrometry (GFAAS), cold vapor atomic absorption spectrometry (CVAAS), inductively coupled plasma atomic emission spectrometry (ICP-AES), and inductively coupled plasma mass spectrometry are the principal methods used for heavy metal analysis (ICP-MS). Several techniques, including the microbial inhibition plate test (Koenen-Dierick et al., 1995) and liquid chromatography approaches, have been developed to identify antibiotic residues in foods such milk, meat, eggs, and dairy products (Freitas et al., 2014).

2.1.6 Contamination during food transport

Additionally, food contamination can happen while being transported. It may result from gasoline and diesel exhaust from vehicles or through cross-contamination in a vehicle used to deliver food. A substantial risk to the safety of food can be created by this cross-contamination. A serious sickness that affected the European Economic Community in 1999 was linked to the use of fungicide-contaminated pallets for the storage and transportation of food packaging materials. Cross contamination from disinfection chemicals or from other sources has also frequently harmed long-distance transport ships (Nerín et al., 2007). A good example of the contamination of food by the permeability of naphthalene, methyl bromide, toluene, ethyl benzene, and ortho par a xylene via a hypothetical high barrier material is the study conducted by (Nerín et al., 2007).

2.1.7 Contamination caused by cleaning processes

Cleaning and disinfection are essential to reducing food contamination because they get rid of any potential bacteria throughout the food preparation process. Cleaners and disinfectants must be safe for surfaces that come into touch with food and must be approved by law. It is

not advisable to use products like glass cleansers or other metal cleaners because they could leave behind dangerous residues. Quantifying the residual chemicals present in the food is crucial in order to confirm that they have been completely removed because the addition of sanitizers in quantities far above permitted levels could still leave some residual concentration on treated materials or food, even in minimally processed fruits and vegetables. Common surfactants include nonionic surfactants like stearyl alcohol ethoxylate and quaternary ammonium compounds like dodecyl-trimethyl-ammonium chloride. factors affecting its removal from various materials surfaces, such as the length of the rinse cycle or the temperature of the water (Odonkor & Odonkor, 2020). Liquid chromatography mass spectrometry is frequently used to investigate these chemicals (Vidal et al., 2004). Numerous writers have noted issues with residues left behind after using cleaning agents and disinfectants on the surfaces of food handling equipment and their ability to transfer to food that has come into contact with those surfaces (Freitas et al., 2014).

2.1.8 Food packaging

Food packaging has various benefits, including barrier protection, physical protection, and the ability to better preserve food, which lengthens the product's shelf life. The migration of these compounds from the packaging to the food might result through direct or indirect interaction between the food and the packaging material (Hernandez-Munoz et al., 2002). If they have a harmful effect, migrants may be hazardous to the health of consumers. The FDA, Europe, Mercosur, Australia, and Euroasia, as well as many other nations, have strong laws to safeguard consumers and prevent contamination of food that comes into touch with materials and objects. The framework Regulation (EC) No 1935/2004, (2004) on materials and products designed to come into contact with food (McConnon et al., 2012) and the

Commission Regulation (EC) No 2023/2006, (2006) on good manufacturing practice must be followed by food packaging materials in Europe (G.-I. Lee et al., 2012). Changing from plastic food contact materials requires compliance with (Commission Regulation (EC) No 2023/2006, (2006) Any substance that has a molecular weight less than 1000 amu can migrate through polymeric or paper layers, reach food, and disintegrate there. When metallic cans are used to package food, corrosion in the can's metallic surface could result in the migration of metallic ions, like iron or tin, into the food (Buculei et al., 2012). Small amounts of epoxy resin manufacturing byproducts, including cyclo-di-BADGE, bisphenol A, and BADGE diglycidyl ether, can contaminate food (Cabado et al., 2008). Glass is another material that is frequently used in the packaging of sauces, vegetables, beans, and jams. In this instance, migration is caused by the metallic lids that are used to seal the glass jars. Epoxidized soybean oil (ESBO) is one of the chemicals used in PVC as a plasticizer, and various authors have claimed that it can migrate into food (Wilfred & Fairuze, 2011). Packaging materials like paper and board are frequently used for products like rice, cereal, frozen meals, or dry foods like flour or sugar. Foodstuffs may migrate from additives in paperboard or printing inks. The usage of recycled materials, including the most recyclable packaging material, might result in food contamination from chemicals such mineral oils or plasticizers that come from printing inks or adhesives (Nerín et al., 2007). Polyethylene (PE), high density polyethylene (HDPE), polyethylene terephthalate (PET), polyvinyl chloride (PVC), polystyrene (PS), and polycarbonate are typical polymers used in food packaging materials (PC). In particular, migration of photo initiators like benzophenone (BP) and 2-isopropylthioxanthone (ITX) emanating from UV curable inks has been extensively researched (Sanches-Silva et al., 2009). More recently, set-off transference has been

observed to cause migration from parts derived from printing inks. Recycled plastic materials are particularly relevant because they could contain chemicals from previously packaged food, substances from customer misuse of the packaging, or inadvertent contamination from the recycling process (chemical additions)(Hernandez-Munoz et al., 2002). Non-intentionally added substances (NIAS), which are compounds that are purposely added to food packaging materials, can potentially migrate to food and have negative consequences. High temperatures or high irradiation energies that are used in the production of polymers can lead to degradation processes in the polymer itself as well as in polymer additives (Burman et al., 2005). Impurities in the raw materials might also cause NIAS.

2.1.9 Contamination during food storage

Key factors affecting food quality and safety are the circumstances of food storage. The shelf life of food is dependent on the product type, packaging, and storage conditions, especially temperature and humidity. Proper storage increases shelf life. Food storage should not result in organoleptic changes, hence packing materials used for long-term storage should have excellent barrier qualities. Some packaging materials may break down as a result of moisture (e.g., paper degradation and metal rusting). The chilly to moderate range, between 4 and 210C, is the ideal temperature range. The deterioration of the food and the packaging can both be accelerated by direct sunlight. As shown (Nerín et al., 2007), the transmission of chemicals through the packing material will vary depending on the barrier qualities.

2.1.10 Food-Borne Diseases and Microorganisms

Microorganisms were described as microscopic, living things that pervaded the environment. While some were benign, others were virulent and could spread illnesses (CDC, 2008). The diseases were caused by a number of things, including the disregard for

some fundamental food hygiene rules. For instance, FBDs were brought on by microorganisms or poisons that were spread from person to person, between animals and humans, or between humans and animals, as well as through contact with the environment, such as from a person to a surface or piece of equipment. Infections were reported to spread either directly or indirectly through food and/or water, which in most cases served as vectors for the disease. Food poisoning agents were reported to cause contamination at different points along the food chain, including in raw foodstuffs, before harvesting, during slaughter or processing, or as a result of cross contamination by food handlers in the kitchen. CDC, (CDC, 2008) also noted that the primary cause of food-borne disease was consuming food contaminated with bacteria or their toxins (poisons). Four different species of microorganisms have been identified by the CDC (CDC, 2008) as having the potential to contaminate food and result in FBDs. These comprised fungi, bacteria, viruses, and parasites.

According to the National Restaurant Association, (2006), these bacteria needed food, acidity, temperature, time, oxygen, and moisture to flourish (FATTOM). Additionally, it was found that practically all of these come from meals that people eat. According to the (Andaleeb & Conway, 2006) these bacteria needed food, acidity, temperature, time, oxygen, and moisture to flourish (FATTOM). Additionally, it was found that practically all of these come from meals that people eat. According to the National Restaurant Association (Andaleeb & Conway, 2006), these bacteria needed food, acidity, temperature, time, oxygen, and moisture to flourish (FATTOM). Additionally, it was found that practically all of these come from meals that people eat.

Food-borne illnesses were recorded on a daily basis worldwide, in both developed and developing nations, food-borne illnesses were one of the most common issues and the main factor reducing economic productivity (F. Käferstein & Abdussalam, 1999).

The prevalence rate of FBDs caused great alarm because there was no credible information on the size of the issue. FBDs have been on the rise, and even more difficult is the re-emergence of drug-resistant bacteria, which was seen as a major threat to the hospitality industry (Fisher et al., 2002). Salmonella Enterica, Ecoli 0157, and H. Listeria Monocytogenes were three of the eight recognized pathogens that accounted for the great majority of reported food-borne illnesses, hospitalizations, and fatalities each year, according to the (CDC, 2008) report (Hald et al., 2016). For instance, Salmonellosis outbreaks have been documented for years, but over the past 25 years, the disease has become more prevalent throughout many continents. As a result, it was claimed that microorganisms were to blame for the rise in food-borne illnesses.

For instance, there were 1270 food-borne disease outbreaks reported in the USA in 2006, resulting in 27,634 illnesses and 11 fatalities (CDC, 2008). According to a 2009 research by Schaff (Schaff & Papadopoulos, 2009), food-borne illnesses cost the US \$152 billion annually in healthcare, lost productivity at work, and other costs. The discovery of lethal E. coli 0157:H7 outbreaks in spinach also caused widespread alarm among Americans. According to some accounts, the outbreak killed three people in 2006 and 250 persons were affected throughout 26 states (Hald et al., 2016). Salmonellosis, Listeria monocytogenes, and E. coli were found to be the most frequently reported bacterial food-borne illnesses that caused numerous hospitalizations and even deaths. Enterohemorrhagic (EHEC). Hemorrhagic colitis is known to be mostly caused by a group of bacteria called E. Coli (bloody diarrhoea).

According to (Hald et al., 2016), relatively recent bacteria including *Campylobacter jejune*, *Listeria monocytogen*, and *Escherichia coli* 0125:H7 are to blame for the spread of food-borne illnesses in developed nations.

2.1.10.1 Salmonella

Serotype enteritidis (SE) of *Salmonella* had taken over as the most common strain in Europe and other Western nations (F. K. Käferstein et al., 1997). Investigations on SE outbreaks revealed that eating poultry, meat, and their byproducts was a major factor in the disease's spread. Bloody diarrhea and acute renal failure have been linked to infections with *E. coli* serotype 0157:H7 in Australia, Canada, the United States, Europe, and South Africa (Breuer et al., 2001). These diseases were thought to be lethal, especially in children, and outbreaks were linked to eating beef. For instance, it is known that in Japan, in 1996, an *E. coli* 0157:H7 outbreak infected over 6300 schoolchildren and resulted in two fatalities (Fisher et al., 2002). The size of this outbreak was regarded as being unprecedented for this virus.

E. coli 0157 outbreak in Walkerton, Ontario, Canada, claimed 5 lives and hospitalized 27 people (Organization, 2015) (Organization, 2001) Laboratory tests proved that the water delivery system was the main source of *E. coli* contamination. Because of this, Walkerton residents were given a "Boil Water Order," which was still in effect when the information was released by (Organization, 2001). Due to newly identified forms of food-borne pathogens as *Campylobacter jejuni*, *Listeria monocytogenes*, and *E. coli* 0157:H7, several developed countries had experienced disease outbreaks. According to (Clarke et al., 2002), the two infections that were most frequently found in fish, *Campylobacter* and *Vibrio parahaemolyticus*, were most likely spread during the market or during cooking.

Fruits and vegetables have also been found to contain other pollutants, such as pesticide residues or environmental toxins. Examples included viruses like rotavirus and bacteria like *Shigella*, *Salmonella*, and *E. coli* that were allegedly brought from the soil, as well as *Bacillus*, *Clostridium*, and *Listeria monocytogens*. Additionally, it was reported that governments around the globe were stepping up their efforts to increase food safety (Breuer et al., 2001). The actions were taken in response to the growing number of issues with food safety and the rising number of consumer complaints. It was stated that 2.1 million people died from diarrheal diseases in the year 2000 alone, despite the fact that it was difficult to assess the global incidences of food-borne diseases. Food and water pollution were blamed for these incidents (Fisher et al., 2002).

For instance, 76 million cases of food-borne illnesses were documented in the United States. 325,000 of those were admitted to hospitals. Despite knowledge and protective measures against the vice, it was revealed in Rome that millions of individuals still suffered from communicable and non-communicable diseases (Organization, 2001). The research went on to say that there were other issues that could be related to the numerous food-related issues, such as a lack of access to clean water, improper sewage disposal, and irregular garbage disposal. The issue did not only affect poor nations. According to studies conducted in industrialized nations, 5–10% of the population was expected to contract a food-borne illness annually. Poultry, eggs, and egg products were noted as the main sources in several nations where *Salmonella enteritidis* was cited as the prevalent pathogen. *Salmonella enteritidis*, which was largely linked to poultry and eggs, dairy products, and beef, was estimated to be present in between 60 and 80 percent of chicken worldwide. According to reports, a salmonella outbreak in the United States in 2008 resulted in the infection of 1442 people.

286 of those were admitted to hospitals across 43 States, the District of Columbia, and Canada. According to reports, this was the biggest foodborne outbreak to hit the US in ten years (F. K. Käferstein et al., 1997).

Although the rate of infection in developing nations in Latin America, Asia, and Africa has received less attention, these nations have suffered the brunt of the issue because of the existence of a wide spectrum of food-borne illnesses. Most food-borne illnesses were thought to be caused by salmonella and shigella, which were primarily linked to diarrhea, stomachaches, nausea, and vomiting (Breuer et al., 2001). Although viruses can not thrive on food, it has been suggested that raw fruits and vegetables can serve as entry points for infection. For instance, eating lettuce and sliced tomatoes was linked to numerous Hepatitis A epidemics (F. Käferstein & Abdussalam, 1999).

