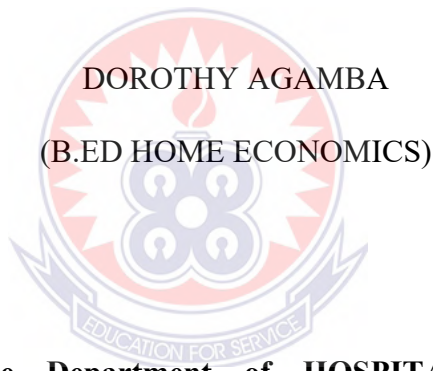


UNIVERSITY OF EDUCATION, WINNEBA
COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

ASSESSING THE SANITATION AND HYGIENE PRACTICES AMONG BAKERS
AND BREAD VENDORS IN SELECTED PARTS OF THE KASSENA- NANKANA
EAST MUNICIPALITY.



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

DECEMBER, 2015

DECLARATION

Student's Declaration

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

SIGNATURE

DATE:



Supervisor's Declaration

I hereby declare that the preparation and presentation of this project work were done in accordance with the guidelines for supervision of project work laid down by the University of Education, Winneba.

YAA AKUBIA MAUFEMOR (MRS.)

SIGNATURE:

DATE:

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DEDICATION

This work is dedicated to my family for their understanding, support and commitments.



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ABSTRACT

The study was conducted within the Kassena-Nankana East Municipality. It assessed the sanitation and hygiene practices among bakers and bread sellers. The design for the study was a descriptive cross-sectional survey. Twenty (20) bakers and one hundred (100) bread sellers were sampled for the study via the simple random and convenient sampling techniques. Data was gathered using questionnaire (Cronbach's Alpha = 0.76) and semi-structured observation guide. The data was analysed using Statistical Package for Social Scientist (SPSS) version 21. The results were presented in tables and figures or charts as frequency counts and percentages. The study revealed that most of the respondents had poor and/or inadequate knowledge of food hygiene and sanitation. The bakers and bread sellers had no or insufficient knowledge of Hazard Analysis Critical Control Points (HACCP); the regulations governing food vending in Ghana; food safety standards in Ghana; and Food and Drugs Act 1992 (PNDCL) 305B. More than 90% of the bakers and bread sellers were relatively clean with regard to food hygiene and sanitation practices. They had a quite clean personal appearance; clean and hygienic work materials, ingredients, tools, facilities and general work surroundings. It was recommended, among others, that the Kasena-Nankana Municipality Environmental Health Department should intensify health education regarding food hygiene and sanitation to both food handlers and consumers. They should in collaboration with the health directorate conduct periodic inspection of bakeries and sales points of bread, medical examination or screening for bakers and bread sellers along with necessary treatment such as de-worming, typhoid and hepatitis 'B' screening, and vaccination.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Sanitation generally refers to the provision of facilities and services for the safe disposal of human waste. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both in households and across communities. It also refers to the maintenance of hygienic conditions, through services such as garbage collection and wastewater disposal (WHO, 2014).

Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases (WHO, 2014a). It includes personal hygiene which involves those practices performed by an individual to care for one's bodily health and wellbeing, through cleanliness. It also includes keeping preparation areas clean and germ-free. Mixing bowls, spoons knives and any other tools used in the kitchen should be washed thoroughly before they are used as well as after.

According to Norman and Robert (2006), food handlers are potential sources of micro-organisms that cause illness and food spoilage. Bread is handled by the bread sellers and when care or precautions are not taken there is the likelihood that the bread can be contaminated.

Every year, as a result of eating unsafe food, millions of people become ill and thousands die (WHO 2002). The contamination of food can occur at any point before its consumption, including during its preparation. There is a lack of awareness all over the world that food can make an individual sick if not properly handled, prepared and stored

and this ignorance leads to a large proportion of food borne diseases which could be prevented. As a result of this, the WHO has developed the five keys to safer food: Keep clean; Separate raw and cooked; Cook thoroughly; Keep food at safe temperatures; Use safe water and raw materials (WHO, 2012).

Globally, over 780 million people are still without access to improved sources of drinking water and 2.5 billion lack improved sanitation. It was projected that in 2015: 605 million people will be without an improved drinking water source and 2.4 billion people will lack access to improved sanitation facilities (UNICEF and WHO 2012)

In Ghana, one of the major causes of hospital attendance is diarrhoea and 16% of deaths in African children under five years can be directly attributed to diarrhoea diseases (Bruce *et al.*, 2005). The Kassena-Nankana East Municipal Assembly has also experienced quite a number of diarrhoea cases. Currently, diarrhoea ranks fourth on the top ten diseases in the municipality (KNEMA, 2014). Cholera cases have also been experienced in the municipal with its attendant losses of life. In 2012, health authorities reported forty-three (43) cases of cholera with two (2) deaths in Navrongo, the capital of the Kassena-Nankana East Municipal Assembly.

A total of 2.5 billion people all over the world eat street foods everyday (Food and Agricultural Organization (FAO), 2007). The world is becoming rapidly more urban and the population of the developing countries is projected to double from 1.7 to 3.4 billion in 2020. Deprivation in urban areas including poverty, food insecurity and malnutrition is increasing faster and urban growth now present a serious challenge in developing countries (Maxwell, *et al.*, 2000). Street foods are ready-to-eat foods prepared and/or sold

by vendors and hawkers, especially in streets and other similar public places which include schools, markets and motor parks (Muleta and Ashenafi, 2001).

1.2 Statement of the Problem

Studying on food hygiene practices of food handlers in the Federal Capital Territory of Nigeria, Nnebue, Adogu, Ifeadike and Ironkwe, (2014) found that, 89.3% of food handlers wash their hands after the use of toilets, 26.7% change their hand gloves at work. They further discovered that, 71.4% undergo regular medical check-up, 31.5% are isolated from workplace when ill and few of them, (30.4%) use sanitizers/ disinfectants at workplace. They concluded that owners of food centers should train staff on basic personal hygienic techniques, self care and good housekeeping practices. It is unknown if the knowledge on hygiene as well as sanitation practices of bread bakers and sellers in the Kasena-Nankana East Municipality differs from the above findings. As a result, a scientific enquiry into the sanitation and hygiene practices of bread bakers and sellers in the Kasena-Nankana East Municipality is highly necessary.

Worlanyo (2013) researched into the knowledge, attitudes and practices of sanitation among market users at the dome market in the Ga East Municipality. The study concluded that most of the market users have inadequate education on good hygiene and basic sanitation promoting practices. As a result they do not see the issue of improved sanitation as a current priority; hence, they failed to change their lifestyle which could lead them to practice proper sanitation. Since market women had inadequate knowledge of good hygiene and sanitation practices, it is important for the knowledge of bread bakers and sellers on good hygiene and sanitation practices to be examined. The findings

of this research will inform the Ghanaian public about the level of awareness of bread bakers and sellers of food safety standards and the extent to which they comply with those standards.

Using a cross sectional design and 423 food vendors, Boateng (2004) conducted a study on food hygiene practices by street food vendors and microbial quality of selected foods sold in the Dunkwa-on-Offin, Upper Denkyira East Municipality of the Central Region. The study revealed a significant association between place of storing cooked food, frequency of washing eating plates, frequency of changing water for washing plates and microbial quality. In addition, he observed that 84.0% of food vendors used the same hands to serve and collect money and 89% used their bare hands to serve or dish out food. Boateng (2014) concluded that food contamination was high among street foods within Dunkwa-On-Offin. In the light of this finding, it is laudable to conduct a study into the hygiene and sanitation practices of bread bakers and sellers in the Kasena-Nankana East Municipality. This study will bring to light any public health risk inherent in the operations of bread bakers and sellers in the municipality.

1.3 Objectives of the Study

The general objective of the study was to examine the sanitation and hygiene practices among bakers and sellers of bread in the study area.

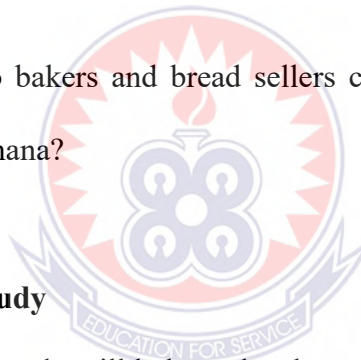
The specific objectives were to:

1. examine the level of awareness of bakers and sellers on sanitation and personal hygiene in selected parts of the Kassena-Nankana East Municipality.
2. assess food hygiene and sanitation practices of the bakers and bread sellers in the study area.

3. determine whether bakers and bread sellers comply with regulations governing food vending in Ghana.
4. make recommendations for improving hygiene and sanitation practices in the bakery industry or business

1.4 Research Questions

1. How knowledgeable are bakers and bread sellers with regard to food hygiene and sanitation in the Kassena-Nankane East Municipality?
2. What are the food hygiene and sanitation practices of the bakers and bread sellers in the study area?
3. To what extent do bakers and bread sellers comply with regulations governing food vending in Ghana?



1.5 Significance of the Study

The results of this study will help to develop strategies that will increase the level of awareness of sanitation and hygiene practices for bakers and sellers in the area of study. Findings will help policy makers and implementers to enforce laws that will help to improve on sanitation and hygiene practices of bakers and sellers. It will also serve as a reference material for further researchers.

1.6 Scope of the Study

This study will cover the Navrongo community in the Kassena-Nankana East Municipality of the Upper East Region.

1.7 Limitation of the Study

Limitations of study are useful for readers because they acknowledge possible errors or difficulties in interpreting results of the study (Baron, 2010). Information in this study could have been collected from a wider scope but it is limited to Navrongo Township due to time and financial constraints.

1.8 Delimitation of the Study

The study focuses on sanitation and hygiene practices of bakers and bread sellers only. It did not cover other food producers and vendors in the municipality

1.9 Organization of the Study

The study comprise of five chapters. Chapter one deals with the introduction to the study. Chapter two presents a literature review of the research conducted on vended foods and bakery products. Chapter three describes the methodology to collect the data from the two communities. This chapter also includes the data analyses from the study. Chapter four represents the results and discussions of the research finding and chapter five talks about recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

In this chapter, related literature has been reviewed from books, journals, articles and internet sources. Literature is reviewed under the following topics:

- Food safety
- Regulations governing food vending in Ghana.
- Food hygiene practices.
- Bread

2.1 Food Safety

Food safety is a broader term, which means an assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use. This can be achieved through the utilization of various resources and strategies to ensure that all types of foods are properly stored, prepared, and preserved so that they are safe for consumption (WHO, 2000). Food can be defined as - edible substances whether in natural or manufactured state which, from a public health perspective form part of the human diet (Will & Guenther, 2007). Understanding the necessity of access to healthy and nutritionally sound foods is important for all. Diseases spread through food are common and persistent problems that result in appreciable morbidity and occasionally in death (Scharff, 2009; Tomohide, 2010). Food-borne illnesses have been described as one of the most widespread problems of the contemporary world (Wheelock, 2006) as it is an important and growing public health and economic problem in many countries.

Food safety has been defined as the conditions and measures that are necessary during the production, processing, storage, distribution and preparation of food to ensure that it is safe, sound, wholesome and fit for human consumption (WHO, 1984). Food safety is a major concern with street foods as these foods are generally prepared and sold under unhygienic conditions, with limited access to safe water, sanitary services, or garbage disposal facilities (WHO-AFRO, 2006; Rheinländer, Olsen, Bakang, Takyi, Konradsen Sam & uelsen, 2008). An estimated 2.5 billion people patronize vended foods world-wide (Nyarango, Aloo, Kabiru & Nyanchongi, 2003). In Ghana and elsewhere, food vendors are noted for selling foods and drinks at reduced prices, so providing more affordable means for people to obtain nutritionally balanced meals outside the home (FAO/WHO, 2003).

