KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF SCIENCE

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

ASSESSING THE LEVEL OF IMPLEMENTATION OF PRE-REQUISITE PROGRAMS TO HACCP IN SELECTED SENIOR HIGH SCHOOLS IN WA

BY

AMATU-SUBUUR OSMAN

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CERTIFICATION

I hereby declare that this submission is my own work towards the Msc. and that to the best of my knowledge, it contains no material previously published by another person or material which has been accepted for the award of any other degree of the university except where due acknowledgement has been made in the text.

Amatu-Subuur Osman ………………………… …………………………....

SIGNATURE   DATE

Certified by:

Dr. Herman Lutterodt …………………………. …………………………

(Supervisor)   SIGNATURE   DATE

Certified by:

Prof. Mrs. I. Oduro ………………………….. ……………………………..

(Head of Department) SIGNATURE   DATE

ABSTRACT

Background: Food safety is a Global public health concern especially in developing countries, accounting for 420,000 morbidities and 65,000 mortalities in Ghana annually. Children in Africa usually experience an average of five episodes of diarrhea per year and about 800,000 children die each year from diarrhea and dehydration.

This study therefore had the objective of assessing the level of food safety management practices in selected Senior High Schools within the Wa Municipality of the Upper West Region.

Methodology: The study was cross-sectional in design and employed focus group interviews to obtain relevant information. In all ninety-seven individuals were interviewed, comprising matrons, cooks, dining hall masters and students representatives (dining hall prefect and assistant, environmental prefect and assistant). Questionnaires were designed to elicit information on written policies and procedures on food safety management including procedures on receiving and storing of food, procedures for ensuring safety of foods brought from home, procedures for ensuring safety of food brought in by food vendors, procedures for ensuring safety of food prepared in kitchens, as well as a crisis management plan that details the roles and responsibilities of staff and procedures for accounting for and releasing students in the event of an out-break of a food-borne illness. The state of facilities and equipment used in cooking and serving food was also recorded.

Results: All the matrons had received training on food safety within the last year, while dining hall masters and cooks had received no training in food safety within the same period. In addition only two schools (25%) had at least 2 written policies on ensuring food safety, and these policies were on ensuring safety of food brought from home by students and safety of food brought for sale by external vendors. Also, 87.5% of schools did not have an outbreak crisis management plan defining staff roles in an emergency, whilst 25% had resident nurses who had protocols on identifying food-borne illnesses. Though all schools had equipment for food preparation, none had equipment for ensuring food safety such as thermometers, whilst hand washing facilities were also found to be inadequate. Finally, all schools are monitored at least once a year by the regulatory officers of the food and drugs authority.

Conclusions: The results of the present study indicate that senior high schools in the Upper West Region have no systems in place to manage the safety of food served to students, placing these students at an elevated risk for food-borne diseases. It is recommended that schools be mandated to install and implement food safety management programs to safeguard the health of students.

KEY WORDS: Food-borne illness, food safety, food safety policy, food safety equipment, food service staff, senior high schools.

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LIST OF ABBREVIATIONS

AFTAR	Agriculture and Rural Development Division of The African Region
BSI	British Standards Institute
CDC	Center for Disease Control
EHPs	Environmental Health Practitioners
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization
FDA	Food and Drug Authority
FSD	Foundation for Sustainable Development
FSRIO	Food Safety Research Information Office
GAO	General Accounting Office
GHP	Good Hygiene Practices
GHS	Ghana Health Service
GMP	Good Manufacturing Practices
GNA	Ghana News Agency
GSA	Ghana Standard Authority
HACCP	Hazard Analysis and Critical Control Points
IFPRI	International Food Policy Research Institute
MDAs	Metropolitan Municipal and District Assemblies
MDG	Millennium Development Goals
MOFA	Ministry of Food and Agriculture
NACMCF	National Advisory Committee on the Microbiological Criteria for Food
PNDC	Provisional National Defence Council

PPRSD   Plant Protection and Regulatory Service Division

PRP   Pre-requisite Program

SHS   Senior High Schools

SNA   School Nutrition Association

SOPs   Standard Operating Procedures

SPSS   Statistical Package for Social Scientists

SSOPs   Sanitation Standard Operation Procedures

USDA   United States Development Agency

WHO   World Health Organisation
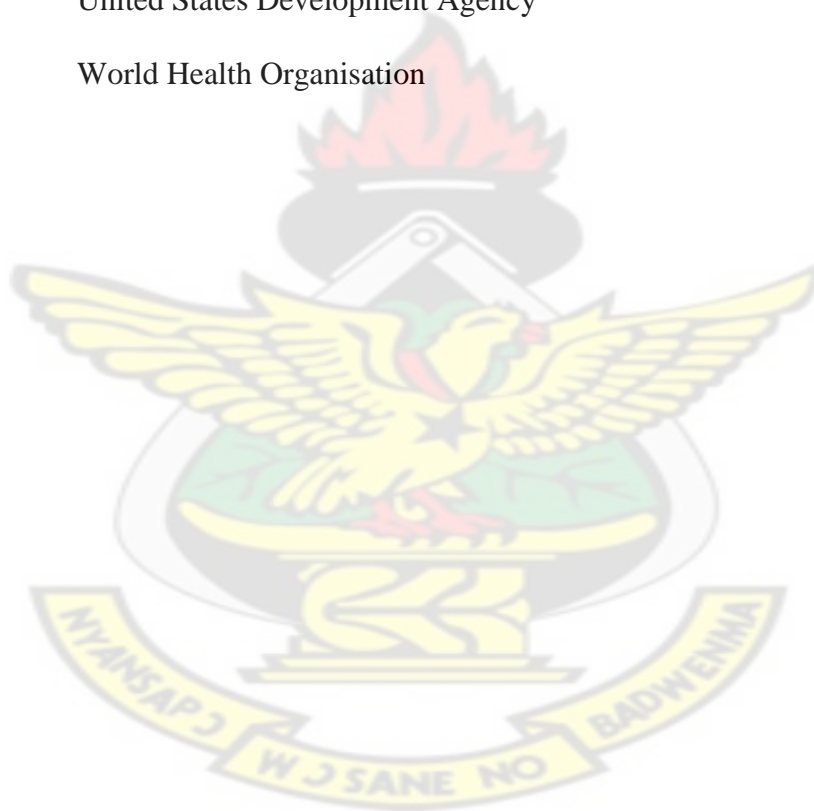
CHAPTER ONE

Introduction

1.1 Background

Food safety is a public health concern especially in relation to the foods served to students and pupils at Schools by vendors. Children in Africa usually experience an average of five episodes of diarrhea per year and about 800,000 children die each year from diarrhea and dehydration (Mead *et al.*, 1999). Also, serving safe food to students is critical to ensuring the safety of the students and key to a healthy school environment.

In Ghana, most consumers do not associate unsafe food with food-borne illnesses (NRI, 2007). Ingesting unsafe food could bring about symptoms ranging from flu- like illness, stomach cramps, diarrhea and vomiting.

Annually food-borne illnesses in retail foodservice operations costs consumers an estimated $6 billion in healthcare costs and loss of productivity (Paez & Ortiz, 2011) In addition, the top three factors contributing to food-borne illnesses in foodservice operations are poor personal hygiene, cross contamination, and time/temperature control. Overcoming these causes is paramount to preventing Food-borne illness in senior high schools. (US FDA, 2006)

In 2010, the Centers for Disease Control and Prevention (CDC) released new estimates of food-borne illness outbreaks in the United States. Each year, an estimated 9.4 million illnesses, 55,961 hospitalizations, and 1,351 deaths result from consumption of foods contaminated with known disease agents (Scallan *et al.*, 2011) with an additional 38.4 million illnesses, 71,878 hospitalizations, and 1,686 deaths estimated from consumption of foods contaminated with unspecified agents (Scallan *et al.*, 2011).

In February 12, 2010, the Daily Graphic newspaper in Ghana published that about 100 students of Archbishop Porter Girls Senior High School (a boarding school in Ghana) were plagued by stomach pains, vomiting, diarrhoea and general weakness after meals due to food poisoning.

The food industry is regulated to ensure a safe food supply; however, there is some degree of risk. All foods must be grown, handled, packed, prepared, stored, and served properly to ensure food remains safe for consumption, (WHO, 2002)

Although the vast majority of cases of food-borne illness are mild, a significant number are fatal, a high incidence of acute infections and chronic sequela can lead to billions of dollars in medical costs, loss of productivity and frequent recalls. The problem of food safety is not only a problem in developing countries but also in developed countries, which have advanced food chain monitoring systems (Duff *et al.*, 2003).

1.2 Problem Statement

The health and well-being of children are of critical importance not only as reflections of the current health status of individuals and the nation as a whole but also as predictors of health of the next generation. However, achieving food security and safety in its totality continues to be a challenge not only for the developing nations, but also for the developed world and Ghana to be specific (IFPRI, 2012).

Statistics from the Food and Drugs Authority of Ghana indicate that about 12,000 children in Ghanaian Junior and Senior High Schools suffer various kinds of food-borne ailments. In Ghana food-borne diseases such as cholera and typhoid fever are among the top ten diseases in most health facilities. However, there is little evidence on policy and

adherence to food guidelines among stakeholders of the food industry (Agyei-Baffuor *et al.*, 2013).

Ensuring basic food safety principles is very important if the problem of food-borne illness is to be reduced, to decrease the government's huge expenditure on food-borne illnesses (Saba et al, 2012).

Even though the Wa municipality has adopted several strategies, interventions and programmes targeting improving the state of food safety management practices in senior high schools, much has not been achieved. There is therefore a need for immediate action in order to reduce health care spending as well as reduce losses in productivity.

Researchers (both governmental and private based) should take into consideration the paucity of food safety research, especially in the northern regions of Ghana and support this research field (Saba *et al.*, 2012).

Based on this, it is necessary that an assessment be made of the level of implementation of food safety management systems.

1.3 Research objectives

1.3.1 General objective

▪ Assess the level of food safety management practices selected in SHS within Wa municipality of the Upper West Region.

1.3.2 Specific objectives

▪ Assess the availability of written policies and guidelines on food safety.

▪ Determine the levels of qualification and training of food service staff.

- Ascertain the availability of food safety equipment.

- Ascertain the regularity of monitoring by regulatory bodies.

1.4 Significance of the study

This research will help policy makers in designing policies that will help check poor food safety practices in senior high as well as junior high and basic schools where the school feeding programme is being implemented to help attain MDG 1.

This study will make significant contributions, both theoretically and empirically to the existing knowledge of literature and also increase the understanding of food safety management practices in the Wa municipal area and provoke future research.

1.5 Chapter Organization

This thesis is organized into five chapters. Chapter one contains the introduction, problem statement, objectives and the significance of the study. Chapter two presents relevant literature that underpins food safety management practices in senior high schools. Chapter three presents methodological framework and techniques employed in conducting the study. Chapter four examines and discusses the results and main findings with reference to the literature. The final chapter (Chapter 5) is summary, conclusions and recommendations of the study.

CHAPTER TWO

2.0 Literature review

2.1 Introduction

A number of food-related crises and scandals in recent years raised the awareness of agrifood companies and supply chains to improve product safety. A food scandal over melamine poisoned milk in China in 2008 made it clear that, due to global trade, hazards can be easily spread to other food chains within the same country, and even to other countries (Okazaki *et al*., 2009; Chan *et al*., 2009; Ingelfinger 2008). The food-borne outbreak of enterohemorrhagic *Escherichia coli* (EHEC) in Germany in 2011, causing 53 dead and 3842 diseased people (Appel *et al*. 2011), demonstrated the seriousness of the consequences not only for the health of consumers, but also for the economy of the affected industries and countries.

Recently in Ghana, over forty students of Twifo Praso senior high school were rushed to the hospital for food poisoning after having consumed their evening meals (GNA, 2013), coupled to this was another incident of food poisoning at Adonten Senior High school in which more than forty students were hospitalized (Ghanaweb.com, 2013). These and many more stories of food poisoning, makes it necessary for an evaluation and improvement of food safety management systems in Ghanaian high schools.

2.2 What is food safety?

The Food and Agriculture Organization of the United Nations in collaboration with the World Health Organization (1983) define food safety as the concept that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use

and is related to the occurrence of food safety hazards but does not include other human health aspects related to, for example, malnutrition.

Food safety is related to the presence of food-borne hazards in food at the point of consumption (intake by the consumer). As the introduction of food safety hazards can occur at any stage of the food chain, adequate control throughout the food chain is essential. Thus, food safety is ensured through the combined efforts of all the parties participating in the food chain (BSI, 2010).