Despite health facilities reporting a high prevalence level of symptoms for FBDs, recorded cases of food-borne infections in African nations, particularly in Kenya, were deemed unimportant (Fisher et al., 2002). In poor nations, viral cholera was a serious issue with regard to public health. It was discovered in tainted water and a variety of foods, including rice, vegetables, millet, gruel, and several kinds of fish. Abdominal pain, vomiting, and diarrhea were among the symptoms, and they all contributed to severe dehydration and, ultimately, death (Fisher et al., 2002). A recent cholera outbreak was confirmed in two Sudanese cities, where it claimed 27 lives after people used contaminated water, according to a UN report. There had been 1433 recorded causes in less than two weeks. It was well known that the disease spread quickly, especially in communities with tight ties. Diseases, intoxications, and toxin-mediated infections were used to categorize food-borne illnesses. Major food-borne illnesses were attributed to a variety of germs. These included vibrio

parahaemolyticus, vibrio vulnificus, listeriosis, salmonellosis, shingellosis, and campylobacteriosis. In instance, Bacillus cereus, a spore-forming bacteria prevalent in soil, was one of the microorganisms that led to poisoning. The bacteria were frequently found in foods like rice, cooked corn, cooked potatoes, vegetables, and their processed forms.

The list of causes of food-borne infections included time, improper temperature control, poor hygiene standards, and cross contamination. According to reports, all three incidents involved restaurant staff members who did not adhere to food safety regulations (Freitas et al., 2014). Over 13 million people were employed in the restaurant sector, according to a 2006 report by the National Restaurant Association. According to research, restaurants were more focused on serving customers than they were on adhering to the established guidelines for food safety. The claim was made that because food service workers did not receive proper training, they did not adhere to food safety rules (Stratev et al., 2017). Green, Selman, and Lynch further stated that training in food safety was linked to better knowledge among food service workers.

2.1.10.2 Brucellosis and Other Pathogens

Another food-borne illness that was causing worry was brucellosis. It happened everywhere, although North America and Western Europe reported fewer instances as a result of careful observation and the use of the HACCP system. The Middle East (Iraq, Iran, Saudi Arabia), Egypt, Greece, Italy, Morocco, and Tunisia, as well as Mexico, Peru, some parts of China, and India, continued to have significant health problems due to the disease. Another bacteria that caused acute gastroenteritis was Vibrio-parahaemolyticus. The microorganism made up a group of infections in impoverished nations, particularly in Africa, that led to persistent diarrhea. Giadialamblia, Cryptosporidium ssp, and Entamoeba histolytica were all members

of this group. Children and others with weakened immune systems were the prime targets of these infections. Vegetables and raw meat were the main sources of their transmission. The parasites *Trichinella spiralis*, *Taechiasolium*, and *Taechia Saginatya* were among those also spread by raw meat (Mensah et al., 2002).

Animals were responsible for 75 percent of newly and re-emerging food-borne illnesses, according to (Muinde & Kuria, 2005). For instance, bovine Spongiform Encephalopathy (BSF), a deadly transmissible neurodegenerative illness of cattle, was initially identified in the UK in 1985. In just the UK, this outbreak affected approximately 180,000 animals. The animals' brains and spinal cords were harmed by the illness. Since then, the illness is said to have spread to 19 additional nations, including Japan. A novel transmissible spongiform encephalopathy of humans known as Variant Creutzfeld-Jacob Disease (VCJD) first emerged in human populations in 1996 as a result of exposure to the BSF agent in France. 119 people had human VCJD as of January 2002, with 5 from Canada and the majority being from the UK. 119 people had human VCJD as of January 2002, the majority of them from the UK and 5 from France.

The avian flu was the most recent food-borne illness. (Organization, 2015) determined that the virus that infected birds was extremely pathogenic. The flu first appeared in Asia, then spread to Europe, and most recently, Africa. According to reports, the virus spread to people when they came into touch with infected living or dead chickens. Inhaling the virus through dust and maybe coming into contact with contaminated surfaces are other possible ways that exposure happened. A particular strain of the avian influenza virus was only discovered in the digestive and respiratory systems of affected chickens, not in the meat. However, given that low temperatures were favorable for the spread of the viruses, evidence available

indicated that highly pathogenic viruses like the H5N1 strain may have been disseminated through marketing and distribution routes. The information that was available also showed that the virus could live for six days at 370 C and at least 35 days at 40 C in poultry droppings (F. Käferstein & Abdussalam, 1999). However, given that low temperatures were favorable for the spread of the viruses, evidence available indicated that highly pathogenic viruses like the H5N1 strain may have been disseminated through marketing and distribution routes. The information that was available also showed that the virus could live for six days at 370 C and at least 35 days at 40 C in poultry droppings (Hald et al., 2016).

It was also discovered that cooling did not render H5N1 inert. According to additional studies, the eggs may include the H5N1 virus both inside and outside the shell (white and yolk). Therefore, it was advised that eggs from regions where the H5N1 outbreak was occurring not be ingested raw or only partially cooked (runny yolk for breakfast). Additionally, raw eggs were not allowed to be added to foods that were going to be baked, fried, or otherwise heated. Accordingly, it was required to serve prepared fowl "piping hot." The highest danger of contracting the H5N1 virus was through handling or slaughtering live infected chicken, according to earlier studies, even though there was no evidence suggesting that people had become sick after eating properly cooked poultry or eggs. Therefore, it was crucial to handle chicken with good hygiene both during and after slaughter in order to minimize cross-contamination from poultry to other foods as well as from food preparation surfaces and equipment. The UN declared a regional crisis in West Africa and issued a warning that the H5N1 virus posed a threat to the entire region. Within a very short period of time, the virus had spread to numerous nations in Europe, Africa, and the Middle East. Over 96 of the 175 people who contracted the avian flu died as a result of it. Iran, Egypt,

Ethiopia, and Sudan were said to be the afflicted nations as of this point. Kenya allocated \$1.2 million as a precaution. The World Health Organization also voiced concern that, due to a lack of laboratories and the ability to identify it, avian flu may have been spreading unnoticed in developing nations. In a similar vein, UN experts cautioned that the Avian Influenza was spreading at a dangerous rate around the world. The UN further warned that if the global community did not take action to stop the spread of the bird flu, the virus would mutate into a variant that might start a human pandemic with terrible consequences.

2.1.10.3 E. coli

Enterohemorrhagic *E. coli* is another dangerous pathogen in terms of food safety, according to (Organization, 2015)The creation of the Codex Committee on Food Hygiene was prompted by this worry (CCFH). The 0157:H7 serotype of enterohemorrhagic *E. coli* (EHEC) was originally identified as a human pathogen in the USA in 1892. Following two significant occurrences of hemorrhagic colitis (bloody diarrhoea). Since then, it has been claimed that outbreaks of this infection have spread to numerous parts of the world, posing a major threat to public health (Clarke et al., 2002). Additional research on the thermal sensitivity of *E. coli* 0157:H7 in ground beef showed that heating killed both *Salmonella* spp. and *E. coli* strains.

E. coli 0157:H7 required a temperature of about 37°C to develop at its best, and it was unable to grow at anything lower than 8°C to 10°C (Miller & Brewer, 2003). *E. coli* 0157:H7, on the other hand, was resistant to freezing. *E. coli* 0157:H7 was noted as being more acid resistant than other *E. coli* strains, according to the study. (Clarke et al., 2002) noted that due to *Salmonella typhimurium*'s high survival, surveillance was extremely important. Foods of bovine origin that were uncooked or insufficiently cooked were most frequently to blame,

particularly undercooked ground or minced beef and unpasteurized milk. The eating of raw or minimally processed fruits and green leafy vegetables was also linked to a number of outbreaks.

According to a research, beef was the primary cause of 46% of food-borne outbreaks in the US between 1993 and 1999. Other items included milk that had been poorly pasteurized. Additionally, it was discovered that bacteria like *E. coli* 0157:H7 were removed from milk by pasteurization. Additional analysis verified that a number of outbreaks were caused by *E. coli* 0157:H7-contaminated fruits and vegetables (Breuer et al., 2001). Between 1998 and 1999, green leafy vegetables were blamed for 26% of food-borne illnesses in the US. Although there were a number of potential methods for vegetables to become infected, the usage of fertilizer or water tainted with feces was thought to be the most likely one. *E. coli* 0157:H7 bacteria were found in cabbage plants, and another possible source was suspected fertilizer from neighboring animals and subpar sewage treatment. *E. coli* 0157:H7 infection after ingestion might result in anything from asymptomatic infection to death. From the moment of consumption until the onset of symptoms, the incubation period varied from one to eight days. Within two to three days, the illness developed from non-bloody diarrhoea and abdominal discomfort to bloody diarrhoea (Mead & Griffin, 1998). Haemorrhagic colitis (bloody diarrhea), a more severe symptom of *E. coli* 0157:H7 infections, primarily affected youngsters and the elderly. However, it was found that individuals of all ages may have contracted *E. coli* 0157:H7 infections. *E. coli* cases increased from 1,420 (0.8/100,000 people) in 1994 to 4410 (about 1.6/100,000 people) in 2000 between 1994 and 2000 (Organization, 2001).

In Belgium, *E. coli* 0157:H7 infection was responsible for 97 percent of food-borne illnesses in 2000 (Gilbert et al., 2001). The burden of food-borne diseases was also recognized by many other developed countries, including those in Japan, Britain, Australia, North America, and Europe. Because they were believed to grow low to the ground, green leafy vegetables were identified as another possible source of *E. coli* 0157:H7 contamination. Therefore, it was thought that vegetables might act as carriers of dangerous microorganisms. When cattle carcasses came into touch with feces and tainted hide during the slaughter process, the meat became contaminated with *E. coli* 0157:H7 (Elder et al., 2000). Due to rising aquaculture productions under filthy conditions, food-borne trematodes were also becoming a significant public health issue, particularly in South East Asia and Latin America. According to (Hilborn et al., 1999) consumption of raw and minimally processed fish and fisheries products is a factor in the increase in FBD patients. Around the world, this had an estimated 40 million individuals affected, particularly those who lived near the coast. It was said to have caused acute liver illness in some and may have contributed to liver cancer.

2.1.10.4 Pseudomonas

According to one definition, *pseudomonas* is a rod-shaped, gram-negative, aerobic, non-spore-forming species of bacterium that is typically found in water or some types of plant seeds. They were widely distributed in the natural world, including in water plants and soil. They were prevalent in medical settings and flourished in damp environments. Nosocomial infection is the term used to describe an infection that occurs in hospitals. Pseudo infections were produced by free bacteria that were found in moist regions including sinks, antiseptic solutions, and urine containers. Healthy people were said to typically not be at danger for infection. *Pseudomonas* infections were regarded as opportunistic infections, which means

that they only led to illness when a person's immune system was already compromised. These included those receiving treatment for burns, cancer patients receiving chemotherapy, people living with HIV, people with cystic fibrosis, and people with a foreign body like a catheter.

Bacteremia is the medical term for blood infection. Fever, chills, weariness, and joint and muscle discomfort were among the symptoms. Chills, fever, a strong cough, and breathing difficulties were signs of pneumonia, an infection of the lungs. Folliculitis, an itchy rash, bleeding ulcers, and headaches were some of the others. Wet surfaces in the kitchen may have contributed to the isolation of pseudomonas.

2.1.11 Environmental Hygiene and Transmission of Pathogens

An essential component of food hygiene and food quality is environmental hygiene. Primary food production should not take place in places where the presence of potentially dangerous compounds would result in an unacceptable level of such substances in food, the WHO (2012) advised. The fundamental fact is that contaminated hands, wiping cloths, utensils, and cutting boards can spread dangerous bacteria from soil, water, and animals into food, leading to food related illnesses. Regarding this, the (Organization, 2001) recommended steps to provide a hygienic environment for the processing of safe food (Mensah et al., 2002), including:

- Protection of food and food ingredients from contamination by pests or by chemical, physical or microbiological contaminants or other objectionable substances during handling, storage and transport;

- Discarding waste to avoid accumulation of waste in food handling, food storage and other working areas and the adjoining environment;
- Adequate drainage and waste disposal system and facilities;
- Adequate supply of portable water and the construction of drainage systems that safeguard and avoid contamination of potable water; and
- Washing and sanitizing all surfaces and equipment used for food preparation Several studies confirm that the hands are the most important transmitters of organisms from faeces, nose, skin or other sites to food.

Salmonella typhi, non-typhi salmonellae, Campylobacter, and Escherichia coli can all live on hands and other surfaces for variable amounts of time, and in some cases even after handwashing, according to epidemiological research (F. Käferstein & Abdussalam, 1999). The serving utensils used at the vending location are frequently contaminated with Micrococcus spp. and Staphylococcus aureus spp., which may have come from the vendors' hands when they touched the food preparation areas, dishcloths, or the water during dishwashing or hand washing, according to (Rane, 2011). This suggested that the food itself, the food preparation surfaces, and the dishwater were all contaminated. Additionally, according to (Rane, 2011), bacteria from contaminated dishwashing water and other sources stick to the surface of utensils and can pose a risk during the food vending process.