Food poisoning and other food borne diseases could occur where food and drinks are served or sold by food vendors or other food handlers (Seaman & Eves, 2006). Several factors are known to favour food borne disease or food poisoning during food handling processes. These factors include poor personal and environmental hygiene, poor storage of food and drinks, improper preparation and cooking, and carrier state with unclean hand (Seaman & Eves, 2006). The preventive steps to enhance food safety developed by the World Health Organization (WHO) are known as the “Golden rules” for safe food preparation. The rules include thorough cooking of food; thorough reheating of stored food; avoiding contact between raw foods and cooked food; and protection of food from insects, rodents and other animals. Despite these “Golden rules,” food borne diseases continue to be a serious public health problem, especially in developing countries (WHO, 2006).

According to WHO (2006), the main source of food borne illness is through bacterial contamination, followed by physical factors (preparing and handling methods) and chemical usage. It is an undeniable fact that food borne illness cases cannot be eliminated thoroughly as it is self-inflicted or accidentally caused by food operators and servers. Across the world, contamination of new bacteria and viruses are found in the food items received either dry or wet and cooked, their temperature should be below 50°C , while frozen items should be below 270°C . Other implementation of the principle of “first in, first out” (FIFO) system and discarding expired items has been stressed. The principle of “first in, first out” seeks to regulate the duration within which food items are persevered before they are consumed in order to ensure the maintenance of the needed nutrients. Fortification of micronutrients of foods therefore is fundamental to good health (WHO, 2006).

Food poisoning risks can be reduced through the implementation of FIFO system and the separation method of raw food and cooked food items. Long food holding time will increase the bacterial growth inside the food and cause food poisoning. Cooked food should be served and consumed within four hours and at a holding temperature of 63°C , which is highly recommended. On the other hand, chilled food should be held at the temperature of 5°C or less and -10°C and below for frozen food (WHO, 2006).

2.1.1 Food Safety Knowledge

Negative attitudes result in practicing harmful behavior (Bedworth & Bedworth, 1992) cited by Kalua, 2001). Knowledge is the ability to recall or recognize something such as a fact concept, principle or custom (Kalua, 2001). It is further stated that

knowledge can be acquired through formal or informal settings either by the help of someone or alone. Knowledge is said to be a source of power necessary for everyone to make informed decisions about one's health and participate actively in promoting health of the community (Kalua, 2001).

Food safety courses are administered worldwide as a means to inform food service workers on matters of food safety. Furthermore, data suggest that the food service industries are more likely to hire workers trained in food safety (Hine *et al.*, 2003). The expectation in providing these courses is ultimately to reduce the incidence of food-borne illness (Kassaet *et al.*, 2010). However, there are conflicting results in the literature. For instance, Hammond *et al.*, 2005 found that critical food violations actually increased after training.

Furthermore, Ehiriet *et al.* (1997) suggest that there are no significant improvements after training on a number of critical concepts in food safety such as, food storage, cross-contamination, temperature control, and high risk foods. The authors further identify problems in training regimes that tend to rely merely on dissemination of information with no practical reinforcement. Powell *et al.*, (1997) determined that there was no relationship between the level of knowledge of staff and hygiene standards in restaurants. Cates *et al.* (2009), however, suggest that the presence of a certified kitchen manager is protective for the majority of critical food violations, and therefore employing and properly training such a manager is essential to ensuring a safe food product. Kneller and Bierma (1990); Mathias *et al.*, (1995) found that health inspection scores increased after food safety training, thereby implying the knowledge imparted from food safety training is sufficient in achieving higher inspection scores.

Knowledge regarding some of the key principles in preventing food-borne outbreaks, such as use of thermometers to verify safe internal food temperatures, is often overlooked and could potentially result in illness. For instance, Green *et al.* (2005) in their study of assessing food safety practices indicate that half of their respondents did not use a thermometer to properly ensure safe internal food temperatures. As such, this imposes a critical concern regarding food safety.

Askarian *et al.* (2004) assessed knowledge, attitudes, and practices of food service staff on food hygiene in government and private hospitals in Iran. The study illustrated that staff comprehension, regarding pathogens that cause disease and the correct temperature for the storage of hot and cold foods, was limited. They further suggest that additional food safety courses and manuals be easily available for staff, however, the validity of such a comment has not been successfully proven (Askarian *et al.*, 2004). A similar study assessing food hygiene knowledge, attitudes, and practices in food businesses in Turkey revealed an immediate need for education and increasing awareness among food handlers on food safety practices (Bas *et al.*, 2006).

A study conducted in Italy by Angellilo (2000) and his associates examined foodservice staff in hospital environments. The results suggested a lack of knowledge regarding temperature of food storage of hot and cold foods, the identification of pathogens associated with foods, and common food vehicles that transmit pathogens (Angelillo *et al.*, 2000).

The skills and knowledge needed by food handlers to ensure food safety and hygiene include:

(a) General practices

- Personal hygiene practices and responsibilities about their health that all food handlers preparing food know and put into practice.
- Food handling practices to prepare and store food correctly.
- Hygiene practices to keep the food premises and equipment clean and well maintained. For example, these rules may require food handlers to know how to assess and judge unsafe food when being delivered to the business.

(b) Specific practices

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

For example, checking temperature would need knowledge of which foods are potentially hazardous and therefore need to be checked; the proportion of the foods to be checked for each delivery; what the correct temperatures are and what to do if the food is not at the correct temperature. The food handler would also need skills to take accurate temperatures of potentially hazardous foods using a temperature probe. The health belief model, posits that individuals must perceive themselves to be at risk of the health threat before they will take actions to reduce risky behaviours or to engage in healthy alternative behaviours (Uwalaka & Matsuo, 2002).

2.1.2 Translating Food Safety Knowledge into Practice

The provision of knowledge to change food safety attitudes and behaviors has not been adequately proven in the literature (Seaman & Eves, 2006). An effective food training course should not only provide food safety information, it should implement knowledge into practice for proper information retention. Campbell *et al.* (1998) suggests that implementation of a food safety training regime must target both managers and food service workers; furthermore the course must be active, such as a workshop. Food safety training courses are often administered via computer-based programs, classroom-based seminars, or hands-on training (Seaman & Eves, 2006). Little research has confirmed the effectiveness of hands-on training delivered in the work environment. Rennie (1994) suggests that training programs that are more closely associated with the work site with practical reinforcement of hygiene messages are more effective than traditional methods of training. Practical in house, hands-on training tends to be the most favorable approach in relaying food safety messages (Hendry *et al.*, 1992).

Food safety training will lead to an improvement in food safety if the knowledge imparted reflects a positive change in behavior (Seaman & Eves, 2006). For instance, a manager of food service establishment in South Carolina that received food safety training was required to take an exam for evaluation purposes. Six months after passing the exam, an outbreak of salmonellosis, involving 135 confirmed cases and approximately 800 affected persons occurred in his establishment (Rennie, 1994). This suggests that the information was not translated into effective food safety practice thereby causing a substantial outbreak.

The majority of food safety courses rely solely on the dissemination of information with very little emphasis on practice which is ineffective (Egan *et al.*, 2007). They tend to adopt the Knowledge, Attitudes, and Practices (KAP) model which has substantial limitations (Griffith *et al.*, 2000). This model has become synonymous with health education and assumes an individual's behavior is dependent on their knowledge and the provision of information alone will lead to a direct change in attitude and thus behavior (Bas *et al.*, 2006). However, one such limitation to this model is that it assumes that people who are provided with food safety information will act upon the information gained (Ehiri *et al.*, 1997). Ehiri *et al.* (1997) in their study of evaluating a food hygiene training course in Scotland noted that after the training, there was no significant improvement in course participants' pre-course knowledge of a number of crucial aspects of food safety, including food storage, cross contamination, temperature control, and high risk foods. This reflects poor training designs whose sole purpose is to comply with regulations and produce certified personnel. MacAuslan (2003) also suggests training in food safety relies too heavily upon attaining a certificate rather than paying attention to achieving competency in food hygiene practice (MacAuslan, 2003). This supported Clayton *et al.*, (2002) that behavioral changes in food safety will not occur as a result of training alone

2.1.3 Food Safety Culture

A relatively new emerging risk factor in the food industry is food safety culture Griffith *et al.*, (2010) propose a definition of food safety culture as the aggregation of the prevailing, relatively constant, learned, shared attitudes, values and beliefs contributing to

the hygiene behaviors used within a particular food handling environment. Further studies investigating and understanding the underlying attitudes and beliefs may help to discover why and how to make a positive and balanced food safety culture at all levels. An organization's culture is ultimately its beliefs, attitudes and values that the employee is exposed to everyday (Griffith *et al.*, 2010).

2.1.4 Food Safety Challenges

Illness from food-borne pathogens is a significant global health concern (Rocourt *et al.*, 2003; WHO, 2002). Population level incidence estimates, however, are uncertain due to under reporting that there is difficulty in attributing illness to food consumption. In the U.S. the Centers for Disease Control estimate that contaminated food-borne pathogens cause approximately million illnesses, 325,000 hospitalizations, and 5,000 deaths among a population of 273 million each year (Mead *et al.* 1999). The World Health Organization believes incidence rates in OECD countries are similar (Rocourt *et al.*, 2003). In developing countries, where it is more difficult to separate water and food-borne illness, approximately 2.2 million people die from these causes (Rocourt *et al.* 2003; WHO, 2002).

The World Health Organisation (WHO) regards illness due to contaminated food as one of the most widespread health problems in the contemporary world (Mukhola, 2000). Bekker (2003b) and McSwane, Rue & Linton (2000) define contamination as the presence of substances or conditions in the food that threatens the wholesomeness of food and can be harmful to humans. According to Käferstein *et al.*,

(2000) biological contaminants, i.e. bacteria, viruses and parasites constitute the major cause of food borne diseases and food spoilage.

In 1996, the United States passed the first major pesticide legislation reform in thirty years, requiring evaluation of cumulative impact of low dose exposure to multiple chemicals on adult and child health and that standards be set to protect children (Hamilton & Crossley, 2004). The new European Chemical Regulatory Law, REACH (Registration, Evaluation, Authorization and Restriction of Chemical Substances), addresses similar concerns (European Council, 2006). The last three decades have also seen significant scientific transformation (Kinsey, 2001). New technologies, such as genetically modified foods and, more recently, nanotechnologies, often raise public concern and calls for new regulation. Consumer attitudes toward new technologies have differed considerably across countries, leading to differences in laws and the threat of trade disputes (Brom, 2004).

Globalization has brought many benefits to consumers, including more varied and nutritious food supplies throughout the year, but it has also complicated management of both infectious and noninfectious food-borne hazards. In developing countries, globalization has helped increase incomes. Globalization has also fostered industrialization and urbanization, which can strain capacity for adequate sanitation and safe food handling (WHO, 2002). It can also lead to more rapid spread of food-borne disease. Poor sanitation in developing countries can result in contamination of food exports to developed countries, as happened in the 1996 *Cyclosporiasis* outbreak in the United States associated with Guatemalan raspberries (Calvin *et al.* 2003). But trade may also spread food-borne pathogens between developed countries, as in the spread of BSE

from Britain to Japan in 2001, or from developed to developing countries (McCluskey *et al.*, 2005). Recent experience with economic adulteration of pet food, milk, and toothpaste from China demonstrates the need for the institutional capacity of industry and governments in emerging economies to grow with their productive capacity (Gale & Hu, 2009; Roth *et al.*, 2008).

Antle (2001) provides an excellent overview of theoretical literature on both supply and demand applicable to food safety economics. Supply and demand analysis is complicated by the fact that safety attributes are not usually directly observable by consumers, and often are either not observable to suppliers or observable by them only at a cost. Even where information relevant to product safety is available to one firm in the supply chain, there is a cost associated with communicating that information to downstream firms and consumers. Labeling and other information approaches to food safety policy are an attempt to deal with the resulting information asymmetries between consumers and suppliers. Traceability requirements, like those in the EU, are designed to address information asymmetry in the supply chain, increasing the speed of response to safety failures and helps strengthen market and liability incentives for precaution (Pouliot & Sumner, 2008). Firms may also invest in obscuring information about product quality and safety by using colorants, additives, and processes that preserve attributes, such as meat color, that consumers look to as signals of safety.

