KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI

COLLEGE OF SCIENCE

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

ASSESSMENT OF HYGIENIC FOOD PRACTICES IN STREET VENDED FOODS

BY

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A Thesis submitted to the Department of Food Science and Technology, College of Science in partial fulfilment of the requirements for the degree of

[MSc Food Quality Management]

AUGUST, 2015.

DECLARATION

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, nor 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.

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ACKNOWLEDGEMENTS

My first and greatest thanks goes to the Almighty God for his awesome grace and mercies throughout my study period and for his special motivation and wisdom to complete this thesis.

My thanks also goes to Rev. Prof. J.E.T. Kuwornu-Adjaottor my supervisor for his dedication, sacrifice and intellectual contributions towards the successful completion of this challenging thesis. My thanks are also due to Mr. Isaac W. Ofosu whose constant reminders, motivation and encouragement pushed me to finish this project.

My special thanks also goes to my parents - Mr. and Mrs. Stephen Adzamli; and my siblings - Innocent, Brigitte, Walter and Timothy whose wonderful support, concern, motivation and encouragement have been indispensable in the successful completion of this thesis.

To Eric W. Nukpezah, a special friend, thanks for your immeasurable support and prompt reminders over the work and the refreshing encouragements. Sincere thanks are also due all my friends for the various roles they played in making this project a success.

Finally, I thank all the street food vendors I used in this study for their cooperation and patience during my data collection.

ABSTRACT

The thriving street food vending sector in developing countries have made it imperative to ensure that food provided by this sector is safe for human ingestion. A large number of these street food vendors have knowledge on basic hygienic practices

in food preparation and vending. They however, do not understand the impact of these practices on the safety and quality of the food they provide for the populace. This study therefore sought to assess the level of hygienic practices among street food vendors and also establish the relevance of education, in- service training and professional training in the delivery of safe food by street food vendors. Using a cross sectional survey method, the study was conducted in the Ho municipality of the Volta region of Ghana. Structured questionnaires, interviews and observations were used for the study involving 300 street food vendors who were randomly selected. The questionnaires, interviews and observations sought to identify the safety and hygienic practices employed by the respondents. The findings from this research indicated that, majority of the vendors are women and every vendor had at least primary education. A high percentage of them had no professional training; they however attend in-service training and workshops in their numbers. There exist no significant association between the level of formal education and most of the hygienic food practices. However there exists a significant association between most of the hygienic food practices and in-service training as most of the vendors who attend in-service training and workshops adhere to hygienic food practices. Similarly there was statistically significant relationship between professional training and most of the hygienic food practices that were studied. Per these findings, the role of in-service and professional training as well as formal education cannot be underestimated in the delivery of street foods which are safe for human consumption.

TABLE OF CONTENTS

CONTENT **PAGE**

LIST OF TABLES

TABLES **PAGE**

LIST OF FIGURES

FIGURE **PAGE**

LIST OF ABBREVIATIONS

ABREVIATIONS	MEANING
1. FAO	Food and Agriculture Organization
2. WHO	World Health Organization
3. SHS	Senior High School
4. JHS	Junior High School

CHAPTER 1

INTRODUCTION

1.0 Background

There has been a recent upsurge of fast food and other food vending businesses all over Ghana. As these food vending businesses are growing, so are the concerns for their safety because food poisoning reports are on the increase every now and then. What gets into the human body is very critical because once it gets there, it cannot be removed and therefore we must be very careful with the food we eat and water we drink. Food contamination creates a massive social and economic strain on societies and therefore more attention must be given to it. This study therefore seeks to explore the role of hygienic food practices in the delivery of safe food by the street food vending sector.

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food related illnesses. This includes a number of routines that should be followed to avoid potentially severe health dangers. Food safety is increasingly becoming an important public health issue and of great concern to everybody. This is due to the widespread of foodborne diseases which result from the activities of wayside food vendors. Foodborne diseases affect children and adults alike. A publication by GNA in September 22, 2005, (as cited in Mensah *et al.*, 2002) asserts that in Ghana food served by some street vendors are prepared under unhygienic environments and not well cooked.

The question of food safety to a large extent depends on the hygienic practices employed by vendors before, during the preparation and distribution of their foods.

According to World Health Organization (WHO), hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases. Mensah, *et al.* (2002), also explain hygiene as the science or art of maintaining good health through practising sanitary principles which improves the health of individuals.

"Street-vended foods" commonly known as "street foods" are defined as foods and beverages prepared and or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation. They include fresh fruits and vegetables which are sold outside authorized market areas for immediate consumption. Street foods are prepared and or sold by itinerant or stationary vendors. The street food vending sector has a lot of potential benefits ranging from providing jobs, income and food to the population. In contrast to these potential benefits, it is common knowledge that street-food vendors are often poor and have little education and lack appreciation for safe food handling.
Consequently, street foods are perceived to be a major public health risk (WHO, 1996).

Bhowmik (2005), reported that most of the street food vending activities are ignited by reasons such as unemployment and poverty in rural areas. Mostly, these street vendors move from rural to the urban areas in search for greater opportunities. Tinker (1987), advocated that street food trade is crucial to street food vendors' family income and nutritional status. Besides, these single-owned or family run enterprises provides lifelong employment and income for many urban dwellers. Street foods may be consumed where they are purchased or can be taken away and eaten elsewhere. In countries where unemployment is high, salaries are low, work opportunities and social

programmes are limited; and where urbanization is taking place, the consumption of street foods is a common phenomenon. Selling of snacks, complete meals, and refreshments at relatively low prices, provides an essential service to workers, shoppers, travellers, and people with low incomes. People who depend on such foods are often more interested in their convenience than in questions of their safety, quality and hygiene.

According to the Food and Agricultural Organization *(*FAO), 2009), because of socioeconomic changes in many countries, the street-vended food sector has experienced significant growth during the past few decades. Many countries, especially developing countries are likely to experience a significant and continuous growth in the street food vending sector. This phenomena is highly attributed to the continuous urbanization and the high concentration of people in the urban centers and also partly due to the high rate of population growth. This however is not to say street food vending is only an urban phenomena. These foods account for a significant proportion of the daily urban food consumption of millions of low-and middle-income consumers. Many people with limited incomes usually depend on street vended foods as they often view it as the least expensive and the most accessible way of obtaining a nutritionally balanced meal outside the home. This is however possible provided the consumer is informed and capable of choosing an appropriate combination of foods so as to get the best out of it.

In Ghana, the street food phenomenon has boomed in recent times and it is assumed that this boom is largely due to rural urban migration and urban population growth. It is also believed that, the labour force has blown up and commuting distances have

increased, thus heightening demand for ready-to-eat food near work places. As people patronize these street food services, most of them do not care or are ignorant of the hygienic practices that the vendors employ to prepare the food. Hygienic practices should be of important concern to vendors and consumers but unfortunately, most of them seem to care less about these practices.

1.1 Problem Statement and Justification

Unhygienic food practices can be a major source of contamination in the street food vending sector. The preparation and sale of street foods provide a regular source of income to millions of people in developing countries. However, it is believed that their knowledge and expertise in food handling are often limited and it is also assumed that they often engage in street foods vending mainly to escape poverty most especially as little start-up principal is usually required. Street food vendors are often perceived to be poorly educated, unrestricted, untrained in food hygiene and they work under insanitary conditions with little or no knowledge about the basis of foodborne diseases. As a result, all kinds of unwholesome foods are being paraded on the streets and sold to the public. Street foods have the highest level of contamination as compared to home cooked foods (Mensah *et al.*, 2002). In Ghana the estimated number of foodborne diseases reported is about 420, 000 per year resulting in a death rate estimate of 65,000 and at the cost of 69 million US dollars to the economy (WHO, 2006). Eating well generally contributes to good living and if one is below average, then the other is likely to suffer too. Good eating however is becoming more difficult all the time, not so much because the direct taste of a food product causes problems, but because the way the product is made is getting more problematic all the time (Korthals, 2004).

Hygienic issues in food safety are not only broad but also complex and cut across every sector of the food industry. Due to limited resources, difficulties and accessibility in the collection of data on all aspects involved in the preparation and vending of food, the study is limited to only some of the hygienic practices involved in the preparation and vending of street foods. The research evaluated the hygienic food practices in this sector and provided recommendations to curb or reduce the associated issues of food poisoning and enhance the safety of the food provided by this sector. The findings of the study does not only make contribution to existing literature on Food safety and Hygienic food practices in Ghana but also provides a basis for further research.

1.2 Main Objective

To improve upon the hygienic practices in the delivery of wholesome foods, thus leading to the reduction in food related illnesses.

1.3 Specific Objectives

To:

1. Describe the relevant background characteristics of street food vendors in Ho in relation to their level of formal education and hygienic food practices.
2. Evaluate the association between in-service training and professional training of vendors and their hygienic food practices.

CHAPTER 2

LITERATURE REVIEW

2.0 Foodborne diseases and illnesses

Foodborne illness is a major international health problem and an important cause of reduced economic growth. There is concern about for example; chemical

contamination, Escherichia coli O157:H7 infections, the use of antibiotics in animal rearing and the transfer of antibiotic resistance to human pathogens (WHO as cited in Mensah *et al*., 2002). Contaminated food and water have been known to be sources of illness in human societies since time immemorial. Foodborne diseases are still among the most widespread health problems in the contemporary world. In rich and poor countries alike, they pose substantial health burdens, ranging in severity from mild indisposition to fatal illnesses (Flint *et al.*, 2005). Foodborne illnesses are a growing public health concern worldwide and results from food contaminated by pathogenic microorganisms, mycotoxins or chemical hazards (Nord *et al*., 2000). The number of reported outbreaks of foodborne illnesses has been high, both in developed as well as developing countries (Nord *et al.*, 2001). Estimations of the burden of foodborne disease are complicated by the fact that very few illnesses can be definitively linked to food. Often these links are only made when there is an outbreak (Flint *et al.*, 2005). The FAO estimates that as much as 70% of diarrhoeal diseases in developing countries are believed to be of foodborne origin (FAO, 1995). Foodborne and waterborne diarrhoeal diseases collectively kill about 2.2 million people annually out of which 1.9 million of them are children. This estimation of 2.2 million people dying yearly according to WHO is just a tip of the iceberg as the extent of the problem is unknown since foodborne diseases often go undetected or underreported (WHO, 2011). Studies determining the burden of acute gastroenteritis provide the basis for estimating the burdens due to food and specific pathogens commonly transmitted by food. Although acute gastrointestinal diseases are not all foodborne and not all foodborne diseases always result in acute gastroenteritis, food does represent an important vehicle for pathogens causing acute gastroenteritis (Flint *et al.*, 2005). In 2000, 2.1 million people

were reported to have died from diarrhoeal disease which resulted from the ingestion of contaminated food and water (WHO, 2004).

Some food poisoning agents that are associated with foods include *Escherichia coli, Salmonella spp, Vibrio cholera, Staphylococcus aureus, Bacillus cereus, Listeria monocytogenes, Clostridium perfringens* and campylobacter *jejuni* (Sockett, 1991). These pathogens are usually found in undercooked meat and poultry, uncooked fruits and vegetables, unwashed fruits and vegetables, unpasteurized milk, soil and water (DeWall *et al*, 1999). *Staphylococcus aureus*, commonly referred to as staph, is usually found on the hands and in the nose, intestines, and open cuts and sores of humans. Staph bacteria are believed to be one of the most common causes of skin infections in the U.S. (Centre for Disease Control, 2003). Foodborne viral infections are also responsible for various illness in humans. Viruses are very different from the bacteria and parasites, which cause similar illnesses (Schlundt, 2001). They are transmitted to humans through foods as a result of direct or indirect contamination of the foods with human feaces (Cliver, 1997). Some commonly found foodborne viral infections are caused by the Norovirus, Rotavirus, and Hepatitis A (Koopmans and Duizer 2004). Foodborne pathogens recently emerging include *Vibrio vulnificus, Cryptosporidium parvum,* and *Cyclospora cayetanensis*. These pathogens have been either newly described, identified or newly associated with foodborne transmission

(Tauxe, 1997). The most common symptoms associated with all these infections range from mild diarrhoea to severe pain and diarrhoea. Other common symptoms include headaches, fever, chills, nausea, vomiting, stomach and abdominal cramps, muscle aches, double vision, jaundice anorexia and loss of appetite (DeWall *et al.*,

1999).

Food contaminants are introduced into food supply at numerous points along the way from farm to the table. Food animals and their manures can carry human pathogens without any clinical manifestations. Likewise fresh vegetables and grains can harbour pathogens or mycotoxins without any discernible loss of quality (FAO, 2009).The issue of mishandling of food plays a significant role in the occurrence of foodborne illness. Howes, McEwen, Griffiths and Harris (1996), argued that 97% of all foodborne illness in most catering outlets is as a result of poor handling of food by the handlers.