2.2 Theories of the Study

2.2.1 Theory of Planned Behaviour

The Theory of Planned Behavior by Ajzen was made possible by the Theory of Reasoned Action proposed by (Fishbein & Ajzen, 1976). According to the idea, an individual's

behavioral intents and behavioral beliefs connecting the activity to various outcomes and other traits are shaped by their attitude toward conduct, subjective norms, and perceived behavioral control. A person's attitude is defined as their positive or negative assessment of their own performance of a certain behavior, which is based on the entire range of available options. Subjective norms were also defined by (Fishbein & Ajzen, 1976) as a person's perspective of a specific behavior that is influenced by the opinions of significant individuals, such as parents, spouses, friends, and teachers. (Fishbein & Ajzen, 1976) define perceived behavioral control, the third core idea of the theory of planned behavior, as the way in which a person perceives the ease or difficulty of carrying out a specific behavior.

According to the theory, the vendor's sanitary practices would be determined by his or her personal attitude toward hygiene in terms of food vending. Additionally, the vendor's perception—which has been shaped by the influence of others—of the necessity of safe sanitary practices, the health implications of particular cooking methods, and the dietary implications of the choices of cooking ingredients would also affect the sanitary standard of vending. Additionally, the simplicity with which the vendor can implement proper hygiene procedures influences any actual or intended food vending practices. The intended action expresses the attitude and subjective norm, where the subjective norm is essentially the perception that the individual has about engaging in or refraining from engaging in that conduct in response to social pressure. The theory of planned behavior makes the salient remark that behavior may also be influenced by other elements, such as the availability of favorable opportunities and resources, which taken together correlate to the degree to which individuals actually control their behavior (McConnon et al., 2012).s In this sense, the hygiene practices pertaining to food vending may also be influenced by the presence of

efficient monitoring institutions, official guidelines for operating food vending outlets and facilities, as well as efficient information dissemination and communication channels for educating food vendors on hygiene practices.

The theory of planned behavior is important because it addresses the previous model's restriction to deal with imperfect volitional control, which puts it one step ahead of the theory of reasoned action (Fishbein & Ajzen, 1976). According to (Fishbein & Ajzen, 1976) theory, people carry out specific behaviors under the presumption that they are rational and weigh the consequences of their choices (Ramayah et al., 2012). Although some behaviors are non-volitional and may appear to be outside the scope of a planned behavior, this rule states that the stronger a person's intention to engage in a given behavior, the more favorable their attitude toward behavior and subjective norm, and the greater their perceived level of behavioral control.

Although not all behaviors or acts can be controlled by the person performing the action, the theory of planned behavior takes this into account. The idea contends that the unintentional activities of the food vendor would likewise influence the sanitary conditions of the foods offered in the setting of non-volitional behaviors. For instance, the food vendor might serve fruits that are overly fertilized, which could result in food illness. Though the farmer is more likely to blame for the tainted state of the fruits, it could be argued that the vendor planned and rationalized the source of the fruit and additives. Therefore, not all behaviors and activities can be anticipated. The theory is also critiqued for its inability to adequately moderate the impact of past behavior, especially in light of the meta-analysis by (Conner & Armitage, 1998) that found that prior activity contributed an additional 13% of the variance in behavior. The current study accounts for these restrictions. The analysis will take into

account the psychological influences, such as feelings of shame, enjoyment, or approval of particular vending practices. It will also be taken into account how previous vending practices have affected present ones.

2.2.2 Social Control Theory

The framework of institutional control can be used to develop food vendor food hygiene practices. This is due to the fact that food vendors frequently have to comply with municipal guidelines for the handling and sale of food, where failure to do so becomes a criminal offense subject to legal penalties (McConnon et al., 2012). In accordance with this, several research have argued that ensuring adherence to recognized norms of food hygiene practices is based on Hirschi's social control theory (1969). (Hirschi, 1969) introduced the idea that absent sufficient moral, social, and/or punitive deterrents, people tend to act in an improper or criminal manner. In other words, if someone knows they won't be penalized for their misconduct, they are more likely to indulge in it. According to the Control Theory, a variety of mechanisms that regulate people's urges to violate social norms keep them from engaging in deviant behavior.

Therefore, control theory explains why some people resist acting on odd impulses while others do. The conscience and motivation of an individual are examples of internal controls in the social setting. External controls include parents, friends, and legal codes. (Hirschi, 1969) established the idea that people can deviate because social relationships between the individual and society are weak, which is in line with control theory's link between non-deviant behavior and social bonds.

In other words, deviant behavior would be encouraged by poor connections between the general public and the regulating agencies. Studies showing how lax rules have fostered dishonest food handling by food vendors have proven this (Mensah et al., 2002). (Hirschi, 1969) distinguished between three types of control: mixed control, centralized control, and decentralized control. Price, competition, or market share are a few examples of the factors that keep decentralized control in place. For instance, consumers would favor purchasing from healthier areas and environments that are aesthetically pleasing, according to the rational choice theory.

Because of this, healthy competition would ensure that businesses with poor environmental hygiene made improvements in order to draw in customers. Administrative or hierarchical methods, such as developing standards or regulations, are generally used to maintain centralized control, such as bureaucratic control. This indicates the type of regulation put in place by municipal agencies in charge of upholding food safety regulations. A crime would be committed if these policies were not followed. A collection of values, beliefs, customs, and traditions is often maintained in order to preserve mixed control or clan control. For instance, food vendors acquire various food-handling techniques through traditional cooking techniques and formal training that appeal to their ethics and conscience when handling food. Whether hygienic or hazardous, these standards become the standard procedure that food handlers follow.

With his containment theory, (Reckless, 1973) backed up the control theory's claim that a person's conduct is determined by what they want most at any given moment rather than by external inputs. Humans are selfish and act in ways that promote their own gain, according to (Hirschi, 1969) theory. This implies that if selling unwholesome meals would increase

food vendors' income, they would be more likely to do so if they were not closely supervised. Therefore, it is believed that inadequate centralized control is a primary enabler of the subpar food handling procedures used by food vendors. Based on these underlying presumptions, the social control hypothesis has been criticized. First, it makes the assumption that people are generally motivated by moral principles. It also makes the assumption that people are aware of all available options and always have access to their preferences, but it ignores factors like monopolies and consumer socioeconomic status that might limit demand for preferences.

2.3 Conceptual Framework

The conceptual framework used in this study explains how the variables are related to one another. The conceptual framework is as shown in figure 2.1.

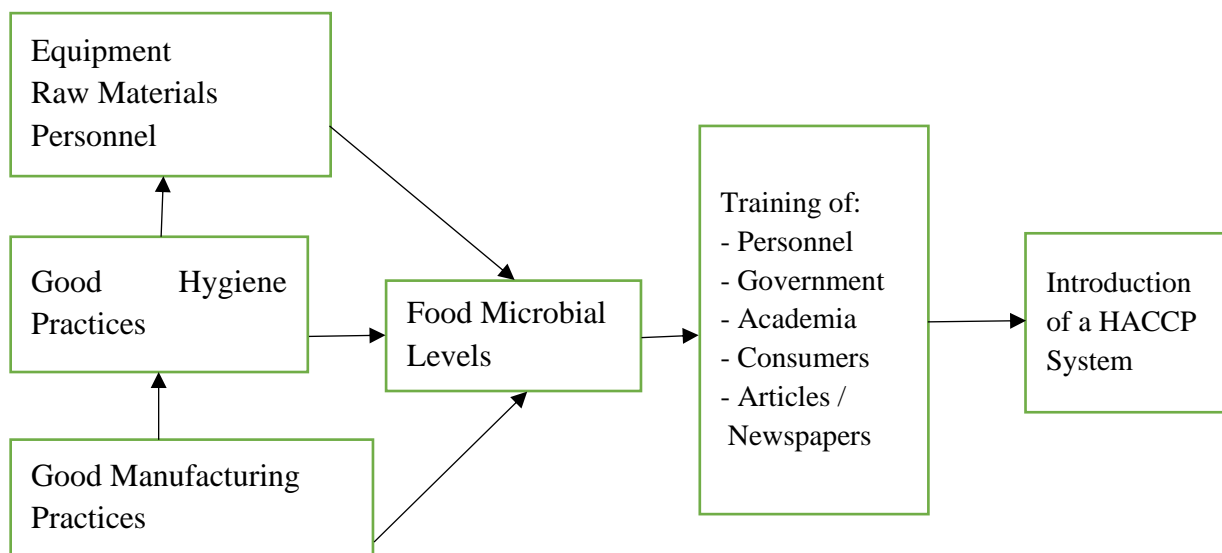


Figure 2.2: Conceptual Framework of Improve hygiene practices through HACCP system

Source: adopted from Pierson and Corllet model (Pierson, 2012).

The model in figure 2 demonstrates how good manufacturing techniques, equipment, raw materials, and employees all affect the amounts of microorganisms in food. The Pierson and Corllet model was chosen by the researcher because it is consistent with the HACCP system study. The conceptual framework's method demonstrates how GMPs can be utilized in food facilities to improve food safety and hasten the implementation of HACCP systems, which would lower disease outbreaks linked to food- and water-borne disease causes and safeguard the general population from these illnesses.

2.4 Empirical Evidence

The model in figure 2 demonstrates how good manufacturing techniques, equipment, raw materials, and employees all affect the amounts of microorganisms in food. The Pierson and Corllet model was chosen by the researcher because it is consistent with the HACCP system study. The conceptual framework's method demonstrates how GMPs can be utilized in food facilities to improve food safety and hasten the implementation of HACCP systems, which would lower disease outbreaks linked to food- and water-borne disease causes and safeguard the general population from these illnesses. The only factor that the two study groups evaluated differently was personal hygiene in the restroom. Asian respondents rated the importance of bathroom hygiene lower than Western respondents. Asian groups were shown to have higher expectations than Western groups for all aspects of restaurant hygiene.

In Bangladesh, (Nizame et al., 2019) research on restaurant and street food vendor hygiene. A nationally representative sample of restaurants and street food sellers provided the study with hygienic indicators. 100 respondents were included in the sample size for the qualitative study design. The survey found that just 33 percent (100) of the locations were handy for restaurant workers, while 91 percent (273/300) had soap and water at handwashing facilities

for consumers. It also showed that when observed, 11 percent (68/600) of street food vending stalls had soap and water. Again, it was discovered that during the 90-minute structured observations, cooks washed their hands with soap on 14/514 (3%) occasions prior to food preparation, 6/82 (8%) occasions following the cutting of fish, meat, or vegetables, 3/71 (4%) occasions prior to serving, and 0/49 (0%) occasions prior to hand-mashing food or preparing salads. No street food vendors washed their hands with soap during these food-handling events.

Researchers (Mensah et al., 2002) examined the practices, attitudes, and knowledge of institutional food handlers in Ghana towards food safety. The study assessed Ghanaian institutional food handlers' knowledge, attitudes, and practices regarding food safety. A descriptive, cross-sectional survey comprising 29 institutions and a sample of 235 institutional food handlers made up the study's design. According to the report, the majority of food handlers were between the ages of 41 and 50. (39.1 percent). Women who responded were (76.6 percent). It also showed that those who handled food were aware of hygienic standards, cleaning techniques, and sanitation practices. It also demonstrates that almost all of the food handlers understood the significance of general hygienic procedures in the workplace, such as hand washing (98.7% accurate responses), wearing gloves (77.9%), thorough utensil/instrument cleaning (86.4%), and detergent use (72.8 percent). According to the findings regarding disease transmission, 76.2 percent of food workers were unaware that hepatitis A and Salmonella are both considered to be food-borne diseases. However, 87.7% of handlers and 81.7 percent of typhoid fever handlers believed that food is the primary means of transmission for both diseases.

In the Bolgatanga Municipality of the Upper East Region, (Aovare, 2017) investigated the cleanliness standards for food vending machines. The study investigated the sanitation practices used by food sellers in the municipality of Bolgatanga. The study, which used a sample of 150 respondents and a mixed research methodology, also adopted a cross-sectional design. The study's findings showed that proximity to customers is the most important factor influencing where food vendors choose to locate; the physical state of the food vending places was satisfactory healthy; the safety of the food vendors' food handling practices was compromised; and the institutional setup was not effectively promoting conformity.

(Muinde & Kuria, 2005) examined the viability of implementing HACCP systems in Thika Town while researching cleanliness practices in urban restaurants. In order to improve food safety in urban restaurants, the examining hygiene procedures and potential introduction of systems based on scientific methodologies are examined. Descriptive survey and experimental design comprised the study's methodology. To choose the 137 respondents in Thika town, a systematic random selection technique was adopted. According to the study, *Escherichia coli*, Aerobic plate counts, and *Staphylococcus aureus* levels were established in a variety of foods, beverages, and other surfaces. It also demonstrates that all seventeen (17) samples had total plate counts (TPC) that were lower than 105CFU/g. Again, nyama choma, work surfaces, and passion fruit had the highest mean total plate counts, whereas chips, plates, and fruit salad had the lowest. Only 8% of business owners use these controls in their kitchens, despite the fact that 63 percent of business owners have some awareness of food quality. The study also showed that, at a 0.05 level of confidence, there is no correlation between HACCP implementation and customer turnover.

At the University of Gondar, researchers (Lema et al., 2020) examined the practice of food hygiene and its factors among food handlers. They evaluated the practices of food hygiene and the contributing variables among food handlers employed by the University of Gondar. Methods: The connection of variables with the practice of food safety was examined using univariate and multivariate binary logistic regression models. Multivariable analysis was a contender for variables with a p-value of less than 0.2. The final model employed the adjusted odds ratio with a 95% confidence interval and p-values less than 0.05 to report relationships. Of the study participants, 184 (46.7%) had good self-reported food hygiene practices. Being male [Adjusted odds ratio (AOR): 2.37, 95 percent confidence interval (CI) (1.34, 4.19)], having a primary or secondary education [AOR: 2.54, 95 percent CI (1.16, 5.58)] and having more than two years of work experience [AOR: 1.86, 95 percent CI (1.06, 3.25)].