2.3 History of food safety

Terry L. Smith (2011) in an attempt to discuss the history of food safety speculates that the first prehistoric people to enjoy a meal of roasted meat were excited at how much better it tasted relative to raw foods. Inferably, no attention was given to the health benefits or otherwise that came with either of these two meals. He further contends that little did they know that their discovery of fire for cooking their food was also the first step toward reducing food-borne illnesses. Even though history had not provided the details, it is apparent that people had suffered and died from food-borne illness beginning with the very origins of man. He goes on to add that early recorded history makes references to dietary practices and records of mass deaths that suggest the existence of food-borne illness. Consequently, some scientists have interpreted the biblical story of a severe plague following an Israelite feast of quail as a case of mass food poisoning. Similarly, the presence of food-borne illnesses is even demonstrated more strongly through the horrors on the battlefield. Indeed almost every war has a history of an accompanying incident of soldiers dying from disease as opposed to the actual battle. For instance, the defeat of the Golden age of Greece by Sparta, in the famous "plague of

Athens" in the century B.C., was most likely due to food-borne illness. Similarly, the fall of the Roman Empire is hypothesized to have been caused by Lead poisoning of wine. Also, the opium wars between the Britain and China in the nineteenth century is linked to a case of intentional food poisoning whiles many more soldiers in the Spanish-American war were thought to have died from disease (Typhoid fever associated with the unsanitary conditions of the training camp) rather than in battle.

2.4 Food safety in the world

Food-borne diseases present adverse consequences on health. The morbidities and mortalities culminating from the intake of unsafe food are pegged at thousands of millions of people. Subsequently, the world health organization in May 2000 in its 53rd world health assembly adopted a resolution imploring the WHO and its member states to recognize food safety as an essential public health function. As part of the endorsement, the resolution also beseeched the WHO to develop a Global Strategy for reducing the burden of food-borne disease. The availability of safe food according to the WHO improves the health of people and is a basic human right. Safe food contributes to health and productivity and provides an effective platform for development and poverty alleviation. People are becoming increasingly alarmed about the health risks posed by microbial pathogens and potentially hazardous chemicals in food. It is estimated that up to one-third of the populations of developed countries are affected by food-borne illness yearly, and the problem is likely to be even more widespread in developing countries with the poor being the most susceptible to ill-health. In less developed countries, food and waterborne diarrheal diseases are leading causes of illness and deaths, responsible for

2.2 million deaths annually. A larger proportion of these deaths usually occur in children (WHO, 2002).

The current trend of events in the global food production front as well as processing, distribution and preparation pose new challenges to food safety. To this end, food produced in one country is now capable of been transported and consumed half way across the globe. There are higher demands for a wider variety of foods than in the past and more so is the demand for out-of-season foods and foods most often consumed away from home. The institutionalization of children in schools and childcare facilities coupled with the growing number of elderly persons in hospitals and nursing homes is indicative that food for many is prepared and handled by a few and therefore can be a major source of food-borne disease outbreaks. Further to this is the fact that, unsafe food remains a more serious threat to the increasing number of immune compromised people. In responding to these challenges therefore, WHO and its member states recognize and protect food safety as a vital public health function. In furtherance to this position, WHO requires that food safety should and must be addressed along the entire food chain on the basis of sound scientific information at both national and international levels. It further requires the enhancement of WHO's capacity to assess the risks posed by microbiological and chemical hazards and that of new food related technologies. In demonstrating its commitment to ensuring better health for all, the WHO will continue to support member states in establishing and updating that capacity (WHO, 2002).

2.5 Food safety in Ghana

Various evidences exist as regards the number of cases, outbreaks, type of food and micro-organisms involved, the economic value of food-borne diseases to a country's

economy as well as the likely negative impact of the absence of food safety in a nation's food supply system (Doyle, 1993; Bean and Griffin, 1990).

In Ghana food-borne diseases such as cholera and typhoid fever are among the top ten diseases in most health facilities. However, there is little evidence on policy and adherence to food guidelines among stakeholders of the food industry (Agyei-Baffuor *et al.*, 2013).

The incidence of food related infections is grossly under-reported in Ghana because, only the very serious episodes are taken to hospital. Invariably, only severe outbreaks may be properly investigated to identify the causative agent (Newman, 2005).

An estimated 30% of the population in developed countries is affected by food-borne diseases every year whiles the incidence in less developed countries remains largely unknown (Mahami and Odonkor, 2012). According to the Africa Agriculture and Rural Development (AFTAR) World Bank (2006), the number of yearly reported outpatient cases of food-borne diseases is 420, 0000 with the annual death rate estimated at 65,000. This economic cost to the Ghanaian economy is estimated at US $ 69 million.

2.6 Why the need for food safety

The existence of evidence on serious outbreaks of food-borne diseases on all continents in the past decade depicts both the public health and social significance of these diseases. Consumers across the globe continue to perceive the outbreak of food-borne diseases with increasing concern. Children, pregnant women, the elderly and people affected by other diseases are among the most affected by food-borne diseases. These diseases do not only hugely affect the health and wellbeing of people, but they have economic

implications for individuals, families, communities, businesses and countries. These diseases are also noted to aggravate the burden on health care systems and markedly reduce economic productivity. In the long run, the loss of income to poor people as a result of food-borne diseases perpetuates the cycle of poverty (WHO, 2002).

2.7 Food Safety in Schools

Preventing food-borne illness is an important concern in school settings because outbreaks have personal, academic, financial, and legal consequences for each school district (Marx, 2008). Student absenteeism affects a student's performance in school, and if a food-borne illness outbreak occurred, school districts could experience increased insurance costs, attorney fees, and loss of revenues due to decreased participation in school meals (Marx, 2008). Children are an at-risk population and can contract food-borne illness from eating or drinking a contaminated substance.

In a 10-year study conducted between 1990 and 1999 by the U.S. General Accounting Office ([GAO], 2003), 3% of food-borne illness outbreaks occurred in schools. Daniels *et al.*, (2002) studied the outbreaks that occurred in the period between January 1973 and December 1997 and found there were 604 school-related outbreaks reported to the CDC from state and local health departments. The commonly reported food practices contributing to the school-related outbreaks were improper food storage, food contaminated by a food handler, and improper holding temperatures (Daniels *et al.*, 2002). Other improper behaviors noted during observational research and survey studies were poor hand washing (Henroid & Sneed, 2004), lack of hair restraints (Giampaoli *et al.*, 2002; Gilmore *et al*., 1998), lack of calibration of thermometers (Henroid & Sneed, 2004), improper reheating (Kim & Shanklin, 1999), inappropriate sanitizing, improper

heating and cooling (Henroid & Sneed, 2004), and consumption of food in a preparation area (Giampaoli *et al*., 2002). In general, these studies found proper food-handling practices in schools were not being followed consistently.

Prior to the requirement for HACCP implementation, there was evidence that school foodservice administrators were aware of the need for food safety plans. In different state and national studies conducted prior to the food safety HACCP policy mandates, foodservice managers in one study and directors in others were asked their familiarity of knowledge of HACCP and frequency of policies in place. Hwang *et al*., 2001 conducted a study among school foodservice managers in Indiana schools to identify factors related to HACCP implementation. The majority of the responding managers (n = 107, 66.5%) indicated they were familiar with HACCP, yet of those, only 22 school operations had a HACCP program in place, although 30 respondents (45%) indicated they were interested or would be implementing HACCP in the near future. Youn & Sneed (2002) found that 22% of foodservice directors (FSDs) in Iowa were familiar with HACCP. Giampaoli *et al*., (2002) found in a national study that 30% of school FSDs reported to have implemented HACCP.

Of the 445 schools contacted in the 2006 School Health Policy and Program Study, 71.4% of the schools had written HACCP-based plans (O'Toole *et a.l*, 2007). Thus, the HACCP mandate did appear to result in plan development. In another study, the SNA (2008) found that, after the USDA mandate, 85% of schools reported HACCP implementation.

School foodservice operations use a variety of food production systems, such as conventional onsite, commissary, satellite, cook–chill, and base kitchens (Unklesbay *et*

al., 1977). Nettles & Gregoire (2000) identified that school districts with enrollments of less than 8,500 primarily had conventional onsite kitchens (69.6%) or conventional base kitchens (54%). The majority of school districts with enrollments greater than 8,500 had conventional onsite kitchens (31%) or conventional base kitchens (45%). There has been a trend for school districts to change production systems to central production as a way to streamline operations and to combat budget constraints. As these changes occur, facilities and equipment items need to be adequate to ensure proper temperature holding and controls for products during transportation to service sites (Almanza & Sneed, 2003). The Food Safety Assurance Pyramid comprises three overarching areas: prerequisite programs, on-going employee training, and total management commitment. This is the foundation of support not only for the pyramid but for the success of the HACCP program. Commitment and support from management and administration are critical; without this support the HACCP program may not work in school operations (National Advisory Committee on Microbiological Criteria for Foods [NACMCF], 1998).

2.8 Food safety implementation in boarding schools

Food safety inspection is lacking in some schools, although federal law requires schools across the country to have food safety inspections twice a year, nearly 9,000 schools during the 2007-2008 school year did not. According to data from the U.S. Department of Agriculture's Food and Nutrition Service, almost 27,000 schools in the U.S. received one food safety inspection or were not inspected at all (Alexa, 2010).

The global importance of food safety is not fully appreciated by many public health authorities despite a constant increase in the prevalence of food-borne illness. Numerous devastating outbreaks of salmonellosis, cholera, enterohaemorrhagic *Escherichia coli*

infections, hepatitis A and other diseases have occurred in both industrialized and developing countries. In addition, many of the re-emerging or newly recognized pathogens are food-borne or have the potential of being transmitted by food and/or drinking water. More food-borne pathogens can be expected because of changing production methods, processes, practices and habits (Abdussalam & Käferstein, 1993).

While food safety is considered to be an important issue in school foodservice, there have been several recent outbreaks of food-borne illness in schools and research shows that safe sanitation and food-handling practices are not always followed in school meal programs.

There are thousands of types of bacteria in the environment but most of them do not cause harm, some bacteria are useful to the body and keep the digestive tract healthy, pathogens which are also harmful bacteria get into contact with food and water supply can cause food-borne diseases or food poisoning. These bacteria could result in food-borne illnesses as a result of the channels raw food products are sourced from, the way they handled during storage, the way they are sanitized before use etc (Medeiros *et al*., 2004).

Infections can lead to inflammation, decreasing nutrition status, further compromising the immune systems. This is not good for students since it retards their studies.

Food safety education is most effective when the messages are geared towards changing behaviors that most likely are the causes of food-borne illnesses. Food education is more effective if the messages are targeted towards specific audience

Furthermore, poor hand and surface hygiene is also a significant contributing factor (Cogan *et al*., 2002) in up to 39 % of domestic or school food poisoning outbreaks (Ryan *et al*., 1996). Overall, research has found that the most common behaviors impacting the control of numerous pathogens include proper hand washing and personal hygiene, safe and adequate cooking of food, storing foods at safe temperatures, and effectively washing surfaces and equipment to prevent cross-contamination (Medeiros *et al*., 2004; Medeiros *et al*., 2001a; Medeiros *et al*.,2001b).

2.9 Food safety management systems

Food safety management systems are systems that are put in place to ensure that food products produced during preparation and processing are wholesome for consumption and of good quality. Examples are prerequisite programs and HACCP. Prerequisite programs (PRPs) provide the foundation for HACCP in an overall food safety management program. PRPs are those practices that are needed before and during the implementation of HACCP otherwise the system will not be functional (Tuominen *et al.*, 2003; WHO, 1998). The PRPs needed include GMP, GHPs, SOPs, SSOPs, and GAPs (FSRIO, 2005; Tuominen *et al.,* 2003; Wallace & Williams, 2001)

Food safety management systems are beneficial in a number of ways which includes;

- it aids in detecting hazards that are likely to occur during the food processing procedure hence measures can be put in place to prevent such hazards

- it ensures compliance to food safety laws

- it improves food safety standards

- it promotes teamwork among staff hence making their work more efficient

- Protects your customers

- Improves control of food processes

- Provides a process for continuous self-inspection and self-improvement

- Provides a defense against complaints and legal action

- Develop procedures to reduce the risk of an outbreak

- Monitor processes to keep food safe

- Verify that food served is consistently safe

(School Nutrition Association, 2005).

2.9.1 History of food safety management systems (HACCP)

HACCP began in the early 1960s. The US National Aeronautics and Space Administration (NASA) needed a system to ensure that astronauts did not become sick from food eaten in space. The Pillsbury Company, along with the United States Natick Laboratories and NASA, developed the HACCP system to ensure food safety (School Nutrition Association, 2005)

During the 1990s HACCP was mandated for seafood, meat and poultry processing plants based on USDA/FDA regulations. In the mid-90s commercial food services, schools with central kitchens and hospitals began to use HACCP Programs voluntarily because HACCP contributes to effective risk management (School Nutrition Association, 2005).