In Ghana, as well as in many countries in the African region, there is an abundance of national legislation but limited resources to control street food safety (DeWall *et al.,* 1999). Institutions such as the Ghana Standards Authority and the Food and Drugs Board are committed to the work of regulating food standards and training the general populace on food safety issues. However, improvement in food safety systems has not been fully realized and this is observed in recent reports of foodborne illness and/or contamination of street foods with enteric bacteria in various parts of the country (Feglo and Sakyi, 2012). The most commonly occurring foodborne diseases in Ghana are typhoid, cholera and diarrhoea and it has been established that foodborne diseases are the fourth largest causes of illnesses after malaria. Contaminated food and water are the vehicles of these three foodborne diseases and the pathogens could be transmitted from a contaminated surface, food or from hands contaminated with organisms from the gastrointestinal tract (Bryan *et al.,* 1995).

A number of outbreaks have been reported in Ghana in recent times. For instance, a cholera outbreak in Atebubu in the Brong Ahafo Region claimed nine lives (JoyNews,

2012). Also, four persons were reported to have died in Sheho in Upper East Region of Ghana after eating contaminated pork (GhanaWeb, 2010). While another of such outbreaks caused the death of one person in Obuasi in the Ashanti Region and the hospitalization of over 50 people. It also has been estimated that about 5000 children under five years of age die from diarrhoea each year in Ghana (Boadu**,** 2013).

Although there are more than 250 types of foodborne diseases, most of them can be prevented if certain precautions are taken. Using good personal hygiene, cooking foods thoroughly, and keeping foods at the correct temperatures during serving and storage are rules that should be followed. Everyone is at risk for foodborne illness, but there are certain individuals who are at greater risk than others. Pregnant women, children, the elderly, and those with compromised immune systems are at an increased risk to illnesses associated with food. Also included are food-insecure individuals and those living in undesirable conditions because of poverty (Shewmake and Dilon 1998; Alaimo *et al.*, 2001).

2.1 Street Food Vending

Street-vended foods commonly known as "street foods" are defined as foods and beverages prepared and or sold by vendors in streets and other public places for immediate consumption or consumption at a later time without further processing or preparation. They include fresh fruits and vegetables which are sold outside authorized market areas for immediate consumption (WHO, 1996). Food and Agricultural Organization (FAO) also defines street foods as ready-to-eat foods and beverages prepared and sold by vendors and hawkers in streets and other similar public places (FAO, 1997). Most street foods are also classified as both finger and fast food and are

cheaper on average than meals from restaurants. Street food may be consumed on the premises or it can be taken away and eaten elsewhere (WHO, 1996). Just as other informal sector enterprises, street food enterprises are characterized by the small scale of the operation, use of traditional food processing technologies, and low capital costs that allow ease of entry into the sector. Those who participate in this sector are principally the urban poor and this has been seen by some as an innovative response or coping strategy on their part when denied access to more formal employment structures (Tinker and Fruge, 1982).

The street food industry plays a very important role in meeting food requirements of customers and urban dwellers in many cities and towns of developing countries, as it feeds thousands of people daily with a large range of foods that are relatively cheap and easily accessible (Tambekar *et al.,* 2009). Street foods are also considered essential for maintaining the nutritional status of the population (Maxwell, 2000). There is increasing recognition that street food vending plays an important socioeconomic role in terms of employment potential, providing special income particularly for women and provision of food at affordable costs to mainly the lower income groups in the cities (Chukuezi, 2010). Street food vending employs on average 37.8 percent of the labour force, and contributes about 38 percent to total gross domestic product in Africa (Charmes, as cited in Campbell, 1998). Women predominate in street food business representing 53 percent of the vendors in Senegal (Winarno and Allain, 1991) and 75 percent of the vendors in Burkina Faso (WHO, 2006). Street food vending assures food security for low-income urban populations and provides a livelihood for a large number of workers who would otherwise be unable to establish a business. The benefits of this trade extend throughout the local economy as often vendors buy their ingredients locally (Winarno and Allain, 1991). Various researches have shown that street food

trade creates a large volume of business involving large amounts of money and provides a viable source of employment and income to millions of people. The FAO estimates that there are approximately 100,000 vendors in Malaysia whose collective total annual sales amount to over $2 billion (FAO, 1995). A survey in Accra, Ghana showed that the street food sector employs over 60,000 people and has an estimated annual turnover of over US$ 100 million, with annual profits of US$ 24 million (Tomlins, as cited in Campbell, 2011). The highly competitive nature of street food markets with many vendors in one location selling common dishes and snacks, provides opportunities for entrepreneurial and innovative skills to make product variations which can provide advantage and favour among consumers (FAO, 2009).

Types of vending sites encompass stalls, a variety of push-carts, roadside stands, and hawkers depending upon the ingenuity of the individual, resources available, type of food sold and the availability of other facilities (FAO 1990). Tinker further explained that street foods are sold on the street from pushcarts or baskets or balance poles, or from stalls or shops having fewer than four permanent walls. Thus those who manufacture and or sell street foods are micro-entrepreneurs forming part of the socalled informal sector. In light of this, the informal sector is not enumerated by official data collecting agencies, and thus official statistics on the street food trade are virtually non-existent (Tinker, 1987).

Street foods are of a heterogeneous food category, encompassing meals, drinks, and snacks. They are mass consumer foods that are normally eaten without further processing or cooking. Street foods show variation in terms of ingredients, methods of processing, and consumption (Ekanem, 1998). Street food trade usually involves both

retail and production activities, although the sale of street foods is the most visible part of the trade. Most street foods have been processed to some extent, much of which may have occurred unseen off-street. Because of this, the trade should be seen as part of the whole food system, rather than just as a service or retail activity (Weber, 1987). In Ghana, street food are mostly prepared and processed manually and sold to the public at various lorry terminals, by the roadside or by itinerant vendors (Mensah *et al.*, 2002). Street food vendors serve as banners illustrating the local culture, the language, the foods and the eating habits of the place and of the vendor who can preserve and promote his or her own culinary culture even outside of his or her country (WHO, 2006). This may explain why most street vendors irrespective of their location, prepare and serve foods that are peculiar to their ethnic groups.

2.2 Street Food Preparation

Food preparation is the process of preparing foodstuffs for eating, which usually entails the selection, measurement as well as combination of ingredients in an ordered method to achieve a desired result. Food preparation consists of all the steps that take place to turn ingredients into a prepared meal, dessert or other items ready for consumption. These may include cleaning, peeling and chopping or slicing vegetables, cutting meat or fish and other preliminary steps, measuring and combining ingredients, as well as the actual cooking to create a dish (Tannahill, 1995). The production processes required for each product are different: for example, preparing popcorn requires a different process to preparing banana chips. A few street foods, such as fruits, are eaten raw and have minimal processing, that is; just washing, peeling and slicing, whereas most street foods are processed to some extent. The most common methods are frying, roasting, toasting, boiling, steaming, and to a lesser extent baking (FAO, 2009). Food preparation

therefore does not mean only cooking but rather all processes involved in turning raw foodstuffs into an edible dish.

Food and snacks that are consumed in a particular area are related mainly to culture and climate. Cultural, ethnic and religious differences impacts on the variety and nature of such food and snacks. Normally these food and snacks are prepared and consumed based on local knowledge and tradition of the people. Despite the use of good traditional practices in preparation of safe food and the recognition that food can on some occasion, cause people to become ill, there is little understanding of the science of food hygiene, infectious diseases or microbiology (Campbell, 1998). According to a report by WHO, the know-how to make these foods is easily accessible as it is commonly passed down from generation to generation and is easily assimilated.

Street food is usually prepared by the vendors at home or at the road side stalls (Muinde and Kuria, 2005). Vendor's sites are mostly within some few meters usually within a radius of 5 metres of dusty roads and foot paths (Mwadime, 2001). These vending sites are usually self-allocated and furnished with little or no sanitary amenities (Mwangi, 2002). Foods are held in a variety of ways before selling; fish are placed openly on the stalls and chips are held in cup boards next to the stalls while fruit salads are held in open bowls. After the food is prepared, it is not reheated to high temperatures before serving. The stalls are poorly constructed and increase the exposure to contamination by dust and smoke on the road side (Muinde and Kuria, 2005). The source of water for street vendors is mostly tap water supplied from the municipal council or from water kiosk or tankers (Mwangi, 2002; Mwadime, 2001). In other instances, when portable water is not readily available in their area of operation, they

transported it from their homes. This water is mostly not enough for washing dishes and also in preparing their food. It is also believed that because the water available is not enough, most vendors do not wash fresh foods properly (Muinde & Kuria, 2005). Mensah *et al.*, (2002) noted that without formal education, the street food vendors lack knowledge on proper food handling.

2.3 Street Food Vendors

A street food vendor is broadly defined as a person who offers foods for sale to the public without a permanent built up structure but with a temporary static structure or mobile stall-head load, wheel-barrow, truck (Janie and Marie, as cited in Nurudeen *et al.*, 2014). Street vendors can be grouped into three main categories. They are stationary, peripatetic and mobile. The stationary vendors are those who carry out their activities on a regular basis at a specific location. The peripatetic vendors on the other hand are those who carry out their vending activities on foot moving from one place to another looking for customers; they are sometimes referred to as itinerant vendors. Mobile vendors vend from stands which are temporary, thus they are capable of moving from one place to another and they usually use motorized carts or trucks. It has been found that stationary vendors, who sold their food items from small stalls, kiosks, and so forth, were the predominant type in most of the countries studied (Powell, Brodber, Wint, & Campbell, 1990; Tinker, 1987).

Most vendors operate from selected strategic locations, including bus and train stations, markets and shopping areas, commercial districts, outside schools and hospitals, residential suburbs, factories, and construction sites. In some places, it appears that vendors have a regular clientele (Nasinyama, 1992). A common perception is that street

food vendors tend to concentrate in downtown commercial areas, but the Equity Policy Center (EPOC) studies found that this was the exception in all locations except Manikganj, Bangladesh and Chonburi, Thailand (Tinker, 1987). In Nigeria, 23 percent of vendors were located in residential areas (FAO, 1992). For the purpose of this study, the stationary category of street vending supports the type of street vendors under study. Therefore, peripatetic and mobile vendors were excluded.

2.4 Safety and Quality of Street Food

FAO defined food safety as any food item devoid of any biological, chemical or physical hazards capable of causing harm to the consumer. The presence of these harmful contaminants not originally present in the food is believed to be introduced by humans although some do occur naturally. Food safety also refers to all those hazards whether chronic or acute, that may make food injurious to the health of the consumer. This makes food safety non-negotiable, that is, the consumer has no control over the consequences once contaminated food is ingested.

Food safety is a vital issue in both developed and developing countries in that foodborne illness contribute to millions of illnesses and thousands of deaths annually (Pilling *et al.*, 2008). This is becoming a vital public health issue, since a large number of people have their meals outside home and thus, they are exposed to foodborne illness that originate from street food vends. In view of that, the World Health Organization (WHO, as cited in Sarkodie *et al.,* 2014) has developed five main preventive steps to enhance food safety which include “thorough cooking of food; thorough re-heating of stored food; avoiding contact between raw foods and cooked food; and protection of food from insects, rodents and other animals”.

The foremost health hazard related with street foods is microbial contamination, while transmission of parasites, pesticide residues, the use of unpermitted chemical additives, environmental contamination and limited access to safe water have also been identified as possible hazards (Abdussalam and Kaferstein, 1993; Arambulo *et al.*, 1994). The potential for the contamination of street foods with pathogenic microorganisms has been well documented and several disease outbreaks have been linked with the consumption of contaminated street foods (Abdussalam and Kaferstein, 1993). The risk of microbial contamination is dependent on the type of street food and how the food is prepared. The risk associated with food is influenced by food type, pH, and method of preparation, water availability, handling, exposure temperature, and holding time (Mathee *et al.*, 1996). In general, cereal and bakery products which have low moisture content, products that have been sufficiently sugared, salted, or acidulated, and some fermented products are less likely to support bacterial growth as compared to dairy, egg, and meat products. Dishes containing raw ingredients or made with ice are also high risk items (Arambulo, *et al.*, 1994). Foods that are cooked immediately prior to consumption are safer than those which have been cooked and stored at ambient temperature (WHO, 1984). Other factors implicated in causing microbial contamination include poor food preparation and handling practices, inadequate storage facilities, the personal hygiene of vendors, and a lack of adequate sanitation and refuse disposal facilities (Abdussalam and Kaferstein, 1993). A lack of knowledge among street food vendors about the causes of foodborne disease is a major risk factor (FAO, 1998). Poor hygiene, inadequate access to potable water supply and garbage disposal, and unsanitary environmental conditions such as nearness to sewers and garbage dumps further exacerbate the public health risks associated with street foods (FAO, 1998). Traditional processing methods that are used in preparation, inappropriate holding

temperatures and poor personal hygiene of food handlers are some of the main causes of contamination of street-vended food
(Mensah *et al.*, 2002; Barro *et al.*, 2006).