The (Thelwell-Reid, 2014) study examined quick service eateries in the Zimbabwean city of Mutare, both registered and unregistered. The study draws conclusions about the food handling procedures that are currently used in both registered and unregistered quick service restaurants in Mutare. The study was divided into two phases; the first phase uses a structured questionnaire to evaluate the opinions, knowledge, attitudes, and self-reported practices of staff and customers on food safety. In the second phase, food handlers' cleanliness and food safety behaviors are assessed using a thorough observation guide. The study's significant p value > 0.05 indicated that there was no significant correlation between a restaurant's registration status and the efficacy of its food handling procedures. The assessment's findings also showed that whereas *Staphylococcus aureus* was predominantly discovered on food handlers' hands, *E. coli* was present in all types of sample categories.

(Thelwell-Reid, 2014) investigated the practices and understanding of food handlers in Jamaica regarding food safety. The efficiency of a mandated training program for food handlers in a rural Jamaican parish was evaluated by the study. To gather the primary data, the study used a cross-sectional survey with self-administered questionnaires. Although these scores were significantly lower than the minimum acceptable standards of 70%, the study found that trained food handlers had statistically significantly higher mean knowledge scores (65.61 percent vs. 59.0 percent, $p < 0.05$) and mean practice scores (67.40 percent vs. 60.35 percent, $p < 0.05$) than untrained food handlers.

(Andaleeb & Conway, 2006) looked at how customers in Nairobi City County, Kenya chose particular African-owned eateries based on the food handlers' hygienic procedures. The study used a cross-sectional descriptive survey with 340 people as its sample size. The survey found that even while not all restaurant managers used the HACCP system, the majority of them did. However, because restaurants do not take proper safety measures throughout the entire food production process, programs connected to HACCP had to be implemented in a doable and practical way. The survey also showed that although some of the restaurants weren't clean at the time of the visits, overall restaurant hygiene standards were fairly high. The study came to the conclusion that while sanitary standards do influence customers' restaurant preferences, the impact is not very large. The survey also showed that although some of the restaurants weren't clean at the time of the visits, overall restaurant hygiene standards were fairly high. The study came to the conclusion that while sanitary standards do influence customers' restaurant preferences, the impact is not very large.

In his 2016 study, Onyango et al., (2016) evaluated the causes of FSM among food handlers in a few Kenyan hotels in Eldoret Town. The study used 106 food handler participants who

responded to standardized questionnaires, interviews, and observation. It also used descriptive and explanatory research approaches. Over 95% of respondents to this poll had sufficient knowledge of FSM, according to the study's findings. The association between knowledge and FSM, however, was insignificant ($r = .147$, $p = .174$). The findings also showed a relationship between position held within the establishment and management of purchase and storage ($X^2 = 106.013$, $df = 70$, $p < 0.05$), as well as management of temperature control ($X^2 = 132,256$, $df = 70$, $p < 0.05$). The management of purchase and storage also had a relationship with education level ($X^2 = 52.901$, $df = 30$, $p < 0.05$). The researchers came to the conclusion that the primary determinants of FSM were understanding of FSM, position held within the establishment, degree of education, kitchen physical environment, and managerial characteristics.

(Worsley & Lea, 2008) College of Health Sciences, research the impact of placard grading on food safety in retail food facilities. The purpose of the study was to assess whether a color-coded placard grading system is a useful tool for educating the general public about food safety. The study chose 1,410 restaurants for a 12-month placard grading period and compared it to a 12-month period before the placard grading period. The study's findings revealed no appreciable variations in confirmed cases of foodborne illnesses or severe CDC infractions between the two years. However, it's anticipated that the new application will offer better methods for handling food in the future. By lowering the incidence of foodborne illnesses, fostering better community health, and raising awareness of food safety, better food handling techniques will help bring about social transformation.

According to (Mlay, 2018) study, street food sellers in Ilala Municipality have knowledge, attitudes, and practices around food safety and hygiene. The study used 385 street food

sellers, 90% of whom were female, in a descriptive cross-sectional study. The findings also showed that the food vending industry primarily employs young, active people between the ages of 20 and 30. Additionally, the majority of them (68.6%) have never had any professional training on food safety, which is crucial for protecting consumer safety. The survey also supported the claims that incorrect cooking, lack of equipment cleaning and sanitization, and cross contamination were not known to 40% of food vendors. About 3.6 percent of the street sellers had no idea where food contamination might have come from. The majority of food vendors (96.4%) were aware that improper or insufficient hand washing and the handling of food by people who were ill (70.4%) could result in food borne illnesses, indicating that they were only partially and not completely ignorant of the most fundamental food hygiene procedures. The findings also show that only 5 out of the 11 potential causes of food contamination could be identified by the majority of food vendors. Despite the vendors' positive attitudes about food safety measures like hand washing, it was actually shown that more than half (59.2%) lacked hand washing facilities, only 28.1% had access to portable water, and 43 percent of the vendors didn't wash their hands after using the restroom.

The examination of food safety handling procedures at Rhode Island farmers' markets was the focus of a study by (Ratnapradipa et al., 2011). The study found that high-risk vegetable merchants at Rhode Island farmers' markets used improper food handling techniques. Direct observations and a smartphone application were employed in the study's descriptive research design to gather its primary data. A total of 26 vendors selling high-risk produce were observed in fourteen farmers' markets, seven of which were public and seven of which were

private. The survey found that sellers handled food improperly by eating, using their phones, touching money, and then touching fruit.

The (Ababio & Lovatt, 2015) study examined three aspects of food hygiene in Belgrade, Thessaloniki, and Porto, three European cities. The first survey dimension assessed the quality of sanitation in various restaurants that serve meals directly to customers. The study includes 91 persons in its sample. The study found that, rather than considering the kind and size of the food institution, considerable disparities in the degree of food hygiene in food enterprises are dependent on HACCP status. The study found that poor food hygiene and safety procedures were mostly caused by poor food preparation and hygiene, with poor layout being the primary issue in evaluating structural requirements. The study examined three aspects of food hygiene in Belgrade, Thessaloniki, and Porto, three European cities. The first survey dimension assessed the quality of sanitation in various restaurants that serve meals directly to customers. The study includes 91 persons in its sample. The study (Ababio & Lovatt, 2015) found that, rather than considering the kind and size of the food institution, considerable disparities in the degree of food hygiene in food enterprises are dependent on HACCP status. The study found that poor food hygiene and safety procedures were mostly caused by poor food preparation and hygiene, with poor layout being the primary issue in evaluating structural requirements. Additionally, the data showed that Thessaloniki and Porto restaurants had higher levels of hygiene than Belgrade restaurants. Managers' opinions support their conviction that increased business may result from a transparent food hygiene rating of all dining venues. The study also found that respondents in all cities acknowledged the significance of food hygiene and identified kitchen-related statements as having the greatest influence.

2.5 FOOD HYGIENE TRENDS IN GHANA

On June 7, 2021, Ghana was recognized for its outstanding efforts to ensure that its citizens had access to safe food. On this day, Accra celebrated World Food Day with the slogan "Safe Food Now for a Healthy Tomorrow."

Through the platform, stakeholders were assembled from all points along the food value chain. The Food and Agriculture Organization and the FDA were congratulated for working together to organize the event by Hon. Kwaku Agyeman-Manu, the minister of health.

The COVID-19 pandemic, according to the Chief Executive Officer of the Food and Drugs Authority, Mrs. Delese A. Darko, has made it even more important to adhere to even higher food safety standards in order to strengthen the immune system and stop the spread of disease. Mrs. Darko revealed that the Ghana Food and Drugs Authority has enacted the National Food Safety Emergency Response Plan (FoSERP), which was created with assistance from the World Health Organization to serve as a guide for a national and comprehensive response to food safety emergencies whenever they occur.

In his remarks, Dr. Francis Kasolo, WHO Country Representative for Ghana, praised the Food and Drugs Authority and collaborators for observing the day every year since its inception in 2019. He claimed that according to World Health Organization estimates, contaminated food causes 420,000 deaths annually and 600 million illnesses worldwide, or 1 in 10 people. "Incidentally, the African Continent produces the highest number of cases and deaths, with more than 91 million people getting sick from eating tainted food and over 137,000 people passing away every year," the article states.

Dr. Blaise Ouattara, a representative of the Food and Agriculture Organization, emphasized that food security, human health, the economy, agriculture, and market access are all negatively impacted by unsafe food situations. He also noted that there cannot be food security without food safety because people need to eat safe food to live active and healthy lives.

2.5.1 FDA Ghana confirms poisoning allegations at Marwako restaurant

Marwako food poisoning: 53 persons undergoing treatment at various health facilities

According to Ghana Web, (2022) fifty-three people who ate at the Marwako Fast Food and Restaurant are being treated at various Accra medical facilities. Four of the restaurant's locations, including those in Abelemkpe, Spintex, La, and East Legon, had to be shut down by the Food and Drugs Authority.

"Analyses of samples of food, certain juice drinks, and items taken from the environment at the East Legon branch of Marwako Fast Food Limited indicate that there was substantial microbial load (pathogens), which may be associated to the food borne sickness reported," the FDA stated.

The Abelenkpe and La branches' samples were determined to be seriously polluted. Additionally, they discovered that all 3 facilities' food preparation sections had insufficient cleanliness and hygiene. Storage options were likewise subpar. Deep freezer temperatures were much higher than what was considered tolerable. The FDA determined that handling procedures for ingredients used in cooking, prepared food, and food items that were ready to eat were likewise very subpar.

To guarantee compliance with its sanctions and Corrective Action and Preventive Action (CAPA) implementation, the FDA continually observed Marwako restaurant branches throughout Accra (Graphic online, 2022).

2.5.2 The Food and Drugs Authority (FDA) Ghana has equipped about 95 operators and managers of Food Service Establishments (FSEs) with skills on good hygienic and catering practices, so as to address food safety concerns.

Documentation and record-keeping, as well as food law, are some of the topics discussed. A focus is placed on the necessity for FSEs to get the Food Hygiene Permit from the FDA.

Participants came from the Cape Coast Metropolis, the municipalities of Mfantseman, Assin-Fosu, Komenda-Edina-Eguafo-Abirem, Abura-Asebu-Kwamankese, and Assin North and South.

The Public Health Act, 2012, Act 851 provides that “any person who sells, prepares, packages, conveys, stores or displays for sale any food under insanitary conditions, commits an offence”.

The Act further forbids the operation of any FSE, including eateries, hotel kitchens, cafeterias, bakeries, mobile food vending operators, and food delivery services, without a valid Food Hygiene Permit.

If you do not comply, you could face fines, jail time, or both.

The activity, according to Madam Francisca Obeng, the Authority's interim Regional Head, is also a step toward reaching Sustainable Development Goal (SDG) three, which is about excellent health and wellbeing.

She emphasized the need for FSEs to have a friendly relationship with the FDA and advised the attendees to adopt the mindset of preserving public health and safety.

She demanded that all FSEs obtain their Food Hygiene Permit certifications, pointing out that any establishments operating without one were breaking the law. The statement was repeated, "All Food Service Establishments already registered with the FDA are to immediately display their certificates."

In order to protect their own health and safety, the FDA director further advised the general people to search for Food Hygiene Permits in the various enterprises before using their services.

2.5.3 Prerequisites to acquire permit

The food business owner must fill out an application form that must be acquired for a price and pay the processing fees before receiving a permit.

The Food and Drug Administration (FDA) will send a health officer or inspector to inspect the facility's premises in order to ascertain whether the Food Safety Management System (FSMS), which includes good processing, storage, distribution, quality control/assurance, safe, and clean methods, is in use.

The application will be provided with a copy of the study's findings, and if any modifications or upgrades are necessary, a Corrective Action and Preventive Action Report (CAPA) report will be issued, and the applicant will be obliged to fix the issue.

If necessary, the inspection team may conduct a follow-up inspection after the CAPA has been successfully implemented to evaluate its effectiveness.

The applicant will be informed of the decision and given the food hygiene permit if the authorized official is satisfied that all of the conditions necessary for the application have been satisfied.

The Food Hygiene Permit must be renewed annually and is only good for one year. The FDA should receive a request for renewal a month before it expires (Chapman et al., 2011).

CHAPTER THREE

METHODOLOGY

3.1 Study Area Profile (Tamale Metropolis)

A district in the Northern Region is the Tamale Metropolitan Assembly, one of 26. It is situated in the center of the Northern Region. Located in the nation's Savannah Woodland Region with an estimated population of 371,351. Tamale Metropolis covers estimated total land area of 550 km². The Metropolis is endowed with social amenities that support the well-being of the people (Service, 2013).

3.2 Research Design

The researcher used a descriptive survey approach. The study design enables the researcher to get data with the least amount of time, money, and effort (Mugenda & Mugenda, 2003). With this style of design, conclusions can be drawn about a population that has been surveyed at a particular point in time (Hall, 2011). With this approach, the researcher can measure their goals without having to change any variables (Mugenda & Mugenda, 2003). (Miller & Brewer, 2003) stated that the conclusion of the findings from a descriptive survey is based on the facts learned about the phenomenon being studied. The design may give the researcher a plethora of data, even from a large sample of respondents (Hira & Mugenda, 1999).

In other words, the main goal of this type of research is to describe the facts and characteristics of the issue under study. A descriptive survey is used by researchers who seek to learn more about a topic. (Babbie, 1990) asserts that descriptive design is used to help researchers gather data, synthesize it, show it, and interpret it in order to be more understandable.