Reduction in consumer health risks is usually the primary benefit of food safety policies. Willingness to pay for health and mortality risk reduction is generally viewed as the most complete and correct welfare theoretic measure of these benefits, but as a practical matter, cost of illness is more widely used in regulatory analysis (Antle, 2001).

The public health literature often uses Health Adjusted Life Year (HALY) measures as an alternative to either cost of illness or willingness to pay. These measures are widely accepted in Europe and used in the World Health Organization's Global Burden of Disease estimates (WHO, 2008). Their use in U.S. regulatory analysis was recently permitted by OMB under the Bush administration (U.S. OMB 2003). HALYs are indices of the impact of illness on physical well-being and function. They were developed to provide a common metric for the severity of health outcomes in evaluating the cost-effectiveness of alternative medical treatments. To be used in cost-benefit analysis, HALYs must be monetized. This has been controversial because HALY measures are not consistent with the utility theoretic foundations of welfare economics (Hammitt, 2002; Hammitt, 2003; Krupnick, 2004; Dickie & List, 2006). A recent U.S. National Research Council report recommended against monetizing HALYs (IOM 2006). HALYs measure discomfort associated with each year of life, they do not measure consumer preferences over reduction in risks of future health states. This leads to HALY measures placing greater weight on reducing chronic disease than to reducing mortality, particularly mortality in the elderly. In an empirical assessment of U.S. diesel fuel regulation, Hubbel (2006) shows that this conceptual difference between HALY and WTP metrics can change the outcome of regulatory analysis, particularly for policies involving more chronic disease than mortality. This could be of significance for food safety analysis comparing the benefits of interventions to reduce pathogens such as *Campylobacter*, which are associated with significant chronic morbidity and pathogens like *Toxoplasma gondii*, which has a higher mortality rate. It would be of even greater

importance in comparing the relative merits of reducing exposure to chemical residues and pathogens.

Empirical research estimating the benefits of food safety policy has used multiple methods including hedonic estimates of demand for safety from market data, stated reference surveys, and experimental auctions (Marks *et al.*, 2003; Shogren *et al.*, 1999). Antle (2001) and Golan *et al.* (2005) provide reviews of the empirical literature, focusing on the U.S. Many areas of applied economics are increasingly looking to meta-analysis, a method of using statistical analysis to look at systematic patterns across related studies, to derive valuation estimates for use in policy analysis (Nelson & Kennedy, 2009; Bergstrom and Taylor 2006). Florax *et al.* (2005) conducted a meta-analysis of research on willingness to pay to reduce health risks from pesticide exposure through food and other pathways.

Lusk *et al.* (2005) conducted a meta-analysis of consumer willingness to pay to avoid genetically modified foods. A recent U.S. study looks at the sensitivity of willingness to pay for avoiding food-borne illness to duration and severity of illness (Hammitt & Haniger, 2007). These reviews all have a U.S. focus. European valuation studies have been published related to BSE (Latouche *et al.*, 1998), GM foods in Italy (Boccaletti & Moro, 2000), organic foods in Denmark (Weir *et al.*, 2002), and *Salmonella* in chicken (Sundström & Andersson, 2009). Mørkbak *et al.* (2008) provide a comprehensive review of stated preference studies of meat safety and quality. However, food illnesses are defined as diseases, usually either infectious or toxic in nature caused by agents that enter the body through the ingestion of food (WHO, 2007).

Every person has a risk of food illnesses, but may vary in terms of risk level either low or high. Those who have little knowledge on food safety have high tendency to contracting food borne illnesses. The entire world statistics on food borne outbreak showed that the cases of food borne illnesses is increasing year by year. In United States, estimation for food borne disease may result in 76 million illnesses, 325,000 hospitalization and 5000 deaths each year (Mead, Stutsker, Dietz, McCaig, Brescp. Shapiro, Criffin & Tauxe, 1999) while in England and Wales, food borne diseases resulted in an estimated 1.3 million cases, 21, 000 hospitalizations and 500 deaths yearly (Adak, Long & Brien, 2002). Also in Malaysia, food borne diseases in 2009 were low which is 1.4 cases per 1,000,000 population, but in terms of food poisoning cases is increasing as proven by the indigence rate of 62.47 and 36.17 per 100,000 population in 2008 and 2009 respectively (MOH, 2009:2010). In a longitudinal study conducted in Ghana, street foods accounted for 19-27% of food expenses and provided 134-417 kcal per day per person. 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. Various projects have shown that street food trade generates a large volume of businesses, involving large amounts of money and provides a competitive source of employment and income to millions of people. In a survey conducted in Accra, Ghana, the street food sector was shown to employ over 60 000 people with an estimated turnover of US\$100 million (Tomlins, 2002).

Although it is difficult to determine the global incidence of food-borne diseases, the World Health Organization (WHO) estimated that in 2005 alone 1.8 million people died from diarrhea diseases; it is estimated that 30% of the population in industrialized countries suffer from food-borne diseases each year (WHO, 2007).

The preventive steps to enhance food safety developed by the World Health Organization (WHO) are known as the “Golden rules” for safe food preparation. The rules 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. Despite these “Golden rules,” food borne diseases continue to be a serious public health problem, especially in developing countries (WHO, 2006).

2.2 Regulations Governing Food Vending in Ghana

Food and Drugs Act 1992 (PNDCL) 305B

Section 4 of the Act which is on the standards of foods state, “Where a standard is prescribed under an enactment for food, a person who manufactures, labels, packages, sells or advertises food in a manner that the food is likely to be mistaken for food of the prescribed standard commits an offence.”

Section 5 of the Act on prohibition against sale of poor quality food states:

A person who sells to the prejudice of a purchaser a food which is not of the nature, substance or quality of the article demanded by the purchaser commits an offence. It is not a defense to an offence under subsection (1) to plead that the purchaser was not prejudiced because the food was bought for analysis or for a purpose other than for consumption.

Section 7 of the Act is on sale of food under unsanitary conditions. It states:

A person who sells, prepares, packages, conveys, stores or displays for sale a food under unsanitary conditions commits an offence.

(1) Food shall be stored and conveyed in a manner that preserves its composition, quality and purity and minimizes the dissipation of its nutritive properties from climatic and any other deteriorating conditions.

2.3 Food Vendors and Hygiene Practices

Basic kitchen sanitation guidelines are an important component of any food safety strategy (Jevs'nik *et al.*, 2006a). Food elaborated with satisfactory hygienic standards is one of the essential conditions for promoting and preserving health, and inadequate control is one of the factors responsible for the occurrence of food-borne disease outbreaks (Oliveira *et al.*, 2003). Food sanitation begins with the purchase or acquisition of different food items and ends with the proper storage of leftovers for future use. One of the most important aspects of practicing food safety involves preventing foods from becoming contaminated. Making sure foods are stored properly goes a long way in avoiding any type of food contamination.

2.4 Food Hygiene

The word "Hygiene" is used to describe a system of sanitary principles for the preservation of health. Personal hygiene refers to the cleanliness of a person's body. The health of workers plays an important part in food sanitation. People are a potential source of microorganisms that cause illness to others. Food hygiene refers to all

conditions and measures necessary to ensure the safety and suitability of food at all stages of the chain. Food hygiene is defined as a sanitary science which aims to produce food that is safe for the consumer; of good keeping quality and free from micro-organisms (Bekker, 2003b). South African Bureau of Standards (2001) noted that, food hygiene is concerned with the provision of food for human consumption with a minimal risk of contracting food poisoning, by exercising good production, preparation, storage and serving of food by following good procedures. Such procedures refer to proper washing of dishes, work surfaces, waste disposal, insect, rodent and bird infestation control, cleanliness of the entire premises and transport vehicles, maintaining safe product temperature, proper separation of food and non food items (McSwane, Rue & Linton, 2000). Practicing food hygiene ensures that the food which we eat is clean, wholesome, nutritious and free harmful additives and dangerous organisms and involves everyone, particularly those who process or serve food (Bekker, 2003b).

2.4.1 Personal Cleanliness and Hygiene

The food handler can often be a major source of contamination. Therefore, the practicing of good personal hygiene is essential for those who handle foods and include:

- Maintaining good personal habits
- Knowing when and how to properly wash hands
- Wearing clean protective clothing
- Maintaining good health and reporting when sick to avoid spreading possible infections

- Practicing food hygiene knowledge and principles (McSwane, Rue & Linton, 2000).

2.4.1.1 Hand Washing

Approximately 25% of food contamination is attributable to improper hand washing (Marriot, 1999). Hands of food handlers should therefore be washed regularly with soap in clean potable water, especially before starting to handle food, after going to the toilet and after handling raw food, food waste or chemicals (Bekker, 2003b). In order to facilitate hand washing, adequate hand washing facilities should be placed such that it will encourage the washing of hands (Bekker, 2003b). Hands should be washed in basins, separate from dish wash sinks (McSwane, Rue & Linton, 2000) and must be provided with hot and cold water, soap or detergent and a suitable hand drying device or paper sheet. The use of fabric cloths, dish towel or apron for hand drying must be discouraged as it can rapidly accumulate a large population of micro-organism, particularly when left moist and their use can actually increase contamination rather than reduce it. Paper towel sheets should rather be provided as an alternative (McSwane, Rue & Linton, 2000).

2.4.1.2 Wearing Clean Protective Clothing

Protective clothing, including coat, head covering, footwear and sometimes trouser and gloves, shall be suitable, clean and neat (Kenya Food Drugs and Chemical Substances Act, Cap 254 of 1992; South African Health Act 63 of 1977, Regulation 918).

2.4.1.3 Health status

In most countries, local health codes prohibit employees having communicable diseases or those who are carriers of such diseases from preparing and handling foods or participating in activities that may result in contamination of food or food contact surfaces (South African Bureau of Standards, 2001). Therefore, medical examination of food handlers is mandatory and a legal requirement in terms of the Kenya Food, Drugs and Chemical Substances Act, Cap 254 of 1992 and the Kenya Public Health Act, Cap 242 of 1986.

The World Health Organization's Ten Rules does however not recommend routine medical and microbiological examination of food handlers, but rather that food handlers suffering from an illness that includes symptoms such as jaundice, diarrhoea, vomiting, fever, sore throat, skin rash or skin lesions such as boils or cuts, report this to their supervisor before starting work (www.med.osaka-u.ac.jp/doc/0157/whorules.html, 15 August 2004) so as to determine their suitability to work or be given off duty, hence prevent possible contamination of food.

2.4.1.4 Contaminated Equipment and Utensils

The source of an infecting organisms on food may be endogenous (that is, the source is the patient's own flora) or exogenous (Jarvis, 2004). In exogenous contamination, the source of food contamination includes the hospital staff or the inanimate environment within the hospital. Food may be contaminated by polluted water, insects e.g. flies, rodents and pets, unclean utensils, dust and dirt (Gudeta, 2007). Equipment and containers that come into contact with food should be designed to enable

easy cleaning and disinfection. The materials used for making the equipment should not have a toxic effect on food. Adequate facilities should be made available for the different core functions in food handling. The working area within the production area should be maintained clean to prevent contamination. All sinks, dish washing machines and other equipment should be so constructed to be easily cleaned and to be kept in good repair (WHO, 2001).

Cross contamination is a very significant concept in food safety. Raw food, particularly meat, should be successfully separated, either physically or by time, from ready to eat and cooked foods, with transitional cleaning or disinfection where essential. Poorly cleaned utensils and equipment surfaces harbor and encourage the spread of pathogens. Equipment and utensils used in the hospitals (for example, aluminum plates) need to be cleaned with warm water and detergent followed by disinfection. Suitable cooking procedures and recommendations need be observed in order to prevent the growth of pathogens (WHO, 2002). Furthermore, if food is not chilled or frozen during storage; and heated to temperatures between 70 and 800 before consumption, then there are high chances of growth and subsequent ingestion of pathogens. Sufficient natural or artificial lighting should be enhanced to enable operations in a hygienic manner. Moreover, adequate means of natural or mechanical ventilation should also be provided. Ventilation systems are made in a way not to allow for air circulation from contaminated areas to clean areas (WHO, 2001).