A study done in Ghana to investigate the microbial quality of street foods sold in Accra, found *Shigella sonnei*, *enteroaggregative Escherichia coli* and *Salmonella arizonae* as the pathogens isolated from some of the food samples (Mensah *et al.*, 2002). A similar study in Ethiopia isolated *Bacillus spp., staphylococci* and *micrococci* as the dominant groups in some foods (Muleta and Ashenafi, 2001). Martins and Anelich conducted an assessment on 200 street food vendors and 800 consumers in greater Johannesburg investigating the socioeconomic background of vendors and their customers, as well as vendors' facilities and aspects relating to the quality and safety, including microbiological testing of foods. The authors reported that street vendors did observe good hygienic practices in food preparation, cooking and handling, even though most of them were not aware of the reasons for doing so.
Additionally, their foods were not kept overnight due to the lack of refrigeration facilities (Martins and Anelich, 2000). In 1997, Mosupye and Von Holy compared the microbiological quality and safety of street foods involving 51 ready to eat street foods, 18 dish water and 18 surface swab samples taken in Johannesburg to those sampled and tested in other countries. The authors concluded that the bacterial counts in Johannesburg were relatively lower than that of other countries (Mosupye and Von Holy, 1999).

The health risk associated with street foods may be no greater than that posed by foods or dishes from other sources such as in restaurants and hotels (Abdussalam and

Kaferstein, 1993). Some studies conducted in India found that the microbial quality of street foods was equivalent to, if not better, than that of foods bought from hotels and restaurants (Bapat, 1992; Chakravarty, 1994). In South Africa, a comparative study found no significant difference between 116 formal and informal food vendors regarding microbiological food quality. With regard to potential risks, formal vendors had more vending experience, used some precautions in food preparation and had better hygiene practices (Mathee *et al.,* 1996). However, whilst food from the informal vendors was hot, food from formal food vendors tended to be cool and 73% stored leftovers for sale the next day, both of which are potential risks for microbiological contamination (Mathee *et al.,* 1996).

CHAPTER 3

MATERIALS AND METHODS

3.0 The Study Area

Ho is the capital town of Ho Municipal Assembly and also the Volta Region of Ghana. Ho lies between Mountain Adaklu and Mountain Galenukui (Togo -Atakora Range). The Municipality shares boundaries with the Adaklu-Anyigbe District to the South, Hohoe District to the North, South-Dayi District to the West and the Republic of Togo to the East. The Ho Municipal District is one of the twenty-five districts in the Volta Region. The municipality has a total population of 214,612 and Ho has a settlement population of approximately 96,213 people (Population Census Report, 2010).

The economy of the Ho Municipality is not particularly vibrant even though the potentials are there to be exploited. There are six (6) tertiary institutions in Ho, thirteen

(13) Senior High Schools and one hundred and fifty seven (157) basic schools. The formal sector of the economy is made up mainly of employment in the Public Service, private construction companies, and a few large trading companies. There are also petty traders and few large scale traders. Other economic activities in these areas are subsistence farming, animal rearing, artisanry and vocations such as hairdressing and dressmaking. Street food vending is also on the increase in recent times due to unemployment and also the up springing of schools and social centres (Ho Municipal Assembly, 2014). The huge number of schools and public services coupled with the increasing number of street food vendors has necessitated this study.

3.1 Research Design

The research design which was adopted for the research was a descriptive crosssectional survey method. According to Levin (2006), this is a type of observational studies in which the investigator observes and investigates the events occurring in the population without doing any interruption or manipulations. The observations are based on a single examination of a cross section of the population at one point in time or over a short period and the results can be projected on the whole population. He further intimated that, cross-sectional studies are usually conducted to estimate the prevalence of the outcome of interest for a given population, commonly for the purposes of public health planning. Data can also be collected on individual characteristics, including exposure to risk factors, alongside information about the outcome. In this way cross-sectional studies provide a 'snapshot' of the outcome and the characteristics associated with it, at a specific point in time. A cross-sectional study design is used when the purpose of the study is descriptive, often in the form of a survey. Usually there is no hypothesis as such, but the aim is to describe a population or a subgroup within the population with respect to an outcome and a set of risk factors.

This method was selected because the total population of street food vendors in the Ho Municipality is large, therefore there is the need for a sample size to be determined from the total population. The cross-sectional descriptive survey was highly preferred and was adopted because, the researcher had no control over the behaviour of the variables under study and therefore had to observe, study and analyse their actions. It was also preferred because it is the appropriate method to use in order to identify specific hygienic issues in enhancing the safety of street vended foods.

3.2 Sampling Procedure and Sample

Data from the Ho Municipal Assembly indicated that there are about 1210 registered street food vendors in the municipality as at the time of study. Out of these number, 300 were randomly selected as the sample size from four different suburbs in the Ho municipality which were also selected using convenient sampling method. The sample size of 300 vendors was arrived at by using the sample determination table. All the 300 street food vendors involved in this study were stationery food vendors selling ready-to-eat food along the streets of Ho. Only food vendors who prepared food at home and conveyed them to their vending locations were used for the study.

These foods included; ‘waakye’ boiled rice, boiled yam and plantain, ‘banku’ and ‘kenkey’. Those who sell pre-packaged foods and fruits were exempted in this study.

3.3 Instruments for Data Collection

For the researcher to acquire a reliable and bias-free data, and to ensure efficiency in data collection which would help in eliminating to the barest degree any misleading outcome, the study employed both quantitative and qualitative techniques to elicit information from respondents. Instruments that were considered for the study were

observation, interview guide and questionnaire. Observation was used in conjunction with the questionnaire to help capture unhygienic behaviours and practices which would have been difficult to gather with the latter instrument. A pilot study of the study area revealed that some of the vendors could not read English and interpret the questions so the interview schedule, which was administered in Ewe was thought to be most appropriate, whilst questionnaires was administered to those who could read and understand the English Language.

Hygienic food practice in this study is defined as good food handling practices which includes personal hygiene of food vendors and cleanliness of their working tools and equipment as well as vending areas and other practices that are likely to enhance food safety. This gave an overview of the hygienic practices of the vendors in the preparation and sale of their food. Interview schedule was developed to verify and clarify practices that were observed and also address the issue of researcher bias. The study questionnaire was organized into distinctive sections to elicit information pertaining to respondents' socio-demographic characteristics, level of knowledge on hygienic food practices, personal hygiene and hygienic practices, food safety resources available to street food vendors and an observation checklist to determine food handling practices and hygienic practices of respondents.

3.4 Data collection

The study made use of interview schedule and observation as instruments to collect data. The respondents were interviewed and questionnaires were administered by the principal researcher and her assistant. Interview and the administration of questionnaires lasted for a month. The observation was carried out along with the administration of questionnaire and interviews. In all questionnaires were administered

to 300 food vendors. Since some of the respondents could not read nor write, they were guided to answer the questions; it must be stressed that this was done without any bias. The responses were collated and grouped under various

classifications to identify the major issues in the responses provided.

3.5 Data Analysis

After the data collection, the completed questionnaires and responses from the interview schedules were edited to check the accuracy of the answers provided for each of the questions. The researcher then prepared a coding scheme to help and guide in analysing the opened ended questions. In order for the researcher to do a bias-free analysis, tools such as Microsoft excel and SPSS were used to analyse the data. Bivariate analysis in the form of cross tabulation was used to describe and examine associations between food safety practices and the set of background variables. Binomial logic regression and chi square test were also used to determine the relationship between hygienic food practices of vendors and the safety of their food as influenced by some of their background characteristics like level of formal education and professional trainings.

CHAPTER 4

RESULTS AND DISCUSSION

4.0 Result Statement

Table 4.1 Socio-demographic Characteristics of Respondents

Demographics	Frequency	Percentages (%)	Mean

Age			
Below 18 years	5	1.7	
18-25 years	44	14.8	3.17
26-32 years	155	52.2	
33-40 years	82	27.6	
41-47 years	10	3.4	
48-54 years	1	0.3	
Gender			
Male	55	18.3	1.82
Female	245	81.7	
Marital status			
Single	96	32.0	1.77
Married	176	58.7	
Divorce	28	9.3	
Religion			
Christian	210	70.0	1.38
Muslim	69	23.0	
Traditional	17	5.7	
Others	4	1.3	
Educational level			
Tertiary	6	2.0	4.53
Tech/vocational	38	12.7	
Secondary	54	18.0	
Middle school/JHS	189	63.0	
Primary	13	4.3	

Ethnic Group			
Ewe	215	71.7	1.467
Akan	55	18.3	
Hausa	21	7.0	
Ga	2	0.7	
Dangme	2	0.7	

Guan	4	1.3	
Others	1	0.3	
Professional Training			
Yes	89	29.7	1.7033
No	211	70.3	
Level of Training			
.00	211	70.3	1.4467
University	1	0.3	
Polytechnic	4	1.3	
SHS	23	7.7	
Tech/Voc	49	16.3	
Apprenticeship	12	4.0	

N=300

Source: *Field Data, 2015*.

The table 4.1 represents the summary of the demographic characteristics of the respondents. It includes the age, gender, marital status, religion, ethnic group, educational level of respondents, professional training and of level of training. From the analysis presented in the table 4.1, the mean age of respondents is 3.17 indicating that the average age of street food vendors in Ho falls within the age group of 26-32years. The modal age group is 26-32 years with 155 respondents representing 52.2% of the total sample size falling within this age bracket. With regards to gender, 55 respondents accounting for 18.3 % are males while the rest 245 representing 81.7 % are females and this is represented in Table 4.1. Out of the 55 male respondents, 30 are single, 21 are married and 4 are either separated or divorced. On the part of the females, 155 of them are married, 66 of them are single and the rest 24 are separated or divorced. These facts are represented in Table 4.2. This question bothers on the ethnic orientation of the respondents. The resultant statistics in Table 4.1 shows that

71.7 % of the vendors are Ewes, 18.3 % are Akans while 7.0 % of them are Hausas. The rest 3 % belongs to other ethnic groups. This is represented in the Table 4.1.

The religious affiliation of the respondents was also explored. The resultant statistics as presented in Table 4.1 showed that 70 % of the vendors are Christians while 23 % of them are Muslims the rest 5.7 % and 1.3 % represents the traditional and other believers respectively.

In relation to educational background of the respondents, the analysis in Table 4.1 above revealed that the modal level of education attained by vendors in the study area happens to be Middle School or Junior High School. This is represented by a percentage value of 63; this was followed by Senior/Secondary school leavers accounting for 18 % of the total sample size. The rest 12.7 %, 4.3 % and 2 % represents Technical/Vocational school leavers, primary school leavers and tertiary graduates respectively.

On whether the vendors had any professional training as far as preparation and sale of food is concerned and the level at which they had the training, the results per table 4.1, 70.3 % of the sample population responded in the negative meaning they had no professional training, 29.7 % responded in the affirmative, thus; they have had professional training in the preparation and sale of food. Out of the 29.7 %, 4.0 % of them were trained as apprentices, 16.3 % had their professional trainings at Technical and Vocational schools. Senior High School took care of the training of 7.7 % of the respondents while tertiary education, took care of the rest 1.6 %.