As of July 2005, Child Nutrition Programs have a legislative mandate to implement food safety programs based on HACCP Principles. Child Nutrition Programs are the first segment of retail foodservice operations to be mandated to implement a food safety program based on HACCP principles (School Nutrition Association, 2005).

HACCP stands for Hazard Analysis Critical Control Points and utilizes the following seven principles:

1. Identify Hazards

2. Identify Critical Control Points

3. Establish Critical Limits

4. Establish Monitoring Procedures

5. Establish Corrective Actions

6. Establish Verification Procedures

7. Establish Record Keeping Procedures

2.10 Predisposing factors for poor food safety practices

Several studies have reported inappropriate food handling practices in school foodservice, such as unsafe food handling with bare hand contact, infrequent changing of gloves between tasks, insufficient handwashing, inappropriate hair restraints, improper eating and drinking in food preparation areas, and inadequate cleaning and sanitation of utensils, equipment, and facilities (Henroid & Sneed, 2004; Giampaoli *et al*., 2002; Gilmore *et al*., 1998).

The USFDA (2006) identified risk practices and behaviors that contributed to food-borne illnesses: improper holding/time and temperature; poor personal hygiene; and contaminated equipment/prevention of contamination.

2.10.1 Knowledge on food safety

Foodservice workers play a major role in prevention and control of outbreaks of food-borne illness and in meeting the goal of serving safe food (Lin & Sneed, 2005).

Socioeconomic class and educational level can affect food safety knowledge and awareness, with lower levels of knowledge related to lower educational levels and lower socioeconomic classes (Sudershan *et al*., 2008).

Only knowledgeable, motivated, and skilled employees who are trained to follow the proper procedures together with management that effectively monitors employees' performances can ensure food safety (Cohen *et al.,* 2001).

Studies have found that food safety training is positively associated with self-reported changes in food safety practices (McElroy & Cutter, 2004; Clayton *et al.*, 2002), and improved attitudes (Wie & Strohbehn, 1997).

Food businesses must make sure that food handlers and people who supervise food handlers have skills and knowledge in food safety and food hygiene for the work they do (Food standards Australia New Zealand, 2002).

Food handlers are those of your staff who are involved in any activity in your business that involves food or surfaces likely to come in contact with foods. It covers your staff whose work involves manufacturing, processing, preparing (such as chopping, cooking, thawing), delivering, transporting or packing your food and your staff that clean your premises and equipment (Food standards Australia New Zealand, 2002).

There are two broad categories of skills and knowledge required. These can be summarized under two categories.

2.10.1.1 General practices

- Personal hygiene practices and responsibilities about their health that all food handlers preparing food know and put into practice.

- Food handling practices to prepare and store food correctly.

- Hygiene practices to keep the food premises and equipment clean and well maintained.

2.10.1.2 Specific practices

Skills and knowledge needed for more specific food handling operations, such as receiving food into the premises, cooking, reheating and cooling food, controlling the time food is at room temperature and disposing of food (Food standards Australia New Zealand, 2002).

It is very important for managers to educate all employees about food safety, train them to use appropriate food handling procedures, and monitor their performance. To ensure safe food handling and change incorrect food handling behaviors, employees must be provided with accurate knowledge and be motivated to apply that knowledge. Moreover, ongoing reinforcement of training programs must be given regularly in the workplace so that employees consistently use desired food handling practices (Rennie, 1994).

2.10.2 Availability of food safety policy

Safe food is important in preventing food-borne diseases. It is a legal requirement to document food preparation procedures to ensure that food served is safe to eat. Food handlers must read the food safety policy and sign to show that they understand its content (Merican, 2000).

A supervisor must check monthly that the food safety policy is being adhered to and record outcome in the food safety diary (Merican, 2000).

The need to protect the public against infections is of paramount importance in the food industry. Food safety policies and procedures are therefore used to create safety management and such safety polices include procedures, quality assurance and the use of HACCP (Agyei-Baffuor *et al*., 2013)

Ensuring food safety is a transdisciplinary task involving, government ministries, departments and agencies (MDAs). While the enactments are made by Parliament and the regulations made pursuant to these enactments provide the main corpus of food law, the work of these MDAs are critical for the successful development and application of food laws and improvement in food safety (Fairman & Yapp, 2004).

In Ghana, the Ministry of Health, Standard Authority and Food and Drug Authority oversee issues about food safety. For instance, the major aims of Ghana Standard Authority (GSA) includes; establishment and promulgation of standards with the object of ensuring high quality in goods produced in Ghana, whether for local or for export; and promoting standardisation in industry and commerce; promoting industrial efficiency and development, promoting standards in public and industrial welfare, health and safety (Ackah, 2010). Again, one of the core mandates of the GSA includes; Article 3(2) (d) to maintain the necessary machinery to ensure that goods prepared and manufactured for export are distinctly marked for export only, and to provide for issue of a certificate to the effect that goods comply with known requirement of standards in the country to which they are or about to be consigned, before the export of such goods are permitted. Others

include; Article 3(2) (k) to cooperate with representatives of any industry, or with any government department, local authority, or other public bodies or persons with a view to securing the adoption of standards safety (PNDC Law 305, 2011).

Policies are of utmost essence with regards to food and every substance human beings ingest. A number of researches have been carried out with regard to policies aligned with food, typical of these is a study by the Allen Consulting Group where they evaluated the benefits and costs of Food Safety Programs as well as the National Risk Validation Project(Food Standards Australia & Minter Ellison, 2002) which also identified high-risk sectors throughout the food supply chain based on food-borne illness data and proceeded to highlight where Food Safety Programs could be justified on benefit/cost grounds. With regard to general food service, the National Risk Validation Project (NRVP, 2002) identified two sectors where Food Safety Programs would be justified by the high food safety risk; catering operations serving food to the entire public and eating enterprises for instance restaurants, cafes, and takeaways (Jouve *et al*., 1998). Food safety management policy must consider public health impacts, which may include impacts relevant to the whole population as well as specific groups or individuals. In effect, food safety management policy should not have adverse effects on protection of public health and safety, incidence of contamination of food and incidence of food-borne illness but must favorably be inclined towards all these variables to ensure its maximum good (Crossley & Motarjemi, 2011). The 2006 report Annual Cost of Food-borne Illness in Australia identified the fact that there is a risk that the effects of food-borne illness on the economy may increase, unless interventions can decrease the incidence of these illnesses (Abelson *et al*., 2006). Food safety management policy guidance that targets specifically at retail or

food service has the potential to underpin arrangements that will significantly reduce food safety risks in the sector, which is currently over-represented in causal and costing data (Crossley & Motarjemi, 2011).

It is worthy of note that good regulatory practices consistent with the principle of minimum effective regulation and effective implementation will aid in achieving regulatory objectives, and at the same time have proper regard for the limited resources available to many businesses within the sector of catering and hospitality (Abelson *et al*., 2006).

Food safety management policy has the tendency to impact upon government mechanisms at all levels. Specifically, food safety management policy guidance for retail/food service should consider potential impacts on local governments as the key regulators of the sector (Jouve *et al*., 1998). Enforcement agencies both at the local and national level, food safety agencies and departments of health and trade may all be impacted, although the extent of impact may vary. This can be done by considering impacts on government in relation to implementation and maintenance of food safety systems, investigating and monitoring food-borne illness, enforcement and surveillance. This will further include the response to food-borne illness outbreaks as well as health care costs in addition to emergency care, general practitioner and specialist services (Bryan, 1988).

2.11 Definition of Terms

The following terms were used in this study:

Central kitchen: A food production facility in which food is produced for service off site in receiving (satellites), often a large production facility; also known as a commissary (Unklesbay *et al*., 1977).

Contract feeding: Foodservice provided through an outside firm; may include outside management, personnel, and food purchasing (Silberberg, 1997).

Conventional foodservice system: A foodservice system in which ingredients are assembled and food is produced on site, held either heated or chilled, and served to customers; some foods are purchased fully prepared and require only portioning and service, whereas other products require full preparation; it is very labor intense (Unklesbay *et al*., 1977).

Flow of food: A path, from receiving through storing, preparation, serving, cooling, and reheating, that food follows in a foodservice system (Berry &Litchford, 1998).

Food production center: A facility in which food is prepared to be served at another location (Berry &Litchford, 1998; Silberberg, 1997).

Food-borne disease or illness: Infection or intoxication caused by microbial or chemical contaminates in food (USFDA, 2010).

Hazard Analysis Critical Control Point (HACCP): A food safety system that focuses on the flow of food in a foodservice operation in order to reduce the risk of food-borne illness (Berry & Litchford, 1998); a systematic approach to construct a food safety program designed to reduce the risk of food-borne hazards by focusing on each step of the food preparation process—from receiving to service (USDA-FNS, 2005a).

Kiosk: A small, free-standing structure with open sides (Berry & Litchford, 1998) and a decentralized dispensing or serving area that is sometimes mobile (Silberberg, 1997).

Personal hygiene: Habits of the food handler, which include clean clothes/uniform, hand washing practices, good health, and neat and clean body (NRAEF, 2008).

On-site kitchen: A kitchen that prepares and serves food at the same location (Berry & Litchford, 1998; Silberberg, 1997).

Transportation: In the event food is prepared in one place and served in another, transportation activities include moving food and nonfood products, can storage and cleaning, return of soiled ware for sanitizing or disposal, and the collection and disposal of plate waste (Berry & Litchford, 1998).
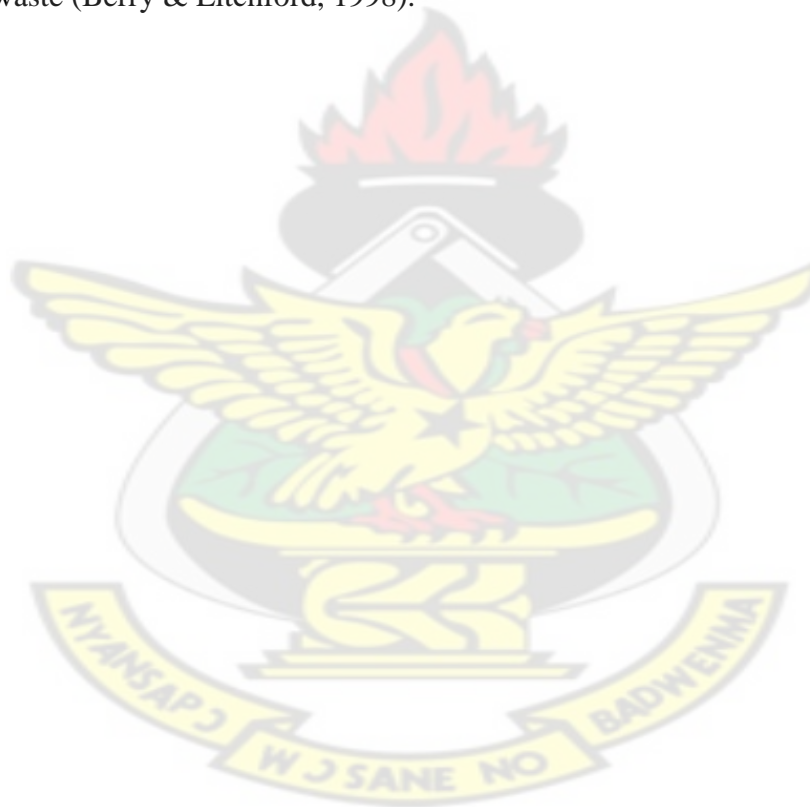
CHAPTER THREE

3.0 Methodology

3.1 Introduction

This chapter covers explanation of the various methods involved with gathering the data for the study. It comprises the study design, the study area, the population, source of the data, sample size, the sampling procedures used in obtaining the final sample for the study, the instrument employed for the data collection and data analyses procedures and limitations of the study.

3.2 Study area

The research was carried out in eight senior high schools within the Wa Municipality of the Upper West Region. Wa Municipal is among the Eleven (11) Municipal and Districts in the Upper West Region. The Municipal Administrative Capital is Wa. The Municipality is also home to the regional capital of Upper West Region. This, of course, makes it the largest urban centre in the region. The Municipality shares boundaries with Daffiama Bussie Issa District to the North, Sawla-Tuna-Kalba District to the South, Wa West District to the West and Wa East District to the East (www.ghanadistricts.com). The Municipality has eight senior high schools, made up of Wa senior high school, Wa senior High Technical School, Ahmadiyya Muslim Senior high school, Islamic senior high school, Wa secondary technical school, Wa School for the deaf, Wa school for the Blind, and St Francis Xavier minor seminary.