3.3 Population

Staff from hotels and restaurants in Tamale Metropolis, Ghana's Northern Region, made up the research populations. Tamale Metropolis has 106 registered hotels and guest houses, according to official documents from the Northern Regional Secretariat of the Ghana Tourism Authority. For the investigation, the researcher chose six (6) hotel restaurants. The population is the total set of people, things, or events that share some observable characteristics (Mugenda & Mugenda, 2003).

3.4 Sample Size and Sampling Technique

3.4.1 Sample Size

A sample, according to (Keller & Yeaple, 2009), is a group chosen from the population. As a result, smaller portions of a unit sample are chosen to represent the pertinent characteristics of the units as a whole (Graziano & Raulin, 1997). (Miller & Brewer, 2003) used the formula for determining sample size to remove bias. Thus:

$$n = \frac{N}{1 + N(\alpha)^2}$$

Where n is the required sample size, 1 is a constant, N is the population, and α is either the significance level or the error margin. In order to have a fair and representative sample size, it is set at a 90% confidence level (at a 0.1 significance level). Below is a calculation of the sample size for Ma's Hotel Restaurant, which employs a total of 18 people.

$$n = \frac{18}{1 + 18(0.1)^2} = 15.254 \approx 15$$

The remaining sample for the remaining category's employees is calculated in Table 3.1. Thus, 96 participants were included in the study.

Table 3.1: List of Hotel Restaurants in the Tamale Metropolis

| Restaurant | No of Staff | Sample |
|-------------------------------------|--------------------|---------------|
| Ma-s hotel restaurant | 18 | 15 |
| Regal hotel restaurant | 11 | 10 |
| Mum hotel restaurant | 14 | 12 |
| Modern City hotel restaurant | 43 | 30 |
| Picornia hotel restaurant | 13 | 12 |
| Mariam hotel restaurant | 21 | 17 |

Author Construct, 2021

3.4.2 Sampling Technique

By focusing on data from a subgroup rather than all cases or elements, sampling methodology offers a variety of ways that let you limit the amount of data you need to collect. The study's sampling method was practical. The researcher chose a convenient sampling method because she thought it would save her time and be practical. It helped the researcher choose participants for the sample who were available and enthusiastic about answering the questions during the time the study was being done. The hotel restaurants were carefully chosen based on their proximity to the researcher, their location, and whether or not the management agreed to participate in the study. The personnel was chosen using the purposeful sample technique because they are in a position to share their opinions on the topic and have some awareness of the activities and services offered by the restaurants. Restaurant managers, chefs, waiters, and cooks were among the hotel restaurant staff members who participated in the survey.

3.5 Data Collection Instruments

Data collection tools included a survey and an observational guide.

3.5.1 Questionnaire

To gather information from the respondents for the study, questionnaires were used. One cannot overstate the value of a well-designed questionnaire that elicits accurate and trustworthy information from respondents while also making analysis and interpretation easier (Freitas et al., 2014). The responses ranged from strongly agree to strongly disagree for each of the closed-ended questions. The analysis was greatly simplified by the closed-ended questions. Additionally, the survey is self-administered, giving respondents plenty of time to read and decide for themselves (Yeboah, 2010). In order to facilitate interpretation and reporting, it is also simple to code and analyze.

3.5.2 Observations

While distributing the questionnaire and conducting the interviews, the researcher was also observing the area around the chosen restaurants to verify some of the responses provided by the respondents and to ensure that the restaurants' hygienic standards were indeed confirmed. The researcher also keeps track of observations regarding how the staff and visitors use the various amenities at their disposal in terms of adherence to hygiene norms. This is done to ensure that issues that the questionnaire missed but are crucial to the research are noted for further examination.

3.6 Coding

The procedure of editing and coding was taken into consideration to make sure that all responses are coherently and logically recorded to provide consistent information to ease the

comprehension of phenomena and cross-check the data obtained. Tables were afterwards used to examine and interpret the descriptive analysis of the survey responses, which were initially presented as frequency of replies and percentages.

3.6.1 Editing

The editing made it easier for the researcher to go over the data, look for any mistakes or omissions, and fix them as needed. To verify the completeness, accuracy, consistency, and comprehensiveness of the acquired data, this was accomplished through examining, inspecting, correcting, and updating the data.

3.6.2 Data Presentation

Data were presented using tabular presentations to show frequency and percentages. The graphs show the statically occurring frequency of answers to specific queries. Data analysis was done by the researcher using SPSS software, and tables and graphs were utilized in the presentations. Graphical representations enable quick and straightforward comprehension of the study interpretations for the phenomenon under investigation.

3.7 Data Collection Procedure

All the chosen hotel restaurants in the Tamale Metropolis, where the study was conducted, received introductory letters. The restaurants' manager was asked for approval. Following his introduction, the student guaranteed the respondent of anonymity. The questionnaires were sent to the managers and employees of the various restaurants, who were informed by the researcher that they were not required to participate in the study and might opt out at any moment. The procedure is repeated until the study's sample is finished.

3.8 Pretest

At the Sagnarigu Municipal, the researcher ran a preliminary test. Based on the population's similar traits, the Municipal was chosen. Two field assistants administered the initial questionnaire models. A day of instruction on the instruments was given to the field helpers. In order to find issues related to question wording, format, and relationship, the questionnaire schedules were given to a representative sample of 10 respondents. Pre-test research found inconsistent and inaccurate answers to some questions, suggesting that some of the questions may not have been correctly phrased or translated to elicit the desired replies.

3.9 Ethical Consideration

Confidentiality, privacy, anonymity, and informed permission are all ethical concerns for research. Any research project must consider ethical issues because it is against the law to conduct research in an unethical manner (Mugenda & Mugenda, 2003). The ethical question was carefully considered in this work. The University of Education, Winneba granted permission for the study. Before filling out the questionnaire, the restaurant's personnel and managers were asked to read an informed consent. However, because they believed they may be held accountable for the information provided, respondents were unable to sign the informed consent form. Others did not want their identities revealed for personal reasons.

3.10 Data Analysis

Analysis, according to (Burman et al., 2005), is the capacity to deconstruct facts and make clear the nature of each component portion and their interrelationship. Qualitative and quantitative data analysis are the two main methods of data analysis. However, this study used a quantitative approach to analyze the data. Statistical analysis of the acquired data was performed using Excel and the statistical package for social science (SPSS). Inferential

statistics were employed to describe the phenomena and analyze the study's variable once all of the collected data had been coded and entered into a computer using the SPSS template.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Socio-Demographic Characteristics of Respondents

The socio-demographic information in this section includes the gender, age, marital status, and other sociocultural information that is pertinent to this study for the respondents who took part in the research.

Table 4.1: Socio-demographic Characteristics of Respondents

| Input Description | Frequency | Percentage |
|--------------------------|------------------|-------------------|
| Gender | | |
| Male | 39 | 41 |
| Female | 57 | 59 |
| Total | 96 | 100 |
| Age | | |
| 20-29 | 28 | 29 |
| 30-39 | 49 | 51 |
| 40-49 | 15 | 16 |
| 50-59 | 4 | 4 |
| Total | 96 | 100 |
| Marital status | | |
| Married | 60 | 63 |
| Single | 24 | 25 |
| Separated | 6 | 6 |
| divorced | 6 | 6 |
| Total | 96 | 100 |

Source: Field Survey, 2021

Male and female participants in the study made up 39 and 41 per cent of the total, respectively and 57 and 59 per cent, respectively.

Gender data show that women are more involved in the catering industry than their male colleagues. In a Muslim-dominated area like Tamale Metropolis, it should be acknowledged that more men are being given attention in employment related to the hotel industry.

The gender pay gap is also narrowing in relation to employment. The reality remains, nonetheless, that women are leading the field of catering.

According to a study by (Worsley & Lea, 2008) men and women with lesser levels of education are more likely to be concerned about food safety, which is the opposite of the traditional perspective on the relationship between gender and cleanliness. Part of an individual's socioeconomic standing is indexed by their level of education (SES).

The age range of respondents was also disclosed by the study. The findings revealed that 28 respondents, or 29 percent, were between the ages of 20 and 29, 49 respondents, or 51 percent, were between the ages of 30-39, 16 percent, between the ages of 40 and 49, and 4 respondents, or 4 percent, were between the ages of 50 and 59.

For the future of the restaurant industry in the tamale metropolis, the study on respondents' ages is encouraging. Restaurants in hotels in Tamale Metropolis will have experienced workers on the job for a long time with a percentage of 64 between the ages of 30-49. This will lessen the pressure of allocating extra funds for hiring and retraining new employees.

According to the study's findings on marital status, 63 percent of respondents were married, while 25.0% were single. As seen in the table, it once more revealed that 6% of respondents were divorced and 6% of respondents were separated.

37 percent of people say their marital duties do not affect their ability to do their jobs. As a result, consistency and long hours of work, which are typical in the restaurant industry, are guaranteed.

There may be solutions to the difficulties that the 62 percent of married restaurant employees are expected to present.

4.2 Educational Status of Respondents

The study also found that 28.10% of respondents had a diploma, 40.50% had a first degree, 9.40% had a master's degree, and 22% had an HND.

Figure 6's data provide reassurance. The six eateries chosen for the study all contained staff members who had some form of schooling. According to the graph, people with educational backgrounds ranging from a diploma to a master's degree can read food labels and instructions (oral and written) and comprehend them. Additionally, it will help prevent the purchase and use of expired raw materials, which are likely to result in food poisoning. The graph makes it obvious that such an exclusive group of educated restaurateurs will practice proper cleanliness. (Ababio & Lovatt, 2015a) research on the impact of education on food handlers' cleanliness habits in Ghana supports this. They discovered that respondents' levels of education had an impact on respondents' hygienic practices. To help reduce food contamination, it is advised to wear protective clothes (aprons, hand gloves, and hairnets) during food preparation and service. A bigger percentage of respondents—across all levels—used aprons as a single piece of clothing, while the percentages fell with increasing levels of education. Without the use of protective garments while serving food, both the population and educational level increased.

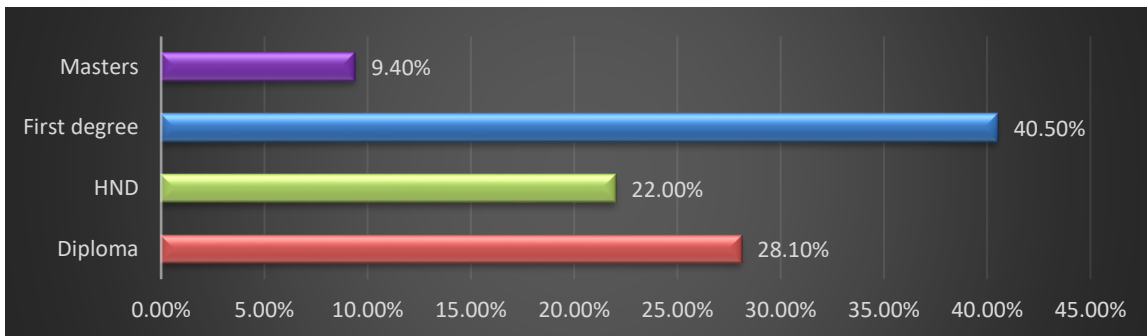


Figure 4.1 Educational Status of Respondents

Source: Field Survey, 2021

4.3 Hygiene practices of hotel restaurants in Tamale Metropolis

Table 4.2: Hygiene practices of hotel restaurants in Tamale Metropolis

| S/N | Statement | N | Min | Max | Mean |
|-----|--|----|-----|-----|------|
| 1 | Production unit located far away from polluted areas, open space, pest infestations and/or areas where solid or liquid waste cannot be removed effectively | 96 | 1 | 5 | 4.43 |
| 2 | A traceability system in order to identify and trace the origin of the products is available and implemented | 96 | 1 | 5 | 4.17 |
| 3 | Hygiene practices of restaurant staff are standard | 96 | 1 | 5 | 4.15 |
| 4 | Pest control procedure in place and implemented by qualified personnel | 96 | 1 | 5 | 4.06 |
| 5 | Waste management procedures available and waste sorted appropriately | 96 | 1 | 5 | 3.73 |
| 6 | There exist good production and packaging practices, supplies, facilities and with maintenance schedules | 96 | 1 | 5 | 3.37 |
| 7 | Production unit have adequate storage places (stores to stock the products and/or storage area for products) against contamination and damage | 96 | 1 | 5 | 2.77 |
| 8 | All products are stored in areas with suitable temperature and humidity condition and FIFO practiced | 96 | 1 | 5 | 2.53 |
| 9 | The products are transported in customized refrigerated trucks/vehicles/containers, in compliance with hygiene and safety conditions | 96 | 1 | 5 | 2.17 |
| 10 | Waste management plan throughout the production unit available and hazardous waste appropriately treated. | 96 | 1 | 5 | 1.36 |

Source: Field Survey, 2021

They discovered that respondents' levels of education had an impact on how people behaved in terms of hygiene. To assist avoid food contamination, it is advised that people prepare and serve meals while wearing protective clothes (aprons, hand gloves, and hairnets). Despite the percentages declining with increasing degree of education, more respondents overall utilized aprons as a single piece of clothing. When protective equipment was not worn when serving food, both the number of people and their educational level increased.