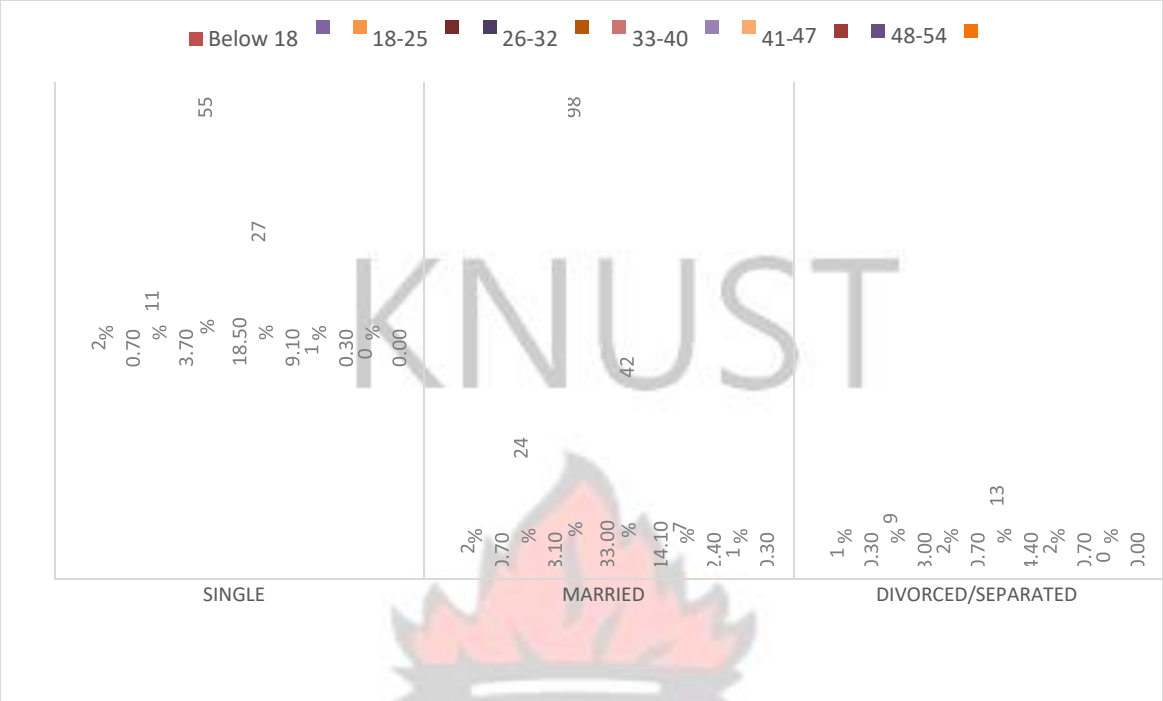

Figure 4.1: Age and Marital Status of Respondents

Source: *Field Data, 2015.*

***Table 4.2* Gender and Marital Status Cross Tabulated**

Marital status	Gender			
	Male		Female	
	Frequency	Percentages	Frequency	Percentages
Single	30	54.5%	66	26.9%
Married	21	38.2%	155	63.3%
Divorced/separated	4	7.3%	24	9.8%
Total	**55**	**100%**	**245**	**100%**

Source: *Field Data, 2015.*

As presented in Figure 4.1, 3 % of the respondents below the age of 18 is divorced while those single and married accounts for 0.7 % each. 3.7 % of those in the 18-25 year group are single, 8.1 % married and 3.0 % are divorced or separated. The 2632year group is made up of 18.5 % singles, 33.0 % married people and 0.7 % divorcees. 9.1%, 14.1% and 4.4% represent the singles, the married and the divorcees respectively in the 33-40. 0.3 %, 2.4 % and 0.7 % also represents the singles, the

married and the divorces correspondingly. In the 48-54 year group, none is single nor divorced and 0.3 % of them is married. Only 297 respondents are accounted for in this Figure because 3 of the respondents did not indicate their ages during the study

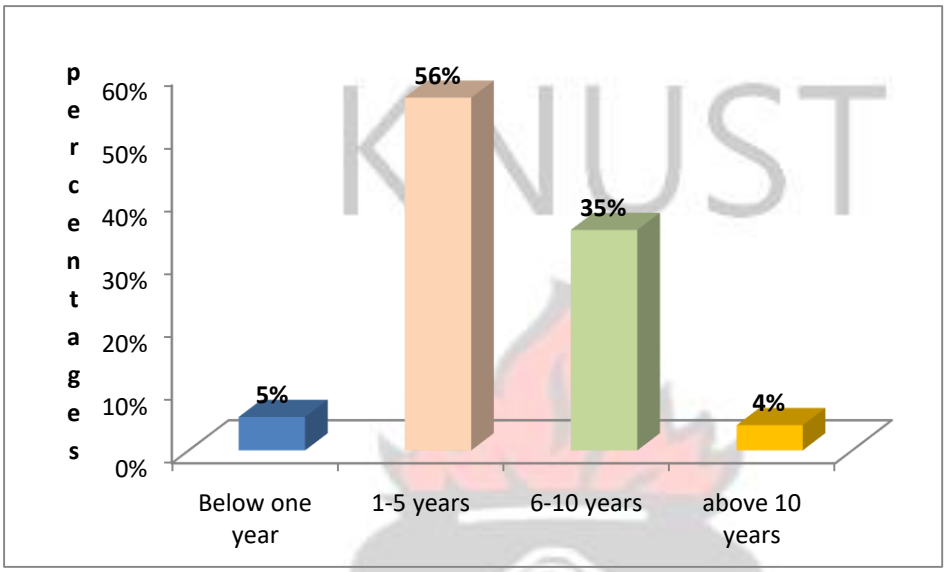

Figure 4.2 Duration in Street Vending

Source: *Field Data, 2015*.

To ascertain how long vendors have been in street food vending, a question to that effect was asked and the responses are represented in Figure 4.1. 56 % accounting for 168 of the respondents have been in the vending business for between 1 and 5 years, the 5-10 years group accounts for 35 % of the total sample size while below 1 year and above 10 years accounts for 5 % and 4 % respectively.

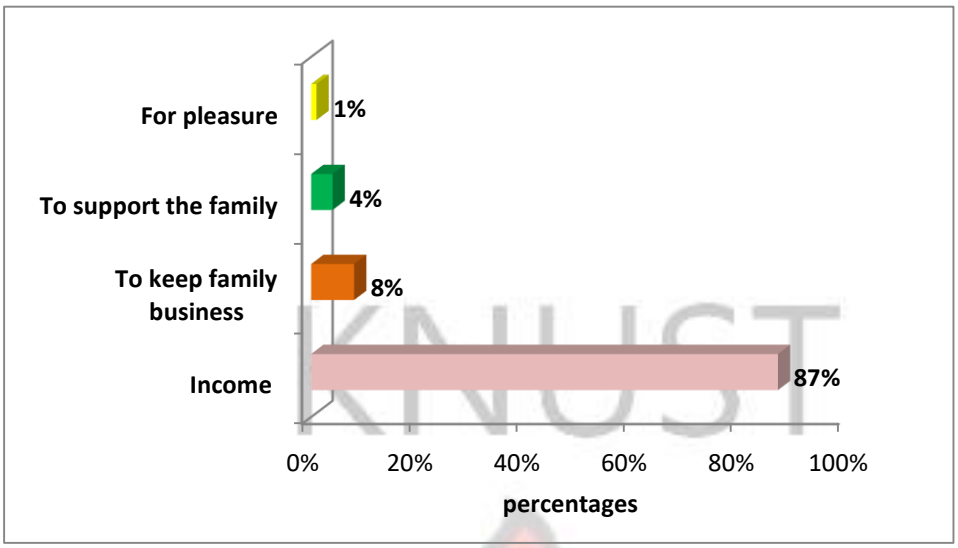

Figure 4.3: Reasons for Respondent's Engagement in Street Vending

Source: *Field Data, 2015.*

Out of the 300 respondents, 91 % are engaged in the business to earn a living that is basically to earn an income. As illustrated in Figure 4.2, apart from the economic reasons, 8 % of the respondents are into the business just to keep the family business booming while 1 % is in it for pleasure.

Table 4.3 presents the summary of the medical history of the respondents. As seen from the table, 282 of them undergo medical examination as part of their work. Out of this number, 36 of them go for the examination every four months, 56 of them go twice in a year while the rest 188 go once a year.

Table 4.3: Medical Examination History of Respondents

Variables	Frequency	Percentages (%)
Medical Examination		
Yes	282	94.0
No	18	6.0

If yes, why do you undergo Medical Examination		
Required by Law	201	67.0
Personal choice	50	16.0
Avoid embarrassment from MHO	33	11.0
How Often is medical Exam is done		
Quarterly	36	12.0
Bi annually	58	19.0
Yearly	188	63.0

Source: *Field Data, 2015.*

As many as 201 of the respondents who go for the medical examination do so because it is a requirement for them. 33 of them go for this medical examination just to avoid embarrassment from the Municipal Health Officers (MHOs) who come around to check the medical certificates. 50 of them go for this medical screening for personal reasons. Only 18 of the respondents do not go for this medical examination.

Table 4.4 presents a summary of the responses of vendors on food resources that are available to them. The responses as presented in the table indicates that, out of the 300 respondents, 100 of them belong to one or two professional association. As much as 200 of them are not part of or affiliated to any professional association, when asked why they are not members of any professional association, 116 of them indicated that they are not aware of any such associations, 49 said they do not and think it is important while the rest 35 respondent indicted that they do not have money to pay to join. The question on the role of the associations was answered by only the 100 respondents who belong to an association.

Table 4.4: Food Resources Available to Respondents

Study Parameters	Frequency	Percentages (%)
Member of any professional association?		
Yes	100	33.0
No	200	67.0
Reason for not being in any association		
Not aware of any such association	116	39.0
Seems unimportant	49	16.0
Do not have money to join	35	12.0
Role of association		
Organize workshops and forums	20	7.0
In-service training	15	6.0
Financial support	6	2.0
A&B	39	13.0
A,B&C	20	7.0
Association meetings		
Monthly	36	12.0
Quarterly	57	19.0
Bi annually	7	2.0

Source: *Field Data, 2015.*

Of these number, 20 respondents intimated that the associations they belong to organizes workshops and forums, in-service training programmes as well as offers them financial support. 39 of them receive in-service training and also they also organize workshops and forums for them. 6 of the vendors said that their association's role is to support them financially while 15 said they only organize

inservice trainings for them. The rest 20 also gave organization of in-service training and forums as the only role of the association they belong to.

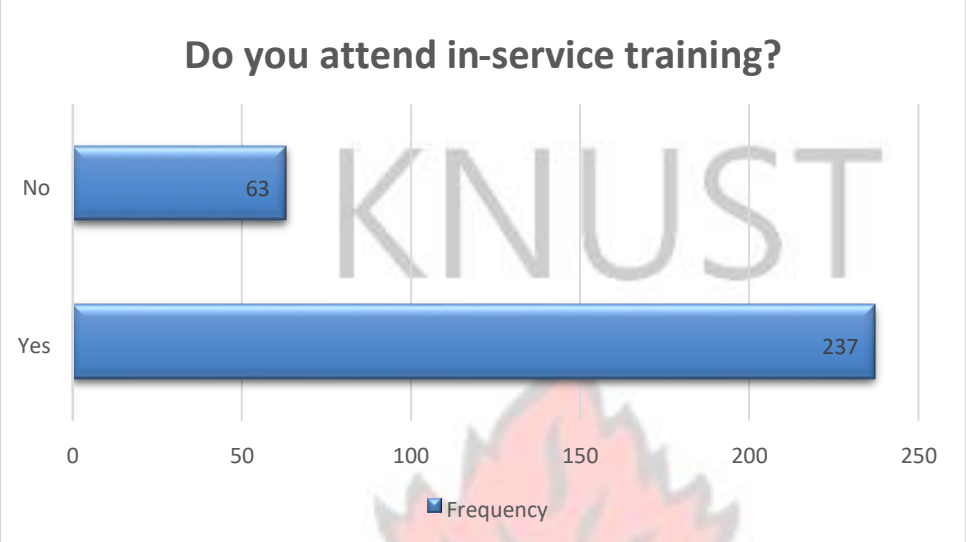

Figure 4.4 Respondents Attendance of In-service Training .

Source*: Field Data, 2015.*

Most of the vendors, 237 representing as much as 79 % do attend in-service training or on the job training at least once in a while. 63 of them accounting for 21 % however do not and have never attended any such training programs. This fact is presented in Figure 4.5.

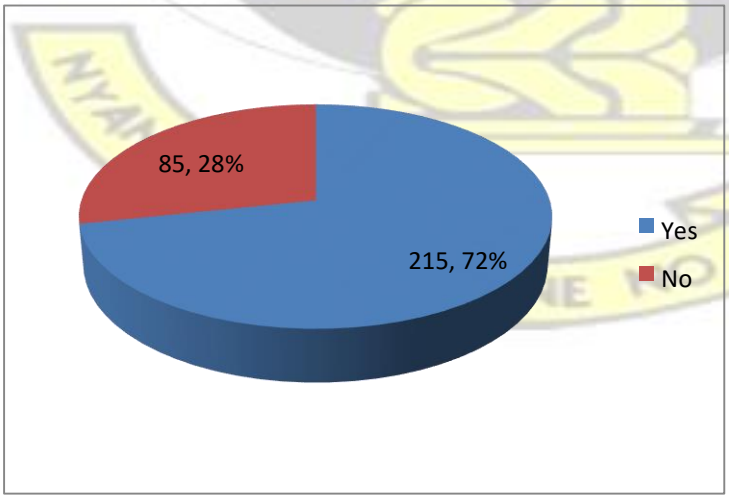

Figure 4.5. Awareness of Food Hygiene and Safety Laws

Source: *Field Data, 2015.*

Figure 4.5 presents the summary of the results on vendors' awareness of laws governing food safety and hygiene. Most of them, 215 representing 72 % said they are aware of some of these laws while the rest 85 representing 28 % of the vendors are unaware of any laws governing food hygiene and safety in Ghana.

