

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF HEALTH PROMOTION, EDUCATION
AND DISABILITY STUDIES



ASSESSMENT OF PERSONAL HYGIENE AND FOOD SAFETY PRACTICES OF
FOOD HANDLERS AMONG SELECTED SENIOR HIGH SCHOOLS IN THE
KUMASI METROPOLIS, GHANA.

BY

ESSAW EBENEZER

SEPTEMBER, 2019

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

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BY

EBENEZER ESSAW (BSc. SPORTS AND EXERCISE SCIENCE)

**A THESIS SUBMITTED TO THE DEPARTMENT OF HEALTH PROMOTION,
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REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF PUBLIC
HEALTH IN HEALTH PROMOTION AND EDUCATION**

SEPTEMBER 2019

DECLARATION

I hereby do declare that except for references to other people's work which have been duly acknowledged, this piece of work is my own composition and neither in whole nor in part has this work been presented for the award of a degree in this university or elsewhere.

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DEDICATION

This thesis is dedicated to the honour of my dear mother, Hagar Sefah and my lovely senior siblings, Christiana Essaw, Peter Essaw, Theresa Essaw, Bro Joe and Sis Nnta for their love, patience, understanding and support given me throughout the MPH programme.

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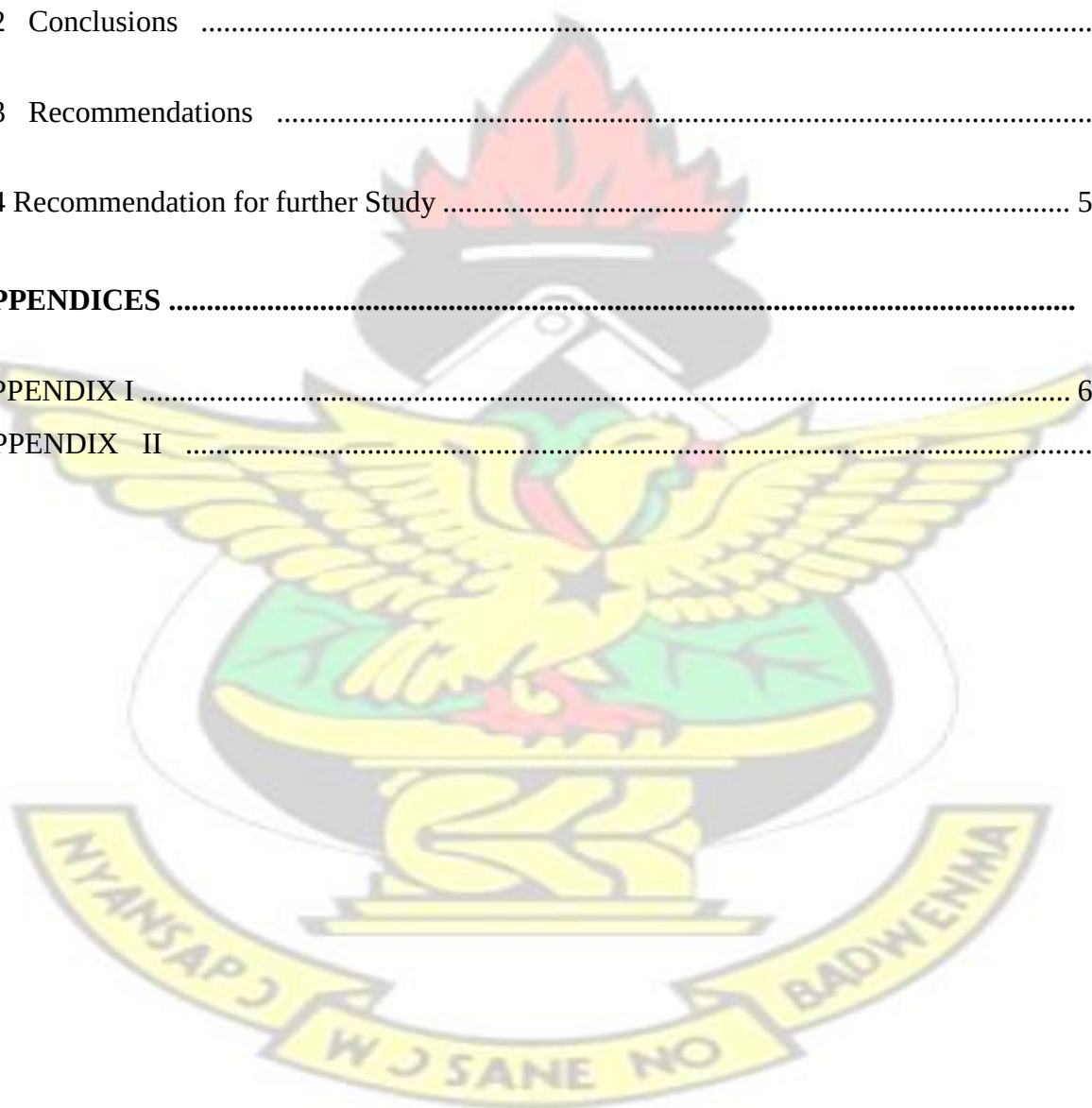
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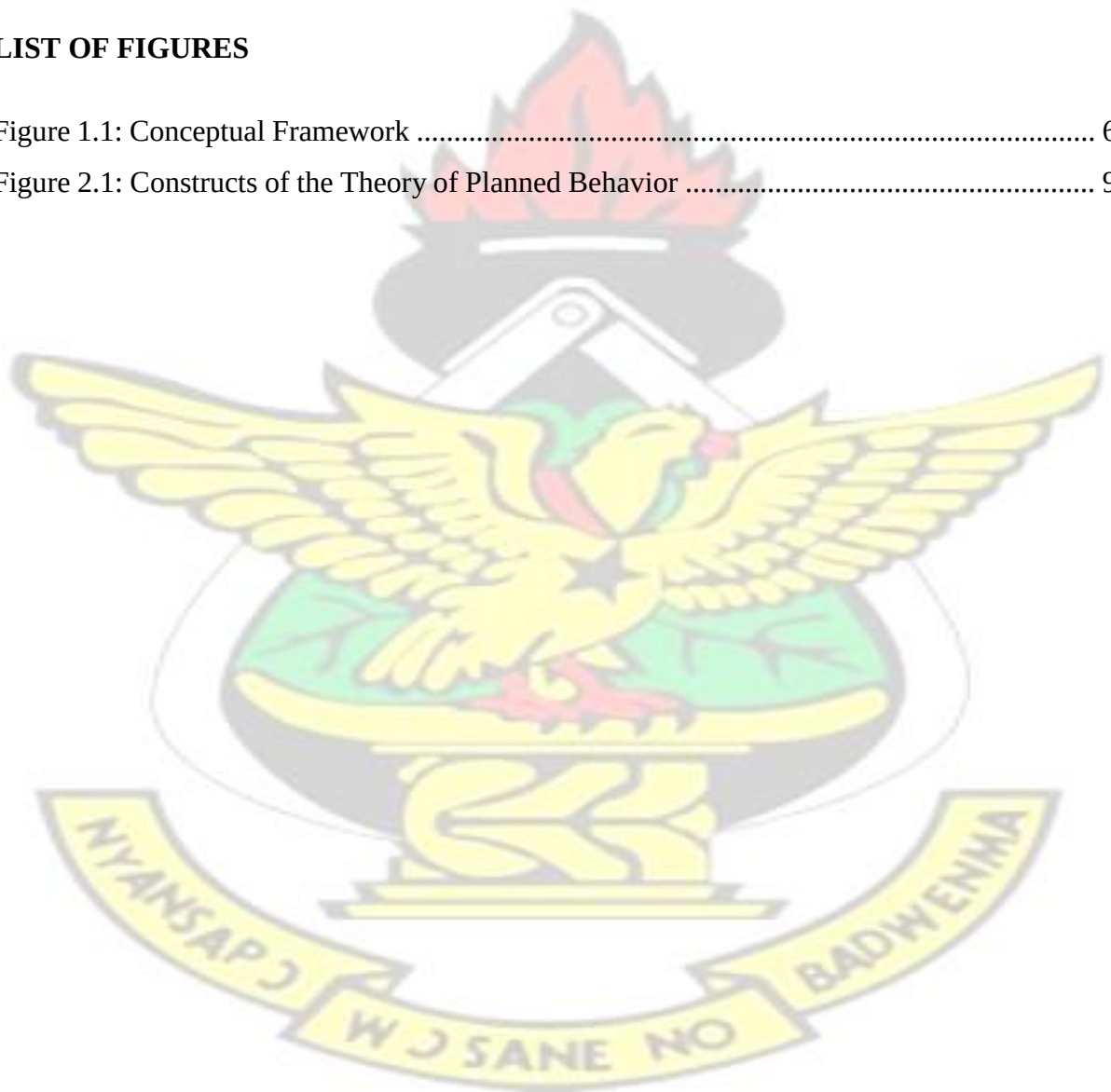


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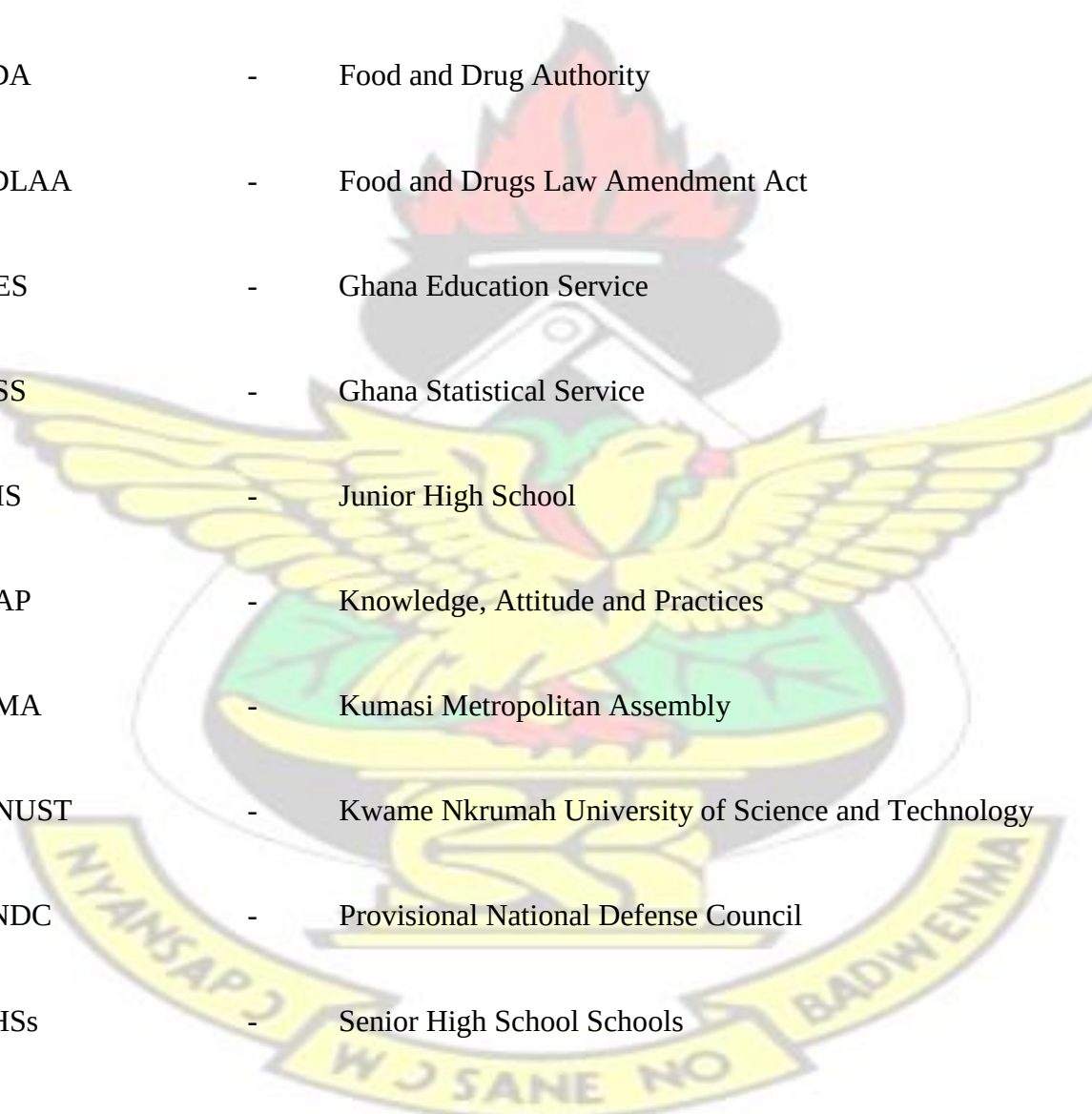
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LIST OF ACRONYMS/ABBREVIATIONS