Fig 3.1: A map of upper West Region showing Wa Municipal (www.ghanadistricts.com)

3.3 Research design

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. It is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data (Dutton & Dutton, 2005). Cross-sectional design forms a class of research methods that involve observation of all of a population, or a representative subset, at one specific point in time (Coggon *et al*., 1997). The study was cross sectional in nature, which was designed to find out from the schools in Wa municipality the level of implementation of food safety management systems in senior high school kitchens. A cross sectional design was adopted because it is suitable for descriptive studies such as this study. Using a complete census sample design, a questionnaire was used for data collection.

3.4 Sources of data

The study employed primary and secondary data. Primary data was collected from the senior high students within the municipality. Secondary data was obtained from reports and records from the offices of the Municipality and the Assembly, internet sources, newspapers, journals, articles, published and unpublished books.

3.5 Sample and Sampling Techniques

3.5.1 Sample size

This study employed 97 respondents and the choice of the sample size was guided by a number of factors stipulated by Selltiz (1976) on the importance for sampling in a study. According to Selltiz (1976), sampling is very important because in many cases a complete coverage of the population is impossible. It is also thought to be more economical than taking the whole population since fewer people are involved and requires fewer experts, printed materials and general costs. Also, considering the nature of the study, logistics, financial constraints and the time period for the study, the number of respondents chosen was deemed appropriate for the study.

Mathematically, the sample size was calculated using the formula shown below:

$N = z^2 pq/d^2$ (Snedecor & Cochran, 1989)

Where N= sample size

z= z-score of the confidence interval level (90%) = 1.645

p= proportion of population affected=0.1

q= proportion not affected=0.9

d= desired precision= 0.05

Substituting;

N= 1.645² (0.1) (0.9)/0.05²=97.41

The sample size for the study is 97.

3.5.2 Sampling procedure

Using the total sample for the study, a purposive sampling technique was employed to select members of all the respondents from eight senior high schools within the Municipal.

3.6 Data Collection instrument

The study employed focus group interviews as a data collection instrument. In this method, the various actors in the food service chain in the participating schools were categorized into M1atrons, cooks, dining hall masters, store keepers and students. An interview guide (Appendix 2) was prepared for each of the categories. The researcher interviewed these categories for information pertinent to their own categories.

3.7 Data Analysis Procedures

The statistical package for social scientists (SPSS Version 20) was be used to analyze the data. This was very suitable for the type of data for the current study. The package summarises and creates appropriate tables and examines relationships between variables. The analyses included cross tabulation and computation of frequencies that was obtained from closed-ended questions.

Frequency tables were constructed for the questionnaire items in line with the objectives of the study as an initial step in the analysis. The frequency tables on the demographic variables were constructed as a way of describing the sample population. Cross tabulation

tables were constructed for all multiple response questionnaire items in an attempt to reduce analyses-output and thereby create compact results of manageable proportions.

3.8 Pretesting of Instrument(s)

To ensure that the interview guide used captured the relevant information needed for the study, it was pre-tested in Kaleo Senior High School (Kaleo Senior High School exhibits similar characteristics as senior high schools in Wa Municipal). The responses from the respondents were used to modify the actual final questionnaire for the study. The pretesting also allowed for accurate and uniform interpretation of the questions in the local language of the people since it revealed problems with the items in the interview schedules that required changes. The pretesting of the instrument also allowed close monitoring and coaching of the field assistants by the researcher so to ensure that the questions are clearly understood by the data collectors and respondents.

3.9 Ethical Issues

Ethical issues such as community entry protocols, adherence to confidentiality, privacy and avoidance of harm to respondents was ensured. The participation of respondents in the study was purely voluntary and as such they could choose to partake or not. Letters of introduction were also obtained from the University and given to headmasters of the various schools to obtain consent.

CHAPTER FOUR

4.0 Results and Discussions

4.1 Introduction

Eight senior high schools participated in the survey. Respondents were taken from each senior high school. The schools include; Wa Islamic Senior High School, T. I. Ahmadiyya Senior High School, Wa Senior High School, Wa School For The Deaf, Wa School For The Blind, Wa Technical Institute, Wa Technical Senior High School and St Francis Xavier Minor Seminary. The data was analyzed under five (5) categories;

1. Background of respondents

2. Written policies or procedures on food safety

3 .Staff development and food safety

4. Food service facilities and equipment

5. Hand washing facilities

4.2 Background of Respondents

4.2.1 Job categories of respondents

A total of ninety-seven questionnaires were administered to the various respondents who form part of the food supply chain in the selected schools. 11% of the respondents were matrons, 32% students, 8% dining hall masters, 8% storekeepers, and 41% cooks. Figure 4.1 indicates the various respondents and the percentages
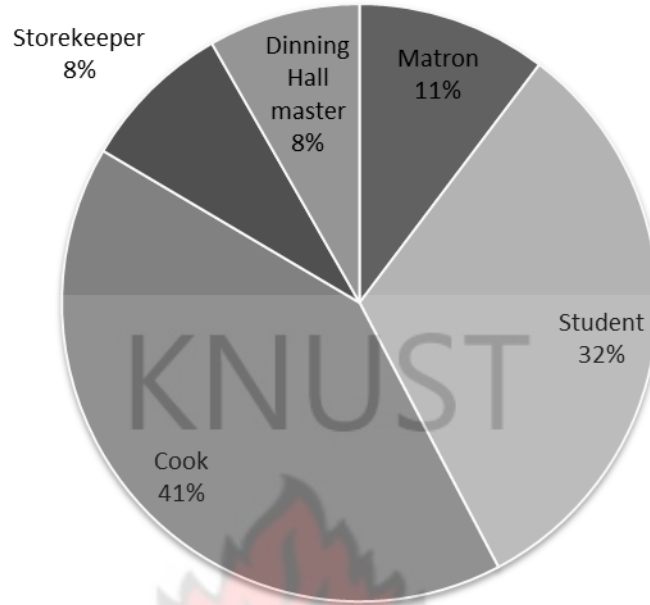
Fig 4.1: Categories of respondents

4.2.2 Educational levels of respondents

Socioeconomic status and educational level can affect food safety knowledge and awareness, with lower levels of knowledge related to lower educational levels and lower socioeconomic classes (Sudershan *et al*., 2008)

Respondents were therefore asked the highest level of education they have attained. Results indicate that 26.8% of respondents all respondents, and 100% of food service supervisors (Matrons, storekeepers and dining hall masters) have attained tertiary education. These results support a study by Ababio *et al*., (2013), which found out that 92.6% of supervisors of food in schools (Matrons and dining hall masters), had tertiary education. Sudershan *et al*., (2008), established a positive correlation between higher education and food safety knowledge and practices. This presupposes that among the

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supervisors of the food service in these senior high schools, food safety practices will be optimal.

In addition, 32% of respondents, made up of students, said they have attained up to secondary education whilst 8.2% and 33% of respondents have had at least primary education and no formal education respectively. All respondents with only primary school or no formal education were found to be the cooks. Again, since there is a positive correlation between educational level attained and knowledge/attitudes towards food safety as suggested by Sudershan *et al*., (2008), it can be posited that among the cooks who are those that directly handle the foods prepared in these schools, there will be inadequate knowledge and attitude towards food safety.

Among all the food service personnel however (cooks, matrons, storekeepers and dining hall masters), only 40% have attained at least senior high school education. This result is at variance with a study conducted in Accra by Akonnor & Akonnor (2013) which found majority (84.9%) of food service personnel to have attained at least senior high school education. This variation could possibly be as a result of variations in the literacy rates of the Upper West region and the Greater Accra region. Greater Accra has an adult literacy rate of 77.6% as compared to 24.4% for the Upper West region. (Ghana statistical service, 2003).
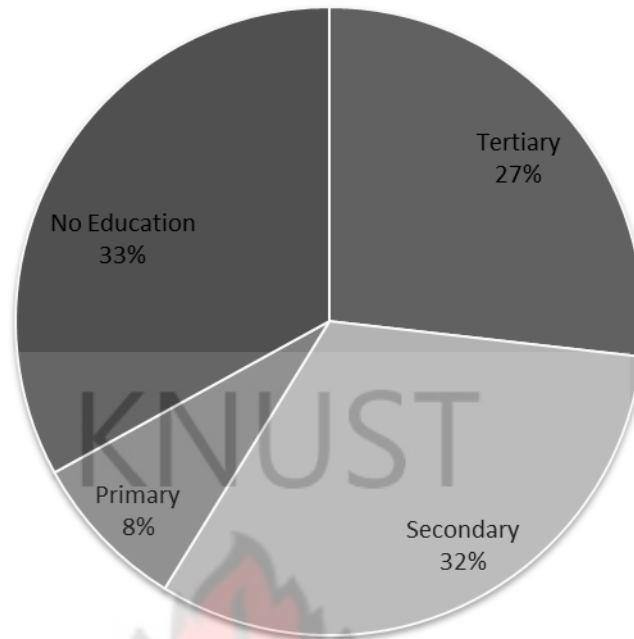
Figure 4.2. Educational level of Respondents

4.3 Availability of written policies or procedures on food safety

Safe food is important in preventing food-borne diseases. It is a legal requirement to document food preparation procedures to ensure that food served is safe to eat. Food handlers must read the food safety policy and sign to show that they understand its content (Merican, 2000)

The research sought to find out if schools had written policies for ensuring food safety at various levels. These included policy on receiving and storing of food, policy for ensuring safety of foods brought from home, policy for ensuring safety of food brought in by food vendors and a policy for ensuring safety of food prepared in kitchens.

For this portion of the study, specific staffs were interviewed (focus group interviews). Store keepers were interviewed on the availability of written policies on receiving and

handling of food, Dining hall masters were interviewed on policy for ensuring safety of food brought from home and vendors and matrons were interviewed on policies for ensuring safety of food prepared in kitchens. The results obtained are presented in table 4.1.

Table 4.1: Availability of written policies or procedures on food safety

Respondent	Frequency	Percentage
Ensuring the safety of food received and stored		
Yes	2	25
No	6	75
n (storekeepers) =8		
Ensuring the safety of foods brought from home		
Yes	1	12.5
No	7	87.5
n (dining hall masters) = 8		
Ensuring the safety of foods brought in by outside vendors		
Yes	0	0
No	8	100
n (dining hall masters) = 8		
Ensuring the safety of foods prepared and served in the kitchen		
Yes	0	0
No	10	100
n (matrons) = 10		

The result indicates that a few schools have written policies on some aspects of food safety even though those schools were unable to make such documents available for verification. Only one school (St. Francis Xavier SHS) (12.5%) had a written policy on ensuring safety of foods brought from home by individual students. In a similar study by Dawso & Ann, (2012), Just over one fourth (27.1%, n = 45) of food service managers indicated policies were in place for food prepared at home and brought in for resale to broader groups (both students and teachers). Whilst (10.1%) of food service managers indicated the existence of policies related to food prepared at home and brought in for a covered dish dinner (not for resale). The presence of a policy on food brought in from home will help schools in identifying hazards of foods prepared from other locations such that those hazards could be eliminated.

In addition, none of the respondents indicated yes to the question on whether they had a written policy on ensuring safety of food brought in by food vendors. However, all schools indicated that they had guidelines they follow before allowing a food vendor to sell food in the school, although there was no documentary evidence of such guidelines. The above finding is in conformity with a similar research that was carried out in Accra by Agyei-Baffuor *et al*., (2013), in which it was realized that 92.14% of respondents in the survey had no written guidelines on ensuring food safety. In addition, Dr. Samuel Sefah-Dedeh in an article presented at the Go-Global conference in Accra, (2009), identified the lack of enforceable policies as one of the key issues confronting the food service industry in Ghana.

Also, none of schools had a written policy on ensuring safety of food prepared in their kitchens. They all however indicated that they had guidelines that they follow to ensure

safety of the foods they prepare, but which are undocumented. Documentation provides a basis for periodic review of the overall food safety program, and certain written records or documentation are needed to verify that the program is working. Documentation is also a pre-requisite for traceability and ability to pinpoint exactly where a hazard may be coming from. Being able to identify the source of a hazard will also put the food service staff in a better position to eliminate that cause and prevent future occurrences. Though undocumented, observations indicated that all schools used the conventional system of food production. This is the system in which food is prepared in a full production kitchen and served on site. This system offers greater flexibility in food preparation with more emphasis on batch cooking and less on cook-and-hold, thus decreasing holding time and increasing freshness of products (Gregoire & Bender, 1999). Limitations of this production system include increased labor hours, availability of adequate space and equipment, and food safety concerns (Dawso & Ann, 2012). The lack of documentation of the processes in food preparations is a great cause for concern.