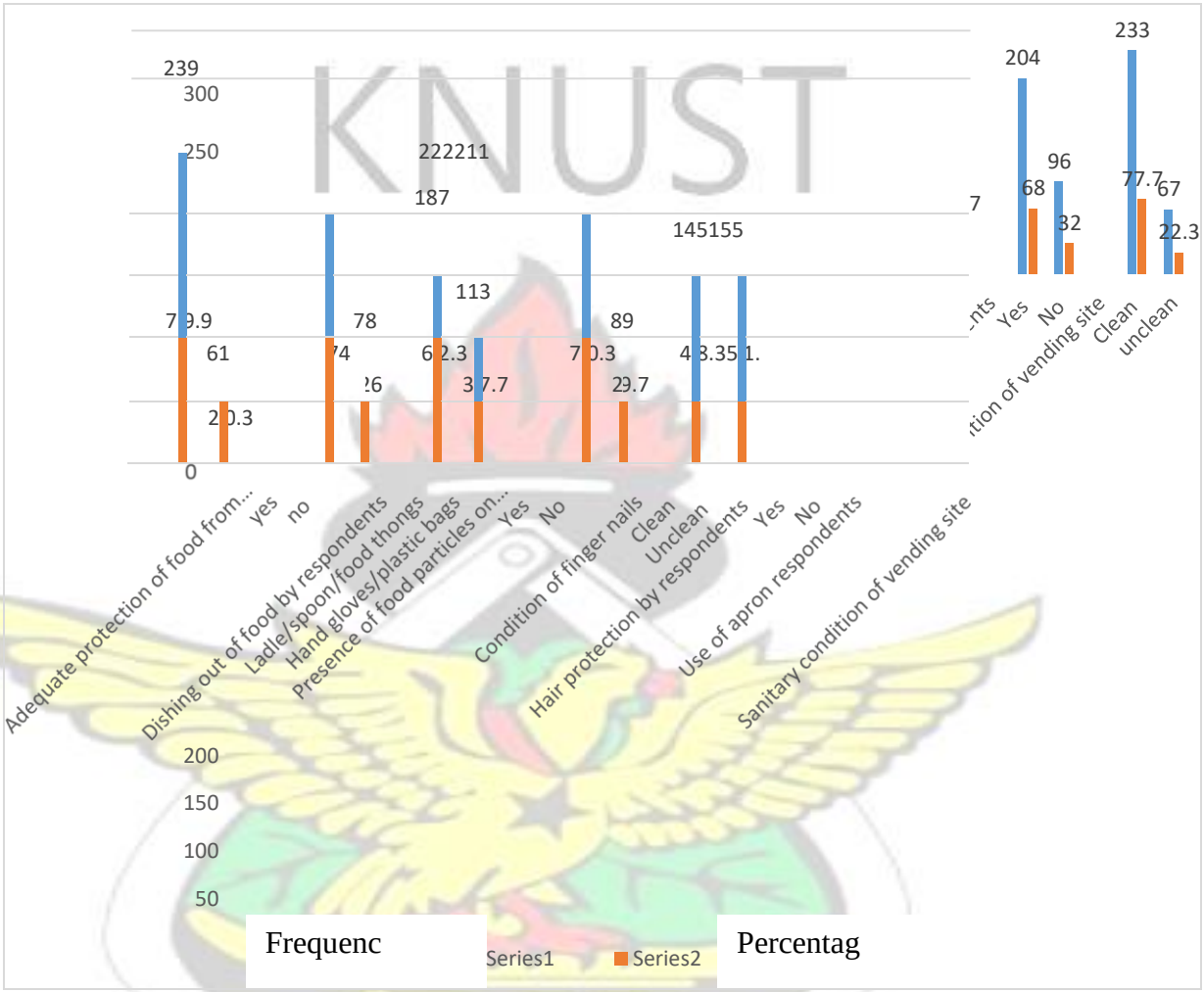

Figure 4.6 Observed Hygienic Food Practices.

Source*: Field Data, 2015.*

Some hygienic and food safety practices were also observed during the study and the results are presented in Figure 4.6. 79.9 % of the vendors observed adequately protected their food from flies and dust whereas 20.3 % of them did not. Also, 74 % of the vendors used ladles, spoons and food thongs while dishing out food to customers and the rest 26 % use hand gloves or plastic bags. The observation as presented also indicates that 62.3 % of the vendors had food particles on their hands

while 37.7 % of them had no food particles on their hands. With regards to the condition of their finger nails, 70.3 % and 29.7 % of the vendors had clean and unclean finger nails fitly. 48.3 % of the respondents protected their hair while 51.7 % did not. Also 68 % and 32 % of the respondents respectively used and did not use aprons while vending. Sanitary conditions of the vending sites were also observed and the results per the Figure indicate that 77.7 % of them kept their vending sites clean while 22.3 % of them did not.

Table 4.5 Relationship between Educational Level and Observed Hygienic Food Practices

		Educational level					
Observed variables		**Tertiary**	**Vocational**	**SHS**	**Middle/ JHS**	**Primary**	**Total**
Adequate protection of food from flies and dust	*Yes*	6 2%	35 11.7%	54 18%	134 44.7%	10.0 3.3%	239 79.7%
	No	0 0%	3 1.0%	0 0%	55 18.3%	3 3%	61 20.3%
Dishing out of food by respondents	*Spoon\ thongs*	6 2%	35 11.7%	53 17.7%	118 39.3%	10 3.3%	222 74.0%
	Hand gloves\plastic bags	0 0%	3 1.0%	1 0.3%	71 23.7%	3 1.0%	78 26.0%
Particles of food on vendors hands	*Yes*	6 2.0%	35 11.7%	46 15.3%	90 30.0%	10 3.3%	**187 62.3%**
	No	0 0%	3 1.0%	8 2.7%	99 33.0%	3 1.0%	**113 37.7%**
Cleanliness of Finger nail	*Clean*	6 2%	35 11.7%	50 16.7%	110 36.7%	10 3.3%	**211 70.3%**

	Unclean	0 0.0%	3 1.0%	4 1.3%	79 26.3%	3 1.0%	**89 29.7%**
Hair protection by respondents	*Yes*	6 2%	32 10.7%	42 14.0%	56 18.7%	9 3.0%	**145 48.3%**
	No	0 0.0%	6 2.0%	12 4.0%	133 44.3%	4 1.3%	**155 51.7%**
Use of apron by respondents	*Yes*	6 2.0%	35 11.7%	48 16.0%	105 35.0%	10 3.3%	**204 68.0%**
	No	0 0.0%	3 1.0%	6 2.0%	84 28.0%	3 1.0%	**96 32.0%**
Sanitary condition of vending site	*Clean\kept*	6 2.0%	35 11.7%	54 18.0%	128 42.7%	10 3.3%	**233 77.7%**
	Unclean\unkempt	0 0.0%	3 1.0%	0 0.0%	61 20.3%	3 1.0%	**67 22.3%**

N=300

Source*: Field Data, 2015.*

Table 4.5 presents the results of the relationship between educational level and the various hygienic food practices observed during the study. It can be deduced from the table that, all the 6 tertiary graduates representing 2 % of the total population, protected their food adequately from dust and flies, used ladles, spoons or food thongs to dish out their food to customers. They had clean, and well-kept nails, protected their hair with chef caps and scarfs while vending, used aprons and their vending sites were in good sanitary conditions. All of them also had food particles on their hands.

Among the Vocational school leavers, all 35 (11.7 %) of them protect their food from flies and dust, used food thongs, spoons and ladles and they had no food particle on

their hands. They had clean and well-kept nails, used aprons and their vending sites were clean and well kept. The rest 3 (1 %) did not protect their food adequately from flies and dust, they used hand gloves and plastic bags while dishing out food to customers and had food debris on their hands. Their finger nails were also not clean and they do not have any protection for their hair. This 1 % of Vocational school graduates as seen in Table 4.5 did not also use aprons and their vending sites were unkempt.

The analysis as presented in Table 4.5 also indicates that all 54 (18 %) of SHS graduates engaged in street food vending adequately protected their food from flies and dust and their vending sites were also clean and kept. 53 (17.7 %) used food thongs, spoons or ladles in dishing out their food while 1 (0.3 %) used hand gloves and plastic bags. 46 (15.3 %) had no food particle on their hand while 8 (2.7 %) had food particles on their hands. The finger nails of 50 (16.7 %) of them were clean and kept while the rest 4 (1.3 %) had the opposite. 42 (14 %) of them protected their hair whereas 12 (4 %) did not. 48 (16 %) of them also used aprons while 6 (2 %) did not.

134 (44.7 %) Middle or Junior High School Middle leavers protected their food from flies and dust adequately. However, the rest 55 (18.3 %) did not observe this fundamental hygienic practice. 118 (39.3 %) of them used food thongs, spoons and ladles depending on the type of food they were selling and the rest 71 (23.7 %) used hand gloves or plastic bags when dishing out food to customers. 90 (30 %) of this category had food particles on their hands while 99 (33 %) of them did not have any food particles on their hands. 110 (36.7 %) of them also had clean and well-kept finger nails but the remaining 79 (26.3 %) do not have clean finger nails. On hair protection,

56 (18.7 %) cover their hair whereas the remaining 133 (44.3 %) do not protect or cover their hair. As seen from the table 4.5. 105 (35 %) of the Middle School leavers wear aprons while 84 (28 %) do not use aprons. Sanitary conditions of the vending sites as observed indicates that, 128 (42.7 %) of them had their vending sites well cleaned and kept while 61 (20.3 %) of them had their vending sites in unfavourable conditions as far as sanitation is concerned.

10 respondents representing 3.3 % of Primary School leavers' as indicated in Table 4.5, protected their food adequately from dust and flies, used ladles, spoons or food thongs to dish out their food to customers and had food particles on their hands.

Again they had clean, and well-kept nails, protected their hair with chef caps and scarfs while vending, used aprons and their vending sites were in good sanitary conditions. The rest 3 %, which is made up of 3 respondents did not protect their food adequately from dust and flies, used hand gloves and plastic bags while dishing out food to customers. They also did not have clean and well-kept nails, their hair was not protected and they did not use aprons. Again, this 1 % of primary school leavers vending sites were not clean and kept, this same percentage however did not have food particles on their hands.

Table 4.6 Medical Examination and Duration in Street Vending

	Medical examination		
Duration of street vending	Yes	No	Total
Below one year	12 (4.0%)	4 (5.3%)	16 (1.3%)
1-5 years	160 (53.3%)	8 (56%)	168 (2.7%)

5-10 years	**100 (33.3%)**	**6 (35.0%)**	**106 (2.0%)**
Above 10 years	**10 (3.3%)**	**0 (3.3%)**	**10 (0.0%)**
Total	**282 (94.0%)**	**18 (6.0%)**	**300 (100%)**

Source*: Field Data, 2015*

The Table 4.6 as presented show the statistics in relation to Duration in Street Vending as against Medical examination. The table shows that 16 (5.3 %) respondents have been in street vending for less than a year, 168 (56 %) for 1-5 years, 106 (35.3 %) for 5-10 years, and 10 (3.3 %) for above 10 years. Of the 16 respondents who were on the street for less than a year, 12 (4.0 %) availed themselves for medical examination and 4 (1.3 %) did not.160 out of the 168 who had been in the street vending between 1-5 years 160 (53.3 %) availed themselves for medical examination and the rest 8 (2.7 %) did not. Of the 106 who had been in the business 5-10 years 100 (33.3 %) availed themselves for medical examination and the rest 6 (2.0 %) did not and those above 10 years, all 10 (3.3 %) of them availed themselves for examination medically. In all, out of the 300 respondents 282 (94 %) availed themselves for medical examination and 18 (6.0 %) did not.

Correlation coefficient of -0.101 was recorded. Appendix B.

Tables 4.5, 4.6 and 4.7 present the result of a simple regression analysis. Table 4.5 presents the result on professional training as the independent variable and some of the hygienic practices that were observed during the study as dependent variables. Tables 4.6 and 4.7 has in-service training as the independent variable and the observed

hygienic practices and some personal and hygienic practices as the dependent variables respectively. The relationship between the independent variable and the dependent variable is explained by the regression coefficient (R) value and the coefficient of determination (R^2) tells what percentage of the variance in the dependent variable is accounted for by the independent variable.