CDC	-	Center for Disease Control and Prevention
CHRPE	-	Committee on Human Research, Publication and Ethics
FAO	-	Food and Agricultural Organization
FBDs	-	Foodborne Diseases
FDA	-	Food and Drug Authority
FDLAA	-	Food and Drugs Law Amendment Act
GES	-	Ghana Education Service
GSS	-	Ghana Statistical Service
JHS	-	Junior High School
KAP	-	Knowledge, Attitude and Practices
KMA	-	Kumasi Metropolitan Assembly
KNUST	-	Kwame Nkrumah University of Science and Technology
PNDC	-	Provisional National Defense Council
SHSs	-	Senior High School Schools
TPB	-	Theory of Planned Behavior
TRA	-	Theory of Reasoned Action
W.H.O.	-	World Health Organization

DEFINITION OF TERMS

1. **Attitude** – Attitude refers to a person's negative or positive evaluation of selfperformance of a particular behavior.
2. **Food** - Food is anything manufactured, sold or intended for the use as drink or food for human intake.
3. **Food Handler** - A food handler is as a person in food trade or somebody professionally allied with it, who in routine work comes into direct contact with food in the course of preparation, processing, packaging or distribution.
4. **Food Handling** - Food handling refers to any contact between the ingredients used for food with other objects during cooking processes.
5. **Foodborne Diseases/Illnesses** - Diseases/Illnesses acquired through the consumption of contaminated food.
6. **Food Vender** - A food vendor is one who sells food. However, a food vendor could also be a food handler or vice-versa.
7. **Food Safety** - A scientific discipline describing handling, preparation and storage of foods in ways that prevent foodborne illness
8. **Microbial Quality of food** - Microbial quality of food refers to the infections and diseases that might exist in food caused by certain bacteria present
9. **Personal Hygiene** - Involves those practices performed by an individual to care for one's bodily health and well-being through cleanliness.

ABSTRACT

Background: Cautious or accidental contamination of food in the process of large scale food preparation compromises the health of consumers and have enormous effects on a country. In ensuring food safety, food handlers therefore play crucial role.

Methods: Data were collected from 15 Senior High Schools in the Kumasi Metropolis involving 226 food handlers. Of the 226 respondents, 141 dining staff and 85 food vendors were recruited using simple random and convenience sampling techniques respectively. Methods of data analyses included both descriptive statistics and inferential analytical tools such as frequency, percentage, mean, standard deviation and chi-square test.

Results: Results from the study showed a satisfactory number ($\geq 80\%$) of food handlers having knowledge on most of personal hygiene and food safety principles. More than 90% of food handlers as well regularly engage in healthy personal hygiene and food safety practices. These healthy practices include washing of hands before and after cooking, use of an apron when cooking and protection of cooked food from insects. Also, 96.9% and 94.2% of food handlers confirmed inspection of food safety practices by Sanitary Inspectors and Food and Drugs boards respectively, however, the inspection is done occasionally. In addition, there was statistically significant association between the educational levels and reading of inscription on packed foods to know how to use or store them (0.000), eggs washed before cooking or frying (0.029), use of an apron when preparing food (0.028) as well as dishes washed with detergent and soap (0.039).

Conclusions: In conclusion, institutional bodies safeguarding food safety standards need to empower food handlers through update courses, domestic training, uninterrupted food safety education, workshops, and seminars on food safety.

Keywords: Food handler, personal hygiene, food safety, foodborne diseases.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Food is an essential basic commodity for survival at every stage of human development. It is an article attached to man since its existence. It is defined as anything manufactured, sold or intended for the use as drink or food for human intake. Notwithstanding the importance of food, it could be detrimental to health if not handled properly. Therefore, from the farmer to the consumer, food as well as any item supplementary to or make use of in the preservation, composition or preparation of any food or drink must be handled with caution. A food handler is therefore described as an individual in the food trade or someone professionally associated with it who comes into direct contact with food during processing, packaging, preparing or distribution in daily work. (Kubde *et al.*, 2016).

According to Akabanda *et al.* (2017), several food handlers in the food supply chain, are usually found in both private and public institutions such as hospitals, prisons, schools and research institutes that commonly have catering or food services where meals are served to staff or clients. Likewise, Mensah *et al.* (2002), highlighted that countless food handlers in developing countries are commercial food sellers such as the street food vendors in cities and towns which offer an indispensable service to the citizens. Not limited to large scale food preparation specified in Akabanda *et al.* (2017) but food prepared at home (Butte & Heinzow, 2002) is handled by many individuals, thus heighten the likelihood of food contamination. Cautious or accidental contamination of food in the process of large scale food preparation compromises the health of consumers and have enormous effects on a country. Mishandling food conferring to Askarian *et al.* (2014) permits the spread of microorganisms that causes illness.

Diseases acquired through the consumption of contaminated food are known as foodborne diseases and are a significant source of human diseases (Powell *et al.*, 2011). Instances of foodborne diseases described by Kubde *et al.* (2016) include diarrhea, campylobacteriosis, ascariasis, botulism, hepatitis A, norovirus infection, typhoid, salmonellosis, shigellosis, hookworm infections, food poisoning, and amoebiasis. Asogwa *et al.* (2015) and Ajala *et al.* (2010) also labeled diarrhea diseases, food allergies and food hypersensitivity as the most frequent complications brought about by the ingestion of contaminated food, predominantly in children. In most of these cases, food pathogens such as *Escherichia coli*, *Bacillus cereus*, *Salmonella*, *Hepatitis*, *Shigella*, *Brucella*, *Staphylococcus aureus*, *Campylobacter*, *rotavirus*, and enteric bacteria are known to be present (Monney *et al.*, 2013). These illnesses are important for public health, as they affect both developed nations and developing nations (Stratev *et al.*, 2017b), and everyone is susceptible (Ajala *et al.*, 2010).

Reports by the World Health Organization (WHO) on the global burden of foodborne diseases approximate that 600 million persons universally become sick of which 420,000 die following consumption of contaminated food, largely in low-income countries (WHO, 2015; Adane *et al.*, 2018). Up to 30% of the inhabitants in advanced countries suffer from foodborne diseases every single year, however, up to 2 million deaths are estimated in developing countries yearly. Moreover, people experience foodborne diseases all over the world from the food they eat each day (Tessema *et al.*, 2014). It has been a challenge to assess the actual level of morbidity and mortality of foodborne diseases, as cases are significantly underreported (Annor & Baiden, 2011).

There are varied justifications by the World Health Organization (2006) for the rise in foodborne diseases globally. These consist of decreased public awareness, crosscontamination, improper temperatures for storing and preparing food, inappropriate foodhandling, and poor

personal hygiene. In addition to these influential factors, in the absence of capacity to apply the knowledge acquired in food safety training (Powell *et al.*, 2011; Afifi & Abushelaibi, 2012).

1.2 Statement of Problem

The outbreaks of foodborne diseases exist as public health challenges to both developed and developing countries. Globally, 1 in 10 people get sick from foodborne illnesses, whereas in developing nations more than 91 million people are impacted (Stratev *et al.*, 2017a). It has been difficult in estimating the precise number of cases, as cases are considerably underreported (Annor & Baiden 2011). In spite of the difficulty to estimate the full degree and cost of unsafe food particularly the burden growing from chemical and parasitic contaminants in food, WHO reports on the global burden of foodborne diseases (FBDs) states that FBDs are a significant cause of morbidity and mortality globally across all ages.

Adding to the outbreaks of foodborne diseases from homes (CDC, 2013) and streets (Bryan *et al.*, 2016; Ahmed *et al.*, 2017), are the institutional foodborne epidemics that continue to hit the headlines in many countries signifying the failure of food handlers to observe safety practices during food preparation (Abdul-Mutalib *et al.*, 2015; Lee *et al.* 2017). Incidences documented among institutions include hospitals (Painter *et al.*, 2013), hotels (Starlander *et al.*, 2010), and schools (Ababio *et al.*, 2016; Stratev *et al.*, 2017a). The major factors contributing to foodborne outbreaks in these institutions encompassed poor personal and environmental hygiene, poor storage of food/drinks, improper food preparation methods, and the unclean hand of food handlers (Musa & Akande, 2003).

As in many other countries, foodborne diseases are a public health problem in Ghana. A review document by Ababio and Lovatt (2015) and Yeleliere *et al.* (2017) discovered that 1 out of every 40 individuals in Ghana suffer from foodborne disease yearly with more than 420,000 cases reported annually. Of this number, 65,000 people die causing a financial loss of about

\$6,900,000.00. This effect has led to studies exploring the knowledge, attitude, and food safety practices among street food vendors mainly in the regional capitals. Many of the studies reported poor food safety practices, inadequate knowledge and lack of awareness concerning food safety among food handlers. Moreover, the reviews confirmed *Enterobacter* spp., *Citrobacter* spp., *Klebsiella* spp., *Escherichia* spp., Saba and Gonzalez-Zorn as pathogens beyond normal in streets foods. Malm *et al.* (2015) and Ameme *et al.* (2016) also have reported on foodborne disease outbreaks among students as a consequence of eating contaminated food. Despite the studies on food hygiene practices in Ghana, there is limited data on food-handlers (those who prepare the school dining foods and food vendors at the school's canteen) among the Senior High Schools (SHSs) in the Kumasi metropolis. Hence the current study principally sorts to assess personal hygiene and food safety practices among food-handlers in selected SHSs in the Kumasi Metropolis, Ghana.

1.3 Research Questions

In order to meet the objectives, the following research questions were set:

1. Do food handlers have knowledge of personal hygiene and food safety practices?
2. Do food handlers engage in healthy personal hygiene and food safety practices?
3. Is there institutional set-up governing food safety standards to ensure food safety practices?
4. What is the relationship between food handlers' socio-demographic characteristics and personal hygiene and food safety practices?

1.4 General Objective

The general objective of the study assessed personal hygiene and food safety practices of food handlers (those who prepare school's dining food and food vendors at the school's canteen) in the selected Senior High Schools in the Kumasi Metropolis.