On the availability of written guidelines on receiving and storing foods, two schools, (25%), Wa Methodist School for the Blind and St. Francis Xavier SHS, had these policies. The purpose of guidelines on receiving and storing food is first of all to aid schools in tracking defective and hazardous food substances back to the suppliers. This way the suppliers can be made to recall the defective foods. This will save the school from food-borne illnesses as well as prevent financial loses. Secondly, a policy on receiving and storage of foods will spell out to the authorities what methodologies to use so as to avoid wastage and loss of food items. Observations conducted in the schools showed that the lack of policies on receiving and storing food was having consequences.

Some schools had defective food items in their stores, some food items were stored on the floor and not on pallets, and this was leading to molding. Also there were signs of rodent and pest infestations in some of the store rooms.

The implications of this observed state of affairs is that food items stored in these store rooms could easily become contaminated and if used to cook for students, could pose serious risks to health. In a study carried out by Dawso & Ann (2012), majority of food service managers agreed on the importance of a district-level food safety policy. Though not part of this study and considering that most schools have no policies on ensuring food safety, it is necessary that a district-level policy on food safety be drawn for these schools. Dawso & Ann (2012) indicated a need for greater adoption of district board-level policies to provide vision and structure on matters relating to safety of all foods prepared and/or served on school grounds. Policies reflect the mission of the district, health and well-being of the child, and communicating to district stakeholders the philosophy of the district while providing authority and guidance. Involvement of both district and school-level teams to create a systemic approach to protecting the health of the school community is needed, as any food safety issues occurring within the district could result in the district being held accountable. Creating a policy related to food safety demonstrates board members' commitment to promoting and safeguarding a healthy school environment. The direct and indirect costs incurred as a result of a food-borne illness outbreak in a school could be prevented with the provision of regular training and establishment of policies and SOPs.

4.4 Availability of outbreak crisis management plan

Schools are expected to have an outbreak crisis management plan to serve as a guide for them in handling cases of food-borne illness. The plan should have the following components; a definition of staff roles and responsibilities in the event of a food-borne crisis, procedures for the identification and treatment of students and staff with a suspected food-borne illness by a school nurse or other school health professional; procedures for accounting for and releasing students; and procedures for when and how to report incidents to the district office, headmaster, principal, and local health department. The procedures should include contact names and numbers. In addition, the plan should include procedures for when and how to communicate with families of students, details on when and how to communicate with the media (e.g., one spokesperson should be designated. This person could be the Food-Safe School Team Leader, the principal, or someone designated by the school), information on when and how to communicate with health care providers who are treating ill students and staff, primary and back-up methods for communication within the school and with the district office, the local health department, families, and the community and information on how to cooperate with public health officials.

The objective of an outbreak crisis management plan is to outline the crisis management procedures, the risk assessment processes and media communications. It also aids in detecting serious food safety hazard involving food products prepared for consumers and has a coordinated approach to ensure that food products identified as being a risk to consumers are controlled or withdrawn from the food chain. (Abu Dhabi Food Control Authority, 2009)

As part of the study, Dining hall masters were interviewed on whether the schools have a written crisis management plan for a suspected food-borne illness outbreak with each of the components as outlined above. The results are presented in Table 4.2.

About eighty eight percent (87.5%) of the schools had no written down roles for the staff in the event of a food-borne crisis. Roles and responsibilities for various actors are identified as one of the key actions in managing crisis situations (Cornell & Sheras, 1998). The implication therefore is that in the event of a food-borne crisis, staff will not know how to go about issues, and this can further compound the situation. School crises often raise complicated questions of responsibility. The most worrisome questions of responsibility concern liability and blame. Who is at fault? Unfortunately, fears about this aspect of responsibility can override other significant issues and paralyze efforts to respond to the crisis. Leaders may refrain from making decisions and team members may fail to act. A second aspect of responsibility has to do with jurisdiction or duty. Whose responsibility is it to take action in response to a problem? School personnel may variously classify problems as matters for the police, mental health agencies, parents, or other responsible parties. Turf battles among disciplines or across agency lines often reflect conflicting views of responsibility.

In addition, only two schools (25%), Wa senior high school and Wa school for the Blind, had protocols on identifying and treating food-borne ailments. This is because they have clinics with resident nurses. Early diagnosis of conditions is a key determinant of treatment success as well as reduction in complications. This therefore indicates that in 75% of the schools, food-borne ailments could be handled as other conditions, and this can lead to complications for the victims as well as lead to infection of others.

The results also indicated that only two schools (25%) had guidelines for accounting for and releasing students in the event of an emergency. Again, these schools were Wa senior high schools and Wa school for the blind. In crisis and emergency situations, accounting for all at risk persons is very critical in preventing situations where sufferers are overlooked. In addition, the same schools Wa senior high and Wa school for the blind, had guidelines on reporting food-borne ailments to the next level of care. School nurses play a critical role in illness surveillance for any disease outbreak. The goal is to quickly identify illnesses that have outbreak potential and take actions to prevent the spread of the illness/disease among the school population or community (Center for Disease Control). Being technical people with requisite training to be able to identify ailments, schools that have resident nurses are likely to be in a better position at diagnosing food-borne illnesses better than those without resident nurses.

However, none of the schools had policies and guidelines on when and how to communicate with parents of students who suffer food-borne ailments. It is very necessary to communicate with parents of students who suffer ailments. That way, allergies and other known chronic conditions suffered by the students can be known so as to help in proper treatment.

Again, none of the schools had procedures on how to report food-borne ailments to public health officials or even co-operate with public health officials in the event of a food-borne crisis. As indicated earlier, food safety is a major public health concern, and bouts of food-borne ailments must be reported to the necessary public health officials for them to help in managing the crisis. Crisis guides routinely recommend establishment of a multidisciplinary crisis response team (Johns & Keenan, 1997). Teams are usually

comprised of school staff, but some teams make use of other school division personnel or community professionals, so that coordination of effort may be complicated by differing lines of authority, responsibilities, and perspectives. For a crisis team to function effectively, at a minimum the members must share common goals, have well-defined roles, and be willing to work together in a coordinated manner. (Cornell & Sheras, 1998). In the case of food-borne crisis management, it is therefore particularly important to coordinate efforts with local public health officials. The Public health officials will then apply epidemiologic investigations to uncover the "time-place-person" factors associated with an outbreak, such as the vehicle (food or beverage), the source of contamination, the exposed population, the number of ill persons and their characteristics and associated timelines. Various entry points for contamination need to be identified including suppliers, packinghouses/stores, kitchens and cooking areas, foodservices staff, food service equipment and the eating area.

4.5 Staff development and food safety

In response to question whether all staff have received professional development on and given copies of the food safety policies and procedures, including the crisis management plan related to their job responsibilities 74.2% of the respondents indicated that they have received no training and the schools have no plans to train them whilst 25.8% indicated that all staff have received professional training as shown in figure 4.2. These percentages indicates that more than half of the staff involved in the food processing procedures are not certified hence foods prepared by this groups may be potentially hazardous, the risk of food-borne occurrences may be very high since non-certified food handlers are unaware of safe practices during the preparation, service and storage of food.

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Various studies found staff trained in safe food handling to exhibit more favorable attitudes toward food safety practices and are more likely to practice appropriate food safety behaviors than those who are not trained (Henroid & Sneed, 2004; Youn & Sneed, 2002 Hwang *et al*., 2001). Oakley (2008) noted training of staff led to greater job satisfaction, built program loyalty, and could lead to lower turnover and decreased absenteeism. Staff development and professional training benefits the employee through improved morale and the employer by increasing productivity (Smith & Mazin, 2004)

Table 4.2: Availability of Outbreak crisis management plan

Respondents	Frequency	Percentage
Definition of staff roles and responsibilities		
Yes	1	12.5
No	7	87.5
n = 8 (dining hall masters)		
Procedure for identification and treatment		
of students with suspected illness		
Yes	2	25.0
No	6	75.0
Procedure for accounting and releasing of students		
Yes	2	25
No	6	75
Procedure for when and how to report incident to		
headmaster or local health department		
Yes	2	12.5
No	6	87.5
Procedure for when and how to communicate		
with families of student		
Yes	0	0
No	8	100
Primary and backup methods for communication		
within the school		
Yes	0	0
No	8	100
Information on how to cooperate with public		
health officials		
Yes	0	0
No	8	100
Information on when and how to communicate		
with health care providers		
Yes	0	0
No	8	100

As shown in figure 4.3 the findings on whether the school have at least one matron (the person responsible for overseeing the preparation and service of food) who is certified in food safety and sanitation from an accredited program shows that 80% of the matrons in schools were certified whilst 20% were not certified with no plans to do so in the future. These results support findings by Pivanik *et al.*, 2009, which found majority (68%) of food service managers to have received food safety education and training in the last three years. The implications of these findings are that if matrons will play their supervisory role, they will be in a better position to use the knowledge they gained from the trainings they have attended to ensure that their subordinates follow the right practices in ensuring food safety in these schools.

Also the findings in figure 4.3 which was seeking to know whether the foodservice manager participates in professional development (which includes on site, example the school or off-site, example national training opportunities) or continuing education on food safety-related topics (food purchasing, preparation practices etc) indicates that 8 (80%) of the matrons have undergone professional training at least once in a year. These were found to be the senior matrons of the schools whilst 2 (20%) who are deputies have not received any professional training. Most of the matrons have undergone training on food safety which is encouraging but the kitchen staff complained that the matrons do not have an in house training with them after they have trained hence the goal of such trainings are likely not to be met since the kitchen staff are directly involved in the preparation process.

However, the question on whether all foodservice staff receive food safety training at new- hire orientation and periodically through continuing education indicates all the food

service staff with the exception of matrons (84.84%) receive any training prior to hire and very little orientation on hire. Most of them however indicated that they learn on the job. In an action research carried out in Chorkor, a suburb of Accra by Donkor *et al*., (2009), it was realized that education in the form of trainings improved the rate of washing hands always before and during food preparation by 47% whilst separation of raw and cooked food always during storage and using separate sets of equipment for them improved from a previous 13.4% prior to training to 33.3% post training, 91.3% separated the two types of food during storage. Keeping food at safe temperature was assessed only after the workshop, and showed that 27% of the vendors always kept food in the refrigerator if stored overnight, while 59.5% always reheated cooked food before selling. In addition, Debrew *et al*., (2013) and (Mensah *et al*., 2002) in separate studies, established a positive linkage between lack of knowledge about food-borne diseases and the risk of food contamination. Going by the above, it can be said that the lack of training among the direct food handlers (cooks) in senior high schools, is a recipe for disaster. Though it can be argued that the matrons who are supposed to supervise the cooks are themselves trained and can bring their expertise to bear on the food safety behavior of the cooks, it has to be noted that most (75%) of these schools have only one matron who cannot be at different parts of the kitchen at the same time to be able to see what each and every cook is doing.

The result on table 4.4 which answers the question whether food service staff follow established food and drugs authority food code guidelines and other federal, state, and local guidelines and regulations on food preparation, handling, storage and service shows

that 9.1% of all food service staff follow the FDA code but do no implement HACCP and

90.9% all food service staff do not follow the FDA code and do not implement HACCP.

Table 4.3: Have you received professional development or training for the work you do?