According to the respondents, there are insufficient storage facilities that hinder the promotion of sanitary measures in the restaurant. As a result, statement 7 had a mean rating of 2.77. Although they have storage facilities, further investigation of this claim revealed that they were insufficient and did not permit the separation of items, therefore they could not ensure contamination. Given the high cost of electricity, it makes sense that these facilities would constantly seek to operate the fewest amount of freezers possible to save their power costs.

With a mean score of 1.36, the respondents to the survey disagree with statement 10 (available waste management plans for each production unit, and proper handling of hazardous waste). The eateries don't generate hazardous garbage, which explains why. Second, while there isn't a defined strategy for managing waste water, there are garbage bins for waste collection companies to use in collecting solid waste.

With a mean score of 1.36, the respondents to the survey disagree with statement 10 (a waste management plan is available for the entire production unit, and hazardous waste is properly disposed). Because the eateries don't generate hazardous garbage, this is the case. In contrast

to the lack of a precise plan for waste water management, there are waste containers for the collection of solid trash by waste collection companies.

With a mean score of 1.36, the respondents in the survey disagree with statement 10 (available waste management plans for each industrial unit, and proper handling of hazardous waste). Due to the restaurants' lack of hazardous waste production, this is true. The management of waste water, on the other hand, lacks a coherent strategy, however there are garbage bins for the collection of solid waste by waste collection companies.

With a mean score of 4.15, the respondents agreed with statement 3 (restaurant worker hygiene practices are standard). This indicates that respondents believe hotel restaurant staff members fulfill some basic standards based on the survey's overall score. During certain trips, it was noticeable that some staff members adhered to the most fundamental cleanliness etiquette. For instance, several staff members wore nasal masks to protect their faces while administering the questionnaire, and their hands were wrapped in plastic gloves that reached their wrists.

Furthermore, respondents concurred with claims 4 as well. Further conversations with respondents revealed that although the hotel's restaurants had pest management processes in place, they lacked qualified staff to handle pests. On the measuring scale, this item received a mean rating of 4.06. This may be understood from the researcher's observations of two distinct occasions where fumigation companies were spotted getting ready to fumigate in a restaurant in the Metropolis. The respondents argued that routine pest treatment keeps eateries free of pests. As a result, there is no longer a chance that food may become contaminated by bugs.

Respondents weren't sure about statements 5 and 6, though. On the measuring scale, these statements' average scores fell between 3.73 and 3.37, or uncertain. Since waste was not separated at their facilities and there were no documented waste management procedures, they were initially unclear about statement 5. As a result, statement 5 had a mean rating of 3.73. Although there existed a production system, it wasn't perfect and still had its share of problems. The mean score for this was also 3.37. Statement 6 is related in a close manner. Statements 5 and 6 raised questions among responders, nevertheless. These statements' average scores fell between 3.73 and 3.37, or uncertain on the measuring scale. They were initially unsure about assertion 5 because there was no trash sorting at their sites and no documented waste management procedures. Therefore, statement 5 received a mean score of 3.73. Although there was a production system, it wasn't perfect and was still plagued with problems, it was observed. Similar to before, this had a mean rating of 3.37. Statement 6 is closely related.

Furthermore, with a mean score of 4.43, respondents agreed with statement 1. Regarding claim 1, restaurants had a pretty good manufacturing unit, which prevented infestations since there were established, routine procedures for eradicating bug infestations. Respondents made the case that rats and insects are attracted to dirty water and solid waste that has been mixed with liquid waste. Such waste water is placed far from the restaurant's production area, keeping the establishment free and secure from pest infestation. Accordingly, (Organization, 2001) advised against conducting primary food production in regions where the presence of potentially dangerous compounds would result in an unacceptable level of such substances in food. The fundamental fact is that contaminated hands, wiping cloths, utensils, and cutting boards can spread dangerous bacteria from soil, water, and animals into

food, leading to food related illnesses. Additionally, (Fishbein & Ajzen, 1976). According to the idea, an individual's behavioral intents and behavioral beliefs connecting the activity to various outcomes and other traits are shaped by their attitude toward conduct, subjective norms, and perceived behavioral control. A person's attitude is defined as their positive or negative assessment of their own performance of a certain behavior, which is based on the entire range of available options. Additionally, the Theory of Planned Behaviour by (Fishbein & Ajzen, 1976), which supports the procedures used in hotel restaurants. According to the idea, an individual's behavioral intents and behavioral beliefs connecting the activity to various outcomes and other traits are shaped by their attitude toward conduct, subjective norms, and perceived behavioral control. A person's attitude is defined as their positive or negative assessment of their own performance of a certain behavior, which is based on the entire range of available options.

4.4 Staff knowledge and utilization of restaurant facilities

Table 4.3 Staff knowledge and utilization of restaurant facilities

| S/N | Staff and facilities hygiene issues | N | Min | Max | Mean |
|-----|---|----|-----|-----|------|
| 1 | Knives are clean almost after every activities | 96 | 1 | 5 | 4.44 |
| 2 | Use of vegetable knives pastry cutters | 96 | 1 | 5 | 4.44 |
| 3 | Plumbing work for water flow is neatly done | 96 | 1 | 5 | 4.43 |
| 4 | The toilet should be well ventilated | 96 | 1 | 5 | 4.42 |
| 5 | Door handles are clean with required sanitizer | 96 | 1 | 5 | 4.42 |
| 6 | Outlet for dirty water flow is neat and clear | 96 | 1 | 5 | 4.41 |
| 7 | Workers should have access to clean toilets | 96 | 1 | 5 | 4.32 |
| 8 | Working table surface is clean after every activity | 96 | 1 | 5 | 4.28 |
| 9 | Use of food processing devices such as blender and eggs slices | 96 | 1 | 5 | 4.17 |
| 10 | Transporting raw food from farm gate to kitchen are done with specifications | 96 | 1 | 5 | 4.16 |
| 11 | A plan for maintenance and cleaning is provided and cleaning frequencies. | 96 | 1 | 5 | 4.16 |
| 12 | Cold and controlled atmosphere storage should be maintained | 96 | 1 | 5 | 4.13 |
| 13 | Production unit have staff facilities for washing hands with soap and clean water | 96 | 1 | 5 | 4.11 |
| 14 | There should be a separate container for food waste and toilet waste (roll) | 96 | 1 | 5 | 4.09 |
| 15 | Clean, neat and clear Ceiling | 96 | 1 | 5 | 4.03 |
| 16 | Chopping boards are always clean and neat | 96 | 1 | 5 | 3.51 |
| 17 | Checking of food temperature to meet international standard | 96 | 1 | 5 | 3.49 |
| 18 | Water sources for cooking are of standard | 96 | 1 | 5 | 3.47 |
| 19 | Hygiene rules are properly applied and displayed such as do not smoke, do not eat or drink, do not chew gum, keep fingernails short | 96 | 1 | 5 | 3.47 |
| 20 | Windows are clean and open for ventilation | 96 | 1 | 5 | 2.34 |
| 21 | Walls and floors do not have cracks | 96 | 1 | 5 | 2.31 |
| 22 | Customized van for transporting cooked food | 96 | 1 | 5 | 1.46 |

Source: Field Survey, 2021

The purpose of objective two was to increase staff understanding of how to use restaurant equipment to improve excellent sanitary standards in Tamale Metropolis hotel restaurants. Respondents concurred with assertions 1, 2, and 3 in order to assess their level of expertise in these areas. A mean score of 4.44, 4.44, 4.43, and 4.42 on the measuring scale, respectively, indicated respondents' agreement. Regarding statements 1 and 2, respondents concurred that pastry cutters, vegetable knives, and knives are all close in comparison. They quickly added that after every activity, this equipment needs to be cleaned. Respondents added that cross-contamination is avoided by thoroughly washing knives before using them to chop green vegetables, pastries, and cooked items. As a result, by skipping the washing process, bacteria might be transferred from contaminated food to uncontaminated food. Similarities in the mean score (4.44) between the two statements demonstrate that respondents have a broad understanding of how to handle restaurant equipment in a hygienic manner.

Respondents concurred with statement 3 regarding the distribution of clean water throughout the restaurant. The statement received a mean rating of 4.43 on the evaluation scale. Plumbing work for water flow was seen to be perfectly completed. Additionally, respondents claimed that providing water to every area of the restaurants had improved operational efficiency. Additionally, it makes sure that locations where food is produced have access to clean, contaminant-free water. The statements 3 and 6 are interconnected. Regarding the flow of contaminated water outside the restaurant, respondents agreed with statement 6. According to the respondents, deep pitch is dug away from restaurant activities. Then, plastic pipelines are extended to dump unclean water into it. Again, respondents expressed the

opinion that dumping filthy water relieves restaurant operations from having to worry about flies, rats, and insects poisoning food.

A well-ventilated, clean restroom should be available to restaurant personnel, according to respondents in conversations about points 4 and 7. Respondents indicated that a well-ventilated toilet keeps off smell that may originate from toilets with a mean score of 4.42. Therefore, it might be argued that precautions were taken to improve staff members' personal hygiene who would eventually use the restrooms, such as installing vents above toilets' roofing levels and placing toilets' manholes a respectable distance from the building. On the other side, a mean score of 4.32 for the cleanliness of restrooms in restaurants indicated that respondents agreed with statement 7. The ability to continue working in a secure environment is given to restaurant personnel by clean restrooms. Additionally, it assures that there is no chance of food contamination in unclean restrooms or restaurant personnel becoming infected with toilet dirt.

The mean scores for the answers to statements 5 and 8 were 4.42 and 4.28, respectively. Respondents concurred with statement 5 that it is crucial to clean restaurant door handles. They contend that both staff members and customers frequently use door knobs. Bacterial carriers are another possibility. Respondents completed their arguments by saying that using sanitizer to clean restaurant door handles removed any potential bacteria that might be present and might contaminate food when handled by customers or workers. Regarding statement 8, respondents said that the surfaces of working and eating tables and chopping boards make up the majority of the equipment utilized in their operations. Working surfaces are a breeding ground for bacteria, according to the researcher's interactions with respondents. Cross contamination may occur on surfaces that haven't been thoroughly

cleaned following one activity. Statement 16 slightly disagreed with statement 8 in stark contrast. Despite being a piece of equipment whose surface is frequently utilized, respondents claimed that cutting boards are rarely cleaned. Additionally, respondents hinted that using subpar cutting boards slows down their productivity. Because chopping boards are inadequate, it is customary to wash them only once, at the conclusion of the day's cooking. One cutting board is implied for each activity of food processing, which encourages contamination.

Additionally, propositions 9, 10, and 11 are given measurement scale scores of 4.17, 4.16, and 4.16, respectively. Respondents concurred with statement 9 that using food preparation equipment eliminates frequent touch of bare hands with food. They continued by saying that excessive handling of food can foster the growth of bacteria. It might therefore result in food poisoning. Respondents agreed with statement 10's assertion that raw materials (food) are delivered to restaurants in accordance with their requirements, giving statement 10 a mean score of 4.16. According to this, grains and other dry food items were transported in unrefrigerated trucks with their tops covered, whereas fresh fruits, vegetables, meat, and fish were supplied under refrigeration and cold storage conditions. Once more, respondents said that the aforementioned stops food from getting wet from dew or rain, drawing in foul odors, or becoming infected. (Clarke et al., 2002) noted that due to the high survival of *Salmonella typhimurium*, surveillance was extremely important. Foods of bovine origin that were uncooked or insufficiently cooked were most frequently to blame, particularly undercooked ground or minced beef and unpasteurized milk. The eating of raw or minimally processed fruits and green leafy vegetables was also linked to a number of outbreaks.

Statement 12 is complementary to statement 10 in the requirements for transferring food from the farm gate to the kitchen. With a mean score of 4.13 on the temperature requirement for fresh meat, fish, and some fresh vegetables, respondents concurred with statement 12. The statement in question 12 was further questioned, and the results showed that the control and maintenance of the meals obtained in frigid and chilly settings is in place. The respondents said that following statement 12's logic would encourage serving clients of hotels and restaurants with safe meals. In order to prevent this, food must be kept at the proper temperature so that bacteria cannot thrive and eventually multiply to contaminate it. According to a study by (Nerín et al., 2007), *E. coli* 0157:H7 prefers a temperature of about 37°C to thrive at, and it won't grow at anything lower than 8°C to 10°C. *E. coli* 0157:H7, on the other hand, was resistant to freezing. *E. coli* 0157:H7 was noted as being more acid resistant than other *E. coli* strains, according to the study.

On the measurement scale, statements 11 and 13 had mean scores of 4.16 and 4.11, respectively. Respondents concurred with the statement on how frequently hotel restaurants are cleaned. Additionally, they mentioned that cleaning is done both before and after daily operations start. A cleaning process typically lasts at least an hour. In addition to the daily cleaning routine, a fortnightly as well as thorough quarterly cleaning is carried out, according to research participants' ongoing interactions with researchers. But when asked to produce a document outlining their intended cleaning schedule, they refused. Respondents concurred that handwashing stations fully equipped with clean flowing water are established at strategic locations with regard to the handwashing practice in the restaurant. Alongside the handwashing sinks is a bottle of liquid soap that can be used. Again, respondents said that tissues and towels were provided for drying hands after washing. During the researcher's

visit to distribute the questionnaire, a chance to use the restaurant restroom presented itself. The respondents' understanding of how facilities might improve cleanliness standards was confirmed at this point.

Respondents agreed with statement 14 on the provision of separate containers for food trash and toilet waste (roll), giving it a mean score of 4.09 on the measuring scale. They both agreed that there are separate containers for restaurant rubbish. The inclusion of such a remark in the questionnaire startled the respondents. Despite their disagreement, they went on to say that it was unacceptable for a hotel restaurant to have just one container for both food trash and bathroom waste.