1.4.1 Specific Objectives

The specific objectives of the study were:

1. Investigate the knowledge of food handlers on personal hygiene and food safety practices.
2. Examine whether food handlers engage in healthy personal hygiene and food safety practices.
3. Examine the institutional set-up governing personal hygiene and food safety practices of food handlers.
4. Ascertain the relationship between socio-demographic characteristics and personal hygiene and food safety practices of food handlers.

1.5 Significance of the Study

The study has brought to light the conditions of foods served to students from the sampled schools in the Kumasi Metropolis. The level of risk which food handlers pose to students' health may as well be deduced from the study. Public health officials would be made aware of the effectiveness of the established policies and monitoring roles in food safety standards through the findings of this study. Measures to improve knowledge, food safety practices and address unsafe food handling practices identified are emphasized in the study. Also, the study has contributed to the academic literature on personal hygiene and food safety practices. Finally, it has prompt further interest and research into general practices and policy issues concerning food handlers in the schools in Ghana.

1.5 Conceptual Framework

The hygienic practices (outcome) regarding personal hygiene and food safety among food handlers are a product of various factors categorized broadly as background and proximate factors. The outcome is greatly influenced by the proximate factors, however, the proximate factors are also influenced by the background factors.

The background factors comprised of socio-demographic and work-related parameters of food handlers such as the level of education attained, personal and food hygiene training acquired and the experience gained through the handling of food over time. Also, the availability of raw materials like foodstuffs and water to be used by food handlers and institutional factors including standard protocols and regulations, enforcing staff, punishment and motivational systems to ensure hygienic practices. The proximate factors mainly encompassed food handler's knowledge of personal hygiene and food safety as well as food safety equipment available. The constructs of the framework are shown in *figure 1.1*.

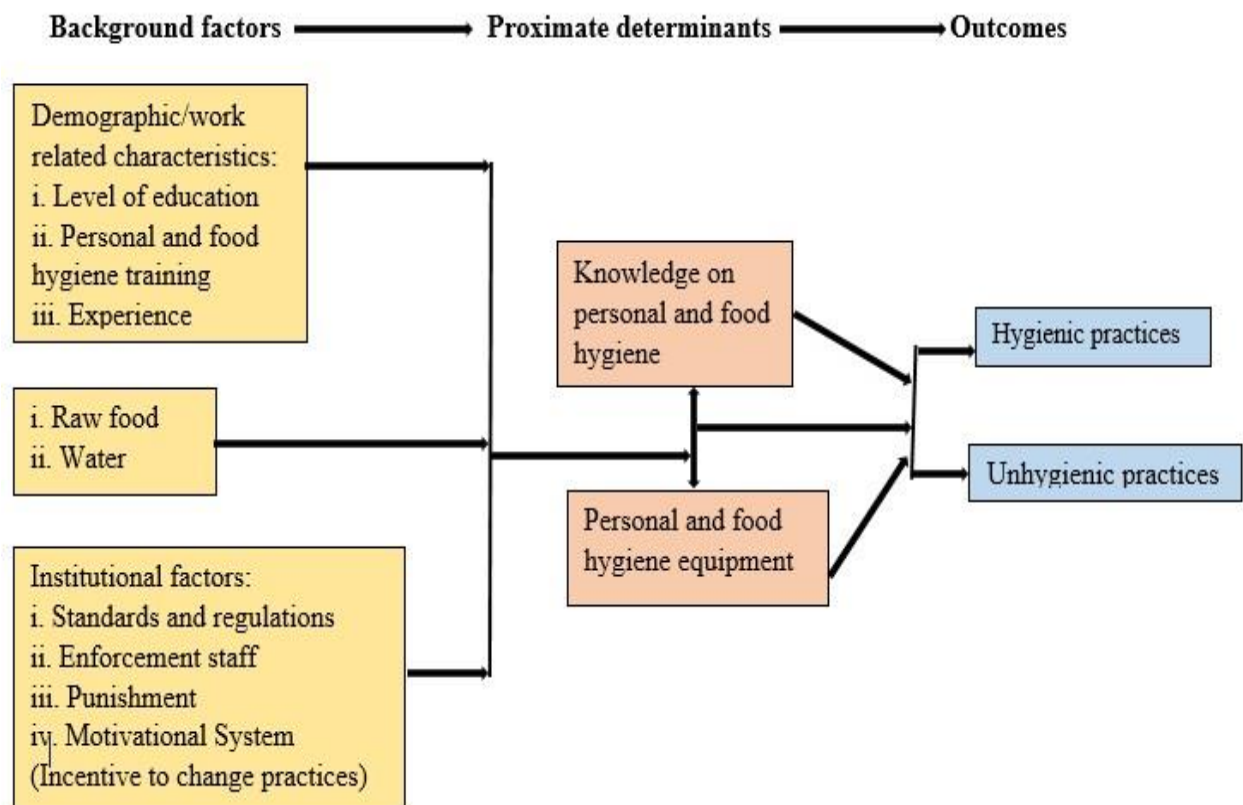


Figure 1.1: Conceptual Framework

Source: Author's construct (2019)

1.7 Scope of Study

The study focused on personal hygiene and food safety practices among food handlers in selected Senior High Schools. Food handlers' knowledge of personal hygiene and food safety practices as well as institutions set-up to ensure food safety standards.

1.8 Organization of Report

The body of the research is divided into six (6) main chapters. The rest of these chapters' outline, chapter two (2) literature reviews which review relevant literature based on specific objectives, chapter three (3) explains the study methodology, chapter four (4) presents research findings/results, chapter five (5) provides discussions and finally chapter six (6) gives the study conclusion and recommendation.



CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviewed the related literature of earlier studies conducted on personal hygiene and food safety practices to support the current study. The issues deliberated were arranged under the following topics:

- Theoretical framework (Theories of Reasoned Action and Planned Behaviors)
- Personal hygiene
- Food handling
- Microbial quality of food
- Food safety knowledge and practices
- Institutional control of food safety
- Relationship between socio-demographics and food safety practices
- Food safety practices in a learning institute

2.2 Theories of Reasoned Action and Planned Behavior

The Theories of Reasoned Action and Planned Behavior were included in this study to explain behaviors because one is an extension of the other (Ajzen & Fishbein, 1980). The Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) are concerned with the factors that influence a person's decisions about his or her behaviors. According to the theory of reasoned action, proper decisions about one's behaviors are based on information and beliefs about their actions, the outcome they expect from their actions, and the value they place on these outcomes.

The theory of Reasoned Action formulated by Ajzen and Fishbein (1980) created the path for the Theory of Planned Behavior by Ajzen (1991). About the Theory of Planned Behavior, the

constructs: attitude, subjective norm and perceived behavioral control lead to the behavioral intention of a person. The most essential component of this theory, however, is that an individual's intentions form the best predictors of actual behavior. The intention to perform certain actions reflects the person's attitudes towards a particular behavior.

A person's attitude denotes his/her negative or positive evaluation of self-performance of a particular behavior. Subjective norms refer to an individual's perception of certain behaviors and are compelled by the verdict of significant others such as teachers, friends, parents, and spouses. The third fundamental concept of the theory of planned behavior, which is perceived behavioral control is explained as an individual's perception of the ease or difficulty in performing a particular behavior. The constructs of the theory are shown in figure 2.

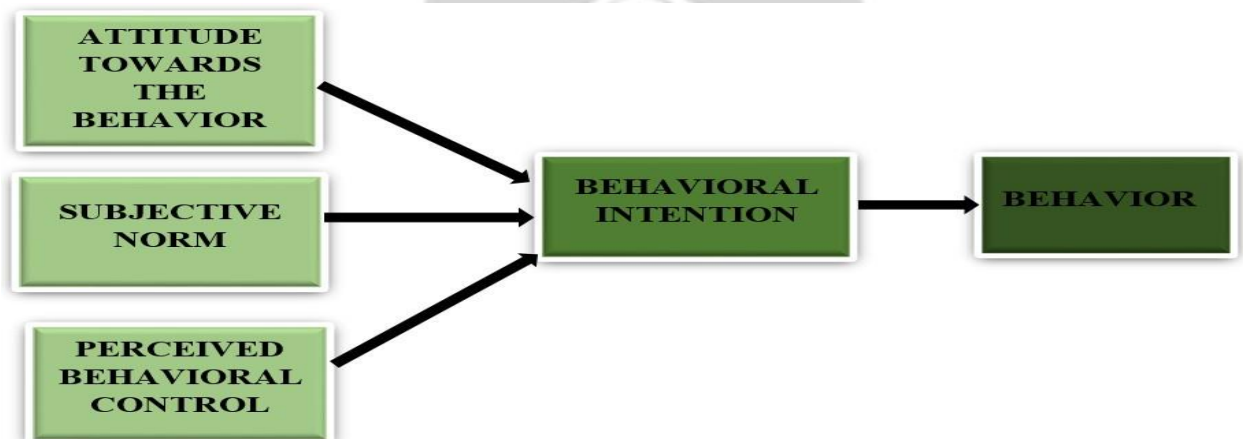


Figure 2.1: Constructs of the Theory of Planned Behavior

In the situation of personal hygiene and food safety practices, the Theory of Planned Behavior postulates that the food handler's general attitude towards hygiene would define the practices adopted by food handlers. Likewise, the food handler's perception, for instance, the importance of hygienic practices, health effects of particular cooking procedures, as well as the procedures involved in choosing certain foodstuffs, which has been formed after the influence of others, would equally inspire the hygienic personal and food quality practices.

Additionally, the easiness with which the food handlers can implement food safety measures is likewise a contributing factor of anticipated or concrete food safety practices.

2.3 Personal Hygiene

From the farmer to consumer, the practice of good personal hygiene at every stage of the food supply chain help avoid the spread of microorganisms into a food. The study by Michaels *et al.* (2004) to comprehend the dynamics involved of spreading microorganisms from food handlers into food, ascribed foodborne diseases epidemics to an infectious state of food handlers including the absence of equipment used in handling food, touching of raw food with unprotected or unclean hands and poor personal hygiene. The study also underlined poor personal hygiene as one of the highest contributing factors of foodborne outbreaks.

Studies have similarly confirmed that humans-beings are naturally transporters of microorganisms and personal hygiene lessens the threat of spreading these microorganisms into meals (Flandroy *et al.*, 2018; Akabanda *et al.*, 2017). The quality of food and the number of its microbial pathogens have also been documented to have a link with food handler's hygiene (Fung *et al.*, 2018). However, in 2006, WHO recommended that consumers and food handlers in food business should:

- Cover cuts and wound with appropriate water-resistant clothing before handling food.
- Avoid spitting, eating or chewing, smoking or coughing or sneezing over unprotected food.
- Wipe hands with none multi-use napkin or towel after washing hands.
- Habitually wash hands before handling food and often during food preparation
- Wear head wrapper when preparing food
- Wash hands after using the toilet
- Avoid using personal accessories such as necklaces, rings and among others in food handling regions

- Wear clean protective clothing

2..4 Food Handling

In a wider sense, food handling refers to any contact between the ingredients used for food with other objects during cooking processes. According to WHO (1989), food handlers play a crucial role in the quality of food and is described as an individual in the food industry or a person skillfully connected with food that comes into direct contact with part or whole food during processing, packaging, distribution or manufacturing for human consumption. Referring to the document by WHO (1989), not every food handler in the food supply chain at every point have direct contact with food, neither does everyone that have direct contact with food transfer microorganisms into food that could cause disease. Individuals capable of spreading microorganisms are those who usually touch foods with unprotected hands when working, and are consumed without additional cooking.