Response	Frequency	Percentage
Yes	17	25.8
No	49	74.2
N	66	100

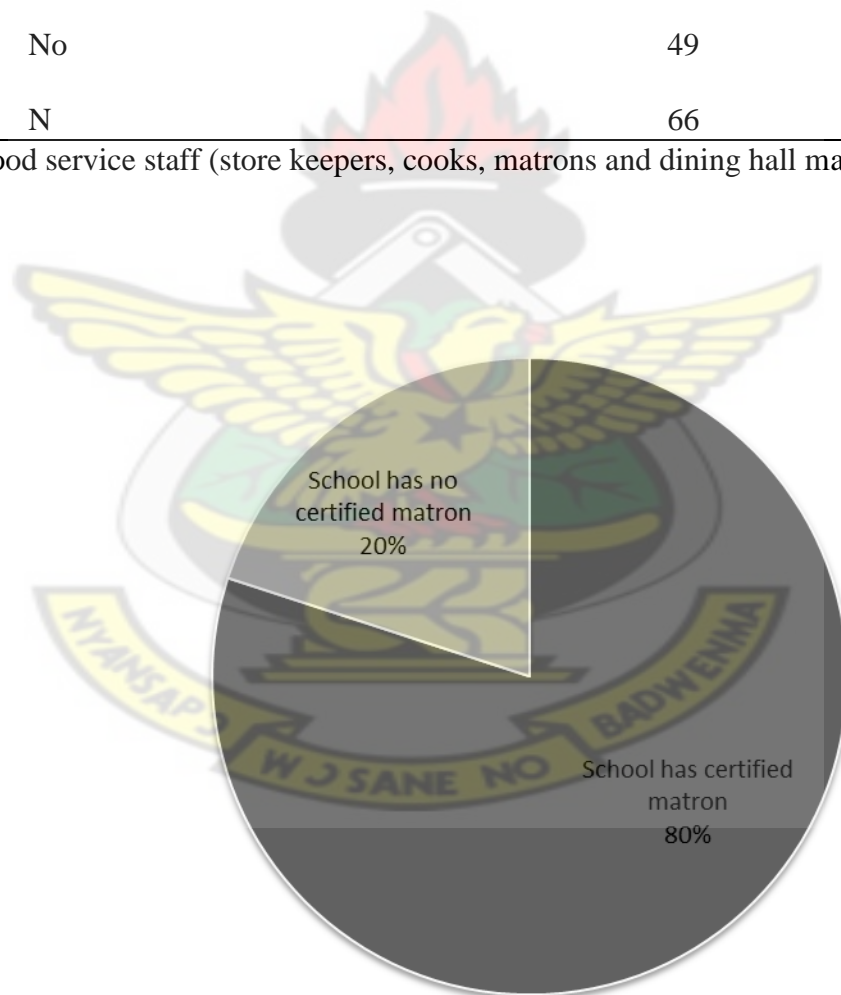n= All food service staff (store keepers, cooks, matrons and dining hall masters)

Figure 4.3: Food service manager certification

Table 4.4: Safe Food preparation in the kitchen

Response	Frequency	Percentage
All food service staff follow the FDA code but do no implement HACCP	6	9.1
All food service staff do not follow the FDA code and do not implement HACCP	60	90.9
N	66	100

n = all food service staff (matrons, cooks, store keepers and dining hall masters)

4.6 Food service facilities and equipment

The section of the questionnaire was seeking to find out whether the safety and function of the food service facilities are addressed.

The findings shown in Table 4.5 indicates that 16.7% said yes that the food service facility includes equipment, kitchen and dining hall area where food is served consumed, this clearly shows food that is to be consumed by students likely to be contaminated during movement (of the food) from the kitchen to the dining hall since there is no link between the dining hall and kitchen. It was observed in some schools that the students eat outside since their dining facility has been converted to a hostel facility.

A few respondents (22.7%) indicated that the school kitchen storage areas are inspected twice in a year by the health department. This indicates that less attention is paid to food service facility in school in terms of monitoring to ensure that safe food is given to students. 4.1% of the respondents indicated that they received critical violation from

health departments which shows that less attention is paid to the inspection and monitoring of schools kitchens and food storage areas. According to Fariman & Yapp, (2004), in the United Kingdom, Environmental Health Practitioners (EHPs) inspect food businesses in order to assess food safety compliance. The frequency of these inspections is set out according to criteria contained within Code of Practice 9, issued under section 40 of the Act. Food Standards Agency (FSA). The majority of non-compliance is identified during the inspection and at this point the enforcement strategy adopted by the local authority is deployed. Enforcing officers have a raft of enforcement tools available to them. Within food safety these range from educational approaches such as advisory visits, training courses and production of guidance leaflets, through to more formal enforcement approaches such as statutory notices, prosecutions and premises closure. Environmental Health Practitioners also react to complaints about food premises made by members of the public and during investigations of food poisoning outbreaks. The Food and Drugs Authority and the Ghana Standard Authority are two major regulatory institutions in Ghana responsible for ensuring the safety and quality of the food and other products that we consume. Other regulatory institutions include; the Environmental Protection Agency (EPA) responsible for the regulation of the importation of chemicals of all forms including pesticides for agricultural purposes; Plant Protection and Regulatory Service Divisions (PPRSD) of the Ministry of Food and Agriculture (MOFA) also mandated to ensure the appropriate use and sale of agro-inputs especially agrochemicals. (Nartey, 2011). The Food and Drugs Authority has a Food Inspectorate Division with a mandate of ensuring the safety of food provided to consumers. Inspection of schools to ensure safety of the foods they serve is one of the functions of this division.

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The mandated frequency of visits to schools was however not established. As has already been established above, it is at these visits that non-compliance to food safety regulations can be identified. If the visits are therefore less as stated in the results (only 22% of schools have been visited twice in one year), the implications are that various acts of non-conformance to food safety regulations will be overlooked and which can lead to food-borne illnesses

Less than thirty percent (22.7%) of the respondents indicated that they had equipments available for ensuring the safety of food. This shows that the safety of food in most of the schools cannot be guaranteed since most of the schools had no refrigerators and those who had were not in very good condition which makes it difficult to store food and meat products that need cold chain to be in good condition

From the observations recorded in table 4.7, very few (19.6%) of the kitchens and food storage areas in the schools were in good condition (had a fully covered kitchen with windows for ventilation, enough illumination and nets to prevent pests). Most of the kitchen areas in the various schools had poor sanitation and stocking discipline in the storage areas were very poor, with signs of pests and dirty environments.

About nineteen percent (19.7%) of the respondents indicated that funds are available in the school to repair poorly functioning equipment but that it takes time for these funds to be released to meet those needs whereas most (80.3%) of the respondents indicate that they did not know of the availability of such funds. This is not so encouraging since the school authorities should be willing to replace or repair all equipment in the food service facility to ensure the safety of food.

4.7 Availability of hand washing facilities

This part seeks to know whether all school hand washing facilities for student and staff are adequate. The results are as shown in table 4.6. The following responses were given 15.5% of the respondents indicated that soap is available at all sinks whilst 84.5% indicated that soap is not available, A study by Mahami & Odonkor, (2012), observed disturbing percentage of inappropriate hand washing with only water and drying with unclean kitchen towel after washing among respondents. Ansari *et al.*, (1981), indicate that poor hand washing practices inevitably lead to retention on the hands of bacterial and viral pathogens, which are obtained from handling raw produce or from toilet activities. Consequently, prepared ready-to-eat foods or other members of the household who are in contact may be contaminated by these pathogens.

All respondents indicated the absence of warm water at all sinks as well as paper towel or hand dryers at all sinks and that hand washing sinks are not easily accessible for students in or near the dining hall. About twenty seven percent (26.8%) of respondents indicated that all people have time to wash their hands before and after eating. Majority (73.2%) however disagreed to this. Few of the schools had sinks for washing of hands which is unacceptable since microbes which can cause food-borne illness are found everywhere in the environment. According to the HACCP guidelines, available at www.foodhaccp.com, proper hand washing procedures include not only water, but the use of water as hot as the hands can comfortably stand. The hands are moistened, soaped thoroughly, and latter to the elbow, scrubbed thoroughly, a brush is used for nails, the hands are then rubbed together using friction for 20

seconds, rinsed thoroughly under running water, and dried using single service towels or hot air dryer.

Table 4.5. Food service facilities and equipment

Response	Frequency	Percentage
Food service facilities includes equipment, kitchen, dining area where food is serves and consumed		
Yes	11	16.7
No	55	83.3
The school kitchen and food storage area are inspected twice in a year by the health department		
Yes	15	22.7
No	51	77.3
The school received no critical or repeat violation from the health department inspection		
Yes	4	6.1
No	62	93.9
Equipment for ensuring safety of food is available in all Facilities		
Yes	15	22.7
No	51	77.3
The kitchen and food storage facilities are in good working Condition		
Yes	19	28.8
No	47	71.2
Funds are available in the school budget for repair of poorly functioning food storage equipment		
Yes	13	19.7
No	53	80.3
N	66	100

n = all food service staff (matrons, cooks, store keepers and dining hall masters)

Table 4.6: Hand washing facilities

Response	Frequency	Percentage
Soap is available at all sinks		
Yes	15	15.5
No	82	84.5
Warm water available at all sinks		
Yes	0	0
No	97	100
Paper towel or hand dryers available at all sinks		
Yes	0	0
No	97	100
Everyone has time to wash hands before and after Eating		
Yes	26	100
No	71	100
Hand washing sinks are easily accessible for students in or near dining hall		
Yes	0	0
No	97	100
N	97	100

n = all respondents

4.7 Observations made at schools

AREA	Wa Senior High School	Wa School for the blind	Wa AMASS	Wa School for the deaf
1.Raw material Supply and Reception • Audit of suppliers	Not observed	Documentation was provided	Not observed	Storekeeper had documents
• Certificate of conformance	Not Observed	Not Observed	Not Observed	Not observed
• Receiving/sorting area	Designated store with pallets, but some food items still on the floor.	Area well kept, signs of rodent infestation.	School has just moved to a new site, stores is new but without pallets.	Area is very well kept, floors are tiled and clean
2.Storage facilities/Cold storage • stacking discipline	Items not properly arranged	Improper stacking of items	Improper stacking, no pallets and items on the floor	Stacking well done
• temperature	Freezer in a good condition	Fridge too small, and does not function properly	Fridge is too small but works well	Fridge working well
• general sanitation level	Storage room not well kept with poor ventilation	Adequate	Adequate	Adequate
3. Food preparation area • general level of sanitation	Sanitation level inadequate.	Needs improvement.	Very poor, though there is a new kitchen, food is cooked in the open.	Needs improvement, makeshift structure is used.

• cross contamination risk	High risk of cross contamination	High, due to storage of foods and others in the freezer.	High risk	Low.
• pest management	cooking area is covered and has nets.	Cooking area protected from pests	Open air cooking poses a greater pest infestation risk.	Structure not properly covered, posing a risk
• ventilation and illumination	Windows for ventilation, but no nets on the windows.	Area is large enough and allows for proper ventilation	Designated kitchen is well ventilated but not in use.	Well ventilated and lit.
• drainage system	Though there is a gutter for drainage, it is unclean.	Adequate, gutters available and well kept	Currently there is no drainage system.	Waste water poured in the open. No gutters seen.
• presence of free flowing portable water	Potable water available, taps at various parts.	Taps available at various points	No taps, tanks are used to store water.	There is a tap and water flows for use.
4. Personnel Issues				
• staff training programs	Only the matron is trained, the cooks said they learn on the Job.	Only the matron is trained.	Apart from matron, all other kitchen staff are newly recruited and have not undergone any training	Only matron and her deputy are trained. Cooks receive no training.
• protective clothing	Inadequate, only a few staff were seen with	Some cooks wore uniforms, whilst others were in home	Cooks have no protective clothing.	Though there are uniforms, not all cooks were wearing

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	aprons and headgears.	attire		them.
• jewelry, ear rings, watches	Almost all staff had jewelry on.	Some staff had earrings and bangles on.	Cooks wearing jewelry.	Only the matron wore jewelry.
• hand washing discipline	Cooks follow handwashing guidelines.	A designated handwashing area is available	No designated handwashing area	No designated area for cooks.
• level of personal hygiene	They washed hands before they started cooking.	Cooks looked neat.	Inadequate	Adequate
• food-borne pathogen status	Not observed	Not observed	Not assessed	Not assessed
5.Sanitary Facilities				
• state of cleanliness	In a clean state. Regularly cleaned by students.	None available.	None for the kitchen staff	Matrons office has a W/C and it is in very neat condition.
• adequacy	Same facility is used by students.	None	None	All staff use the facility in matrons office.
• cleaning /mode of sanitization	Kept clean by the students	N/A	N/A	Kept very clean

• location	It is located away from the cooking and dining area	N/A	N/A	Located away from cooking area, but accessible.
6.Eating area • level of hygiene	Adequate	Adequate	Adequate	Adequate
• congestion	Hall is small to accommodate all students at a go, so they eat in batches	Hall is big enough to accommodate students. No congestion observed	No congestion	No congestion. Same area is used as assembly hall.
• ventilation	Though well ventilated, the nets are torn off and some louvre blades missen.	Properly ventilated	Adequate ventilation	Adequate ventilation
• illumination	Well illuminated	Well illuminated	Well illuminated	Well illuminated
• cleaning schedules	It is cleaned by students on a daily basis	Regularly cleaned by conservancy labourers	Cleaned by students daily.	Cleaned by students daily.
7.Documentation and records • cleaning/chemicals used	Store keeper keeps records. Issue vouchers is the only treaceable document.	Store keeper keeps records. Issue vouchers is the only treaceable document.	Not observed	Matron documents quantities of chemicals given out daily.
• production	Only documentation is on Menu.	No documentation	No documentation	Quantities of ingredients documented but no documentation on process