Table 4.7 Relationship between Professional Training and Observed Hygienic Food Practices

Observed Hygienic Practices	R^2
Constant	
Adequate protection of food from flies and dust	0.685
Dishing out of food by respondents	0.492
Presence of food particles on vendors hands	0.688
Condition of finger nails	0.550
Hair protection by respondents	0.324
Use of apron by respondents	0.321
Sanitary condition of vending site	0.719

Source: *Field Data, 2015.*

From Table 4.7 the relationship between professional training and adequate protection of food from dust and flies, dishing out of food by respondents, presence of food particles on vendors hands, condition of finger nails, hair protection by respondents, use of apron by respondent and sanitary condition of vending site recorded R values of 0.828, 0.702, 0.830, 0.742, 0.569, 0.567, 0.848 respectively. The R^2 values in percentages fitly are, 68.5 %, 49.2 %, 68.8 %, 55.0 %, 32.4 %,

32.1 % and 71.9 %.

Table 4.8 Relationship between In-service Training and Observed Hygienic Food

Practices

Observed Hygienic Practices	R	R^2
Constant		
Adequate protection of food from flies and dust	0.726	0.527
Dishing out of food by respondents	0.761	0.579
Presence of food particles on vendors hands	0.758	0.574
Condition of finger nails	0.703	0.494
Hair protection by respondents	0.605	0.366
Use of apron by respondents	0.725	0.525
Sanitary condition of vending site	0.597	0.356

Source: *Field Data, 2015.*

In-service training was also paired with the Hygienic food Practices which were observed during the study and the results are presented in Table 4.8 and they are as follows; adequate protection of food from dust and flies recorded an R value of 0.726, dishing out of food by respondents and presence of food particles on vendors' hands recorded R values of 0.761 and 0.758 respectively. Condition of finger nails, hair protection by respondents, use of apron by respondent and sanitary condition of vending site also recorded R values of 0.703, 0.605, 0.725, and 0.356 correspondingly. The R^2 values recorded are 52.7 %, 57.9 %, 57.4 %, 49.4 %, 36.6 %, 52.5 %, 35.6 % fitly.

Table 4.9 Relationship between In-service Training and Hygienic Food Practices

Hygienic Practices	R	R^2
Constant		
How often is medical exam	0.625	0.395

Why do you undergo medical examination	0.742	0.551
Are you aware of laws on food hygiene and safety	0.562	0.316
How often do you cut your finger nails	0.711	0.506
What is the source of your water	0.753	0.567
Do you treat your water before using?	0.610	0.372
How do you treat your water?	0.780	0.608
What do you do to leftover food	0.730	0.533
How often do you disinfect working tools	0.854	0.729
Hair Protection	0.706	0.498

Source*: Field Data, 2015.*

Table 4.9 also presents the results of the regression analysis on in-service training and some hygienic food practices. The R and R^2 values recorded for how often respondents undergo medical examination is 0.625 and 39.5 % respectively and on why they undergo medical examination, the R value is 0.742 and an R^2 value of 55.1 %. The relationship between the respondent awareness on laws governing food hygiene and safety and in-service training gave an R value of 0.562 and an R^2 value of 31.6 % and that of how often they cut their finger nails recorded an R value of 0.711 and an R^2 value of 50.6 %. The R and R^2 values for the relationship between in-service training and the vendors source of water, whether it is treated or not and

type of treatment respectively are, 0.753 and 56.7 %, 0.610 and 37.2 % and 0.780 and 60.8 %. The rest are 0.730 and 53.3 %, 0.854 and 729 .0 % and finally 0.706 and 49.8 % for the R and R^2 values of the relationship between in-service training and what the vendors do to their left over foods, how often they disinfect their working tools and their hair protection.

A correlation matrix analysis was run to establish the significance of education and professional training on some hygienic food practices among food vendors. The relevant results are presented in Tables 4.10 and 4.11

Table 4. 10 Relationship between Educational level and Hygienic Food Practices

	Educational level
Study parameters	P-Value
How often do you cut your nails	0.434
Source of water for cooking	0.106
Treatment of water before usage	0.478
How do you treat water	0.399
Treatment of leftover foods	0.002
Disinfectant of working tools	0.000
Medical examination	0.085
Attendance of medical exams	0.068
Why undergo medical exams	0.317
Awareness food laws	0.093

Source*: Field Data, 2015.*

From Table 4.10 it is evident that most of the hygienic food practices employed by the respondents when correlated against their education, recorded large p values thus

p values greater than 0.05 These practices include, how regularly they cut their finger nails, their source of cooking water, their treatment of water, how the water is treated by those who treat it before using, medical examination status, how regularly they undergo the medical examination and their reason for attending in addition to their awareness of food laws. The p values recorded respectively are; 0.434, 0.106, 0.478, 0.399, 0.085, 0.065, 0.317 and 0.093. How they manage their leftover foods and the disinfecting of their working tools however recorded low p values of 0.002 and 0.000 respectively.

Table 4.11 Relationship between Professional Training and Hygienic Food Practices

	Professional training
Study parameters	P-Value
How often do you cut your nails	0.100
Source of water for cooking	0.069
Treatment of water before usage	0.003
How do you treat water	0.006
Treatment of leftover foods	0.606
Disinfectant of working tools	0.000
Medical examination	0.857
Attendance of medical exams	0.096
Why undergo medical exams	0.154
Awareness food laws	0.952

Source: *Field Data, 2015.*

The results presented in Table 4.11 also indicates that most of the hygienic food practices employed by the respondents when correlated against professional training, recorded large p values that is the p values are greater than 0.05. These practices and their p values include, how regularly they cut their finger nails (0.100), their source of cooking water (0.069) , treatment of leftover food (0.606) , medical examination status (0.857), how regularly they undergo the medical examination (0.096), their reason for undergoing medical examination (0.154) as well as their awareness of food laws. (0.952). The study parameters that recorded low p values in this analysis are, their treatment of water with a p value of 0.003, how the respondents treat their cooking water also recorded 0.006 as its p value and the disinfecting of their working tools also has a p value of 0.000

4.1 Discussion of Results

4.1.1 Socio Demographic Background of Respondents

The descriptive statistics presented so far from the demographic background of the respondents proves nothing but a clear indication that majority of the street vendors happen to be females and this agrees with findings from Lues *et al*. (2006) who found street food vending to be a common income generating venture particularly for women in developing countries. It is also in line with Fellows and Hilmi (2011) who also intimated that women are generally knowledgeable in food preparation, as it is commonly passed down from mother to daughter. They further stipulated that, it is common in many African countries for street food enterprises to be inherited by the female members of a family. In line with these existing knowledge, this survey has also confirmed that women are those predominantly active in this sector of the economy. The success of the street food vending is therefore largely attributed to

female labour. The small number of males in the street food vending sector is also a well-established fact. For instance FAO (1989) and FAO (2012) also reported that the food vending sector was made up of mostly women and this might be to the fact that cooking is a traditional role of women.

The average age of the respondents also falls within the working age group. From the survey, the ages of the respondents ranges between 18 and 54 with the average age of the respondent falling within the 26-32 age range. This therefore means that majority of the food vendors are within the active working age group. However, there are differences in the reported age ranges as far as existing literature is concern. For instance while the present study had an age range 18-54 years, that of Ntiforo (2001) had an age range of 23-48. This slight difference may lie in the different categorization of the age group used by the two separate studies.

On the ethnicity of the respondent, which was aimed at determining whether certain ethnic groups are predominantly street food vendors, the response indicated that majority of the vendors are Ewes representing 72% of the sample population size with the remaining shared among the other ethnic groups. Apart from Akans who accounted for 18%, all other group account for a small proportion. The high concentration of Ewes may be due to the fact that they are the local inhabitant of the study area with all others being immigrant. Christians also dominated the sector while a hand full of them belonged to the Islamic faith and other faith. This picture painted could be attributed to the fact the study area is predominantly a Christian community as there are more Christian worship centers or churches than all other faith worship centers put together.

Most of the respondents are also married with a few of them being single or separated. This statistic closely relates to the reason why majority of them are into street food vending, that is; to earn an income to support the family. This finding is in line with the existing knowledge that street food vending is a coping strategy to supplement husband's low wages (Tavonga, 2014). Street food vending enables women to leave the homestead to earn an income. This income makes women more self-reliant, more confident and less dependent. It also gives them more status and a greater say in a family, as well as improved status in the community. For some, it can provide a safety net in case of abandonment. Street food vending is also a way by which women especially, respond to their unemployment issues when they do not have access to more formal employment structures (Fellows and Hilmi, 2011) It is also a known fact that entry into this sector does not involve any huge investment or capital nor does it require any advanced technology thus it is a relatively easy avenue to earn extra income.

All the respondents had at least Primary School education with majority of them being Middle or Junior High School education. This finding disagrees with the studies of Chukuezi (2010) in Nigeria where only five percent of food vendors had formal education. On the other hand this finding also agrees with existing literature in that, in most cases the level of education of street venders is low there by making them unemployable in the formal sector of the economy (FAO, 2012). Most of the respondents who are Middle School or Junior High School leavers are females who could not continue their education due to financial difficulties, teenage pregnancy, early marriages and unwillingness to continue their education.

A good proportion of the respondents had been selling food for less than six years meaning that in the whole study area, the street food business has boomed only recently. This trend could be attributed to the influx of many second cycle and tertiary institutions into the Ho Municipality and also rural-urban migration. This trend is similar to that reported by Abdalla *et al.* (2008) and also confirms the assertions in available literature that the street food vending business in developing countries is developing rapidly and serves as employment for urban residents. This study also confirms this assertion as almost all the vendors are in the business for economic reasons, it was however interesting to know that a few of the vendors are actually selling food on the street as a hobby.

A chunk of the respondents do not have any form of professional training as far as food vending is concern. Most of these vendors learn their trade through their own personal intuition and informal education from friends and parents while a few of them acquire their skills formally from vocational and technical institutions, senior high schools and a handful from the polytechnics and universities.

4.1.2 Food Resources Available to Vendors

Joining professional associations though not mandated by law in street food vending, its importance cannot be underestimated since it affords the vendor to gain access to new and requisite information and also promotes professional networking among vendors. Furthermore, it is a way by which street food vendors can channel their grievances to the right authorities, as well as enjoy certain trade discounts and also support themselves financially and also share ideas. On the contrary, most vendors in

Ho are not in any association and the survey reveals that they wish they could join an association but they have not heard about any such association and the few who knew about the existence of street vendor associations do not see the importance of joining while some are just not interested in joining any association though they understand its important.

4.1.3 Observed Hygienic Food Practices

A substantial number of the vendors about 80%, were observed to protect their food adequately from flies and dust while 20% of them exposed their food to flies and dust. This is a little disturbing in that WHO and FAO recommend that food and drinks should be adequately protected from airborne contaminants and pests in such a way so as not to pose a threat to food safety.

Luckily, none of the vendors involved in the study were found to dish out food with their bare hands but rather used spoons, ladles or food thongs. Few of them were also found to be using hand gloves and plastic bags. These findings differ from those of Muinde and Kuria (2005) who reported that, in Nairobi 60% of street food vendors handled food with their bare hands. This new trend may be due to the fact that more vendors are becoming aware of the dangers in handling food with bare hands. Similarly, patrons too are becoming aware of the negative effect of handling foods especially cooked ones with bare hand, and thus have become wiser and selective in choosing where and whom to buy food from. Contrarily, it was observed that 62% of the vendors had food remains or particles on their hands, indicating possible hand contact with food during dishing out. According to Ferron *et al.* (2000) the hands of food vendors are usually the most precarious means of transmitting pathogens from

surfaces and thus could easily result in cross contamination upon contact with food. Most importantly in the case where vendors usually use same hands to handle money and other items and this can further exacerbate the situation due to possible accumulation of dirt on the money.

More so, most of the vendors had clean, short and well-trimmed nails and wore aprons; however less than 50% of them wore scarfs or chefs cap as a form of hair protection. Rane (2011) reported that *Salmonella, Campylobacter and E. coli* can survive on finger tips and other surfaces for different periods of time and in some cases even after hand washing. It is therefore appropriate for food vendors to always keep their finger nails clean, short and trimmed to prevent them from serving as a vehicle for transmission of pathogens. The relatively low proportion of food vendors with hair coverings, as found in this study is in support with those of Muinde and Kuria (2005) and Abdalla *et al.* (2008*)* who reported that a relatively low number of street food vendors protect their hair but in contrast with the findings with Musa and Akande (2003).WHO has also stated that, the use of aprons and hair restraints in the form of scarfs and caps by food vendors has more to do with aesthetics and motivating consumer assurance than food safety.