The contamination of food is stimulated by unsafe food handling practices by food vendors and consumers and has caused the death of millions worldwide (Fung *et al.*, 2018). Large scale food preparation according to Akabanda *et al.* (2017) upsurges the likelihood of food contamination for the reason that food is handled by several individuals. During large scale food preparation, contamination occurs either consciously or unconsciously and this poses threats to the health of consumers and immense consequences to a nation. In Accra, Ghana, evaluation of street foods by Mensah *et al.*, (2002) found a high quantity of micro-organisms in foods following improper handling of foods during cooking.

2.5 Microbial Quality of Food

The expression microbial quality of food denotes infections and diseases that might exist in food caused by certain bacteria present. Elimination of determinants of food contamination is a burden to the developed world, however, the situation is worse in developing countries due

to multiple factors ranging from how food is processed locally, poor personal hygiene and improper holding of temperatures (WHO, 2010). Foodborne diseases are primarily found in developing countries, the source is intertwined with developmental and economic problems such as infrastructure, legislation and enforcement mechanisms (Monney *et al.*, 2013; Feglo & Sakyi, 2012). Diseases and infections that are mostly reported by victims of foodborne outbreaks are diarrhea, food poisoning and hepatitis A (Kubde *et al.*, 2016) with the media as the focal source for reporting foodborne diseases (Ababio, 2015). Asogwa *et al.* (2015) and Ajala *et al.* (2010) have documented food hypersensitivity, diarrheal diseases, and food allergies as regular effects of ingesting contaminated food, mainly in children.

To enhance the quality of food and limit its microbial content according to WHO (2010) required various food hygiene practices including:

- Fruits and Vegetables should be washed before eating
- Food should be well cooked before eating
- Raw meat should be separated from other foods when storing
- Cooked food not eaten immediately should not be kept at room temperature beyond 2 hours.
- Leafy outer coats of fruits should be removed before eating
- Equipment, as well as utensils used to prepare raw meats, should be washed with soap and warm running water before using for other foods or separate equipment should be used
- Freshly prepared food not eaten immediately should be promptly kept in the refrigerator.

2.6 Food Safety Knowledge and Practices

Overcoming foodborne outbreaks has been difficult because of the complex nature of the contributing factors. Nevertheless, WHO in 2010 identified the most prevailing determinants as a low level of education and knowledge, insufficient heating or cooking of food, food obtained from unsafe sources and serve contaminated raw food. In addition to the cited factors are the country-specific practices and knowledge observed through studies.

In Ghana, food hygiene and safety research have been studied among food suppliers, particularly in regional capitals. The majority of these research specifically focused on the microbiological safety of street and commercial foods with limited information regarding institutional foods. The Ghanaian culture placed food preparation responsibilities on women and has been confirmed in studies (Ackah et al., 2011; Ababio et al., 2012). They identified that women were dominant in their demographic reports among food vendors but have a low level of formal education. Feglo & Sakyi (2012) studied street food vendors together with catering services and recounted hygienic practices to be lower than the recommended standards while microorganisms in street food were above standards.

Most of the women in a study by Mensah et al. (2002) were educated and demonstrated good hygiene practices. Monney et al. (2013) evaluated hygienic practices among food vendors from 20 basic schools in Konongo, Ghana and documented a positive adherence to food safety practices including regular medical check-up and safeguarding food from insects and rodents. The study respondents also engage in inappropriate practices of serving food, used protective wear and demonstrated good hand hygiene procedures. Intervention study (Donkor et al., 2009) among food vendors in a low-income community using the five keys to safer food by WHO detailed a significant increase in food handling practices with the level of knowledge after food safety training. Lack of equipment for storing food was the drawback of modifying behaviors among vendors. Most of Akabanda et al. (2017)'s study participants were within the age range

(41-50 years) and had a sufficient understanding of food safety practices. A greater percentage (87.7%) of food handlers agreed in the same studies that diarrhea can develop by consuming contaminated food. Furthermore, most participants reported frequently wash hands, wear gloves, wash utensils before and after use, and use detergent as good practice.

A cross-sectional study in Nigeria (Aluko et al., 2014) disclosed that most research participants were over forty years old, women, married, and at least attended high school. A higher proportion (> 70 percent) of research respondents wash their hands after using the toilet, maintain leftovers in the refrigerator, but touch raw food with unprotected hands after handling cash. Ifeadike et al. (2014) noticed a lack of cleansing agents, sanitizers, hand gloves and food temperatures that are not checked with a thermometer as part of poor hygienic practices among food handlers.

Research in the United Arab Emirates (Afifi and Abushelaibi, 2012) revealed a high level of education among food handlers (Master and Ph.D.) and knowledge of food safety. The majority of the respondents were Muslims, wash hands with warm running water and soap after using the toilet, before and after meals, after handling raw meat and usually read food safety articles. A comparable study by Ayaz et al. (2018) in Saudi Arabia confirmed a good level of knowledge concerning food poison and personal hygiene among respondents but had poor knowledge of food handling. In the same study, knowledge of food safety increased with age, level of education, monthly salary, employment status and the number of children.

2.7 Institutions to Control Food Safety

The benefits, as well as the threats food, pose to citizens is recognized. This has paved the way for the establishment of authorized bodies to control food safety issues. Regular monitoring of food to warrant its safety, wholesome and certification of food vendors by both government agencies and certain by-laws has been the controlling mechanism in Ghana. There are several

by-laws on food hygiene which usually functions at the district assembly level. The Food and Drugs Law Amendment Act 523, Food and Drugs Law (P.N.D.C.L. 305 B) together with the by-laws are there to ensure food available to consumers and the public are wholesome, quality, with reasonable prices, under hygienic surroundings (sources) plus punishments to those who violate the law.

Also, a component of the law mandates every food vendor to:

- Implement good food handling practices
- Seek approval for their structures and sites from the district assemblies before setting up food joint or business
- Seek business permit
- Obtain medical report proving healthy to operate as a vendor
- Renew vending certificate annually
- Safeguard food from all forms of infections
- Keep food one meter above the ground

Food and Drugs Authority (FDA) is the authorized Government Agency (under the Ministry of Health) liable to implement the Laws. These regulatory body safeguard consumers by making sure that anything manufactured, sold or used for food or drugs are good for consumption. A division within the FDA, specifically, the Food Division comprising of the Food Inspectorate Division and Food Safety Division regulates food safety matters.

The Food Inspectorate Division is delegated to undertake a regular inspection of food dissemination, processing, raw materials, and test finished food products for public use. Also, the division functions to ensure that vendors obtain a permit before establishing Food Business as well as inspection of vending premises. The Food Safety Division develops Food Safety Protocol or Guideline, Register and Inspect Food Joints, Restaurants, Street vending food and Catering facilities (FDA, 2013). Other regulatory bodies functioning to support the

FDA to ensure the wholesomeness of food are the Ministry of Agriculture, Ghana Tourism Board, Environmental Agency and the Ministry of Health.

Consuming safer foods is a priority for every citizen. According to Apaassongo *et al.* (2016), food low in quality, expensive and disorganized vending sites exist in unindustrialized countries because of lack of ability to separate and target formal food professionals. Food vendors from the same research disliked all forms of registration and certification despite the annual renewal period (annual renewal). Hence there were a few numbers of food vendors that have a certificate.

A study that explored food safety issues among students at the University of Cape showed that students were highly concerned about food safety issues. Respondents who were much concerned were likely to eat from restaurants regardless of the cost to unhygienic environs (Adam *et al.*, 2014). Another study conducted to evaluate the compliance to food laws among schools in the Ashanti Region, Ghana, and the United Kingdom reported disparities in significance dedicated to the laws. There was a lack of indication of food safety administration, the obligatory requirement of Food laws for the monitoring management and the absence of compulsory food safety training for food handlers from the schools in Ghana (Ababio *et al.*, 2016).

Agyei-Baffour *et al.* (2013) investigated food safety managers and food handlers on compliance with food safety standards in Kumasi metropolis. They reported that adherence to food safety principles in the metropolis was principally steered by Public Health officers, the Metropolitan Assembly, and Ghana Tourism Board while the majority of food handlers were not certified to operate in the food business. Akuu *et al.* (2017) reported fair effectiveness of regulatory bodies on food safety issues. The reasons were lack of logistics and resources and nonexistence of cooperation from the food vendors. Tomlins *et al.* (2012) documented ineffective food safety supervision structures among the locally-owned food industry to international food producers

and processors. The locally owned companies were deficient in the implementation and keeping standards that are endorsed internationally.

2.8 Relationship between Socio-Demographics and Food Safety Practices

There are various factors associated with food safety practices. Samples of these factors run through different studies. However, diverse studies have testified dissimilar determining factors linked with food safety practices. Some of these variables include the sociodemographic features of food handlers such as knowledge level, monthly earnings, gender, marital status, and food handling experience. In addition to the demographic characteristics are environmental determinants like temperature, hand washing facilities and solid waste discarding (Havlaar et al., 2013). According to Tessema et al. (2014), the difference sometimes exists in the reported factors due to differences in socio-demographic variables, geographical location and environmental factors of the study participants.

Food handler's knowledge on how to handle food significantly influence food handling practices (Kibret and Abera 2012). Similar, a comparative study carried out in Bangladesh by Rabbi and Dey (2013) found that the educational status of food handlers directly relates to food handling practices. Also, gender was well-known to be associated with food handling practices among food vendors (Muinde and Kuria, 2005). Research that determined the factors affecting food handling practices identified divorced in the marital status responses to have a significant relationship with good food handling practices. Food handlers receiving high monthly income and had good knowledge of food handling as well participated in healthy practices (Tessema et al., 2014). Furthermore, Ayaz et al. (2018) recognized an increase in food handler's safety practices and knowledge with progression in age, level of education (formal), monthly come and employment status.

2.9 Food Safety Practices in a Learning Institute

School premises remain vulnerable setting to the foodborne outbreak because foods are consumed by many people at a time. In schools with boarding facilities especially, foods from the same source are consumed by almost every boarding-student during dining. Thus just a single food safety error might result in an intense foodborne outbreak.

In 2015, Ameme et al. (2016) confirmed a foodborne outbreak among students in a Senior High School due to a high incidence of abdominal discomfort, diarrhea, and nausea at the emergency unit of a district hospital in Ghana. They concluded that the students ate a meal and drank water infested with *Salmonella* spp and *C. perfringens* pathogens. Similar, an investigation by Malm et al. (2015) to ascertain the mode of infection, source and the causal agent of a foodborne outbreak among school children in Accra, Ghana found that the children were exposed to meat stored in poor facilities and had consumed contaminated rice and groundnut soup.

Research which evaluated food safety practices among food vendors in a Secondary school in Nigeria recorded low adherence to most food safety practices. Vendors regularly mishandle cooking equipment and utensils, wash dishes with previously used water, do not wash dishes immediately after used and do not wear an apron around food areas. The respondents however observed certain good food safety practices which include reheating or cooking of food in advanced before sales. (Musa and Akande, 2003).

In Malaysia, Schools have recorded the highest foodborne outbreaks to other settings (Doraliyana et al., 2018). In seven senior high schools, Dora-liyana et al. (2018) evaluated knowledge, attitudes, and practices (KAP) among food handlers and reported a good degree of knowledge, positive attitude and good food hygiene practices. Also, there was a significant statistical association between certain demographic characteristics such as gender and whether

or not have had food safety training with cross-contamination knowledge, practices, and personal hygiene.