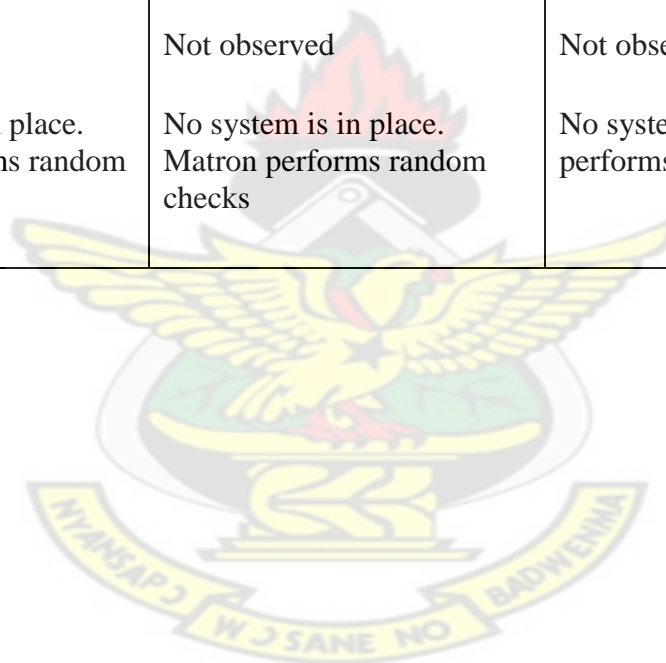|				
• personnel	Matron has records on all personnel.	There is a record of all kitchen personnel, kept at the administration.	No documentation seen	Matron has records on all personnel
• pest management	Not observed	Not observed	Not observed	Not observed
• training	Only the matron was able to show certificate for a training attended.	No evidence of trainings.	No evidence of trainings	No evidence of trainings. Only the matron showed a certificate of a training she attended.
8. Process controls				
• GMP	Not observed	Not observed	Not observed	Not observed
• HACCP	Not observed	Not observed	Not observed	Not observed
• Self Audit	Not observed	Not observed	Not observed	Not observed
• No system	No system is in place. Matron performs random checks.	No system is in place. Matron performs random checks	No system is in place. Matron performs random checks	No system is in place. Matron performs random checks

AREA	Wa Technical high Sch	Wa Technical Institute	Wa Islamic High School	St Francis Xavier Minor Sem.
1. Raw material Supply and Reception • Audit of suppliers	No system in place.	No system in place.	No system in place.	System in place
• Certificate of conformance	Not Observed	Not Observed	Not Observed	Not observed
• Receiving/sorting area	Receiving area not good, food on the floor, signs of rodents infestation.	Matrons' office is used, not properly arranged, food item with detergents in one place.	Foods are received directly at the stores. Area in a deplorable state	Area is very well kept, floors.
2. Storage facilities/Cold storage • stacking discipline	Items not properly arranged	Improper stacking of items	Stacking very poorly done, no pallets, food items packed close to walls	Stacking well done
• temperature	Freezer in a good condition	Fridge is functional but too small.	Fridge functional, so many items packed together	Fridge working well
• general sanitation level	Storage room not well kept with poor ventilation, door does not close properly.	Storage room though properly ventilated, has no pallets and food items sit on the floor.	Sanitation in the store is too poor, ventilation is poor, rodent and pest infestation visible	Adequate
3. Food preparation area • general level of sanitation	Open air cooking *see appendix 1a* (newly constructed kitchen not used)	Cooking is done in the open, sanitation is very poor.	Food is prepared in a shed, some in the open in a cemented verandah	Very poor sanitation in this area.

		High cross contamination risk, cooking area not in good state	High risk, some cooks had babies in the area and attend to them whilst cooking	Low.
• cross contamination risk	Very high			
• pest management	Poor pest management	Cooking is done under trees in the open and uncovered.	Open air cooking poses a greater pest infestation risk.	Structure is covered with windows.
• ventilation and illumination	Open air cooking.	Area is open hence well ventillated	Area is open so there is ventilation	Ventilation is very poor, walls are black from smoke.
• drainage system	Waste water is poured in the open..	No proper drainage system, waste water is poured in the open	No drainage system, waste water seen in small pools near the cooking area	There is a drainage system in place and used well.
• presence of free flowing portable water	There is an overhead tank that supplies water.	There is a bore hole near the cooking area, in addition to an overhead tank	Tanks with stored water, but too near to the ground.	There is a tap and water flows for use.
4. Personnel Issues				
• staff training programs	Only the matron is trained, the cooks said they learn on the Job.	Only the matron is trained.	Apart from matron, all other kitchen staff are have not undergone any training	Matron said they train staff on hire, but no subsequent trainings
• protective clothing	None of the staff wore uniforms or other protective clothing.	Some cooks wore uniforms, whilst others were in home attire	Cooks have no protective clothing.	All cooks were in uniforms, though the uniforms looked worn out.
• jewelry, ear rings, watches	Apart from earrings no other jewelry were seen.	Some staff had earrings and bangles on.	Cooks wearing jewelry.	None of the cooks wore any jewelry

• hand washing discipline	Designated handwashing area.	No designated hand washing area.	No designated handwashing area	No designated area for cooks to wash hands.
• level of personal hygiene	Cooks looked unkempt	Cooks looked unkempt, uniforms looked dirty and overused.	Inadequate	inadequate
• food-borne pathogen status	Not observed	Not observed	Not assessed	Not assessed
5. Sanitary Facilities				
• state of cleanliness	None available near kitchen area	None available for cooking staff.	None for the kitchen staff	No sanitary facility for kitchen staff.
• adequacy	Not available. Kitchen staff	Shared facility with students.	None, cooking staff use a nearby latrine	N/A
• cleaning /mode of sanitization	Kept clean by the students	Kept clean by students.	N/A	N/A
• location	It is located away from the cooking and dining area	Located away from the cooking area	Located at a distance, away from the cooking area	N/A.
6. Eating area • level of hygiene	Adequate	Inadequate and incomplete	No designated eating area. Food is served and taken away.	Adequate

• congestion	Hall is small to accommodate all students at a go, so they eat in batches	Hall is small, and students eat in batches. It was recently constructed by students.	N/A	No congestion.
• ventilation	Though well ventilated, the nets are torn off and some louvre blades missen.	Properly ventilated	N/A	Adequate ventilation
• illumination	Well illuminated	Well illuminated	N/A	Well illuminated
• cleaning schedules	It is cleaned by students on a daily basis	Cleaned by students on daily basis	N/A	Cleaned by students daily.
7. Documentation and records • cleaning/chemicals used	Store keeper keeps records. Issue vouchers is the only treaceable document.	No documentation seen.	No documentation seen.	No documentation seen.
• • production	Only documentation is on Menu.	No documentation seen.	No documentation	No documentation.
• personnel	Matron has records on all personnel.	No records on personnel was seen.	No documentation seen	Matron has records on all personnel
• pest management	Not observed	Not observed	Not observed	Not observed

• training	Only the matron was able to show certificate for a training attended.	No evidence of trainings.	No evidence of trainings	No evidence of trainings. Only the matron said she has been trained but showed no certificate
8. Process controls				
• GMP	Not observed	Not observed	Not observed	Not observed
• HACCP	Not observed	Not observed	Not observed	Not observed
• Self Audit	Not observed	Not observed	Not observed	Not observed
• No system	No system is in place. Matron performs random checks.	No system is in place. Matron performs random checks	No system is in place. Matron performs random checks	No system is in place. Matron performs random checks

4.9 Discussion of observations

Whilst data collection was on-going, observations were made on a number of issues pertaining to food safety in the various institutions visited. These observations have been grouped into thematic areas and are presented below.

4.9.1 Raw materials supply and handling:

Institutions usually receive their food supply from various suppliers. It is therefore necessary that they have a system of tracking these food supplies so as to identify defective food substances. In addition, tracking food substances will allow store keepers to release foods that would otherwise go bad to be used first. This will save schools a lot of money. The observations indicated that though all schools had store keepers, not all of them are able to track their food suppliers. The main system of tracking used by the schools was the stores receive vouchers that are issued at the stores. The issue with this system of tracking is that most food materials come in sacks without batch numbers. It will therefore be difficult to track items back to a particular supplier. In addition, most receiving areas which by the way are store rooms, had no pallets for packing foods. This therefore resulted in food substances been left on the floor and close to walls. This practice exposes food to moisture, rodents and pests which are all sources of food contamination.

4.9.2 Storage facilities/cold storage

Storage areas in all schools also doubled as cold stores, this is because refrigerators and freezers were packed in these rooms. Observations showed that most of these rooms were not neat, they had food particles from torn sacks on the floor. This can lead to rodent

infestation. Cold storage facilities in most of the schools were in the form of refrigerators with a portion for freezing. Stacking in the refrigeration compartments were found to be optimal. The freezers were however found to be stacked improperly. Various items including meats, fish and leftover foods were frozen together in same freezers. A few schools however had malfunctioning freezers and so were forced to procure items that need freezing, on a daily basis.

4.9.3 Food preparation areas

All schools used the conventional system of food preparation that was discussed earlier. Food preparation areas in all schools lacked hygiene. Cooking pots were found in all schools to be black from soot. This showed that the outsides of these pots are not washed regularly. The danger is that in preparing certain foods such as "Banku", some of the food spills to the sides and has to be scooped back into the pot. This can lead to contamination of the food. In addition, all schools were using fuel wood in the preparation of food. Cooks therefore had to periodically adjust these fuel woods whilst cooking and did not go to wash hands before continuing. Fuel wood can be a source of contamination of foods since they are usually left to the mercy of the weather.

4.9.4. Personnel Issues

All matrons in the study, with the exception of the matron at St. Francis Xavier Minor seminary, wore jewelry of various kinds. Some cooks were also found to be wearing jewelry. Though six of the eight schools indicated that they had uniforms for the cooking staff, it was only at two schools that cooks were seen in uniforms. In the rest of the

schools, cooks wore no uniforms or other protective clothing. Almost all cooks however had headgears on.

4.9.5 Sanitary facilities

Only two schools had sanitary facilities in the form of urinals and toilet for their kitchen staff. Majority of those who did not have indicated that they used students facilities. For those who had, the facilities were found to be in neat conditions.

4.9.6 Eating areas.

Two schools had no designated eating areas, students therefore took their meals either in the open or in their class rooms as the case may be. Some also took meals to their dormitories. These can pose great food safety risks since serving and eating food in the open elevates the risk of food contamination. Among those that had eating areas, three were found to be inadequate thereby forcing students to eat in batches. The general level of cleanliness in the eating areas was however observed to be good. This is attributable to the fact that students are made to clean these areas regularly.

4.9.7 Documentation

Documentation is very important in helping food service staff to track their activities. However it was realized that the only form of documentation in the cooking process was the documentation of quantities of ingredients that are released to cooks. No documentations were seen on the processes followed in cooking any of the meals. Also there was no documentation on mandatory health screening that personnel had taken. Only matrons were able to provide certification that they had been screened by health authorities.

4.9.8 Process controls

Observations indicated that none of the schools used any process control. Process controls are intended to monitor the food preparation process so that possible hazards can be detected in time to prevent food-borne illnesses. They are also used to track sources of possible food-borne illnesses. None of the schools however had any system in place to monitor the food preparation process. Matrons, who are supposed to be in supervisory roles, just release food items to cooks and go back to their offices. These cooks too from interviews, have not been trained in food safety management.

CHAPTER FIVE

5.0 Conclusion and Recommendation

5.1 Limitations of the Study

This study was limited in a number of ways:

The study was not a comparative study of the various schools; it only sought to find out what factors in the various schools were predisposing these schools to food-borne illnesses.

Secondly, the study did not have the objective of measuring knowledge attitude and practices, but was concerned with assessing the educational level and training levels of the various actors in the schools food service chain in food safety.

In addition, data on the availability of a national policy on food safety management in high schools was not obtained. The municipal and regional education directorates were contacted on the availability of such a policy, but after several visits up to the time of writing this report, no reply had been received.

5.2 Conclusions

Based on the findings of the study, the following conclusions have been derived:

Results from the study indicate that overall, schools lack policies on food safety management with only two schools having partial policies on foods brought from home. In addition, only 15% of food service staff have received trainings on food safety. These were found to be matrons.

Schools were also found to lack basic equipments for ensuring food safety such as thermometers. Only a few schools (22%) have been visited twice in the year by regulatory authorities with 4.1% of them receiving warnings on critical violations.

5.3 Recommendations

Based on the findings above, the following recommendations are made:

Policies and guidelines on food safety for senior high schools should be drafted and copies given to the schools and the schools mandated to implement these policies and guidelines.

Schools should collaborate with the necessary authorities to organize trainings on food safety for dining hall masters and other food service staff. As well as organize periodic food safety sensitization talks for staff and students.

Finally, matrons should lobby with heads of the various schools to provide the requisite equipment for food safety practice in the schools. This will greatly reduce the risks of contamination of food through storage to consumption.