Food handlers should maintain a high level of personal cleanliness and wear suitable protective clothing, head gear and footwear. People involved in food handling should refrain from smoking, spitting, chewing and sneezing or coughing over

unprotected food. Personal effects like jewellery, pins and other adornments should not be brought into food handling areas. A food handler implicated to be a carrier of a disease illness should neither be allowed to go into food handling areas or handle food. Food handlers should undergo full medical examinations and issued with a certificate before allowed handling food. Food hygiene training is basically significant to equip the handlers with the knowledge and skills to handle food safely. Regular appraisals of the effectiveness of training and instruction activities should be made together with periodic supervision to enforce adherence to hygienic procedures (WHO, 2001).

2.4.2 Food Sanitation

Proper sanitation practices are important in maintaining food safety. Lack of hygienic practices can contribute to outbreak of food borne illnesses. Food Sanitation means creating and maintaining hygiene and healthful conditions in the food preparation storing and serving areas. To sanitize means, to reduce the bacterial contamination of the area being treated to a safe level. This condition is considered to be superior to physically clean and slightly less desirable than sterile. To ensure that the environment and equipment not only have been cleaned, but also are protected against microbial contamination, it is thus necessary to apply sanitation practices.

The importance of sanitation practices is to combat the proliferation and activity of food spoilage and food poisoning microorganisms. A major challenge of the sanitarian is to protect the production area and other involved areas from the microorganisms that can reduce the wholesomeness of foodstuffs. Waste management, maintenance and cleaning as well as pest control as sanitation practices are described below:

2.4.2.1 Waste Management

Improper removal, storage and disposal of waste can result into contamination of food, equipment, potable water and may attract breeding of pests (South African Bureau of Standards, 2001). There should be designated containers with covers, if necessary, for collection of waste and garbage and for their temporary storage until disposal. These containers should be properly identified, and be made of durable, impervious material and maintained in a sanitary condition (Alli, 2004; South African Bureau of Standards, 2001).

2.4.2.2 Maintenance and Cleaning

The establishments and equipment shall be kept in an appropriate state of repair and Condition (National Board of Experts-HACCP, the Netherlands, 2002; South African Bureau of Standards, 2001). Accordingly, food handlers should prevent contamination of food, for example, from metal sharps, flaking plaster, debris and chemicals. It must however be done in such a way that it will avoid contamination of ingredients, products or packaging material, minimizing the risk of pest infestation and also permit effective cleaning before continuing with processing.

The necessary cleaning methods and materials will depend on the nature of the maintenance conducted. Cleaning chemicals should however be handled and used carefully and in accordance with manufacturers' instructions and stored, where necessary, separated from food, in clearly identified containers to avoid the risk of contaminating food (World Health Organisation, 1997). Food grade detergents should be used in cleaning (Bekker, 2003b).

Cleaning of a food establishment is a fundamental and important part of the operations and entails the removal of bacteria as well as soluble that is salt, sugar and insoluble particles, that is, oil, food particles, grease, grimed matter, residues and dirt that maybe a source of contamination. Kenya Food, Drugs and Chemical Substances Act, Cap 254 of 1992, regulation 13, Cleaning is normally done in different phases namely (Alli, 2004).

- Pre-clean: Removing excess soil by sweeping, wiping or pre-rinsing.
- Main clean: Loosening of the surface grease and dirt using a detergent.
- Rinse: Removal of loose dirt and detergent.
- Disinfection: Destroying bacteria/other organisms.
- Final rinse: Removal of disinfectant.
- Dry: Preferably natural by evaporating dry.

To provide for the different stages of cleaning it is advisable to draw up a cleaning programme that will provide for the HACCP programme (Alli, 2004; National Board of Experts-HACCP The Netherlands, 2002; South African Bureau of Standards, 2001).

- Ensuring that all parts of the establishment are appropriately clean, and shall include the cleaning of cleaning equipment. Therefore, adequate facilities and suitably designated, shall be provided for cleaning food utensils and equipment and shall have an adequate supply of hot and cold potable water.
- Specifying all areas, items of equipment and utensils to be cleaned.
- Specifying the responsibilities for particular tasks, including method and frequency of cleaning.

- Continual and effective monitoring for suitability and effectiveness Although cleaning chemicals is used as cleaning aids, water still remains the main cleaning agent and should therefore be potable, complying with standards as previously indicated. Cleaning chemicals shall be of the food grade type (Alli, 2004; Bekker, 2003b) and shall be stored, where necessary, separately from food, in clearly identified containers to avoid the risk of contamination of food (National Board of Experts-HACCP, The Netherlands, 2002).

2.4.2.3 Pest Control

The availability of food and water encourages pest harborage and infestation (Alli, 2004; World Health Organisation, 1997). It is further stated that good hygiene practices should be employed to avoid creating an environment conducive to pests. Good sanitation, inspection of incoming materials and good monitoring can minimize the likelihood of infestation and thereby limit the need for pesticides (Alli, 2004; World Health Organisation, 1997).

The benefits of proper cleaning and sanitizing of equipment and utensils, time and temperature controls and food handling can all be wasted if insects and rodents are allowed to contaminate foods and food contact surfaces. There is therefore a need for a pest control program in food establishments (McSwane, Rue & Linton, 2000, National Board of Experts-HACCP, the Netherlands, 2002).

Toilet facilities near work areas provide good personal hygiene, reduce lost productivity and permit closer supervision of employees (McSwane, Rue &

Linton,2000). Adequate, suitable and conveniently located change rooms, toilets and ablution facilities shall be provided at all food establishments (Alli, 2004).

2.5 Food Handling

Food handling is defined as manufacturing, processing, producing, packing, Preparing, keeping, offering, storing, transporting or displaying for sale or for serving (South African National Health Act 63 of 1977, Regulation 918 of 1999). Increased handling of food is responsible for a more complicated and critical challenge of protecting food from contamination (Marriott, 1999). Good hygiene practice in food preparation and service plays an important role in ensuring food safety. This is achieved by following general rules of good food hygiene and other approaches like HACCP (www.med.osaka-u.ac.jp/doc/0157/who_rules.htm: 15 August 2003). Poor hygienic practices can contribute to outbreaks of food borne illnesses. It is therefore important that the food establishment management / owner provide methods and means of handling that prevent damage to or deterioration or contamination of any food product (South African Bureau of Standards, 2001).

2.5.1 Purchasing

Bekker (2003) and McSwane, Rue and Linton (2000) argue that for a sanitation program to be effective, it should start with a sound food supply. The person entrusted with purchasing, should therefore buy the product that is best suited for the job, buy the proper quantity of the item, pay the right price for the item, buy from only reputable and dependable suppliers and should have knowledge of products

and market conditions. Food is purchased from local market, butcheries, farmers, and suppliers.

2.5.2 Receiving

Personnel responsible for receiving products must carefully inspect all incoming food supplies to make sure they are in sound condition, free from filth, spoilage, damage, insect infestation and at proper temperatures. Deliveries that do not go for immediate use should be stored at once in an appropriate storage area. Foods that are damaged, for example, dented cans should be rejected (Bekker, 2003b; McSwane, Rue & Linton, 2000; National Board of Experts-HACCP, The Netherlands, 2002).

2.5.3 Storage

All foodstuffs undergo unwanted changes during storage if not kept under proper conditions (Heijden *et al.*, 1999). Cool refrigeration, frozen and dry storage are among the methods of food preservation. Cool storage refers to storage at temperatures above freezing, from about 16°C down to -20°C while frozen refers to storage at temperatures -18°C or below to maintain food (Potter & Hotchkiss, 1998).

Dry storage refers to holding of foods above ambient temperatures. Dry storage is used in the storage of food grains such as maize, beans, flour and potatoes. The perishable foods are obtained on daily bases for use.

2.5.3.1 General Storage Rules

The following general rules should be followed when storing food (Bekker, 2003; McSwane, Rue & Linton, 2000):

- Cooked foods should be kept well separated from raw food and covered to reduce the risk of cross-contamination.
- Food should be kept off the floor and away from walls.
- First-in-first-out (FIFO) system stock rotation should be implemented.
- Arrangement of items in stores should be well done and coded/marked for ease of identification and removal and for use.
- All food should be stored in an orderly fashion so as to facilitate ventilation and assessment of food to detect deterioration.
- Any shelf or display case used for displaying or storing food or any container shall be kept clean and free from dust or any other impurity.

2.5.4 Cooking

Proper cooking of potentially hazardous foods destroys harmful micro-organisms that may be present in the food (McSwane, Rue & Linton, and 2000). However, different foods and the methods by which they are cooked, require different end point temperatures to be safe. The range of safe cooking temperatures can vary from 63°to 74°C (McSwane, Rue & Linton, 2000) but it is recommended that the core temperature of all parts of the food must reach at least 70°C within a period of 2hours (Frazier & Westhoff, 1988). The Department of Health, South Africa(1997) states that the time and temperature of cooking should be sufficient to ensure destruction

of non-spore forming pathogenic micro-organisms. However, spores of certain bacteria like *Clostridium botulinum*, *Clostridium perfringens* and *Bacillus cereus* can survive cooking temperatures (Frazier & Westhoff, 1988).

Frozen meat, fish and poultry must be thoroughly thawed before cooking (www.med.osaka-u.ac.jp/doc/0157/whorules.htm 1, 15 August 2004) so as to result in better return of moisture to the cells hence gaining look of original food (Frazier & Westhoff, 1988). They further state that this should be done slowly and be well controlled. However, reasonably rapid thawing is recommended to prevent the possible growth of micro-organisms.

2.5.5 Cooling

Cooling refers to the removal of heat energy. Proper cooling of food after cooking prevents the conversion of spore forming bacterial cells to vegetative bacterial cells and the growth of vegetative bacterial cells. During cooling, food must be cooled to 21°C within 2 hours and from 21° to 5°C within an additional 4 hours (McSwane, Rue & Linton, 2000). When dishes containing a mixture of cooked and raw ingredients e.g. salads are being prepared, it is important to cool the cooked component before mixing with the other ingredients (www.med.osaka-u.ac.jp/doc/0157/whorules.htm, 15 August 2003).

2.5.6 Holding of Food

Holding of food implies keeping or retention of semi-finished or finished food for a period of time under specified temperatures

(www.brainydictionary.com/words/ho/holding173887.html, 9 May 2005; www.cogci.princeton.edu/cgi-bin/webwn, 9 May 2005) and may be done during cooking, cooling, reheating and food preparation. During these activities, the amount of time foods is in the temperature danger zones must be minimized to control microbial growth. The National Board of Experts-HACCP, The Netherlands (2002) and McSwane, Rue and Linton (2000) are of the opinion that foods should be held for a minimal amount of time during preparation in the temperature danger zone.

2.5.7 Serving of Food

Food should be handled, served or sold with clean equipment and utensils i.e. tongs, forks, spoons or disposable gloves and never handled with bare hands (Department of Health, South Africa, 1997:67). Utensils/cutlery should be clean and dry and not handled by touching the food contact surfaces (McSwane, Rue & Linton , 2000).

2.6 Food Handlers/Visitors

A food handler is defined as anyone who is engaged in any of the processes which make up or are ancillary to food processing (for examples; a cook, a wash-up, waitress) even though they might not handle food directly) (Alli, 2004; National Board of Experts, the Netherlands, 2002).

2.6.1 Personal Habits/Behavior

Persons working in direct contact with food should wear clean outer garments and conform to hygienic practices while on duty; they shall wash their hands thoroughly,

remove jewellery, and take any other necessary precautions, for example, bathing, washing and restraining hair; keeping finger nails short and clean; washing hands after using toilet to prevent contamination of food with micro-organisms or foreign substances (Kenya Food, Drugs and Chemical Substances Act, Cap 254 of 1992; South African Bureau of Standards, 2001:27; South African Act 63 of 1977, Regulation 918).