Food handlers in a research carried out among schools in Brazil by Soares et al. (2012) affirmed that the respondents were engaged in poor hygiene practices even though the majority have had training on food safety. The respondents exhibited an inadequate level of knowledge but had a positive attitude toward food safety.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter emphasizes the methods that were employed in collecting data for the study. It covers the inscription of the geographical and demographic data of the study area, study design, target population, sample size estimation, sample size and sample frame, sampling technique, procedures for data collection, and tools that were used in data collection and analysis. Besides, considerations were taken to strengthen the validity of data and reliability of the instrument for the study.

3.2 The Study Area

Kumasi, the Ashanti region's capital city, is approximately 270 km north of the national capital, with a population of nearly 2,035,064 individuals (GSS, 2014). Kumasi is the quickest developing city in Ghana with a yearly development rate of 5.4 which is distant over the territorial and national development rates of 2.7 and 2.5 separately. Almost 86% of the dynamic populace in Kumasi is financially dynamic with a normal number of families per house being 3.4 in 119 communities inside ten (10) kilometers span (KMA, 2014).

In Kumasi Metropolis, there are 34 Senior High Schools of which 26 are public and 8 are private. Of the public schools, 24 have boarding facilities while all the private schools have boarding facilities.

3.3 Study Design

To accomplish the objectives of this non-intervention study, a quantitative cross-sectional analytic design was utilized in the collection and analysis of the data. The quantitative method allowed the study to enumerate data and generalize conclusions from the sampled to the target population.

3.4 Target Population

The targeted population for this study was all the food handlers in both public and private Senior High Schools in the Kumasi Metropolis. They represent male and female food handlers registered with the school's authorities as part of catering service personnel who prepare the dinning food or vend food as a private business (those who prepare food outside or inside the school and sell at the school's canteen). The targeted institutions comprised schools in the four categories of schools as listed by Ghana Education Service (GES) which is a grade (A, B, C, and D).

3.5 Sample Size Estimation (number of schools and respondents).

To estimate the number of schools and respondents that would be representative for inference conclusions, 2 formulas were applied. Both formulas were used together to estimate the number of schools whereas formula 1 was employed to estimate the number of respondents for the study. Formula 1 was developed by Yamane (1967) while formula 2 was developed by Pennsylvania State University (2016). Formula 2 complements formula 1 when estimating a sample size using a small finite sample population (usually less than 100)(Pennsylvania State University, 2016). Formulas are presented below:

$$n_1 = \frac{N}{1 + N(E)^2} \dots \dots \dots \text{Formula 1}$$

Where, n_1 is the initial sample size; N is the sample population and E is the margin of error at a 95% confidence level (0.05).

Number of schools ($N = 34$),

$$n_1 = \frac{34}{1 + 34 (0.05)^2} = 31 \text{ schools}$$

Subsequently, a correction factor was computed (for a small finite population)

$$n_2 = \frac{n_1}{1 + \frac{n_1 - 1}{N}} \dots \dots \dots \text{Formula 2}$$

Where, n_2 is the final sample size (final sampled schools); n_1 (31) is the initial sample size (initial sampled schools), N is the sample population (total number of schools)

$$n_2 = \frac{31}{1 + \frac{31 - 1}{34}} = 16 \text{ schools}$$

Respondents was estimated using formula 1.

Total number of food handlers from the 16 schools ($N = 500$)

$$n = \frac{500}{1 + 32 (0.05)^2} = 222 \text{ food handlers}$$

3.6 Sample Size and Sample Frame

Of the 34 schools in the Metropolis, a simple random sampling technique was used to select 16 schools and 141 dining staff. A convenience sampling technique was utilized to include 85 food vendors who sell ready-to-eat food at the canteen of the selected schools in the study. The number and percentage of respondents from the various schools are represented in *Table 1.1* below.

Table 1.1: Frequency and Percentage of Respondents from the Selected Schools.

Name of School	Frequency	Percentage
Saint Louis SHS	23	10.2
Prempeh College	25	11.1
Kumasi Wesley Girls SHS	12	5.3
KNUST SHS	17	7.5
Opoku Ware SHS	16	7.1
Kwasi Oppong SHS	10	4.4
Kumasi High SHS	19	8.4
Saint Hubert SHS	17	7.5
Adventist SHS	11	4.9
Anglican SHS	17	7.5
Kumasi Girls SHS	14	6.2
Asanteman SHS	11	4.9
Serwaa Nyarko SHS	10	4.4
Osei Kyeretwire SHS	13	5.8
TI Ahmadiya SHS	11	4.9
Total	226	100

3.6.1 Inclusion Criteria

An individual qualified to be part of the study when registered with the school authorities as part of those who prepare dining food:

- Cook food
- Wash dishes

- Serve food
- Purchase food items/stuff
- Matron
- And vend cooked food at the school canteen

3.6.2 Exclusion Criteria

An individual was excluded from the study if he/she:

- Operate as a food vendor outside the school premises.
- Has not vended food within the school for more than a term (one term)
- Has not been with those who prepare dining food for more than a term (one term).

3.7 Sample and Sampling Technique

Sampling is the act, procedure or method of selecting a suitable sample or a representative part of the population to determine parameters or characteristics of the whole population (Fridah, 2002). In this study, both probability and non-probability sampling technique was applied to select the schools and respondents. In selecting the schools and those who prepare the school's dining food, a simple random (probability) sampling technique was used. This was to ensure that each school and food handler has an equal and independent chance of being included in the sampled population. However, convenience (non-probability) sampling technique was utilized to recruit food vendors who sell ready-to-eat food.

3.8 Data Collection Instruments

The study used primary data collection approach to collect the data. To obtain the primary data suitable to achieve the objectives of the study, a questionnaire was adopted from previous studies (Stratev *et al.*, 2017; Santos *et al.*, 2008) and modified to suit the aim of the study. The questionnaire consisted of four main sections. The first section contained questions on demographic characteristics (8 items); such as age, gender, religion, marital status, level of education, food training course, and work experience (years). The second section involved

questions (20 items) on personal hygiene and food safety practices. The third section entailed questions (26 items) on knowledge of food handlers on personal hygiene and food safety practices. while the last section encompassed questions (12 items) on the institutions' set-up to govern personal hygiene and food safety practices of food handlers in the senior high schools in the Metropolis. Respondents signed an informed consent document as part of ethical requirements.

3.9 Procedures for Data Collection

A suitable time was arranged with the schools on a different date for the collection of data. Food handlers who prepare dining food were approached at the dining hall where they provide their services however food vendors were approached at the canteen. Eligible subjects for the study signed an informed consent document or provided oral consent after the significance of the study, their role in the study and the overall guiding principle governing the whole study has been explained to them. The eligible subjects were assured that any information given as part of the study will remain confidential and anonymous. After this information, the questionnaires were administered to respondents and orally translated from English to Twi to those with low level of education. The respondents had room to withdraw their participation at any stage of the study.

3.10 Data Analysis

This section of the study reflects the statistical procedures that were used in the analyses of the data collected, thus data preparation and the main statistical techniques used in analyzing the data collected. Data were edited to exclude errors and reorganize. Data were analyzed with STATA (version 14.0) and Microsoft Excel 2013 software compatible with Microsoft window 8.1. The statistical tools that were used in analyzing the socio-demographic characteristics, food safety knowledge and practices of respondents include frequencies, percentages, means, and standard errors. Also, the relationship between socio-demographic characteristics and the

assessed personal hygiene and food safety practices was analyzed using Pearson chi-square test. All the tests were conducted at a significant of 0.05.

3.11 Ethical Considerations

Permission was sought from the School of Public Health, Kwame Nkrumah University of Science and Technology (KNUST) to carry out this study. Permission was also further sought from:

1. The Committee on Human Research and Publication Ethics (CHRPE) at KNUST
2. The Metro Director, Kumasi Metropolitan Education
3. Headmasters/Headmistress of the schools

Informed consent was sought from participants to either participate or not whilst acknowledging their choice to withdraw from the study at any period without any conditionalities. Participants were informed about their choice not to answer any question they are not comfortable with. The participants for the study were informed about the purpose, procedure and any risk involved in the study. Verbal informed consent was obtained from every participant before administering the questionnaire. There was strict adherence to the confidentiality of the participant as well as the information given in the questionnaire.

Data collected is to be kept until the submission of research work is done and approved.

3.12 Study Limitation

The generalization of results is limited due to the food handlers in the 15 schools used instead of 16 schools. One school in the selected schools was on vacation at the time of data collection. The study is also limited due to the sampling technique (convenience sampling) used to include available food vendors during the data collection, therefore cannot be said to be the views of all food sellers who vend ready-to-eat food. The data analyzed is the response from the

respondents which might have some recall bias but efforts were made to get as much accurate information as possible.

KNUST



CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the analysis of data collected from respondents. The main objective of the study was to assess the personal hygiene and food safety practices among food handlers in selected SHSs in the Kumasi metropolis. The results are presented in sections in this chapter.

The first section presents the socio-demographic characteristics of respondents.

Subsequent sections answer the research objectives of the study.

4.2 Socio-Demographic details of Respondents

A total of 226 respondents were included in the research. This comprised of 10 (4.4%) males and 216 (95.6%) females. 1 (4.0%) of the respondents were less than 20 years while 29 (12.8%) were within 21 – 30 age range. 90(39.8%) and 655(28.28) were within 31 – 40 and 41 – 50year range respectively. 41 (18.1%) of them were more than 50 years. 31(13.7%) of them have had no form of formal education. 19 (8.4%) have attained Primary as their highest education. 97(42.9%) and 46(20.4%) have attained JHS and SHS respectively. 7 (3.1%) of them have attained post-secondary/vocational education while 26(11.5%) have tertiary education. More than half of the respondents, 137(60.6%), are married while 45 (19.9%) are single. 21(9.3%) and 16(7.1%) are divorced and widowed respectively. Only 7(3.1%) are cohabiting. 83(36.7%) of them have ever attended a food safety training course with 143(63.3%) not attending any related training course. Respondents understudy had varied years of employment. 64(28.3%) and 63(27.9%), the majority of them, have had 6-10 years and 11-15 years of experience respectively. However, only 2 (0.9%) have more than 30 years of experience. 85 (37.6%) of them are vendors with 141(62.4%) of them providing dining services. Respondents were from 15 different schools in the metropolis. Table 4.1 shows the demographic details of respondents' understudy.