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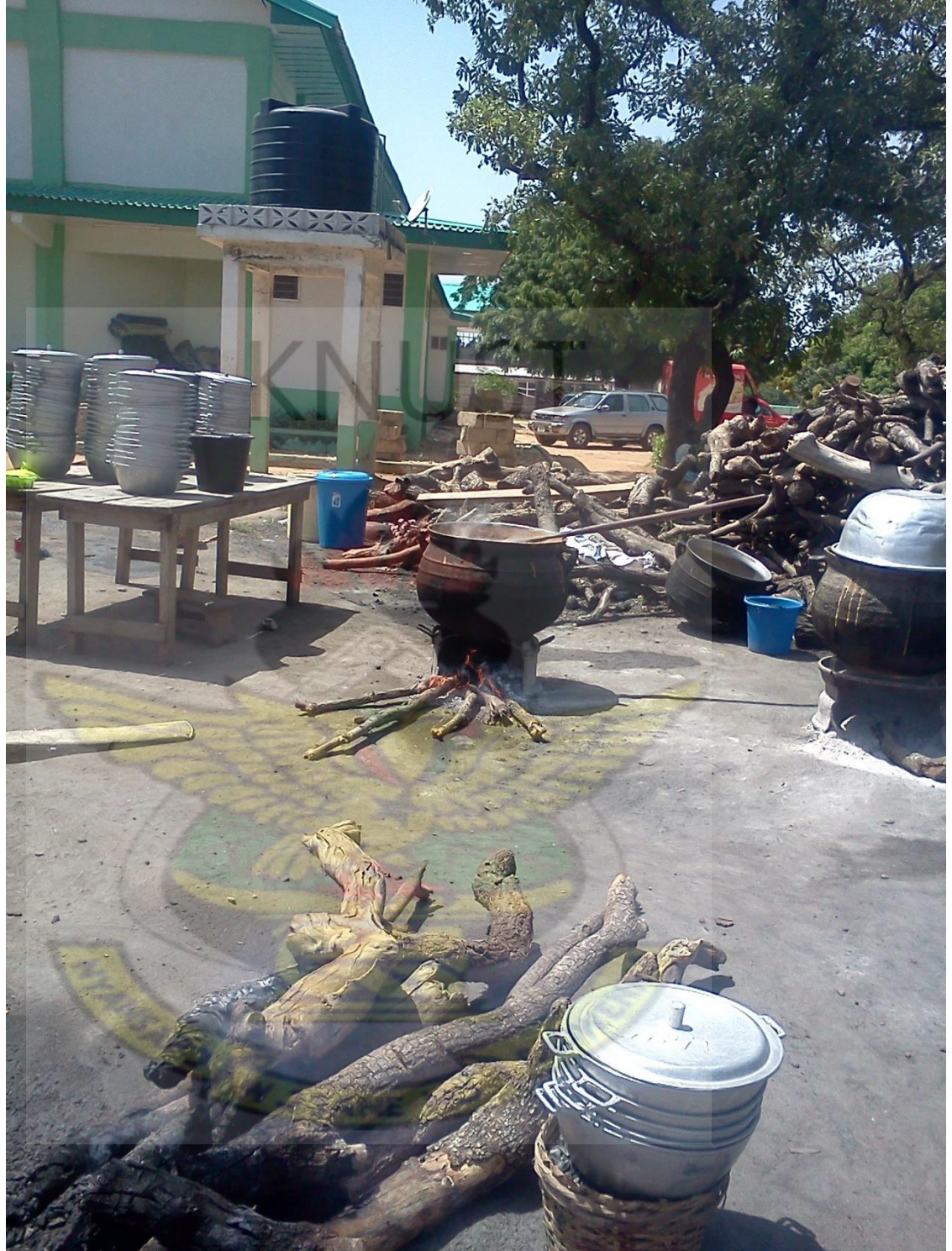
APPENDICES

Appendix A

Pictures of the environment where some schools cook for their students

Appendix A1. Food preparation area at Wa Technical institute

Appendix A2. Food preparation area at Wa senior high Technical

Appendix A3. Cooking staff preparing food for students in a makeshift structure

Appendix A4. Serving pans left in the open on the ground

Appendix A5. Fish being air dried at Islamic Senior high school.

Appendix B

Interview Guide

Interview guide on Food Safety Management Practices in Senior High Schools

Institution name: …………………………………………………………………….

Date: ……………………………………………………………………………………

WRITTEN POLICIES OR PROCEDURES ON FOOD SAFETY

1.Does the school or district have written policies or procedures on food safety that commit the school to each of the following?

□Ensuring the safety of foods received, stored, prepared, and served in the dining hall and other foodservice areas (e.g., time and temperature policies and procedures)

□Ensuring the safety of foods brought from home for individual usage

□Ensuring the safety of foods at school events (e.g., field trips, food served at fund raising events) and school stores

□Ensuring the safety of foods brought into the school from outside vendors or caterers

□Ensuring the safety of foods prepared or served in the kitchen

3 = Yes, all five of these are addressed
2 = Three or four of these are addressed
1 = One or two of these are addressed
0 = No, none of these are addressed

2. OUTBREAK CRISIS MANAGEMENT PLAN

Does the school have a written crisis management plan for a suspected foodborne illness outbreak with each of the following components?

□A definition of staff roles and responsibilities

□Procedures for the identification and treatment of students and staff with a suspected foodborne illness by a school nurse or other school health professional

□Procedures for accounting for and releasing students

□Procedures for when and how to report incidents to the district office, headmaster, principal, and local health department. The procedures should include contact names and numbers

□Procedures for when and how to communicate with families of students

□Details on when and how to communicate with the media (e.g., one spokesperson should be designated. This person could be the Food-Safe School Team Leader, the principal, or someone designated by the school district)

□Information on when and how to communicate with health care providers who are treating ill students and staff

□Primary and back-up methods for communication within the school and with the district office, the local health department, families, and the community

□Information on how to cooperate with public health officials

3 = Yes to all of the above components
2 = The school has a plan with five to nine of the above components
1 = The school has a plan with one to four of the above components
0 = The school does not have such a plan or the plan does not contain any of the above components
_____ Score

3. STAFF DEVELOPMENT AND FOOD SAFETY

Have all staff (e.g., teachers, school nurses, foodservice staff, custodians/facilities managers,
secretaries, etc.) received professional development on and been given copies of
the food safety policies and procedures, including the crisis management plan, related
to their job responsibilities?

3 = Yes
2 = Staff are given copies of policies and procedures but are not trained on them
1 = No, but there are plans to do so within the next academic year
0 = No
_____ Score

4. FOODSERVICE MANAGER CERTIFICATION

Does the school have at least one matron (the person responsible for overseeing
the preparation and service of food) who is certified in food safety and sanitation
from an accredited program?

3 = Yes
2 = The foodservice manager is certified in either food safety or sanitation, but not both
1 = No, but he or she plans to receive certification from an accredited program within the
next academic year
0 = No
_____ Score

5. CONTINUING EDUCATION FOR FOODSERVICE MANAGER

Does the foodservice manager (matron) participate in professional development or
continuing
education on food safety-related topics (e.g., food purchasing and preparation practices,
Hazard Analysis and Critical Control Point) at least once a year?
"Professional development/continuing education" includes on-site (school, district)
and off-site (city, state, national) training opportunities.

3 = Yes
2 = The manager participates in such professional development or continuing education,
but less often than once a year
1 = No, but there are plans to participate in the next academic year
0 = No
_____ Score

6. STAFF DEVELOPMENT FOR ALL FOODSERVICE STAFF

Do all foodservice staff receive training on basic sanitation and the school's HACCP
based
food safety program?
HACCP, an acronym for Hazard Analysis and Critical Control Points, is a preventive
food
safety program designed to reduce the risk of food-borne hazards by focusing on each
step of the food preparation process from receiving to service.

3 = Yes
2 = Most foodservice staff receive training on basic sanitation and the school's
HACCP-based food safety program
1 = Few foodservice staff receive training on basic sanitation and the school's

HACCP-based food safety program
0 = No
____ Score

7. EXTENT OF STAFF DEVELOPMENT FOR ALL FOODSERVICE STAFF

Do all foodservice staff receive food safety training at new-hire orientation and periodically through continuing education?
"Continuing education" includes on-site (school, district) and off-site (city, state, national) training opportunities.

3 = Yes
2 = Most foodservice staff receive food safety training at new-hire orientation and periodically through continuing education
1 = Few foodservice staff are trained in food safety at new-hire employment and periodically through continuing education
0 = No
____ Score

8. FOODSERVICE FACILITIES AND EQUIPMENT

Is the safety and function of foodservice facilities addressed in the following ways?

□Foodservice facilities include equipment, kitchen(s), cafeteria(s), and any other room(s) or classroom(s) where food is prepared, served, or consumed.

□The school kitchen, cafeteria, and food storage areas are inspected twice a year by the health department to ensure that they are safe and sanitary

□Classroom kitchens and food storage areas are inspected twice a year by the health department to ensure that they are safe and sanitary

□In the last year, the school received no critical or repeat violations from the health department inspection(s)

□Equipment for ensuring the safety of food is available in all facilities (e.g., thermometers,
gloves, test strips, etc.)

□The kitchen, cafeteria, classroom kitchens, and food storage facilities are kept in good working condition (e.g., safe and sanitary)

□Funds are available in the school budget for the repair or replacement of poorly functioning food storage, preparation, holding, or service equipment

3 = Yes, the school addresses all seven of the ways listed above

2 = The school addresses at least three of the six ways listed above
1 = The school addresses at least one of the six ways listed above
0 = No
_____ Score

9. HANDWASHING FACILITIES

Are all school handwashing facilities for students and staff adequate in the
following ways?

□Soap is available at all sinks (e.g., classroom, bathrooms, cafeteria, etc.)

□Warm (at least 100° F) water is available at all sinks

□Paper towels or hand dryers are available at all sinks

□Enough sinks are available for use

□Everyone has time to wash his or her hands before eating and after hands are soiled

□Handwashing sinks are easily accessible for students in or very near the cafeteria

3 = Yes, facilities are adequate for all five of the above
2 = Facilities are adequate for four to five of the above
1 = Facilities are adequate for one to three of the above
0 = No
_____ Score

10. SAFE FOOD PREPARATION IN THE CAFETERIA

Do foodservice staff follow established FDA Food Code guidelines and other federal,
state
and local guidelines and regulations on food preparation, handling, storage, and service?

3 = Yes, all foodservice staff follow the FDA Food Code and all federal, state, and local
guidelines and implement HACCP
2 = All foodservice staff follow the FDA Food Code and all federal, state, and local
guidelines,
but do not implement HACCP
1 = All foodservice staff follow some of the Food Code and some federal, state, and local
guidelines, but do not implement HACCP
0 = No
_____ Score

11. ASSESSMENT OF STUDENTS AND STAFF FOR POTENTIAL

FOODBORNE ILLNESS

Do school health services or school nurse protocols address each of the following topics?

□A school nurse protocol is a procedural statement written and used by school nurses that outlines the standard of practice for assessing and managing a specified clinical problem and authorizes particular activities.

□Signs and symptoms of foodborne illness

□In-school management of students and staff suspected of having a foodborne illness

□Referral of students and staff suspected of having a foodborne illness for further health care

□Procedure for contacting the local health department if foodborne illness is suspected

□Review of health records for indications of a foodborne illness outbreak

3 = Yes, address all 5 of the topics listed above
2 = Address three or four of the topics listed above
1 = Address one or two of the topics listed above
0 = No

CHECKLIST FOR FOOD SAFETY AUDIT OF SENIOR HIGH SCHOOL KITCHEN ESTABLISHMENTS

AREA	OBSERVATION	TRAIL
1.Raw material Supply and Reception • Audit of suppliers • Certificate of conformance • Receiving/sorting area • traceability		
2.Storage facilities/Cold storage • stacking discipline		

• temperature • general sanitation level		

3. Food preparation area
    • general level of
      sanitation
 	
    • control of workers and
      equipment traffic
 	
    • cross contamination
      risk
 	
    • pest management
 	
    • ventilation and
      illumination
 	
    • drainage system
 	
    • presence of free
      flowing portable water		

5. Personnel Issues
 	
    • staff training programs
 	
    • protective clothing
 	
    • jewelry, ear rings,
      watches
 	
    • hand washing
      discipline
 	
    • level of personal
      hygiene
 	
    • habits and level of
      responsibility in term
      of hygiene
 	
    • food-borne pathogen
      status		

6.Sanitary Facilities		

• state of cleanliness • adequacy • cleaning /mode of sanitization • location		
7.Eating area • level of hygiene • congestion • ventilation • illumination • cleaning schedules		
8.Documentation and records • cleaning/chemicals used • production • personnel • pest management • training 9.process controls • GMP • HACCP • Self Audit • No system		