4.1.4 Medical Examination and Duration in Street Vending

As per FAO and WHO, it is necessary to ensure that people with communicable diseases are excluded from food handling. Also, Section 286 of the Criminal Code, (Amendment) Act, 2003 (Act 646) of Ghana charges all food vendors to be examined to ensure they do not infect consumers with communicable diseases. This study revealed that most of the vendors undergo regular medical screening. The R value of

0.101 as recorded, indicates that there is a weak direct relationship between the numbers of years a vendor spends in street food vending and how often he or she avails himself or herself to medical examination. The R^2 value of 0.01 is an indication that only 1% of the respondents' frequency of going for medical examination as part of their job is actually influenced by the number of years they have spent in street food vending.

The reason may largely be due to the fact that, it is mandatory as per the laws of Ghana and the bye laws of the Ho Municipal Assembly for every street food vendor to undergo medical examination and obtain a medical clearance card before engaging in street food vending and these cards are to be renewed at least once in a year as part of their work. Without this medical certification, one is not allowed to sell food in the municipality. This law is strictly adhered to by most of the respondents as health officers from the assembly are always on routine checks to enforce the law and flush out those who do not comply with the law. It was observed that some of the vendors become complacent over time but they are in the minority. The findings of this study are in agreement with that of Monney *et al*. (2013) who reported that street food vendors generally comply with medical screening legislation but in contrast with findings of Sarkodie *et al*, (2014) who reported that less than 50 % of food vendors comply with this law.

4.1.5 Relationship between In- service training and Hygienic Food Practices Per existing literature, it is important for street food vendors to undergo in-service training or on the job training so as to equip them with the necessary knowledge and skills in the delivery of safe food for their customers. In this survey, most of the vendors when

asked the question whether or not they attend in-service training, majority of them answered in the affirmative. Thus most of them (79%) did attend these programmes as and when they were organized.

These findings however contradict the findings of the study done by Chukuezi, (2012) in Owerri; Nigeria who reported that only 39% of vendors attend in-service training. The huge number of vendors found to be attending in-service training, which is a hygienic practice as far as food vending is concerned, perhaps accounted for the relatively high number of vendors found to be adhering to hygienic and food safety practices. A further relational analysis was carried out to determine the relationship between vendors' disposition to adhere to hygienic and food safety practices which were explored during the study and their participation in in- service training programmes. Per the analysis, in-service training has a strong positive relationship with most of the hygienic food practices of the vendors. Most of the hygienic food practices which vendors in Ho were found to be observing were significantly influenced by their participation in in-service training programmes as it accounted for more than 40% in most of the variables. This presupposes that an increase in vendors participation in in-service training programmes is likely to improve vendors observance of most hygienic food safety practices like; adequately protecting food from flies and dust, disinfecting work tools and site regularly, keeping of short and clean nails, minimal hand to food contact and other hygienic practices by a 40 % margin thus significantly improving the safety of street foods. A few of these practices however recorded R^2 values lower than the threshold value of 40 %. This variation may be accounted for by the vendors understanding and willingness to put into practice the knowledge they acquired during the training programmes.

4.1.6 Relationship between Educational Level and Hygienic Food Practices The result of the cross tabulation carried out to establish the relationship between educational level and the observed hygienic food practices revealed that all vendors with tertiary education were found to be adhering strictly to all hygienic food practices that were observed during the study. The rest who had attained other levels of education on the other hand had been adhering strictly to high levels of the hygienic food practices while others were not.

A chi square test was also carried out to establish the relationship between educational level and a set of personal hygienic food practices. The results indicated that educational level of vendors and their inclination to engage in personal hygiene, hygienic food and other hygienic practices as far as street food vending is concerned are not necessarily correlated. From the chi square test analysis only two variables that is, the disinfection of working tools and the treatment of leftover foods is associated with the educational level of vendors as they recorded a statistically significant difference; thus their p values were less than 0.05. This implies that vendors with high levels of education are most likely to disinfect their work tools regularly and also are most likely not to resale their left over foods. These facts therefore indicate that not all food and personal hygiene variables are determined by the level of education of the street food vendors. This confirms the findings of Mwangi (2002) who reported no statistically significant difference between education and hygienic and sanitary practices among street food vendors in Nairobi in his work entitled, "Nutritional, Hygienic and Socio Economic Dimensions of Street Foods in Urban Areas". The findings of this survey however is slightly in contrast with the findings of Mensah *et al.* (2002) who reported that street food vendors who had formal

education exhibit good hygiene practices. This is not to say that education is not important in the delivery of safe food but rather to establish the fact that it is not a prerequisite for safe food delivery by street food vendors.

4.1.7 Relationship between Professional Training and Hygienic Food Practices

Just as in existing literatures, this study also established that most vendors do not have any professional training in street food vending. The reasons for these phenomena has been attributed to the ease of entering into this sector of the economy among other things. Authors like Monney *et al.* (2013), Chukuezi (2012), Lues *et al*. (2006) among others underscore the relevance of professional training in the observance of hygienic practices by food vendors which will in turn improve the safety of food being vended. This survey reveals that there exist a positive direct relationship between professional training and some hygienic and hygienic food practices that were observed. This relationship was established by a relational analysis in which the R values obtained ranges from 0.567 to 0.848. The highest R^2 value of 0.719 means that 71.9 % of vendors compliance to the hygienic and hygienic food practice of keeping their vending sites in sanitary condition is accounted for by professional training. This means that, an increase in professional training is likely to increase the rate of keeping vending sites in good sanitary conditions by 71.9%. The other variables recorded lower R^2 values meaning that not all the observed hygienic and hygienic food practices of these vendors are accounted for by professional training. This assertion is further explained by the chi square test result which found most of the associations between professional training and a set of hygienic and hygienic food practices to be statistically insignificant, thus the p value was greater than 0.05. Three variables however were found to have statistically significant associations with professional

training. These variables are, water treatment options and how it is treated and also the regularity of disinfecting their working tools as the p values were less than 0.05. This means that professional training which is a hygienic practice in any profession is important in street food vending too. However not all hygienic and food safety practices are correlated to professional training.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.0 Conclusion

The study had revealed that all the respondents had formal education and a high percentage of them are females which is an indication that food vending is primarily a job for women in Ho and all the vendors had at least primary school education. Furthermore, most of the vendors had no professional training in food vending. However a chunk of them do attend in-service training programme as and when they are organized. The study also revealed that, street food vendors in Ho generally adhere to hygienic food practices with regards to regular medical screening, personal hygiene and protection of food from flies and dust. Interestingly not all vendors were found to be in the vending business for economic reasons. A few of them were into vending as a form of hobby.

It is evident from the study that most of the hygienic and food safety practices of the respondents had no statistical significant association with formal education. Professional training and in-service training were found to have a relatively strong relationship with the crucial hygienic and food safety practices considered in this study. This is an indication that when vendors receive professional training in food vending before venturing into the sector and also receive adequate training while on

the job, they will be equipped with the relevant information that will ensure continuation of best practices in the street food vending business thereby reducing the risk of selling unwholesome food which will lead to the protection of public health.

The relevance of professional training, in-service or on-the job training and joining of relevant associations as requirements in any job cannot be underestimated especially in the food vending business. This is because they are avenues through which relevant information is disseminated which will equip and improve vendors' knowledge and inclination to engage in best practices so as to enhance the safety of food being sold to the public. Just as many of the studies done, the practices examined in this studies also indicated that street food vendors are capable of providing good quality food if emphasis is placed on hygienic practices and regulatory compliance. Thus, they have adequate information regarding hygiene and food safety principles and they are aware of the need to ensure safe practices in preparing meals for public consumption. Training can be regarded as crucial in ensuring food safety thus, higher education is not necessarily a prerequisite for better performance in this business. Professional training and in-service training are more crucial as compared to formal education for this sector as it is a potential area for the increasing unskilled and semi-skilled unemployed population.

5.1 Recommendations

Based on the findings of this study, the following recommendations are made in order to improve overall efficiency and effectiveness of the street food vending industry**.**

Government and Policy makers.

1. Large scale food preparation and vending should be included in vocational school educational curriculum in order to equip students with professional

skills and knowledge in the food vending sector thereby improving the quality of street foods.

2. Policies should be geared towards regularizing the sector so that their activities can be monitored on regular basis.
3. A further research should be conducted in this area so as to get enough information on the sector.

Ho Municipal Assembly.

4. Regular in-service training programmes should be organized by the assembly so as to empower the vendors with the requisite information and skills which will sequentially enhance the safety and quality of street food.

   This, if possible should be done at no cost to the vendors.
5. Award schemes should be established to reward vendors who attend inservice training programmes and workshops regularly and also put into practice food safety knowledge acquired.

Food Vendors

6. Formation and joining of food vendor associations so as to ensure that food vendors adhere to appropriate codes of practice in street food vending and also serve as a vehicle to efficiently train and convey information to other food vendors
7. Vendors should avail themselves for in-service training and workshops and also put into practice knowledge and skills they acquire so as to improve the safety of their foods.

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APPENDIX A- RESEARCH QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF FOOD SCIENCE AND TECHNOLOGY

STUDY ON HYGIENIC FOOD PRACTICES AND SAFETY OF STREET VENDED FOODS IN HO

INTERVIEW SCHEDULE FOR STREET FOOD VENDORS

Identification

Investigator: _____ Date: _____

Tel:_____ Location of the business_____

Interviewer's Declaration

My name is Genevieve Adzamli, a master's student in the above mentioned school. I am doing an academic research on how to enhance the safety of street vended foods through hygienic practices. I need your responds to some few questions to enable me complete my thesis.

Of course, we will treat your information confidential and it will not be shared with other people. The data will only be used for academic purposes. If you don't want to give the answer to any particular question please mention it along the conduction of the survey.

SECTION A: SOCIO DEMORGRAPHIC CHARACTERISTICS OF RESPONDENT

1. Age

_____ years

2. Gender

a. Male

b. Female

3. Marital Status
    a. Single
    b. Married
    c. Divorced/Separated 4. Religious affiliation

a. Christian
b. Muslim
c. Traditionalist
d. Others (Specify) ……..

5. Which ethnic group do you belong to?

a. Ewe
b. Akan
c. Hausa
d. Ga/Adangbe
e. Guan
f. Other (specify)…….

6. What is your highest educational level?
a. Tertiary
b. Training college
c. Tech/voc
d. Secondary
e. Middle School/ JHS
f. Primary
g. None

7. How long have you been engaged in street food vending?
a. Below one year
b. 1-5
c. 5-10
d. Above 10

8. Why are you engaged in street food vending?

a. Income
b. Keep the family business
c. To support the family
d. For pleasure

9. Have you ever had any professional training in food preparation? a. Yes b. No

10. If yes at what level?
a. university
b. Training college
c. Polytechnic
d. Vocational/Technical e. Middle school
f. Apprenticeship

SECTION B: HYGIENIC AND FOOD SAFETY PRACTICES

1. How often do you cut your nails?
a. Weekly
b. every two weeks
c. monthly
d. occasionally

2. What is the source of your water for cooking?
a. Well
b. Borehole
c. rain harvesting
d. Pipe borne

3. Do you treat your water before using?
a. Yes
b. No

4. If Yes, How do You treat it
a. Boiling
b. Filtering
c. Using Chlorine

5. What do you do with left-over food?
a. Throw it away
b. Resale the next day

6. How often do disinfect your working tools and working area?
a. Daily
b. Weekly
c. Monthly

d. Occasionally

7. Do you undergo medical examination as part of your work?
   a. Yes
   b. No

8. How often if yes?
   a. Quarterly
   b. Bi- annual
   c. Once a year
   d. Occasionally

9. If Yes, Why do you undergo medical examination?

   a. it is require by law
   b. it is hygienic
   c. to avoid embarrassment from Municipal Sanitary Officers

10. Are you aware of laws on food hygiene and safety?
    a. Yes
    b. No

SECTION C: FOOD SAFETY RESOURCES AVAILABLE TO STREET FOOD VENDORS

1. Do you attend in-service or on the job training programs?
   a. Yes
   b. No
2. Do you belong to any professional association?
   a. Yes
   b. No
3. If no, why?
   a. Not aware of any association
   b. Seems unimportant
   c. Do not have money to join
   d. It is made up of only elites
   e. Any other?
      (Specify)……
      …….
4. What roles do the association(s) you belong to play in relation to hygienic and food safety practices?
   a. Organize workshops
   b. Provide in-service training
   c. Organize forums
   d. Others, specify
5. How regularly do you meet?
   a. Monthly
   b. Quarterly
   c. Bi-annually
   d. Annually.

Thank you very much for the time you took for answering these questions! Have a good day!