Activities that encourage hand/mouth contact such as smoking or the chewing of gum, tobacco, betel nut or finger nails can also therefore lead to food contamination and must be avoided. The same also applies to the tasting of food during preparation. Similarly food handlers should not spit, sneezes or cough over food, or pick their nose, ears or any other parts of the body (www.med.osaka-u.ac.jp/doc/0157/whorules.html, 15 August 2004; McSwane, Rue & Linton, 2000; Kenya Food Drugs and Chemical Substances Act, Cap 254 of 1992; South African Health Act 63 of 1977, Regulation 918).

2.6.2 Wearing Clean Protective Clothing

Protective clothing, including coat, head covering, foot wear and sometimes trouser and gloves, shall be suitable, clean and neat (Kenya Food Drugs and Chemical Substances Act, Cap 254 of 1992; South African Health Act 63 of 1977, Regulation 918).

2.6.3 Health Status

In most countries, local health codes prohibit employees having communicable diseases or those who are carriers of such diseases from preparing and handling foods or participating in activities that may result in contamination of food or food contact surfaces (South African Bureau of Standards, 2001). Therefore, medical examination of food handlers is mandatory and a legal requirement in terms of the Kenya Food, Drugs and Chemical Substances Act, Cap 254 of 1992 and the Kenya Public Health Act, Cap 242 of 1986.

The World Health Organization's Ten Rules does however not recommend routine medical and microbiological examination of food handlers, but rather that food handlers suffering from an illness that includes symptoms such as jaundice, diarrhoea, vomiting, fever, sore throat, skin rash or skin lesions such as boils or cuts, report this to their supervisor before starting work (www.med.osaka-u.ac.jp/doc/0157/whorules.html, 15 August 2004) as to determine their suitability to work or be given off duty, hence prevent possible contamination of food. Food handlers should only be subjected to the same health standards used in screening prospective employees.

Further, supervisors should observe employees daily for infected cuts, boils and respiratory complications and food handlers should take personal initiative and be the custodian of their own health and see to it that they go for medical checkup whenever they feel unwell.

(a) General Practices

- Personal hygiene practices and responsibilities about their health that all food handlers preparing food know and put into practice.
- Food handling practices to prepare and store food correctly.
- Hygiene practices to keep the food premises and equipment clean and well maintained

For example, these rules may require food handlers to know how to assess and judge unsafe food when being delivered to the business.

(b) Specific Practices

Skills and knowledge needed for more specific food handling operations, such as receiving food into premises, cooking, reheating and cooling food, controlling the time food is at room temperature and disposing of food (Australia / New Zealand, 2002). For example, checking temperature would need knowledge of which foods are potentially hazardous and therefore need to be checked; the proportion of the foods to be checked for each delivery; what the correct temperatures are and what to do if the food is not at the correct temperature. The food handler would also need skills to take accurate temperatures of potentially hazardous foods using a temperature probe.

The health belief model, posits that individuals must perceive themselves to be at risk of the health threat before they will take actions to reduce risky behaviors or to engage in healthy alternative behaviors (Uwalaka & Matsuo, 2002). Spradley, (1990) indicates that to be most effective in reducing the incidence of food borne illness, it is

important that the health issues of concern are identified and that the subsequent educational messages promoted to consumers and food handlers address the factors that lead to the highest incidence of food borne illness and most serious consequences. Finally, knowledge becomes meaningful and useful when the learner has comprehended and applied the acquired knowledge and skills appropriately.

A major challenge of the sanitarian is to protect the production area and other involved areas from the microorganisms that can reduce the wholesomeness of foodstuffs. Contaminated foods can cause several illnesses including respiratory diseases e.g. Cold, sore throats, Pneumonia, and tuberculosis, gastrointestinal diseases, vomiting, diarrhea, dysentery, typhoid fever and infectious Hepatitis. Even if a food handler does not feel sick, he or she can still be carrying microorganisms on their body or clothes that can cause illness if they get into food. Hence, such as the common cold, sore throat, Pneumonia, scarlet fever, tuberculosis and trench mouth. The food handler can often be a major source of contamination. Therefore, the practicing of good personal hygiene is essential for those who handle foods and include (McSwane, Rue & Linton, 2000).

Interestingly, cases of consumption of unhealthy foods are becoming more severe, not only complicating public health, but more worrying is the increase among children. One of the most important aspects of practicing food safety involves preventing foods from becoming contaminated. Making sure foods are stored properly goes a long way in avoiding any type of food contamination (McSwane, Rue & Linton, 2000).

2.7 Bread

Bread is a staple food prepared by baking a dough of flour and water. Flour provides the structure for baked products.

2.7.1 History of Bread

Man learned the art of bread making more than 4000 years ago. Though not always in the same form or as we know it today, bread has been a popular staple food for ages. All countries and cultures have some form of bread. Bread is the world's most widely eaten food and has been a main part of the human diet since prehistoric time. Bread making began very simply by grinding some kind of grains into flour adding liquid to the flour and baking the dough on hot rocks. Bread making today can be a more involved process and many include eggs, leavening agents such as yeast or baking powder and flavouring for hundreds delicious variations (Project Food, Land and People, 2008). Bread products vary widely around the world, as do their production techniques. Basic ingredients are cereal flour, water, yeast or another leaving agent, and salt (Sluimer, 2005).

2.7.2 Nutritive value of Bread

Bread is an essential food in human nutrition. It is a good source of energy and contains groups of Vitamin B, proteins and minerals which are essential in our diet (Ms Al-Mussali *et al*, 2007). The chemical content of balady and pan bread made of whole wheat flour and with flour of 72% extraction rate. They concluded in their results that babady bread contains moisture (33-34%) fat (2.53-2.55%) fibre (3.62-3.93%), ash (2.63-

2.98%) and carbohydrates (78.65-78-74%). Balady bread is produced from whole wheat flour (Al-Mussali *et al*, 2007).

Al-Kanhal *et al* (1999) studied the nutritive value of various bread Saudi Arabia such as Mafroud, Samouli (French type bread) and white bread commonly consumed over the world they concluded that these type of bread had protein, fat and fibre. The high starch content as energy source cereals also provide dietary fibre (high in protein and glutamine, but low in lysine) and functional lipids rich in essential fatty acids (Kloffenstein, 2000).

2.7.3 Ingredients for making Bread

Flour, yeast, water, fat, eggs and salt and used in making bread. Flour provides the structure for baked products involving pastry or dough. This is made possible by the gluten (protein) in the flour. It forms the main structure or the bulk of the product (Adow *et al*, 1991).

Fat include lard, butter, cooking oil and vegetable oil, Fat add flavour and helps to brown the crust of the baked product. Fat make baked products rich and tender and keeps baked products from getting dry.

According to Adigbo *et al* (2011) sugar improves texture, crispness and helps brown the crust of the baked product. Apart from sugar making flour product sweet, it also help to make the product soft and tender so as to make the product rise in the oven (Adjadji, 1998). Sugar is the source of fermentable carbohydrates for yeast and it also provides sweet taste. Liquid helps to bind flour and the other ingredients in the recipe

and produces steam during baking and therefore helps raise the products and gelatinizes the starch and develop the gluten (Adigbo *et al*, 2011).

Leavening agents or raising agents in baked products means adding in bulk to the basic mixture that is to use for the products and also making the mixture light enough so that the finished products may feel soft and crumbly (Adjadji, 1998). Raising agents are used to raise product in the oven during cooking.

Salt in bread enhance flavour of all other ingredients and adds taste to the bread. It also strengthens the gluten network in the dough, (Ceserani *et al.*, 2009). The absent of salt make bread bland.

2.7.4 Shelf-life of Bread

The average shelf life of bread is 3-5 days but if the hygiene and sanitation of the bakery is poor the shelf life of bread especially some wheat bread can be shorter.

One of the main causes of bread spoilage is bread staling. This phenomenon has been studied for many years and the results indicate that the main reasons for bread staling are starch-gluten cross-linkages and water migration from bread crumb to its crust (Martin *et al*, 1991; Martin & Hosney, 1991; Hosney, 1994; Gray & Bemiller, 2003). To delay bread staling and increase bread shelf-life, different bread additives and technological methods have been applied (Rogers *et al*, 1988; Hosney, 1994). One of the possible methods is to use frozen storage. This method is an appropriate method for long-term storage of bread (e.g. 3-4 weeks). Freezing converts the water in the bread into a non active compound and this along with the low temperature retard microorganism

growth and prevent chemical and enzymatic deterioration of bread, (Barcenas & Rosell, 2006).

Another technique to increase the shelf-life of bread is part-baking. Part baked bread which is also called interrupted or part-baked bread has been introduced in which the bread is partially baked so that baking is just interrupted before formation of crust colour, i.e. before Millard and caramelization creations (Vulicevic *et al.*, 2004; Barcenas and Rosell, 2006). The part-baked bread is then packaged and can be kept at ambient temperature for several days or chilled and frozen for long storage before full-baking by consumers.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology used for the study. It covers the research design, population, sample size and sampling technique, instrumentation, validity and reliability, procedure for data collection, ethical considerations and data analysis.

3.2 Research Design

Babbie and Mouton (2004) describe research design as a plan or structure for an investigation or a list of specifications and procedures for conducting a research project. The researcher employed a descriptive cross-sectional survey design for this study. Descriptive research design is concerned with describing characteristics of a problem. According to Amedahe and Gyimah (2004), descriptive survey is a design which describes the present status of a phenomenon. This means that, it is concerned with the conditions or the relationships that exist such as determining the nature of prevailing conditions, practices and attitudes; opinions that are held; processes that are going on; or trends that are developed. Descriptive design helps portray an accurate profile of persons, events and situations. The purpose of employing the descriptive method was to describe the nature of a condition, as it takes place during the time of the study and to explore the cause or causes of a particular condition. The researcher adopted the descriptive design because it is one of the most convenient and reliable research designs for such a study. In the view of the researcher, the method (design) is indicative of prevailing conditions.

A cross-sectional design is the process of collecting data in a specific period (Creswell, 2003). Ghauri and Gronhaug (2005) define descriptive cross-sectional survey method as one which looks with intense accuracy at the phenomena of the moment and then describes precisely what the researcher sees. Descriptive research of cross-sectional survey type was used to enable the researcher provide assessment of the food hygiene and sanitation knowledge, practices and attitudes among the bread bakers/sellers.

3.3 Study Location

The Kassena Nankana Municipal was upgraded by LI 2106 from the Kassena Nankana District which was established in 1988 by LI 1855. It is one of the thirteen (13) districts/municipalities in the Upper East Region of the Republic of Ghana. The municipality has Navrongo as its political and administrative capital. The climatic conditions of the Kassena Nankana Municipality is characterized by the dry and wet seasons, which are influenced mainly by two (2) air masses the North-East Trade winds and the South-Westerly's (Tropical Maritime). The harmattan air mass (North-East Trade Winds) is usually dry and dusty as it originates from the Sahara Desert. During such periods, rainfall is virtually absent due to low relative humidity, which rarely exceeds 20 percent and low vapour pressure less than 10mb. Day temperatures are high recording 42° Celsius (especially between February and March) and night temperatures could be as low as 18° Celsius (Ghana Statistical Service, 2014).

Agriculture is the dominant economic activity in the municipality. The major crops grown are millet, sorghum, rice, groundnuts, leafy vegetables, cowpea, bambara

beans, okro, cotton, tomatoes and onions. Livestock reared in the Municipality include cattle, sheep, goat, pigs, guinea fowls, fowls and other domestic animals like donkey. Trading and commercial activities in the municipality revolves mainly around foodstuffs semi- processed food and crafts. These commodities are sold in the local markets and outside the municipality. Commodities traded in ranges from foodstuffs and livestock to manufactured goods (Ghana Statistical Service, 2014).