Table 4.1: Demographic details of Respondents

Variable	Frequency (n)	Percentage (%)
Gender		
Male	10	4.4
Female	216	95.6
Total	226	100.0
Age (40.79 ± 8.904)		
<21	1	4.0
21-30	29	12.8
31-40	90	39.8
41-50	65	28.8
>50	41	18.1
Total	226	100.0
Highest level of education attained		
No formal education	31	13.7
Primary	19	8.4
JHS	97	42.9
SHS	46	20.4
Post-secondary/vocational	7	3.1
Tertiary	26	11.5
Total	226	100.0
Marital Status		
Single	45	19.9
Married	137	60.6
Divorced	21	9.3

Widowed	16	7.1
Cohabiting	7	3.1
Total	226	100.0
Food safety training course		
Yes	83	36.7
No	143	63.3
Total	226	100.0
Length of employment (years) (9.85 ± 7.067)		
<5	77	34.1
6-10	64	28.3
11-15	63	27.9
16-20	19	8.4
21-25	16	7.1
26-30	4	1.8
>30	2	0.9
Total	226	100.0
Type of food handler		
Vendor	85	37.6
Dinning	141	62.4
Total	226	100.0
Religion		
Christian	208	92.0
Muslim	18	8.0
Total	226	100.0

4.3 Food Handler's Knowledge on Personal Hygiene and Food Safety Practices.

The knowledge of food handlers on personal hygiene and food safety were also examined. 221(97.8%) know that cuts and burns should be properly bandaged and gloves are worn before handling foods as well as always washing the hands with soap and warm water after using the toilet. 219(96.9%) always wash hands with soap and warm running water after handling raw meat. However, 168 (74.3%) of them do not dry their hands with a towel used by more than one person after washing them. Also, 193(85.4%) of them when wearing gloves do not handle cooked foods after handling raw meat. For food safety practices, 192 (85.0%) and 194(85.8%) purchase frozen foods at the end of shopping and freeze defrosted meat for later use respectively. 225 (99.6) and 224(99.1%) wash dishes immediately after use and clean kitchen countertop and stove with detergent warm water respectively. 220(97.3%) wash vegetables and fruits with running cold water before serving as well as heat leftovers until they boil. However, 16(7.1%) do not know that raw meat should be placed at the bottom shelf of a fridge. Also, 54(23.9%) do not know that long leftovers should be kept in the fridge for less than 2 days. Concerning knowledge, 224(99.1%) are aware that washing hands after handling meats avoids foodborne diseases, as well as foodborne illness, can be developed through the intake of contaminated food. However, 5(2.2%) of them do not have any idea that the inadequate cooking of raw food can cause an outbreak of food illness. Table 4.2 shows the details of the knowledge of food handlers on personal hygiene and food safety practices.

Table 4.2 Knowledge of Food Handlers on Personal Hygiene and Food Safety Practices.

STATEMENT	Y	%	N	%	K	%
PERSONAL HYGEINE						
Burns and cuts on hands ought to be properly bandaged and 221 gloves worn before handling foods		97.8	1	0.4	4	1.8
Hands should be washed at all times with soap and warm running water after handling raw meat	219	96.9	5	2.2	2	0.9
After washing, hands have to be dried with a multi-use kitchen napkins/towels	54	23.9	168	74.3	4	1.8

It is essential always to washed hands with soap and warm running water before handling cooked foods	218	96.5	5	2.2	3	1.3
Hands should be washed all the time with soap and warm running water after using the toilet	221	97.8	5	2.2	0	0.0
When wearing gloves one might handle cooked foods after handling raw meat	19	8.4	193	85.4	14	6.2
Hands should be properly washed after sneezing	219	96.9	5	2.2	2	0.9
Individuals with fever, diarrhea, flu or sore throat should not cook for others	169	74.8	13	5.8	44	19.5

FOOD SAFETY

Frozen foods should be bought at the end of shopping time	192	85.0	13	5.8	21	9.3
Defrosted meat can be frozen for later use	194	85.8	29	12.8	3	1.3
Freshly prepared food that will be consumed 3 h later should be put in the refrigerator, then reheat when ready to eat	196	86.7	24	10.6	6	2.7
Chunks of raw meat to be stored in the freezer should be sliced into smaller pieces and Sealed	171	75.7	45	19.9	10	4.4
Vegetables and fruits should be washed with running cold water before serving	220	97.3	2	0.9	4	1.8
Heating until they are boiling is the correct way to heat leftovers	220	97.3	2	0.9	4	1.8
Leftovers that are still not eaten completely should be discarded Immediately	180	79.6	45	19.9	1	0.4
Refrigerator has three shelves (top shelf, middle shelf and Bottom shelf); raw meat should be put at the bottom shelf	180	79.6	30	13.3	16	7.1
Long leftovers should be preserved in the fridge for not more than 2 days	155	68.6	17	7.5	54	23.9
Kitchen stove and countertop must be washed with detergent and warm water	224	99.1	2	0.9	0	0.0
After meal, dishes should be washed immediately	225	99.6	1	0.4	0	0.0
Separate chopping boards should be used for cutting meat and fruit	211	93.4	12	5.3	3	1.3

FOOD POISON

Women who are pregnant, aged and children are more susceptible to food poisoning	134	59.3	19	8.4	73	32.3
Hand washing before handling raw food avoids foodborne disease	224	99.1	2	0.9	0	0.0
Diarrhea can be spread through food that is contaminated	217	96.0	4	1.8	5	2.2

Water that is contaminated can be a means for foodborne disease transmission	223	98.7	1	0.4	2	0.9
Insufficient cooking of food such as vegetable, chicken and meat could results in foodborne disease outbreak	218	96.5	3	1.3	5	2.2
Foodborne diseases can be developed through intake of contaminated food	224	99.1	0	0.0	2	0.9

Y=Yes, N=No, K=I do not know

4.4 Food Handler's Personal Hygiene and Food Safety Practices

The research was performed to assess the engagement of healthy personal hygiene and food safety practices by food handlers. A significant number of them, 22 (98.2%), always rinse their hands before and after cooking. More than half of them, 119 (52.7%), never eat food reserved at room temperature for long. However, 44 (19.5%) of them always dish and taste out food using unprotected hands. 192 (85.0%) always wash fruits and vegetables before consumption as well as check labels for the packaged food expiry date prior to purchase. 69 (30.5%) and 92 (40.7%) respectively always read conditions of use of packaged foods and wash eggs before cooking or frying. 220 (97.3%) always wash their dishes at least with detergent and water as well as their hands before handling raw food. 210 (92.9%) always separately store chicken or meat from food. 219 (96.9%) and 214(99.1%) always protect raw and cooked foods from pests respectively. Table 4.3 shows the healthy personal hygiene and food safety practices by food handlers.

Table 4.3 Personal Hygiene and Food Safety Practices by Food Handlers

QUESTION	N	%	S	%	A	%
Do you wash your hands before and after cooking	0	0.0	4	1.8	222	98.2
Do you consume food reserved at room temperature long	119	52.7	90	39.8	17	7.5
Do you cover your mouth with your hand when coughing or sneezing	61	27.0	45	19.9	120	53.1
Do you taste or dish out food with unprotected?	166	73.5	16	7.1	44	19.5
Do you wash vegetables and fruits before consuming them	7	3.1	27	11.9	192	85.0
Do you read labels on packaged food to know the expiry date before buying	11	4.8	23	10.2	192	85.0
Do you read inscription on packaged food to know how to use or store them	35	15.4	69	30.5	122	54.0
Do you wash eggs before frying or cooking	23	10.1	92	40.7	111	49.1
Do you wash and rinse knives, plates and cutting boards used for raw meat before using them for other food	2	0.8	7	3.1	217	96.0
Do you defrost frozen food outside the refrigerator	9	3.9	13	5.8	204	90.3
Do you put on accessories like rings, bracelets when cooking food	169	74.8	36	15.9	21	9.3
Do you wear an apron when preparing food	14	6.2	17	7.5	195	86.3
Do you store raw chicken or meat separately from food	10	4.4	6	2.7	210	92.9
Do you wash dishes with detergent and water or in a dishwasher preparing food	4	1.8	2	0.9	220	97.3
Do you wash your hands before handling raw food	3	1.3	3	1.3	220	97.3
Do you wash dishes with water and detergent or in a dishwasher after preparing food and before new usage	4	1.8	5	2.2	217	96.0
Do you cover your cut with bandage and use gloves	8	3.5	13	5.8	205	90.7
Do you keep food unrefrigerated to exceed 2 hours	104	46.0	113	50.0	9	4.0
Do you protect fresh food from rodents and insects	2	0.9	5	2.2	219	96.9
Do you protect cooked food from rodents and insects	2	0.9	0	0.0	224	99.1

N=Never, S=Sometimes, A=Always

4.5 Institutions governing Food Safety Practices

Institutional gaps governing personal hygiene and food safety practices were examined. A 219 (96.9%) and 213 (94.2%) of the respondents receive regular visits from sanitary inspectors and food and drug board inspectors respectively. 29 (12.8%) and 9(4.0%) of them have these visits very often while 64(28.3%) and 35(15.5%) of them often have these visits respectively. However, 118 (52.2%) and 137(60.6%) of them have occasional visits. 58 (25.7%) of them are members of Work Group Associations. These associations ensure that its members practice safe and hygienic food handling practices. 80(35.4%) are required to renew a vending permit or operation license while 146(64.6%) are not. The same number of respondents agree and are unaware that authorities perform a sanitary inspection before issuing continuance of operation. For 5(2.2%) of them, warnings were issued, while 1(0.4%) each had a good compliment, invitation to train in a sanitation program and no response from the team. 8 (3.5%) of respondents have ever been told of having violated sanitary and safe food practices. Table 4.4 shows the details of institutional gaps governing personal hygiene and food safety practices of food handlers.

Table 4.4a Institutions governing Personal Hygiene and Food Safety Practices

STATEMENT	Y	%	N	%	K	%
Do sanitary inspectors visit you to inspect your place	219	96.9	7	3.1	0	0.0
Do food and drugs board inspectors pay you regular visits	213	94.2	13	5.8	0	0.0
If yes, have you ever been told that you have violated sanitary and safe food practices	8	3.5	213	94.2	5	2.2
Are you a member of any Work-Group Association	58	25.7	168	74.3	0	0.0
If yes, does the Association ensure that you practice safe and hygienic food handling practices	58	25.7	0	0.0	168	74.3
Are you required to renew your vending permit or operating license periodically	80	35.4	146	64.6	0	0.0

If yes, do the authorities perform a sanitary inspection before issuing the continuance in your operations 80 35.4 0 0.0 146 64.6

Table 4.4b Institutions governing Personal Hygiene and Food Safety Practices

STATEMENT	Frequency (n)	Percentage (%)
If yes Sanitary Inspectors visit, how often do they visit for inspection?		
Very often	29	12.8
Often	64	28.3
Occasional	118	52.2
Rarely	7	3.1
Very rarely	1	.4
No response	7	3.1
If yes Food and drugs Board visit, how often do they visit for inspection?		
Very often	9	4.0
Often	35	15.5
Occasional	137	60.6
Rarely	29	12.8
Very rarely	3	1.3
No response	13	5.8
If yes you have violated safety practice, what was the resolve of the inspection team?		
I was fine	1	0.4
A warning was issued	5	2.2
I was invited to train in a sanitation programme	1	0.4
Nothing was done	1	0.4
No response	218	96.5
If yes you are in Association ensure food safety, how do they ensure this monitoring duties are effective?		
Assigning inspectors to visit vending sites	4	1.8

Organizing training programs for vendors	54	23.9
No response	168	74.3

Table 4.5: Associations between Practices and Socio-Demographic Characteristics.

A Pearson's chi-square test was conducted to establish the association between each of the assessed personal hygiene and food safety practices and the socio-demographic characteristics of food handlers. With gender, a statistically significant association (0.05) was recorded only between the use of hands to cover mouth when sneezing or coughing. Statistical significant associations were also found between the educational levels and the reading of inscription on packaged foods to discern how to store or use them (0.000), eggs washed before frying or cooking (0.029), use of an apron during food preparation (0.028) as well as dishes washed with detergent and water (0.039). Besides, whether food handlers have acquired a food training course or not, has a statistically significant association among a reading of inscription on packaged food to know how to use or store them (0.007) and washing of eggs before cooking (0.024) as shown in *Table 4.5* below.