APPENDIX A2: OBSERVATION GUIDE

OBSERVED HYGIENIC CONDITIONS/PRACTICES	REMARKS

1. Adequate protection of food from flies and dust	
2. Dishing out of food by respondents	
3. Particles of food on vendors hands	
4. Finger nails	
5. Hair protection by respondents	
6. Use of apron by respondents	
7. Sanitary condition of vending site	

APPENDIX B- COPY OF CORRELATION ANALYSIS

Correlations

		Do you attend in-service or on the job training programs?	How Often is medical Exam	If yes why do undergo Medical Examination	How often do you cut your nails	what is your source of water	Do you treat your water before using	If yes how do you treat it	what do u do to left over food	How often do you disinfect working tools	Do you belong to any association
Pearson Correlation	Do you attend in-service or on the job training programs?	1.000	.153	-.167	.024	.029	.159	-.213	-.124	.066	.128
	How Often is medical Exam	.153	1.000	.250	-.042	.072	.310	-.028	.030	-.225	-.127
	If yes why do undergo Medical Examination	-.167	.250	1.000	-.139	.039	.293	.087	.276 -.040	-.147	-.261
	How often do you cut your nails	.024	-.042	-.139	1.000	.134	-.248	-.011	.279	.139	.088
	what is your source of water	.029	.072	.039	.134	1.000	.155	-.044	.136	-.095	.025
	Do you treat your water before using	.159	.310	.293	-.248	.155	1.000	-.132	.122 1.000	-.255	-.252

	If yes how do you treat it	-.213	-.028	.087	-.011	-.044	-.132	1.000	-.188	.131	.013
	what do u do to leftover food	-.124	.030	.276	-.040	.279	.136	.122	-.180	-.188	-.180
	How often do you disinfect working tools	.066	-.225	-.147	.139	-.095	-.255	.131		1.000	.292
	Do you belong to any association	.128	-.127	-.261	.088	.025	-.252	.013		.292	1.000
Sig. (1-tailed)	Do you attend in-service or on the job training programs?	.	.039	.027	.391	.369	.034	.007	.078	.224	.071
	How Often is medical Exam	.039	.	.002	.316	.206	.000	.376	.366	.005	.073
	If yes why do undergo Medical Examination	.027	.002	.	.056	.327	.000	.159	.001	.045	.001
	How often do you cut your nails	.391	.316	.056	.	.062	.002	.449	.323	.055	.158
	what is your source of water	.369	.206	.327	.062	.	.037	.307	.001	.139	.386

									.059		
	Do you treat your water before using	.034	.000	.000	.002	.037	.	.065	.080	.002	.002
	If yes how do you treat it what do u do to leftover food	.007 .078	.376 .366	.159 .001	.449 .323	.307 .001	.065 .059	. .080	. .015	.066 .015	.440 .019
	How often do you disinfect working tools	.224	.005	.045	.055	.139	.002	.066	.019	.	.000
	Do you belong to any association	.071	.073	.001	.158	.386	.002	.440		.000	.
N											
	Do you attend in-service or on the job training programs?	133	133	133	133	133	133	133	133	133	133
	How Often is medical Exam	133	133	133	133	133	133	133	133	133	133
	If yes why do undergo Medical Examination	133	133	133	133	133	133	133	133	133	133
	How often do you cut your nails	133	133	133	133	133	133	133	133	133	133
	what is your source of water	133	133	133	133	133	133	133	133	133	133
	Do you treat your water before using	133	133	133	133	133	133	133	133	133	133
	If yes how do you treat it	133	133	133	133	133	133	133	133	133	133
	what do u do to left over food	133	133	133	133	133	133	133	133	133	133
	How often do you disinfect working tools	133	133	133	133	133	133	133	133	133	133

Do you belong to any association	133	133	133	133	133	133	133		133	133

Correlation matrix between demographic profile and personal hygiene and hygienic practices

	1	2	3	4	5	6	7	8	9	10	11	12
Educational level	1											
Professional training	.298**	1										
	(.000)											
How often do you cut your nails	-0.045	.095	1									
	(.434)	(.100)										
Source of water for cooking	-0.094	-.105	.084	1								
	(.106)	(.069)	(.148)									
Treatment of water before usage	.041	.171**	.153**	.023	1							
	(.478)	(.003)	(.008)	(.692)								
How do you treat water	.052	.168**	.001	-.050	.029	1						
	(.399)	(.006)	(.984)	(.415)	(.641)							
Treatment of leftover foods	.176**	.030	-.028	.178**	.129*	.219**	1					
	(.002)	(.606)	(.627)	(.002)	(.026)	(.000)						
Disinfectant of working tools	.202**	.268**	.044	-.105	.033	.130*	-.101	1				
	(.000)	(.000)	(.451)	(.069)	(.567)	(.033)	(.081)					
Medical examination	0.100	.010	-0.062	-0.049	0.036	-0.001	0.032 0.580	0.125 0.030	1			
	(0.085)	(0.857)	(0.281)	(0.401)	(0.534)	(0.991)						
Attendance of medical exams	-0.024	-0.098	-0.003	-0.081	0.024	-0.028	0.001	.202**	-.013	1		
	(0.068)	(0.096)	(0.953)	(0.172)	(0.684)	(0.753)	(0.992)	(.001)	(.825)			
Why undergo medical exams	-.058	-0.083	-0.083	0.067	.126*	0.090	0.098	-.054	.042	.116*	1	
	(0.317)	(0.154)	(0.152)	(0.246)	(0.029)	(0.293)	(0.091)	(.348)	(.467)	(.048)		
Awareness food laws	0.097	0.004	-0.105	0.030	-0.043	-0.062	-.099	.021	.121*	-.028	.188**	1
	(0.093)	(0.952)	(0.070)	(0.595)	(0.457)	(0.471)	(0.089)	(.713)	(.035)	(.639)	(.001)	

Correlation matrix between demographic profile and level of knowledge on hygienic food practices

	1	2	3	4	5	6	7	8
Educational level	1							
Professional training	0.298**	1						
	(0.000)							
Level of training	-2.19**	-0.851**	1					
	(0.000)	(0.000)						
In-service training	0.041	-1.113	-0.002	1				
	(0.475)	(0.050)	(0.973)					
Awareness of food hygiene laws	0.97	0.004	-0.023	-0.052	1			
	(0.093)	0.952)	(0.694)	(0.372)				
Medical examination	0.100	0.010	-0.024	0.042	0.121*	1		
	(0.085)	(0.857)	(0.683)	(0.468)	(0.035)			
Often attendance of medical examination	-0.024	-0.098	0.076	0.125*	-0.028	-0.013	1	
	(0.680)	(0.096)	(0.199)	(0.034)	(0.639)	(0.825)		
Reasons to undergo medical examination	-0.058	-0.083	0.115*	-0.103	0.188**	0.042	0.116*	1
	(0.317)	(0.154)	(0.046)	(0.075)	(0.001)	(0.467)	(0.048)	

APPENDIX C- REGRESSION ANALYSIS

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.779	.338		2.307	.023		
	How Often is medical Exam	.119	.061	.174	1.934	.055	.846	1.182
	If yes why do undergo Medical Examination	-.106	.050	-.197	-2.113	.037	.791	1.264
	How often do you cut your nails	.013	.043	.027	.313	.755	.890 .857	1.123
	what is ur sourcee of water	.000	.033	-.001	-.009	.993	.737	1.166
	Do you treat your water before using	.159	.074	.208	2.158	.033	.931	1.358
	If yes how do you treat it	-.134	.066	-.174	-2.034	.044	.803	1.074
	what do u do to left over food	-.030	.070	-.039	-.427	.670	.820 .834	1.245
	How often do you disinfect working tools	.063	.053	.108	1.185	.238		1.219
	Do you belong to any association	.086	.069	.113	1.244	.216		1.199

a. Dependent Variable: Do you attend in-service or on the job training programs?

Correlations

		Do you attend inservice or on the job training programs?	professional training	Level of Training	Are you aware of laws on food hygiene and safety	Medical Examination	How Often is medical Exam
Pearson Correlation	Do you attend in-service or on the job training programs?	1.000	-.120	-.018	-.058	-.014	.125
	professional training	-.120	1.000	-.821	.005	-.011	-.098
	Level of Training	-.018	-.821	1.000	-.018	.009	.064
	Are you aware of laws on food hygiene and safety	-.058	.005	-.018	1.000	.021	-.028
	Medical Examination	-.014	-.011	.009	.021	1.000	-.013
	How Often is medical Exam	.125	-.098	.064	-.028	-.013	1.000
Sig. (1-tailed)	Do you attend in-service or on the job training programs?	.	.021	.382	.165	.408	.017
	professional training	.021	.	.000	.466	.426	.048
	Level of Training	.382	.000	.	.380	.441	.138
	Are you aware of laws on food hygiene and safety	.165	.466	.380	.	.364	.320
	Medical Examination	.408	.426	.441	.364	.	.413
	How Often is medical Exam	.017	.048	.138	.320	.413	.
N	Do you attend in-service or on the job training programs?	288	288	288	288	288	288
	professional training	288	288	288	288	288	288

Level of Training	288		288	288	288	
Are you aware of laws on food hygiene and safety						
Medical Examination	288	288	288	288	288	288
How Often is medical Exam	288	288	288	288	288	288
	288	288	288	288	288	288

Are you aware of laws on food hygiene and safety * Do you attend in-service or on the job training programs? Crosstabulation

		Do you attend in-service or on the job training programs?		
		Yes	No	Total
Are you aware of laws on food hygiene and safety	Yes			
	Count	167	48	215
	% within Are you aware of laws on food hygiene and safety	77.7%	22.3%	100.0%
	% within Do you attend inservice or on the job training programs?	70.5%	76.2%	71.7%
	% of Total	55.7%	16.0%	71.7%
	No			
	Count	70	15	85
	% within Are you aware of laws on food hygiene and safety	82.4%	17.6%	100.0%
	% within Do you attend inservice or on the job training programs?	29.5%	23.8%	28.3%
	% of Total	23.3%	5.0%	28.3%
Total				
	Count	237	63	300
	% within Are you aware of laws on food hygiene and safety	79.0%	21.0%	100.0%
	% within Do you attend inservice or on the job training programs?	100.0%	100.0%	100.0%
	% of Total	79.0%	21.0%	100.0%

APPENDIX D- COPY OF CROSSTABULATION ANALYSIS

If yes why do undergo Medical Examination * Do you attend in-service or on the job training programs? Crosstabulation

			Do you attend in-service or on the job training programs?		
			Yes	No	Total
If yes why do undergo Medical Examination	Required by Law	Count	155	48	203
		% within If yes why do undergo Medical Examination	76.4%	23.6%	100.0%
		% within Do you attend in-service or on the job training programs?	65.4%	76.2%	67.7%
		% of Total	51.7%	16.0%	67.7%
	for hygienic reasons	Count	51	11	62
		% within If yes why do undergo Medical Examination	82.3%	17.7%	100.0%
		% within Do you attend in-service or on the job training programs?	21.5%	17.5%	20.7%
		% of Total	17.0%	3.7%	20.7%
	Avoid embarrassment from MSO	Count	31	4	35
		% within If yes why do undergo Medical Examination	88.6%	11.4%	100.0%
		% within Do you attend in-service or on the job training programs?	13.1%	6.3%	11.7%
		% of Total	10.3%	1.3%	11.7%
Total		Count	237	63	300
		% within If yes why do undergo Medical Examination	79.0%	21.0%	100.0%
		% within Do you attend in-service or on the job training programs?	100.0%	100.0%	100.0%

	% of Total	79.0%	21.0%	100.0%

How Often is medical Exam * Do you attend in-service or on the job training programs? Crosstabulation

		Do you attend in-service or on the job training programs?		
		Yes	No	Total
How Often Quarterly is medical Exam	Count	13	0	13
	% within How Often is medical Exam	100.0%	0.0%	100.0%
	% within Do you attend inservice or on the job training programs?	5.7%	0.0%	4.5%
	% of Total	4.5%	0.0%	4.5%
Bi-Annual	Count	85	18	103
	% within How Often is medical Exam	82.5%	17.5%	100.0%
	% within Do you attend inservice or on the job training programs?	37.1%	30.5%	35.8%
	% of Total	29.5%	6.3%	35.8%
Once a year	Count	131	41	172
	% within How Often is medical Exam	76.2%	23.8%	100.0%
	% within Do you attend inservice or on the job training programs?	57.2%	69.5%	59.7%
	% of Total	45.5%	14.2%	59.7%
Total	Count	229	59	288
	% within How Often is medical Exam	79.5%	20.5%	

% within Do you attend inservice or on the job training programs?			100.0%
% of Total	100.0%	100.0%	100.0%
	79.5%	20.5%	100.0%