3.3 Population

According to Sugiyono (2011), a population is set or collection of all elements possessing one or more attributes of interest. Population refers to any collection of specified group of human beings or non-human entities (Koul, 2002). The population involved in this study consisted of bakers and bread sellers in the Kassena-Nankana Municipality in the Upper East Region of Ghana.

3.4 Sample Size, Sampling Techniques and Procedures

Sampling is an important aspect of data collection (Rao, 2008). It is that part of statistical practice concerned with the selection of an unbiased or random subset of individual observations within a population of individuals intended to yield some knowledge about the population of concern, especially for the purposes of making predictions based on statistical inference (Leedy & Ormrod, 2005). A sample is a small subset of a larger population whose selection is based on the knowledge of the elements of a population and the research purpose (Babbie, 2004). The simple random and convenience sampling techniques were used in selecting 20 bread bakers and 100 bread

sellers for this study. The sample size was selected based on the assumption that, it was large enough to yield accurate information for reliable conclusions.

A list of bread bakers and sellers were compiled and coded serially. The serial numbers were written on pieces of papers. These were placed in an empty box and picked at random. Twenty out of 48 pieces of papers were picked at random when selecting the bakers.

This process was repeated to select 100 out of 179 bread sellers. The random selection ensured that each baker and bread seller had an equal chance of being selected. “This is required for generalisation of the results to the target population” (Creswell, 2009). To ensure voluntary participation, any sampled respondent who declined to be studied was replaced by conveniently selecting a substitute bread baker or seller. The convenience sampling was used to ensure proximity and ease of access to respondents and information. In all, 120 study participants were enrolled in the study.

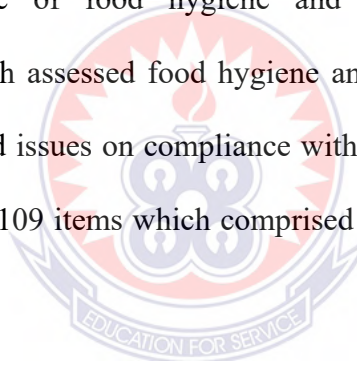
3.5 Instrumentation

Two techniques were used during data collection. These are administration of questionnaire and observation. Multiple instruments were used in data collection are: questionnaire, observation guide (checklist), photo and video camera in addition to documentary analysis. This was done to ensure triangulation of data as noted by Punch (2003) and cross-checking data from multiple sources to search for regularities in the research data (Berg, 2007).

3.5.1 Questionnaire

The questionnaire mainly contained close ended and a few open ended items. The close ended items mainly contained a Likert-scale type questions/statements which were built on a five-point scale rating: Very Great Extent (VGE) = 4; Great Extent (GE) =3; Some Extent (SE) =2; Very Little Extent (VLE) =1; Not at all (N) = 0. The questionnaire was designed for the respondents to reflect on the key themes raised in the research questions.

The questionnaire was designed into four main sections labelled as A,B, C, and D. Section 'A' has 8 items on the demographic data of the respondents. Section 'B' contains 14 items on knowledge of food hygiene and sanitation. Section 'C' has 77 statements/questions which assessed food hygiene and sanitation practices. Section 'D' which has 9 items covered issues on compliance with food safety laws and standards. In all, the questionnaire had 109 items which comprised 107 close ended and 2 open ended questions/statements.



3.5.2 Observation Schedule/Checklist

A semi-structured observation guide was designed to collect data. The observation involved interaction and physical examination or inspection of bread bakers and sellers as well as the work environment and facilities/equipment.

3.5.3 Documentary Analysis

Documents such as registration/operation and medical certificates among others were obtained from the bakers and bread sellers for observation, review and analysis.

This is indicative of Rose and Grosvenor (2001) suggestion that documents are credible, authentic and have meaning to the issues of interest.

3.6 Reliability and Validity of Instruments

Validity refers to the extent to which the research instrument serves the use for which it is intended (Seidu, 2006). The instruments were first scrutinized by the supervisor for the suitability of the items before pre-test. All the necessary corrections in the items were made and declared valid by the supervisor. This was done to establish content validity. Construct validity was also ensured by critically developing it within established theoretical framework.

Reliability of a study instrument is the consistency of the instrument in producing the same or similar results given the same condition on different occasions (Seidu, 2007). To ensure reliability of the research instruments, they were pre-tested on 5 bakers and bread sellers who were randomly selected among bakers/bread sellers who did not take part in the actual study in the municipality. In the following week, the test-retest technique was used to determine the reliability of the instrument. The same 10 people were asked to answer the same questions. The two results were subjected to Cronbach's Alpha reliability analysis using Statistical Package for Social Sciences (SPSS) version 21.0. A reliability coefficient (r) of 0.76 was obtained which indicated that the instrument was reliable for use in the actual study.

3.7 Procedure for Data Collection

The questionnaire was administered personally by the researcher. To obtain appropriate responses, the instructions and items were read and explained in Kassem dialect to respondents who cannot read and write. The respondents who are literates answered the questionnaire. This was done to ensure high coverage, response and return rates. The administration and collection of data lasted for five (5) weeks.

The observation/inspection of bread bakers/sellers, work environment and facilities/equipment as well as the certificates were done before, during and after administration of the questionnaire.

3.8 Ethical Considerations

A letter of introduction from the Head of Department of Basic Design and Technology at the University of Education, Kumasi was obtained to seek permission and consent from the respondents and association of bread bakers/sellers or food vendors if there is any in the municipality. This is to seek for consent, and to prevent any suspicion about the purpose of the research. The purpose of the study was explained to sampled respondents. Participation in the study was voluntary when necessary. The respondents were also assured of confidentiality and anonymity. The identity of the respondents was blinded. That is, identity of each respondent was numerically coded.

3.9 Data Analysis

In the questionnaire data analysis, responses made by the respondents to each set of items were sorted out. The quantitative data was analysed descriptively using frequency counts,

percentages. The data was coded, edited and entered into the Statistical Package for Social Sciences (SPSS version 21) for onward analysis. The SPSS data analysis commands and menus were employed to generate the frequency counts and percentages of responses according to each research question. The data is presented as frequency counts and average count. The average frequency counts were interpreted as below: 0.0 - 0.99 = very low level; 1.0 - 1.99 = low level; 2.0 - 2.99 = marginal/satisfactory or moderate level; 3.0 - 3.99 = high level; and 4.0 - 4.99 = very high level. The qualitative data was categorized into themes, and presented in narratives with direct quotations. The results of the data analysis were presented in tables, figures or charts and photographs.



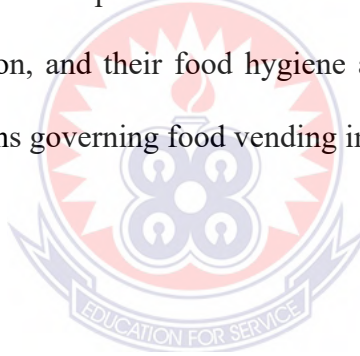
CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents results and discussion of findings. Section ‘A’ focuses on the bio data of the respondents. Section ‘B’ covers analysis of the responses on the knowledge of bakers and bread sellers on food hygiene and sanitation. Section ‘C’ discusses responses on food hygiene and sanitation practices; and section ‘D’ looks at the responses on compliance with regulations governing food vending in Ghana. The data were organized under themes in relation to the research questions.

The observation data also presented the knowledge of bakers and bread sellers on food hygiene and sanitation, and their food hygiene and sanitation practices as well as compliance with regulations governing food vending in Ghana.



4.2 Bio Data of Respondents

Table 4.1. Demographic Data of Bread Bakers and Bread Sellers in the Navrongo Community

Variable	Variable	Bakers (%)	Sellers (%)
Gender	Male	0.0	5.0
	Female	100	95.0
Age (yrs.)	Below 20	0.0	4.0
	20-29	10.0	17.0
	30-39	45.0	38.0
	40- 49	30.0	16.0
	50-59	15.0	13.0
	60 & above	0.0	0.0
Level of Education	Basic	45.0	53.0
	Secondary	20.0	9.0
	Tertiary	0.0	0.0
	None	35.0	38.0
No. of yrs in bread baking/ vending industry	Below 5	30.0	32.0
	5-10	45.0	40.0
	11-15	15.0	17.0
	16 yrs. & above	10.0	11.0
Description of the type of bread baking/vending business	Small-scale	55.0	57.0
	Medium-scale	35.0	34.0
	Large-scale	10.0	9.0
	Very large-scale	0.0	0.0
Frequency of medical examination per year	None	20.0	16.0
	Occasionally	40.0	45.0
	Quarterly	30.0	22.0
	Bi-annual	10.0	10.0
	Once a year	0.0	7.0
Whether respondent has history of health-related problems/sicknesses	Yes	50.0	37.0
	No	25.0	35.0
	I don't know	25.0	18.0
Type of health problem/sickness which respondent experienced in the last few months	Hepatitis B, C	5.0	3.0
	Tuberculosis (TB)	0.0	0.0
	Cholera/Diarrhoea	10.0	7.0
	Typhoid fever	10.0	10.0
	Skin rashes	30.0	30.0
	Other	45.0	50.0

Table 4.1 shows that, of the total sample of 120 respondents, only 4% were males and the 96% were female respondents. 100% of the bread bakers were female, 5% of bread sellers were males and 95 females. Thus, there were more females than males in the bread baking/selling business. From Table 4.1, (4%) of the bread sellers were below 20 years of age; 10% of the bakers and 17% of the bread sellers were within the age range of 20-29 years whereas, 45% of the bakers and 38% of the bread sellers were between 30 and 39 years of age. Also, 30% of bakers were between 40 and 49 years of age, while 16% bread sellers were within 40 to 49 years of age. Besides, 15% of bakers and 13% of bread sellers were between 50 and 59 years of age. From the survey, majority of the respondents are in their middle-age.

With respect to education, 45% of bakers and 53% of bread sellers had basic education; 20% of bakers and 9% of bread sellers had secondary education and 35% of bakers and 38% of bread sellers had no formal education – they were illiterates. None (0%) of the respondents had tertiary education. A significant number more than 50.0% of the respondents had low level of education. Knowledge is the ability to recall or recognize something such as a fact concept, principle or custom (Kalua, 2001). It is further stated that knowledge can be acquired through formal or informal settings either by the help of someone or alone. Knowledge is said to be a source of power necessary for everyone to make informed decisions about one's health and participate actively in promoting health of the community (Kalua, 2001). It is therefore necessary for bread bakers and sellers to acquire some form of education either formal or informal way to enable them handle food in a better way.

On the experience of the respondents in bread baking/vending business, 30% of bakers and 32% of bread sellers had less than 5 years of experience in the industry; 45% of bakers and 40% of bread sellers had 5 to 10 years of experience; 15% of bakers and 17% of bread sellers had 11 to 15 years while, 10% of bakers and 11% of bread sellers had 16 years of experience or more in the industry. It could be concluded that only few (25% to 28%) of the respondents were relatively experienced in bread baking, and bread selling because of long years in the industry. Rennie (1994) suggested that training programs that are more closely associated with the work site with practical reinforcement of hygiene messages are more effective than traditional methods of training. Practical in house, hands-on training tends to be the most favorable approach in relaying food safety messages (Hendry *et al.*, 1992). This means that, both bread sellers and bakers need to get some form of training to make them more skillful and experience to handle issues relating to hygiene, sanitation and food contamination better in the baking industry.

On the description of the type of bread baking/vending business which is operated by the respondents, the majority 55% of bakers and 57% of bread sellers operated small-scale ventures. This was followed by medium-scale bread baking/vending business bakers = 35%; bread sellers = 34%. Only 10% of bakers and 9% of bread sellers operated large-scale type of venture.