Table 4.5: Association between Practices and the Socio-Demographic Characteristics.

Question	Characteristic	(n)	Category			X ² -value	P-value
			Never	Sometimes	Always		
Gender							
Do you cover your mouth with your hand when coughing or sneezing	Male	10	2	5	3	5.998 ^a	0.05*
	Female	216	59	40	117		
	Total	226	61	45	120		
Level of education							
Do you read inscription on packaged food to know how to use and store them	No formal education	31	9	10	9	37.412 ^a	0.000*
	Primary	19	0	36	10		
	JHS	97	19	14	42		
	SHS	46	7	3	0		
	Post-secondary/vocational	26	0	0	23		
	Tertiary	226	3	69	123		
Total		34					
Do you wash eggs before frying or cooking them	No formal education	31	2	9	20	19.981 ^a	0.029*
	Primary	19	0	11	47		
	JHS	97	17	33	19		
	SHS	46	7	2	25		
	Post-secondary/vocational	26	0	10	11		
	Tertiary	226	1	92	22		
Total		22					

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CHAPTER FIVE

DISCUSSION

5.1 Introduction

This study was designed to assess personal hygiene and food safety practices of food handlers in selected Senior High Schools in the Kumasi Metropolis. The findings of this study are discussed in accordance with the socio-demographic responses and the objectives of this study.

5.2 Socio-Demographic responses

In Ghana, women play a vital role when it comes to traditions especially household chores such as food preparation and has been discovered in the present study. Of the 266 respondents sampled, the majority of them were females (216, 95%) and have a low level of formal education (JSS: 97, 42.9%). Tomlins *et al.* (2002) and Ackah *et al.* (2011) likewise reported more women with a low level of education in their demographic reports among food vendors in Ghana. A greater proportion (143, 63.3%) of food handlers in this study have not received any food safety training course but have experience in handling food for at least 1-5 years. This outcome reflects a study carried out among food handlers in a college canteen in Malaysia by Nee and Sani (2011). In the study of Nee and Sani (2011), the majority of the respondents (33) representing 50.8% had experience in handling food as a profession for at least 1-5 years while 47 constituting 72.3% had no training on food safety.

Concerning marital status, age-range, and religion of food handlers. 60.6% signifying a maximum number of respondents were married, 39% were in the range 31-40 whereas 90% were Christians respectively. Studies have congruently quantified high proportion in their demographic findings relative to marital status as married (Akuu *et al.*, 2017), age in the range 31-40 (Annor and Baiden) and religion as Christians (Donkor *et al.*, 2009).

5.3 Knowledge of Food Handlers on Personal Hygiene and Food Safety Practices.

Adequate knowledge of food safety is a prerequisite for food hygiene practices. From the results in Table 4.2, it is obvious that the majority of food handlers have knowledge of personal hygiene, food safety, and food poison. In the same way, Ayaz *et al.* (2018) documented a satisfactory number of respondents with sufficient knowledge of food poison and personal hygiene among food handlers.

With respect to knowledge on food poison specifically, majority ($\geq 90\%$) of the food handlers in this study are aware that diarrhea can be spread through food that is contaminated, water that is contaminated can be a source of foodborne disease transmission, eating contaminated food can cause foodborne illness and foodborne disease can be prevented through washing of hands after handling raw food. These findings are in agreement with a study which found that 96.7% of respondents were certain diarrhea can be transferred through food that is contaminated, 91.1% confirmed that water that is contaminated can be a means for spreading foodborne disease, 94.4% agreed foodborne diseases can be developed through consuming contaminated food while 97.8% attested foodborne diseases can be prevented through washing of hands after handling raw food (Stratev *et al.* 2017). All the same, those who indicated that insufficient cooking of raw food can cause an outbreak of foodborne illness in this study is slightly higher than those reported in Stratev *et al.* (2017).

Maximum number of respondents are also conversant with most of the personal hygiene and food safety principles inquired in this study. The majority established it is always necessary to wash hands with soap and warm running water after using the toilet as recognized by Afifi and Abushelaibi (2012). Greater than 90% of food handlers are conscious that cuts and burns on hands should be properly bandaged before touching food, hands should be washed always with soap and warm running water after handling raw meat, hands should be properly washed after sneezing, vegetables and fruits should be washed with running cold water before serving,

heating until they are boiling is the correct way to heat leftovers and as well leftovers not eaten immediately should be discarded. Ayaz *et al.* (2018) testified comparable outcomes with quantities of respondents marginally lower than in this study.

Only a few respondents are not mindful of certain food safety principles. Fairly high number but less than half (32.3%) of respondents do not know the aged, women who are pregnant and children are more vulnerable to foodborne disease. 19.5% don't know people with diarrhea, fever, sore throat or flu are not supposed to cook for others. Approximately 20% do not know long leftovers should not be in a refrigerator for more than 2 days.

5.4 Personal Hygiene and Food Safety Practices among Food Handlers

In Table 4.3, the majority of the respondents engage in healthy practices concerning personal hygiene and food safety. These behaviors could be the influence of visitation and inspection by Sanitary Inspectors or Food and Drugs Board as shown in Table 4.4a. Another reason for the regular performance of safe practices may be due to the satisfactory level of knowledge of food handlers on personal hygiene, food poison and safety practices in table 4.3. Previous research by Asmawi *et al.* (2018) established that adequate knowledge of food safety influences practices.

A high number (>80%) of the sampled population in their routine work, always observed most of the food safety practices presented. This result is supported by research conducted among basic school food handlers (Monney *et al.*, 2013). Monney *et al.* (2013) concluded that the majority of basic school food handlers continuously observed food safety practices including the protection of food from flies.

Also, more than three-fourth (3/4) of food handlers in the present study, always wash their hands before and after handling food, wash fruits and vegetables before eating and as well wash and rinse utensils used for raw meat before using them for other foods. Additionally, it is evident that food

handlers frequently protect raw and cooked food from insects, use an apron when cooking, cover cuts and wound with a bandage, do not use accessories like ring during cooking and among others. These results substantiate that the respondents habitually follow practices recommended by WHO/FAO (2006) or avoid practices marked unsafe. Moreover, specific studies on food safety practices have likewise documented certain practices that supports the findings in this study including good hand hygiene practice (Monney *et al.*, 2013), washing of utensils before and after use (Akabanda *et al.*, 2017), washing of hands after using toilet (Aluko *et al.*, 2014) and washing of hand after handling raw meat (Afifi and Abushelaibi, 2012) as the regular practices mostly engaged by respondents.

Conversely, some respondents reported poor food safety practices. They repeatedly defrost frozen food outside the refrigerator. Approximately half of the food handlers do not always read inscription on packaged food to know how to use or store them, wash eggs before frying or cooking and sometimes keep food unrefrigerated for more than 2 hours. Investigations (Afoakwa, 2005; Feglo & Sakyi, 2012), reported poor food hygiene including defrosting of frozen food outside the refrigerator and food kept unrefrigerated for more than 2 hours among food vendors.

5.5 Institutions set-up to govern Personal Hygiene and Food Safety Practices

An operational institutional set-up is essential for monitoring food safety principles. In this study institutional control was analyzed from the viewpoint of the food handlers. In table 4.4a, 96.9% of respondents confirmed that Sanitary Inspectors visit and inspect the workplace while 94.2% verified visits by Food and Drugs Board. They responded that Sanitary Inspectors and Food and Drugs Board usually inspect the environs, cooking ware, and professional certificate of vendors, foodstuffs, protective wear and taking of blood samples. This is a positive result that indicates the availability of management bodies monitoring food safety practices even though they are inconsistent in the visitation and inspection (Table 4.4b). Akuu *et al.* (2017)

correspondingly reported fairly effectiveness of regulatory bodies on food safety practices including regular visitation and inspection of vending sites. The inconsistency in the inspection of food safety practices may due to limited logistics and resources as noted by Akuu *et al.* (2017). On the contrary, Ababio *et al.* (2016) found lack of food safety administration that governs food safety standards among food handlers in some schools in the Kumasi metropolis.

Food handlers who prepare school dining only required initial medical reports proven healthy to handle food, the majority of food vendors verified that they have vending permits and are required to renew this permit or operating license periodically (annual renewal) (Table 4.4a, b). Studies including Okai and Dordi (2002) and Mensah *et al.* (2002) discovered that most vendors, particularly restaurant operators just required the health certificate. Previous research in Ghana has exposed that maximum food vendors operate without the necessary licenses. For instance, Monney *et al.* (2013) noticed street food vendors work devoid of due approval of the set of authorizations required for food vending.

Punishment could be used as a mechanism to prevent unwanted practices. Hence the study assessed that the necessary punishment faced by those who violate food safety principles. Only 8 people said they have been told they have violated food safety principle, but just a warning was issued to most of them. This finding suggests the absence of penalty to those who breach the principles.

This study also tested whether food handlers are in Work-Group Associations that ensures food safety practices. Just about one-third of the sampled population said they are in Association. According to those in Associations, the Associations warrants effective food safety practices by assigning inspectors to inspect vending sites and organized food safety training programs for food handlers. These activities of Work-Group Associations might be a contributing factor for good food safety practices among some food handlers in the study

5.6 Associations between Practices and Socio-Demographic Characteristics

In table 4.5, the study took into consideration to ascertain the association between food handlers' socio-demographic characteristics and each of the assessed practices as similarly documented by Afifi and Abushelaibi (2012).

Statistical significant association (0.05) was recorded only between the use of hands to cover mouth when sneezing or coughing and gender in this study, with most women (117) 'always' engage in such activity.

About the educational levels, a high number of food handlers (42) in JHS 'always' read inscription on packaged foods to know how to use or store them. There was as well a statistically significant association (0.000) between the educational levels and reading of inscription on packaged food to know how to use or store them. The reason for this behavior among the JHS food handlers could be that they are the ones' who usually purchase packaged foodstuffs. Also, Statistical significant association (0.029) was verified among the educational levels and eggs washed before cooking or frying, however, a greater number of food handlers in JHS (47) practices it 'always'. Furthermore, 98 of food handlers in JHS 'always' use an apron when preparing food with a significant association (0.028) between the use of an apron and the levels of education. Finally, on the levels of education, there was a statistically significant association (0.039) between dishes washed with water and detergent and the educational levels. All the same, it is 'always' done mostly by food handlers in JHS (94). The reason for the high number of food handlers in JHS engages in these practices maybe because they constitute the greater percentage (42.9%) of respondents in the study.

On the food safety training course, this study identified a statistically significant association between those who have had food safety training and those who have not had any food safety training against certain food safety practices. There was a statistically significant association

(0.007) between the reading of inscription on how to use or store packaged foods and whether or not food handlers have acquired a food safety training course. Additional, a significant association (0.024) was recognized between the washing of eggs before cooking or frying and whether or not food handlers have acquired food safety training.

Similarly, Afifi and Abushelaibi (2012) established statistical significant associations between the educational levels and certain food safety practices among food handlers in Al Ain, United Arab Emirates. The associations were detected between the levels of education against hands washed before and after eating, hands washed after using toilet and hands habitually washed with soap and warm water.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This section summarizes the study's goals and conclusions. Recommendations to enhance food safety practices, knowledge and effectiveness of established food safety regulating organizations.