Participants concurred with statement 15. The majority of respondents agreed with this statement, as evidenced by their mean score of 4.03 on this question. Gypsum boards and Plaster of Paris (P O P) are the materials used in the construction of hotel restaurant ceilings, it was discovered through contacts with respondents. According to responders, this form of ceiling does not flake such that fragments fall into food. In addition, they claimed that P O P adds beauty to the hotel restaurant in addition to its function of enhancing food safety and hygiene thanks to its shiny, smooth, and compact appearance.

In general, those surveyed agreed just a little bit with statements 17, 18, and 19. The three assertions had corresponding mean scores of 3.49, 3.47, and 3.47. According to findings on statement 17, respondents only modestly agreed that maintaining food at the proper temperature would help the United States comply with international norms. It was discovered that measuring the temperature of hot food is being done without the necessary tools, a food thermometer. Therefore, it can be argued that respondents have a respectable

degree of understanding regarding how to utilize the equipment in hotels and restaurants to maintain excellent sanitary practices. Once more, respondents were uncertain of the requirements for the water sources used by hotel restaurants to operate. According to respondents, Ghana Water Company Limited (GWCL) delivery of portable water to hotel restaurants is erratic, with a mean score of 3.47 on the measuring scale for statement 18. They are frequently forced to use the services of commercial water tankers, whose operations are unknown to be subject to any restrictions. They sunk boreholes to supplement their water needs in an effort to deal with the GWCL's erratic water delivery. Private water engineers that work in the borehole drilling industry, however, frequently disregard the importance of pre-testing the quality of the water to determine its suitability or otherwise. According to respondents' opinions, hotel restaurants' water standards cannot be guaranteed, which raises the possibility of contaminated cooking water.

Regarding assertion 19, the responders nodded in agreement. The respondents' average score of 3.47 indicates that they were uncertain about the cleanliness standards that were posted in hotel restaurants. They argued that although management verbally reminded workers on a regular basis to follow hygiene requirements, the guidelines were not printed up and put on the walls of the workplace. Humans have a tendency to forget things. A flaw in maintaining excellent hygiene standards is the absence of printed hygiene guidelines at work places to constantly remind hotel restaurant workers about hygiene. As a result, hygiene laws like the prohibition on smoking might not be followed. Respondents just somewhat agreed with statement 19 in this way. The respondents' average score of 3.47 indicates that they were not confident whether the posted hygiene regulations in hotel restaurants were accurate. They argued that although management constantly reminded workers of the need of adhering to

hygiene regulations on a regular basis, the requirements were neither in print or posted on the walls of their workspaces. Human beings are forgetful by nature. An oversight in maintaining proper hygiene standards is the lack of posted hygiene guidelines at work places to regularly remind hotel restaurant workers of hygiene. As a result, hygienic regulations like not smoking could be skipped.

Like table 4, there was disagreement with and substantial disagreement with assertions 20, 21, and 22. Mean scores of 2.34, 2.31, and 1.46 were observed for the measuring scale. Responses to statement 20 revealed that, despite being clean, windows could not be opened for ventilation. According to replies, neither glass window shutters nor sliding glass doors have a net underneath to keep insects out of hotel restaurants when they are opened for ventilation. As a result, windows are never properly aired and are always closed. They said that in hotel restaurants, hoods are placed above the kitchen to remove hot air and keep staff members dry from perspiration. Windows in the dining area have full air conditioning but are sealed. This makes hygiene practices as effective as possible. However, the personnel of hotel restaurants lacks access to fresh air that is sufficient in oxygen for the proper operation of regular bodily functions.

Additionally, respondents disagreed with statement 21's assertion that hotel restaurants' walls and flooring are free of cracks. According to the mean score of 2.31 for statement 21, the majority of hotel restaurants had cracks in their walls and flooring. According to the opinions of the respondents, the condition of the hotel restaurants may be conducive to mice, cockroaches, wall geckos, and other insects that come into contact with food, water, and equipment used in food operations. Droppings and other behaviors of unwelcome living

things that inhabit the fissures increase hygiene issues that can result in severe food poisoning.

Statement 22 is the variable measuring staff usage of kitchen tools and awareness of appropriate hygiene practices at the base of table 4.2. Significantly, the majority of respondents strongly disagreed with the statement, as seen by the mean score of 1.46. The majority of respondents said that while transporting cooked food, a multipurpose vehicle is employed. The effects of this one act could invalidate all of the hygienic precautions taken from the farm gate to the finished product. For instance, if a multifunctional vehicle is not made to match the specifications for transporting prepared food with an open top, wind could contaminate the food. Because they are so common, germs can infect food. In essence, customers who consume such meals risk getting sick.

Other researchers' investigations into restaurant sanitation problems have produced results that are consistent with those from Tamale Metropolis. (Meyer et al., 2013) assert that factors influencing food handlers' safe food handling practices are multifaceted and go beyond only their understanding of food safety. According to (Chapman et al., 2011) organizational characteristics can affect how food handlers behave in terms of food safety. Effective food hygiene and safety measures can be improved with knowledge of organizational aspects including workplace culture. It helps to reinforce the beneficial effects of customer-contact workers, who are continually dealing with clients and influencing the quality of the service. Food-borne illness surveillance is not strong enough in Africa. According to research by (Mensah et al., 2002) there are noticeably more instances of poor food hygiene in ethnic restaurants than in non-ethnic ones. The investigation revealed the lack of food hygiene training in restaurants serving native cuisine as one of the causes of the discrepancies.

Further investigation by (Kobayashi et al., 2011) revealed that the majority of restaurants in Nairobi City County had a strong positive association between environmental hygiene, personal hygiene, kitchen cleanliness, food hygiene, and waste disposal. The habits of food handlers are directly related to the sanitary issues.

4.5 Hygiene practices of hotel restaurants at pre and post certification status

Table 4.4 Hygiene practices of hotel restaurants at pre and post certification status

| S/N | Statement | N | Pre-certification status | Post-certification status |
|-----|--|----|--------------------------|---------------------------|
| 1 | Waste storage area isolated from finish products | 96 | 4.44 | 4.07 |
| 2 | Water hygiene of restaurant meet minimum acceptable standards | 96 | 4.33 | 4.33 |
| 3 | Chilling and the temperatures of perishable food commodities in the cold storage rooms are maintained and monitored | 96 | 2.42 | 3.48 |
| 4 | HACCP training of restaurant manager and team ownership of the good Hygiene Practice guide | 96 | 1.25 | 4.34 |
| 5 | Staffs are informed of and trained in following hygiene procedures and related activities before, during and after production of food. | 96 | 1.22 | 4.15 |

Source: Field Survey, 2021

The study's third goal was to compare the stated sanitary practices of hotel restaurants before and after they received accreditation. Respondents concurred with statement 1 in table 4.5 in line with this goal. The mean score for how closely responders agreed on the measuring scale was 4.44. Waste storage space and finished products are two parallel units in hotel restaurant operations, it was discovered at the pre-certification stage. In contrast to respondents' perceptions of pre certification, the mean score of the same variable decreased by 0.37 during the post certification research, bringing the mean reading on the measuring scale down to 4.07. More in-depth conversations with respondents revealed that hotel

restaurant managers permitted a time of staff self-discipline after certification. It was revealed that waste is still left quite close to final items even if isolation of waste and finish products is still done. The post-certification research was done during the self-discipline trial phase. The trend ought to cause hotel restaurants considerable sanitation concerns. This suggests that due to proximity, prepared food may become contaminated by waste.

The consistent mean score for Statement 2 in Table 4.5 is 4.33. This indicates that respondents agreed that water hygiene reached minimum acceptable levels both before and after certification. In light of this assurance of high-quality water, prospective customers will be given healthful food.

Statements 3, 4, and 5 reveal a pattern in hotel restaurant hygiene standards that has become standard in both pre- and post-certification status. A post-certification mean score of 3.48 indicates a modest agreement with statement 3, whereas a pre-certification mean score of 2.42 indicates respondents disagreed. This suggests that 1.06 have better hygienic standards observed. Speaking with respondents suggested that keeping perishables at a cool temperature was a crucial factor to take into account. The least important factors were monitoring and temperature control. However, the certifying body's teaching on keeping and monitoring temperatures of perishables prompted them to accept and use it. Thus, it can be concluded that temperature control of perishable food commodities, such as meat and meat products, fish and fish products, milk and milk products, and vegetables, significantly enhances the hygiene standards of hotel restaurants.

Additionally, pre-certification respondents vehemently disagreed with statement 4. The measuring scale's mean score of 1.25 indicates that respondents have not undergone hazard

analysis and crucial control point training (HACCP). There was no haccp team in place as a result. Although there was a hygiene practice guide for hotel restaurants, the respondents were not involved in its creation. Performance on the HACCP standard after certification showed a significant improvement, with a 3.09 difference between pre and post certification. A mean score of 4.34 was reported for hotel restaurants' performance at this period on the measurement scale. Such a score indicates that the majority of respondents felt they had received haccp training at the post-certification stage. When responders were questioned further, it became clear that they had participated in the review of the hygiene practice guide. High standards of hygiene practice in hotel restaurants will be attained as a result of haccp improvement.

Last but not least, on table 4.7 at the pre-certification status of hotel restaurants on cleanliness practices, statement 4 got the lowest mean score of 1.22. The majority of respondents vehemently denied that they had been trained in cleanliness measures before to, during, and after food manufacturing. It implies that during their employment, respondents did not receive any on-the-job instruction regarding sanitary procedures pertaining to food cooked in restaurants before, during, or after. A significant mean score of 2.93 was recorded for post-certification performance of on-the-job training, on the other hand. Respondents who earned a post-certification performance mean score of 4.15 agreed that they had received on-the-job training in hygiene procedures. Once more, they claimed to have received information about the sanitary precautions that must be taken in order to create a specific food. Respondents received information and training on hygienic measures relevant to steps in food production in light of this. Restaurants that follow good sanitary procedures will undoubtedly benefit from a large customer base.

According to a research by (G.-I. Lee et al., 2012), customers visited restaurants more frequently than those without a food safety and hygiene training program. The cleanliness level of the food outlets was seen to have improved as a result of food training programs that concentrated on employees' education and proper food handling behavior.

The study recommended using HACCP, a management method used to address food safety through the analysis and control of chemical, physical, and biological risks from procurement, raw food material manufacturing, processing, handling, and consumption in an effort to produce safe food (Hald et al., 2016).

In conclusion, there is optimism in the comparative examination of the key factors affecting hygiene practice performance before and after certification. While statement 1's hygiene performance declined after certification, statement 2 performed consistently at both levels, and statements 3, 4, and 5 saw significant increases in hygiene performance.

4.6 Challenges of hotel restaurants compliance with hygiene practices

Table 4.5 Challenges of hotel restaurants compliance with hygiene practices

| S/N | Statement | N | Min | Max | Mean |
|-----|---|----|-----|-----|------|
| 1 | Insufficient resources may pose limitations on performing operations hygienically | 96 | 1 | 5 | 4.36 |
| 2 | Lower levels of knowledge of regulatory laws and state regulatory systems | 96 | 1 | 5 | 4.32 |
| 3 | Hand washing practices after waste handling | 96 | 1 | 5 | 4.21 |
| 4 | lack of food safety knowledge | 96 | 1 | 5 | 4.11 |
| 5 | Hand washing practices after nose blowing | 96 | 1 | 5 | 4.05 |
| 6 | Lack of periodical medical check-up | 96 | 1 | 5 | 3.75 |
| 7 | Hand washing practices before preparing food | 96 | 1 | 5 | 3.51 |
| 8 | Hand washing practices in-between handling fresh and cooked food | 96 | 1 | 5 | 3.49 |
| 9 | Food safety knowledge of the food handlers were poor | 96 | 1 | 5 | 3.47 |
| 10 | Food handlers do not comply with temperature values with cooking temperature needed for the control of microbiological hazards. | 96 | 1 | 5 | 3.36 |
| 11 | Changing gloves for raw meat and fresh food | 96 | 1 | 5 | 2.37 |
| 12 | Hand drying thoroughly after hand washing | 96 | 1 | 5 | 2.36 |
| 13 | Change of utensils while cooking raw and cooked food | 96 | 1 | 5 | 2.15 |
| 14 | Shortages of skilled labor | 96 | 1 | 5 | 2.05 |
| 15 | Hand washing practices with water only after visiting the toilet | 96 | 1 | 5 | 2.03 |
| 16 | Handwashing practices after using the toilet with both soap and water | 96 | 1 | 5 | 1.63 |

Source: Field Survey, 2021

The study's fourth goal examined barriers to hygiene practice compliance. Respondents agreed with statements 1, 2, and 3 just like in table 4.7. On the measuring scale, 4.36, 4.32, and 4.21 were reported, respectively. Regarding the topic of statement 1, resources limit the use of sanitary procedures while conducting activities. The respondents concurred that, despite their readiness to work hygienically, they were hindered by a lack of resources. The respondents claimed that the provision of soap, gloves, tissue napkins, and nasal masks—all of which needed to be changed frequently—was insufficient. Statement 3 closely relates to

statement 1. With a mean score of 4.21, respondents indicated their agreement with the practice of washing hands after handling trash.