Table 4.1 further revealed that 20% of bakers and 16% of bread sellers never had medical examination as a requirement for their work. However, 40% of bakers and 45% of bread sellers occasionally had medical examination per year; 30% of bakers and 22% of bread sellers had quarterly medical examination or screening. Also, 10% of bakers and 10% of bread sellers had medical examination bi-annually while, 7% of bread sellers

went for medical examination once in a year. It could be concluded that, majority ($\geq 60\%$) of the respondents rarely go for medical examination. McSwane, Rue & Linton (2000) indicated that, even if a food handler does not feel sick, he or she can still be carrying microorganisms on their body or clothes that can cause illness if they get into food. Hence, illness such as the common cold, sore throat, Pneumonia, scarlet fever, tuberculosis and trench mouth could be transferred into food even if the handler feels normal. The food handler can often be a major source of contamination. Therefore, the practicing of good personal hygiene is essential for those who handle foods. Based on this, it is also imperative for food handlers to go for medical check up to ensure that they are free from any form of ailment which can cause contamination of food and lead to food borne illness in the final consumer. This also supported by Jarvis, (2004) that, the source of infecting organisms on food may be endogenous or exogenous which means that it come from internal (from the baker or the seller) or external source (the consumer or the environment).

On whether respondents had history of any health-related problem or sickness for the past few months, 50% of bakers and 37% of bread sellers answered in the affirmative; 25% of bakers and 35% of bread sellers indicated 'no' while, 25% of bakers and 18% of bread sellers did not know at all. On the type of health problem or sickness which respondents experienced in the last few months, (bakers = 5%; bread sellers = 3%) mentioned hepatitis B, C. This was followed by cholera/diarrhoea (bakers = 10%; bread sellers = 7%), typhoid fever (bakers = 10%; bread sellers = 10%); skin rashes (bakers = 30%; bread sellers = 30%); and other illnesses (bakers = 45%; bread sellers = 50%). None (0%) of the respondents was affected by TB in the past few months.

The above findings indicate that some of the bread bakers and sellers were not medically fit to handle food meant for public consumption. This agrees with (WHO, 2001) that, a food handler implicated to be a carrier of a disease or illness should neither be allowed to go into food handling areas or handle food. Medical examination is necessary for bread bakers and sellers to be checking themselves to enable them to be fit and safe in selling food to the public. Although, the World Health Organization' Ten Rules does however not recommend routine medical and microbiological examination of food handlers, but rather that food handlers suffering from an illness that includes symptoms such as jaundice, diarrhoea, vomiting, fever, sore throat, skin rash or skin lesions such as boils or cuts, report this to their supervisor before starting work (www.med.osaka-u.ac.jp/doc/0157/whorules.html, 15 August 2014) as to determine their suitability to work or be given off duty, hence prevent possible contamination of food. Food handlers should only be subjected to the same health standards used in screening prospective employees.

Table 4.2 Businesses Registered with Valid Certificates

Responses	Bakers %	Bread Sellers %
Yes	35.0	9.0
No	65.0	91.0
Total	100	100

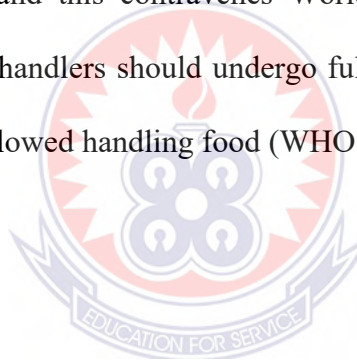
As observed in Table 4.2, the data revealed that 35% of bakers and 9% of bread sellers answered in the affirmative that they had registered their businesses, and they had valid certificates. However, 65% of bakers and 91% of bread sellers indicated no. This shows that majority of the bread bakers and sellers do not register their business whilst operating

and hence food and drugs board will find it difficult to trace them to check their operations to conform to their standard of operating a business in the country.

Table 4.3 Possession of Valid and Certified Medical Certificates

Responses	Bakers %	Bread Sellers %
Yes	55.0	37.0
No	45.0	63.0
Total	100	100

Table 4.3 shows that 55% of bakers and 37% of bread sellers had valid and certified medical certificates. Nevertheless, 45% of bakers and 63% of bread sellers did not. This means that majority of the bread sellers do not have medical certificates whilst selling bread to the consumers and this contravenes World Health Organization indications which suggest that, Food handlers should undergo full medical examinations and issued with a certificate before allowed handling food (WHO 2001).



4.3. Respondents' Knowledge on Food Hygiene and Sanitation

Table 4.4: Knowledge of Bread Bakers/Sellers on Food Hygiene and Sanitation

(nB = 20; nBS = 100)

Statement		Responses (%)				
		VGE	GE	SE	VLE	N
I have professional training, knowledge & awareness of						
Purchasing quality & proper quantity of ingredients for bread making	B	50.0	30.0	5.0	15.0	0.0
	BS	33.0	47.0	2.0	18.0	0.0
Hazard Analysis & Critical Control Points (HACCP)	B	0.0	5.0	15.0	35.0	45.0
	BS	3.0	4.0	10.0	39.0	44.0
Shelf life & proper storage of bread & ingredients for bread making	B	10.0	20.0	65.0	5.0	0.0
	BS	12.0	29.0	48.0	8.0	3.0
Regulations governing food vending in Ghana	B	0.0	5.0	10.0	25.0	60.0
	BS	1.0	4.0	7.0	36.0	52.0
Food safety standards in Ghana	B	0.0	5.0	15.0	25.0	55.0
	BS	2.0	9.0	12.0	29.0	48.0
Food & Drugs Act 1992 (PNDCL) 305B	B	0.0	0.0	5.0	35.0	60.0
	BS	0.0	8.0	12.0	32.0	48.0
Personal cleanliness & hygiene Practices	B	40.0	50.0	10.0	0.0	0.0
	BS	45.0	39.0	16.0	0.0	0.0
Food waste/waste management (storage & disposal)	B	30.0	50.0	20.0	0.0	0.0
	BS	38.0	36.0	24.0	2.0	0.0
Food pest/pest & insect management and control	B	45.0	30.0	25.0	0.0	0.0
	BS	36.0	43.0	16.0	5.0	0.0
General food handling (processing, packaging & distribution)	B	40.0	25.0	35.0	0.0	0.0
	BS	44.0	28.0	16.0	12.0	0.0

Table 4.4 gives information on the knowledge of bread bakers/sellers Kassena-Nankana East Municipality on food hygiene and sanitation. The majority of the respondents (bakers =80%; bread sellers = 80%) had professional training, knowledge and awareness of purchasing quality and proper quantity of ingredients for bread making to a great extent. Also, 20% of bakers and 20% of bread sellers had knowledge of food

hygiene and sanitation to a slight extent. This agrees with Bekker (2003) and McSwane, Rue and Linton (2000) that, for sanitation program to be effective, it should start with a sound food supply. The person entrusted with purchasing, should therefore buy the product that is best suited for the job, buy the proper quantity of the item, pay the right price for the item, buy from only reputable and dependable suppliers and should have knowledge of products and market conditions.

Also, knowledge on HACCP indicated only few of the respondents (bakers = 5%; bread sellers = 7%) had training, knowledge and awareness of Hazard Analysis and Critical Control Points (HACCP). Also, 50% of bakers and 10% of bread sellers had knowledge of HACCP to a little extent while, 45% of bakers and 83% of bread sellers never had knowledge of HACCP. Moreover, 30% of bakers and 41% of bread sellers had knowledge of shelf life, proper storage of bread and ingredients for bread making. A significant number of the respondents (bakers = 65%; bread sellers = 56%) held same views a little extent. Only 5% of baker and 3% of bread sellers had no knowledge of the shelf life. Increased handling of food is responsible for a more complicated and critical challenge of protecting food from contamination (Marriott, 1999). Good hygiene practice in food preparation and service plays an important role in ensuring food safety. This is achieved by following general rules of good food hygiene and other approaches like HACCP (www.med.osaka-u.ac.jp/doc/0157/who_rules.htm: 15 August 2003).

A few respondents (bakers = 5%; bread sellers = 5%) were aware of the regulations governing food vending in Ghana to a great extent. In addition, 35% of bakers and 43% of bread sellers held congruent views to a slight extent. The majority of the

respondents (bakers = 60%; bread sellers = 52%) had no knowledge of the regulations governing food vending in Ghana. Only 5% of baker and 11% of bread sellers had knowledge of the food safety standards in Ghana to a high extent; 40.0% of bakers and 41% of bread sellers held same opinion to a slight extent while, the majority (bakers = 80%; bread sellers = 48%) never had knowledge of the food safety standards in Ghana. A few 8% of the bakers had knowledge of the Food and Drugs Act 1992 (PNDCL) 305B to a large extent. A considerable number of them (bakers = 60%; bread sellers = 44%) held same views to a little extent while, 40% of bakers and 48% of bread sellers had no knowledge. This means that majority of both bread bakers and sellers have no knowledge on regulations governing food vending and food safety standard issues in Ghana and hence operates under their own rules which may go contrary to the rules and safety measures of the Food and Drugs Act 1992 (PNDCL) 305B of the country Ghana.

A substantial number of the respondents (bakers = 90%; bread sellers = 84%) had knowledge of personal cleanliness and hygiene practices to a great extent. A lesser number of them (bakers = 10%; bread sellers = 16%) held same views to a little extent. This is a positive indication because consumers are most likely to be free from products which may be contaminated as a result of poor hygienic practices and poor personal cleanliness. This is supported by Oliveira *et al.*, (2003), they indicated that food elaborated with satisfactory hygienic standards is one of the essential conditions for promoting and preserving health, and inadequate control is one of the factors responsible for the occurrence of food-borne disease outbreaks.

Also, the majority of the respondents (bakers =80%; bread sellers =74%) had knowledge of food waste/waste management, storage and disposal to a high extent. A

few of them (bakers =20%; bread sellers =26%) held same views to a slight extent. A considerable number of the respondents (bakers =75%; bread sellers =79%) had knowledge of food pest/pest and insect management and control. A lesser number of them (bakers =25%; bread sellers =21%) held congruent views to a slight extent. The majority of the respondents (bakers =65%; bread sellers =72%) had knowledge of general food handling (processing, packaging and distribution to a large extent. Moreover, 35% of bakers and 28% of bread sellers held same views to some extent.

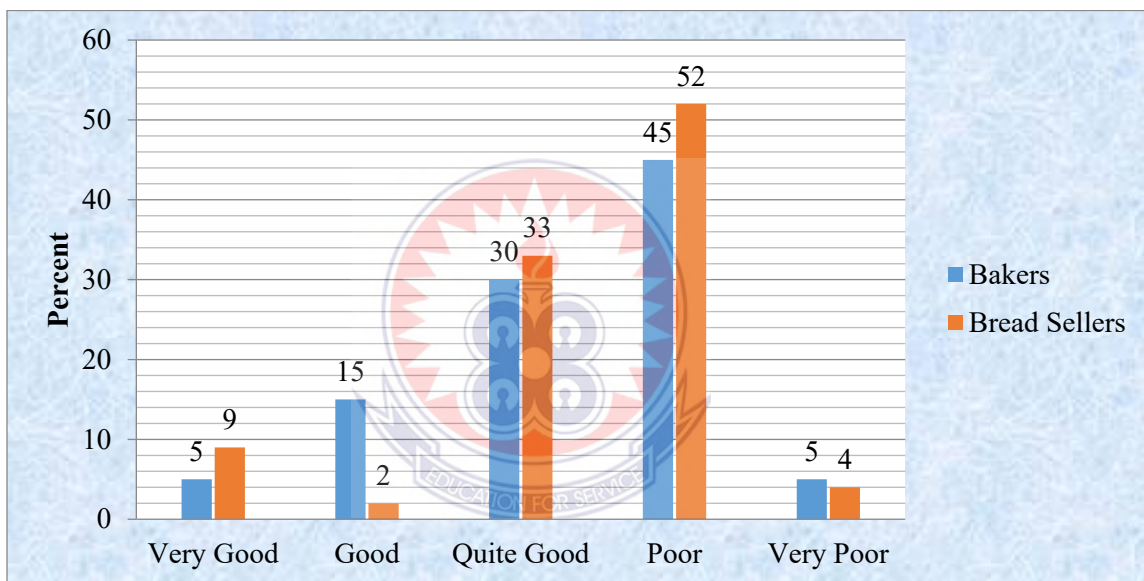


Figure 4.1: Knowledge of Bread Bakers/Sellers on Food Hygiene and Sanitation

Figure 4.1 above gives information on the knowledge of bread bakers and sellers on food hygiene and sanitation. This was revealed during face-to-face interaction and observation of the respondents. It was found that the majority of the respondents (bakers = 45%; bread sellers = 52%) had poor knowledge of food hygiene and sanitation. This means that they either had no or inadequate/low level of knowledge of food hygiene and sanitation.