6.2 Conclusions

Principally, the study assessed personal hygiene and food safety practices among food handlers in the selected Senior High Schools in the Kumasi Metropolis. The specific objectives were to investigate the knowledge of food-handlers on personal hygiene and food safety practices, examine whether food handlers engage in healthy personal hygiene and food safety practices, examine the institutional set-up governing personal hygiene and food safety practices of food handlers and also determine the relationship between socio-demographic characteristics and personal hygiene and food safety practices of food handlers.

On the first objective, satisfactory number of food handlers have adequate knowledge of food safety values. Food handlers are aware that;

- Foodborne disease can be developed from eating contaminated food.
- Hands should be washed always with warm running water and soap after using the toilet.
- Hands should be properly washed after sneezing.
- Vegetables and fruits should be washed with running warm water before eating.
- Heating until they are boiling is the right way to heat leftovers.
- Leftovers that are still not eaten completely should be discarded immediately.
- Foodborne illness can be prevented through washing of hands after handling raw food.
- Diarrhea can be spread through food that is contaminated.
- Water that is contaminated can be means for foodborne disease transmission.
- Cuts and burns on hands should be properly bandaged and gloves are worn before handling foods
- Hands should be washed always with soap and warm running water after handling raw meat
- It is always crucial to wash hands with soap and warm running water before handling cooked foods

On the second objective, the study concludes that food handlers largely adhere to healthy personal hygiene and food safety practices recurrently. That is more than 90% of their daily work observed food safety standards. They usually:

- Wash hands before and after cooking
- Use an apron when cooking
- Protect raw and cooked food from rodents and insects
- Cover wound and cut with a bandage and wear gloves

- Store raw meat or chicken separately from other food
- Wash dishes with water and detergent before using
- Wash hands before handling raw food
- Wash and rinse utensils used for raw meat before using them for other food
- And among others

On the third objective, it is concluded that there are available regulatory bodies ensuring food safety practices among the food handlers in the selected schools. However, they are ineffective in the visitation and inspection as it is done occasionally. Also, only warning is mostly issued to those who violate sanitary and food safety practices, suggesting an absence of laydown punishment to individuals who violate the food safety standards.

On the last objective, the study concludes that both male and female food handlers engage in the same way of using hands to cover mouth when cooking or frying them in most times. It also concludes that food handlers at each of the levels of education, in the same way, read inscription on packaged foods on how to use and store, wash eggs before cooking or frying them, use an apron when cooking and as well wash dishes with soap and detergent. Also, food handlers who have had food safety training and those who have not had the training, engage in a similar way of reading inscription on packaged foods to identify how to use and store them and wash eggs before cooking them.

6.3 Recommendations

Due to the outcome of this study, the following are the recommendations proposed to maintain and improve food safety knowledge, practices and effectiveness of the established institutions ensure food safety standards among food handlers in the schools in the Kumasi Metropolis:

- Food and Drugs Board and Sanitary Inspectors in the Metropolis need to organized update courses, domestic training, uninterrupted food safety education, workshops, and seminars on food safety standards to empower food handlers.
- Policymakers in the schools within the Kumasi Metropolis need to set in place procedures that would ensure that food handlers go through professional training on food handling before employment
- Ministry of Health and the Kumasi Metropolitan Assembly should introduce food safety surveillance and control systems in the schools to make sure that food safety equipment emulates the required standards.
- Ministry of Health and the Metropolitan Assembly should empower the Sanitary Inspectors and Food and Drugs Board with the necessary logistics and resources to aid regular inspection of food safety practices.
- Sanitary Inspectors and Food and Drugs Board need to be effective in the monitory of food safety standards. This can be accomplished through regular visits and inspection of food safety practices among food handlers.
- Enhancement of the conditions of the food safety utensils and equipment for the dining staff in the schools. This could be through preventive maintenance, procurement supports, and routine services from the governments.

6.4 Recommendation for further Study

The research suggests additional study on factors affecting non-regular visitation and inspection of Sanitary Inspectors and the Food and Drugs Board. Also, the collaboration between the Kumasi Metropolitan Assembly, Sanitary Inspectors and the Food and Drugs Board in monitoring food safety practices. As well, further study should investigate the effect of school food consumption on student's health.

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APPENDICES

APPENDIX I

Questionnaire

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI,

COLLEGE OF HEALTH SCIENCES,

SCHOOL OF PUBLIC HEALTH,

DEPARTMENT OF HEALTH PROMOTION AND EDUCATION

Dear Participant,

This instrument is meant to collect information on PERSONAL HYGIENE AND FOOD

SAFETY PRACTICES OF FOOD HANDLERS AMONG SELECTED SENIOR HIGH SCHOOLS IN THE KUMASI METROPOLIS, GHANA as part of my postgraduate programme. Therefore, I would like you to respond to all the stated questions as accurately as possible by ticking the box that represents your choice. All information provided will be treated with strict confidentiality and used only for academic research purposes.

SECTION A: Socio-Demographic information of Food Handlers

Gender: Male ☐ Female ☐ **Age (years):**

Marital status: Single ☐ Married ☐ Divorced ☐ Widowed ☐
Cohabiting ☐

Level of Education: No formal education ☐ Primary ☐ JHS/JSS ☐ SHS/SSS ☐
Post-secondary/vocational ☐
Tertiary ☐

Food safety training course: Yes ☐ No ☐

Length of employment (years):

Vendor ☐ **Dinning staff** ☐

Name of School:

Religion: Christian ☐ Moslem ☐ Other ☐

SECTION B: Personal Hygiene and Food Safety Practices of Food Handlers;

	Statement	Never	Sometimes	Always
1	Do you wash your hands before and after cooking			
2	Do you consume food kept at room temperature for long			
3	Do you use your hand to cover your mouth while coughing or sneezing			
4	Do you taste and dish out food with unprotected hands?			
5	Do you wash fruits and vegetables before eating			
6	Do you read labels with the use by and/or expiry date of packaged food before purchasing			
7	Do you read conditions of use and storage of packaged food			
8	Do you wash eggs before cooking or frying them			
9	Do you wash and rinse cutting boards, knives and plates used for raw meat before using them for other food			
10	Do you defrost frozen food outside the refrigerator			
11	Do you wear accessories like rings, bracelets when cooking food?			
12	Do you use an apron when cooking			
13	Do you store raw chicken or meat separately from food			
14	Do you wash dishes with detergent and water or in a dishwasher when preparing food			
15	Do you wash your hands before handling raw food			
16	Do you wash dishes with detergent and water or in a dishwasher after preparing food and before new usage			
17	Do you cover your cut with bandage and use gloves			
18	Do you keep food unrefrigerated for more than 2 hours?			
19	Do you protect raw food from insects and rodents			

20	Do you protect cooked food from insects and rodents			
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SECTION C: Knowledge of Food Handlers on Personal Hygiene and food safety practices

	Statement	Yes	No	I do not know
Personal Hygiene				
21	Cuts and burns on hands should be properly bandaged and gloves worn before handling foods			
22	Hands should be washed always with soap and warm running water after handling raw meat			
23	After washing, hands should be dried with a multi-use kitchen towels			
24	It is always necessary to washed hands with soap and warm running water before handling cooked foods			
25	Hands should be washed always with soap and warm running water after using the toilet			
26	When wearing gloves one might handle cooked foods after handling raw meat			
27	After sneezing hands should be properly washed			
28	People with diarrhea, fever, sore throat or flu should not cook for others			
Food Safety Practices				
29	Frozen foods should be purchased at the end of shopping time			
30	Defrosted meat can be frozen for later use			
31	Freshly prepared food that will be consumed 3 h later should be put in the fridge and reheated when ready to eat			
32	Chunks of raw meat to be stored in the freezer should be sliced into small and sealed			
33	Vegetables and fruits should be washed with running cold water before serving			
34	Heating until they are boiling is the correct way to heat leftovers			
35	Leftovers that are still not eaten completely should be discarded immediately			

36	A fridge has three shelves (top shelf, middle shelf and Bottom shelf); r shoulda be placed at the bottom shelf			
37	Long leftovers should be kept in the fridge for not more than2 days			
38	Kitchen countertop and stove should be cleaned with detergent and warm wat			
39	Dishes should be washed immediately after meal			
40	Different chopping boards should be used for cutting meat and fruit			
	Knowledge on Food Poisoning			
41	Children, pregnant women and older individuals are more at risk of food poisoning			
42	Washing of hands after handling raw food prevents foodborne disease			
43	Diarrhoea can be transmitted through contaminated food			
44	Contaminated water can be a means for foodborne disease transmission			
45	Inadequate cooking of raw food like meat, chicken and vegetable can cause outbreak of foodborne illness			
46	Foodborne illness can be acquired from eating of contaminated food			

SECTION D: Institutional set-up governing Safe Practices of Food Handlers;

47. Do sanitary inspectors visit you to inspect your place? Yes ☒ No ☐

48. If yes, how often do they visit for inspection?

- a. Very often
- b. Often
- c. Occasionally
- d. Rarely
- e. Very Rarely

49. Do food and drugs board inspectors pay you regular visits? Yes ☐ No ☐

50. If yes, how often do they visit for inspection?

- a. Very often
- b. Often
- c. Occasionally
- d. Rarely
- e. Very Rarely

51. If yes, have you ever been told that you have violated sanitary and safe food practices?

(refer to question 47 or 49)

Yes ☐ No ☐

52. If yes, what was the resolve of the inspection team?

- a. I was fined
- b. A warning was issued
- c. I was invited to train in a sanitation programme
- d. Nothing was done

e. Others

53. Are you a member of any Work-Group Association? Yes ☒ No ☐

54. If yes, does the Association ensure that you practice safe and hygienic food handling practices?

Yes ☐ No ☐

55. If, yes how do they ensure this monitoring duties are effective?

- a. Assigning inspectors to visit vending sites
- b. Obtaining reports on the vending sites
- c. Organising training programmes for vendors
- d. Others

56. Are you required to renew your vending permit or operating license periodically?

Yes ☒ No ☐

57. If yes, do the authorities perform a sanitary inspection before issuing the continuance in your operations? Yes ☒ No ☐

58. If yes, what do they inspect? (You can select more than one options)) a. The environs

b. The cooking ware

c. The professional certificate of vendors and helpers

d. The foodstuffs

e. The protective ware

f. Others

Thank you for completing this questionnaire and taking part in this research

APPENDIX II



KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES



SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/526/19

28th August, 2019.

Mr. Ebenezer Essaw
Department of Health
Promotion and Education
School of Public Health
KNUST-KUMASI.

Dear Sir,

LETTER OF APPROVAL

Protocol Title: *"Assessment of Personal Hygiene and Food Safety Practices of Food Handlers Among Selected Senior High Schools in the Kumasi Metropolis, Ghana."*

Proposed Site: *Selected Senior High Schools, Kumasi Metropolis.*

Sponsor: *Principal Investigator.*

Your submission to the Committee on Human Research, Publications and Ethics on the above-named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 10th July, 2019 from the Kumasi Metro Education Directorate (study site) indicating approval for the conduct of the study at the Metropolis.
- A Completed CHRPE Application Form.
- Participant Information Leaflet and Consent Form.
- Research Protocol.
- Questionnaire.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, beginning 28th August, 2019 to 27th August, 2020 renewable thereafter. The Committee may however, suspend or withdraw ethical approval at any time if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at the close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you, Sir, for your application.

Yours faithfully,

Osomfo Prof. Sir J. W. Acheampong MD, FWACP
Chairman

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