The respondents concurred that they were ignorant of state institutions and legal requirements. With a mean score of 4.32, they responded to statement 2 in emphatic agreement. They claimed that once regulators paid routine visits, it is when they first learned about several of their laws. The regulatory organizations typically conduct pre- and post-briefings while they are present at the eateries. Restaurant owners frequently have access to reports on regulator visits. More objective findings will expose information that may show respondents' lack of understanding of hygiene regulatory laws.

Additionally, the mean scores of 2.37 and 2.15 for propositions 11 and 13 show that respondents strongly disagreed with the idea of using different utensils and gloves for raw and cooked food, respectively. On the measuring scale, Statement 5 received a mean rating of 4.05. They asserted that this implies soap is a necessary resource used in concert with water to remove filth. The respondents bemoaned being forced to consume consumables for longer than necessary due to the insufficient supply of these resources. The order of hygiene practices is to wash your hands without soap after handling waste and, in some cases, after using the restroom. Overuse of gloves causes wear and tear, exposing food to handling with bare hands. Additionally, the recorded mean scores of 2.37 and 2.15 for statements 11 and 13 show that respondents strongly disagreed with the idea of switching gloves and utensils when handling raw and fresh meat. On the measuring scale, Statement 5 averaged 4.05 points. According to them, this means that soap is a crucial tool used in conjunction with water to wash away filth. The respondents bemoaned the fact that the scarcity of these resources forces them to utilize consumables for longer than is necessary. In some cases, the

order of hygiene activities is to wash your hands without soap after handling waste and before using the restroom. Gloves that have been worn out too much must be removed to handle food with bare hands.

The measurement scale gave Statement 6 a mean score of 3.75. By this margin, respondents just modestly agreed that the city of Tamale lacks routine medical examinations of hotels and restaurants. They also stated that management only performs a required medical examination of newly hired employees and only at the irregular intervals requested by regulatory organizations. Respondents made the case that employees often shoulder the cost of their own personal attempts to keep routine medical checkups. Due to this, there could be a client-caused breakout of a highly contagious disease among workers. The public may lose trust in the restaurant's ability to maintain hygiene if the entire human resource is disabled.

Mean scores of 3.51 and 3.49 for statements 7 and 8 respectively show that respondents only somewhat agreed with washing hands prior to preparing food as well as after handling both fresh and cooked food. If hands are not cleansed before starting to prepare meals, bacteria may be brought in from outside the restaurants and introduced inside the restaurants. It is possible for bacteria from fresh foods, such as meat or fish, to contaminate cooked food.

Even more so, statements 15 and 16 have a connection. Their scores of 2.03 and 1.63 on the measuring scale indicate that respondents disapproved of hand washing procedures in Tamale Metropolis hotel restaurants. They believed that when the soap used for hand washing at the restroom runs out before the end of the workday, hand washing should only be done with water. Staff members who handle cooked food after handling fresh food do so without washing their hands out of concern that they could complete the day's work with

odorous hands. According to the respondents' further comments, in the past, when the workday came to an end and the soap in the sink had run out, the workers had to wash their hands with only water. This means that by the time prepared food is served to customers, its bacteria load has increased and can cause illness when consumed. If a restaurant has a history of food-related sickness, it may face harsh penalties.

Additionally, respondents somewhat agreed, disagreed, and agreed with assertions 4, 9, and 10. The respondents admitted that they had very little expertise of food safety. Statement 9 supports statement 4 by suggesting a lack of full awareness of food workers' hygienic awareness. Statement 10 in the previous declarations confirmed that cooking temperatures for food to eradicate potential microorganisms in food are not followed. In actuality, few survey participants were able to estimate the temperature at which water boils. Food handler safety and hygiene go hand in hand. For customers of restaurants, a lack of safety understanding and a disregard for hygiene could have disastrous results. Safety issues arise, for instance, when food workers disregard the recommended cooking temperatures.

A second time, respondents disputed assertion 12. They were concerned that there weren't enough cloth and paper napkins available for staff members working in the kitchen and at the serving counter thus they worried about fully drying their hands. The hand dryers in some hotel restaurants were no longer functional. The measuring scale score of 2.36 revealed that there had not been a proper drying of the hands. It is possible for restaurant personnel to contaminate food by handling other food products with wet hands that have not been fully dried. Electrical shocks can result from handling cables that are exposed on appliances like toasters, blenders, and whisks.

Statement 14 sought to ascertain whether hotel restaurants lacked skilled labor. There are shortages, but respondents disagreed. They consequently acknowledged a lack of skilled labor in hotel restaurants. Respondents quickly added that the majority of restaurant staff lacked proper training in food handling. On a scale of 1 to 10, this variable performance is 2,05. These staff categories received on-the-job training. They were required to copy what other employees already doing the job did while conducting everyday operations. This suggests that the only skills that staff members possess are those required to prepare the common foods that are sold every day. There are limitations to the staff's understanding of dishes for events other than those hosted at the restaurants where they work. As a result, it may be claimed that restaurant staff is not adaptable in providing food and beverages due to a lack of abilities in the creation of a variety of foods.

4.8 Observation

The researcher could see overflowed garbage bins with waste blowing around. Fresh and cooked foods were sighted stored close to each other with ropes and arranged cutlery separating them.

Hotel restaurant staffs were seen gauging food temperature by placing hands on sides of food containers.

Quick transfer of sauces/soups for saucepan to be used for other purposes, changing oils used to fry fish for stir-fry and tossing of vegetables with same frying pan were some of the practices seen at the hotel restaurants.

It was also observed that hotel restaurant staff who hitherto washed hands with soap after handling waste, in between handling meat and pastry now wash hands with water only. Again, protruded fingers of restaurant staff through gloves were so visible.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Key Findings

In view of insufficient space and facilities for storing cooked and uncooked foods, they are inappropriately stored. A plan for restaurant waste treatment is nonexistent at the hotel restaurants in Tamale Metropolis. Subsequently solid wastes from the restaurants are collected by waste management companies.

It was discovered that to maintain the temperature of processed food it is being done without the necessary tools-food thermometer. Despite being a piece of equipment whose surface is frequently utilized, respondents revealed that cutting boards are rarely cleaned. Hygiene and safety conditions in transporting finish products were not complied with.

All hygienic variables assessed at pre and post certification operations of hotel restaurants had better hygienic standards observed at post certification.

Findings disagreed with changing gloves after handling meat. Inadequate cooking utensils also permitted the use of one cooking saucepan to prepare several dishes rotationally. Respondents disapproved hand washing procedure without soap at one point in their daily operations.

5.2 Conclusions

The study concluded that current hygiene standards of hotel restaurants do not make room for segregation of products and unavailability of waste treatment plant.

Cracked walls and flows of the restaurants and rare cleaning of cutting boards were worrisome.

Hygienic performance had improved after certification.

Compliance of hygienic practices was challenged by insufficient resources availability to restaurant staff and unskilled labour.

5.3 Recommendations

Adequate facilities should be provided for separation of cooked and fresh food commodities.

Thermometre for gauging food temperature be secured.

Instituting award scheme for best hygienic practicing restaurant can help sustain gains made after certification.

Admonishing restaurant staff on hand washing with soap must be enhanced.

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APPENDIX
UNIVERSITY OF EDUCATION, WINNEBA

Questionnaire

Dear Respondent,

I am currently carrying out a study for the purpose of writing a thesis as a requirement for the award of Master of Philosophy (Catering and Hospitality) degree. The topic of study is “hygiene practices of hotel restaurants in tamale metropolis, Ghana” You have been selected to participate in this study due to the importance of your information in the study. The information you provide will be used for the purpose of this study and will be treated with utmost confidentiality.

Please tick the appropriate box and where necessary supply an answer.

SECTION A: PERSONAL INFORMATION

1. Please indicate your age group.

(A) 20-29 years (B) 30-39 years (C) 40-49 years (D) 50-59 years (E) 60+ years

2. Please indicate your sex:

(A) Male (B) Female

3. What is your marital status?

(A) Single (B) Married (C) Separated (D) Divorced (E) Widowed

4. Educational level

1. Diploma/HND First Degree Masters PhD

SECTION B

Reported hygiene practices of hotel restaurants in Tamale Metropolis

Please rank the following statement on likers' scale ranging from strongly disagree to strongly

Agree Where; 1= strongly disagree 2= disagree 3= not sure 4= agree 5= strongly agree

| S/N | Statement | 1 | 2 | 3 | 4 | 5 |
|-----|--|---|---|---|---|---|
| 1 | Production unit located far away from polluted areas, open space, pest infestations and/or areas where solid or liquid waste cannot be removed effectively | | | | | |
| 2 | A traceability system in order to identify and trace the origin of the products is available and implemented | | | | | |
| 3 | Hygiene practices of restaurant staff are standard | | | | | |
| 4 | Pest control procedure in place and implemented by qualified personnel | | | | | |
| 5 | Waste management procedures available and waste sorted appropriately | | | | | |
| 6 | There exist good production and packaging practices, supplies, facilities and with maintenance schedules | | | | | |
| 7 | Production unit have adequate storage places (stores to stock the products and/or storage area for products) against contamination and damage | | | | | |
| 8 | All products are stored in areas with suitable temperature and humidity condition and FIFO practiced | | | | | |
| 9 | The products are transported in customized refrigerated trucks/vehicles/containers, in compliance with hygiene and safety conditions | | | | | |
| 10 | Waste management plan throughout the production unit available and hazardous waste appropriately treated. | | | | | |

SECTION C

Staff knowledge and utilization of restaurant facilities

Please rank the following statement on likers' scale ranging from strongly disagree to strongly

Agree Where; 1= strongly disagree 2= disagree 3= not sure 4= agree 5= strongly agree

| S/N | Staff and facilities hygiene issues | 1 | 2 | 3 | 4 | 5 |
|-----|---|---|---|---|---|---|
| 1 | Knives are clean almost after every activities | | | | | |
| 2 | Use of vegetable knives pastry cutters | | | | | |
| 3 | Plumbing work for water flow is neatly done | | | | | |
| 4 | The toilet should be well ventilated | | | | | |
| 5 | Door handles are clean with required sanitizer | | | | | |
| 6 | Outlet for dirty water flow is neat and clear | | | | | |
| 7 | Workers should have access to clean toilets | | | | | |
| 8 | Working table surface is clean after every activity | | | | | |
| 9 | Use of food processing devices such as blender and eggs slicers | | | | | |
| 10 | Transporting raw food from farm gate to kitchen are done with specifications | | | | | |
| 11 | A plan for maintenance and cleaning is provided and cleaning frequencies. | | | | | |
| 12 | Cold and controlled atmosphere storage should be maintained | | | | | |
| 13 | Production unit have staff facilities for washing hands with soap and clean water | | | | | |
| 14 | There should be a separate container for food waste and toilet waste (roll) | | | | | |
| 15 | Clean, neat and clear Ceiling | | | | | |
| 16 | Chopping boards are always clean and neat | | | | | |
| 17 | Checking of food temperature to meet international standard | | | | | |
| 18 | Water sources for cooking are of standard | | | | | |
| 19 | Hygiene rules are properly applied and displayed such as do not smoke, do not eat or drink, do not chew gum, keep fingernails short | | | | | |
| 20 | Windows are clean and open for ventilation | | | | | |
| 21 | Walls and floors do not have cracks | | | | | |
| 22 | Customized van for transporting cooked food | | | | | |

SECTION D

Hygiene practices of hotel restaurants at pre and post certification status

Please rank the following statement on likers' scale ranging from strongly disagree to strongly

Agree Where; 1= strongly disagree 2= disagree 3= not sure 4= agree 5= strongly agree

| S/N | Statement | 1 | 2 | 3 | 4 | 5 |
|-----|--|---|---|---|---|---|
| 1 | Waste storage area isolated from finish products | | | | | |
| 2 | Water hygiene of restaurant meet minimum acceptable standards | | | | | |
| 3 | Chilling and the temperatures of perishable food commodities in the cold storage rooms are maintained and monitored | | | | | |
| 4 | HACCP training of restaurant manager and team ownership of the good Hygiene Practice guide | | | | | |
| 5 | Staffs are informed of and trained in following hygiene procedures and related activities before, during and after production of food. | | | | | |

SECTION E

Challenges of hotel restaurants compliance with hygiene practices

Please rank the following statement on likers' scale ranging from strongly disagree to strongly

Agree Where; 1= strongly disagree 2= disagree 3= not sure 4= agree 5= strongly agree

| S/N | Statement | 1 | 2 | 3 | 4 | 5 |
|-----|---|---|---|---|---|---|
| 1 | Insufficient resources may pose limitations on performing operations hygienically | | | | | |
| 2 | Lower levels of knowledge of regulatory laws and state regulatory systems | | | | | |
| 3 | Hand washing practices after waste handling | | | | | |
| 4 | lack of food safety knowledge | | | | | |
| 5 | Hand washing practices after nose blowing | | | | | |
| 6 | Lack of periodical medical check-up | | | | | |
| 7 | Hand washing practices before preparing food | | | | | |
| 8 | Hand washing practices in-between handling fresh and cooked food | | | | | |
| 9 | Food safety knowledge of the food handlers were poor | | | | | |
| 10 | Food handlers do not comply with temperature values with cooking temperature needed for the control of microbiological hazards. | | | | | |
| 11 | Changing gloves for raw meat and fresh food | | | | | |
| 12 | Hand drying thoroughly after hand washing | | | | | |
| 13 | Change of utensils while cooking raw and cooked food | | | | | |
| 14 | Shortages of skilled labor | | | | | |
| 15 | Hand washing practices with water only after visiting the toilet | | | | | |
| 16 | Hand washing practices after using the toilet with both soap and water | | | | | |