The findings indicate that between 50% and 56% of the bakers and bread sellers respectively had no knowledge of HACCP; the regulations governing food vending in Ghana; food safety standards in Ghana; and Food and Drugs Act 1992 (PNDCL) 305B. Over all, bread sellers had poor and/or inadequate knowledge of food hygiene and sanitation than bakers. This finding validates Ababio, Adi and Commey's (2012) observation that the level of education of food vendors in Ghana is generally low. Hence, Bas, Ersun and Divan (2006) advocated for an immediate need for education and increasing awareness among food handlers on food safety practices.

Nevertheless, Egwuogu (2004) cautions that the provision of knowledge to change food safety attitudes and behaviors has not been adequately proven in the literature (Seaman & Eves, 2006). Other studies by Ehiri, Morris and Mcewen (1997) found no significant improvements after training on a number of critical concepts in food safety such as, food storage, cross-contamination, temperature control, and high risk foods. Mathias, Sizto, Hazlewood and Cocksedge (1997), and Cates, Kosa, Karns, Godwin, Speller-Henderson, Harrison and Draughon(2009) found no relationship between the level of knowledge of staff and hygiene standards in restaurants. Similarly, Egan, et al. (2007), Bas et al. (2006), Roberts et al. (2008) and Clayton et al. (2002) agreed that behavioral changes in food safety will not occur as a result of training alone. Many researchers (Clayton & Griffith, 2004; Clayton *et al.*, 2003; Green & Selman, 2005) also found that food safety education was not enough to encourage employees to perform proper food safety and sanitation procedures.

4.4 Food Hygiene and Sanitation Practices of Respondents

Table 4.5 Food Hygiene and Sanitation of Bread Bakers and Sellers
(nB = 20; nBS = 100)

Statement As a food handler (baker/bread seller), I.....		Responses (%)				
		VGE	GE	SE	VLE	N
Control food contamination by flies, rodents & pests	B	25.0	30.0	45.0	0.0	0.0
	BS	9.0	47.0	36.0	8.0	0.0
Ensure adequate natural or mechanical ventilation	B	30.0	55.0	15.0	0.0	0.0
	BS	22.0	51.0	18.0	9.0	0.0
Refrain from smoking drinking alcoholic beverages, and chewing gum	B	70.0	25.0	5.0	0.0	0.0
	BS	25.0	70.0	5.0	0.0	0.0
Properly remove, store & dispose waste	B	10.0	65.0	25.0	0.0	0.0
	BS	39.0	44.0	17.0	0.0	0.0
Use designated containers/dustbins with lids for waste collection & Disposal	B	20.0	45.0	30.0	5.0	0.0
	BS	15.0	48.0	36.0	1.0	0.0
Regularly empty & clean the Dustbin	B	55.0	20.0	25.0	0.0	0.0
	BS	25.0	41.0	34.0	0.0	0.0
Ensure that all parts of the premises are appropriately cleaned	B	60.0	30.0	10.0	0.0	0.0
	BS	33.0	42.0	25.0	0.0	0.0
Have change room, toilet & ablution Facilities	B	15.0	10.0	10.0	20.0	45.0
	BS	12.0	8.0	24.0	20.0	36.0
Completely cover hair during food Handling	B	35.0	20.0	30.0	15.0	0.0
	BS	28.0	36.0	24.0	12.0	0.0
Wear appropriate clean clothing with apron which is changed every day or as often as necessary	B	15.0	45.0	30.0	10.0	0.0
	BS	14.0	46.0	32.0	8.0	0.0

Table 4.5 presents data on food hygiene and sanitation practices of bakers and bread sellers in the Kasena-Nankana East Municipality. Of the to sample, 55% of bakers and 56% of bread sellers indicated that they controlled food contamination by flies,

rodents and pests to a large extent while, 45% of bakers and 44% of bread sellers held same views to a little extent. The availability of food and water encourages pest harborage and infestation (Alli, 2004; World Health Organisation, 1997). It is further stated that good hygiene practices should be employed to avoid creating an environment conducive to pests. Good sanitation, inspection of incoming materials and good monitoring can minimize the likelihood of infestation and thereby limit the need for pesticides (Alli, 2004; World Health Organisation, 1997).

A sizeable number of the respondents (bakers = 85%; bread sellers = 73%) ensured adequate natural or mechanical ventilation at their bakery and sales points to a high extent. Also, 15% of bakers and 27% of bread sellers did same to a slight extent. The majority practice is consistent with (Bekker, 2003; McSwane, Rue & Linton, 2000) that “All food should be stored in an orderly fashion so as to facilitate ventilation and assessment of food to detect deterioration”. On the aspect of smoking, drinking alcoholic beverages and chewing gum during bread-making and selling periods majority 95% of the bakers and bread sellers (95%) refrained from smoking, drinking alcoholic beverages and chewing gum during bread making and selling periods. Only 5% of baker and 5% of bread sellers consented to this claim to some extent. Activities that encourage hand/mouth contact such as smoking or the chewing of gum, tobacco, betel nut or finger nails can also therefore lead to food contamination and must be avoided. The same also applies to the tasting of food during preparation. Similarly food handlers should not spit, sneezes or cough over food, or pick their nose, ears or any other parts of the body (www.med.osaka-u.ac.jp/doc/0157/whorules.html, 15 August 2004;

McSwane, Rue & Linton, 2000; Kenya Food Drugs and Chemical Substances Act, Cap 254 of 1992; South African Health Act 63 of 1977, Regulation 918).

A large number of the respondents (bakers = 75%; bread sellers = 83%) often removed, store and disposed waste properly to a great extent. A few, 26.7% of the bakers and bread sellers (17%) held similar views to a slight extent. A sizeable number of the respondents (bakers = 65%; bread sellers = 63%) used designated containers/dustbins with lids for waste collection and disposal to a large extent. A lesser number of the bakers (35%) and bread sellers did same to a little extent. Besides 75% of bakers and 66% of bread sellers regularly emptied and cleaned the dustbin to a high extent. 25% of bakers and 34% of bread sellers held same views to some extent. A significant number of the respondents (bakers = 90%; bread sellers = 75%) ensured that all parts of the premises (bakery and sales points) were appropriately cleaned to a great extent. A few of the bakers (10%) and bread sellers (25%) confirmed this practice to a little extent. Food hygiene is therefore concerned with the provision of food for human consumption with a minimal risk of contracting food poisoning, by exercising good production, preparation, storage and serving of food by following good procedures. Such procedures refer to proper washing of dishes, work surfaces, waste disposal, insect, rodent and bird infestation control, cleanliness of the entire premises and transport vehicles, maintaining safe product temperature, proper separation of food and non-food items (McSwane, Rue & Linton, 2000). Practicing food hygiene ensures that the food which we eat is clean, wholesome, nutritious and free harmful additives and dangerous organisms and involves everyone, particularly those who process or serve food (Bekker, 2003b).

A lesser number of the respondents (bakers = 25%; bread sellers = 20%) have provided change room, toilet and ablution facilities at their work premises to a great extent. Also, 30% of bakers and 44% of bread sellers admitted this practice to a little extent. A substantial number of the respondents (bakers = 45%; bread sellers = 36%) did not have change room, toilet and ablution facilities at their premises (bakery). The majority of the respondents (bakers = 55%; bread sellers = 64%) completely covered their hair during food handling to a great extent. Besides, 45% of bakers and 36% of bread sellers affirmed this practice to a slight extent. A large percentage 60% of the bakers and bread sellers 60% admitted to a great extent that they wore appropriate clean clothing with aprons which were changed every day or as often as necessary. However, 40% of bakers and 40% of bread sellers did same a little extent. This means that a lot of the bread bakers and sellers cannot supervise adequately the hygienic practices of their employees since they go elsewhere to use toilets, ablution containers and change rooms. To buttress this, Alli (2004) indicated that toilet facilities near work areas provide good personal hygiene, reduce lost productivity and permit closer supervision of employees (McSwane, Rue & Linton, 2000). Adequate, suitable and conveniently located change rooms, toilets and ablution facilities shall be provided at all food establishments.

Table 4.6: Food Hygiene and Sanitation Practices of Bread Bakers/Sellers

(nB = 20; nBS = 100)

Statement As a food handler (baker/bread seller), I.....		Responses				
		VGE	GE	SE	VLE	N
Clean baking dishes/pans & equip- Meant	B	40.0	50.0	10.0	0.0	0.0
	BS	24.0	48.0	28.0	0.0	0.0
Regularly wash kitchen napkins	B	45.0	30.0	25.0	0.0	0.0
	BS	27.0	43.0	30.0	0.0	0.0
Always wear clean clothes that have Sleeves	B	15.0	55.0	15.0	10.0	5.0
	BS	15.0	40.0	19.0	16.0	10.0
Always have clean nails, but not Coated	B	25.0	30.0	40.0	5.0	0.0
	BS	20.0	34.0	42.0	4.0	0.0
Always use gloves/forceps or ladles to pick up bread	B	15.0	40.0	15.0	20.0	10.0
	BS	15.0	31.0	18.0	22.0	14.0
Often dry hands with kitchen rag/napkin after hand washing	B	45.0	50.0	5.0	0.0	0.0
	BS	23.0	39.0	34.0	4.0	0.0
Always sterilize utensils and equipment properly before & after baking/selling of bread	B	35.0	60.0	5.0	0.0	0.0
	BS	24.0	30.0	39.0	7.0	0.0
Always clean & sanitize knives, cutting boards, wiping cloths properly before and after baking/selling of bread	B	20.0	45.0	35.0	0.0	0.0
	BS	28.0	41.0	31.0	0.0	0.0
Wash hands with clean water & soap after using the washroom/toilet	B	70.0	15.0	10.0	5.0	0.0
	BS	39.0	35.0	26.0	0.0	0.0
Clean food contact surfaces before & after baking/selling of bread	B	40.0	45.0	15.0	0.0	0.0
	BS	45.0	36.0	19.0	0.0	0.0

A total of 90% of bakers and 72% of bread sellers affirmed to a great extent that they cleaned baking dishes/pans and equipment and (10% of bakers and 28% of bread sellers) held same views to a slight extent. 75% of bakers and 70% of sellers indicated to a high extent that they regularly washed kitchen napkins. 25% of bakers and 30% of

bread sellers did same to a little extent. The majority of the respondents (bakers = 70%; bread sellers = 55%) confirmed to a high extent that they always wore clean clothes that have sleeves. A few of the respondents (bakers =25%; bread sellers = 35%) admitted the practice to a slight extent while, 5% of baker and 10% of bread sellers never did it. The establishments and equipment shall be kept in an appropriate state of repair and Condition (National Board of Expert s-HACCP, the Netherlands, 2002; South African Bureau of Standards, 2001). Accordingly, food handlers should prevent contamination of food, for example, from metal sharps, flaking plaster, debris and chemicals It must however be done in such a way that it will avoid contamination of ingredients, products or packaging material, minimizing the risk of pest infestation and also permit effective cleaning before continuing with processing.

A substantial number of the respondents (bakers =55%; bread sellers = 54%) acknowledged to a great extent that they always had clean nails, which are not coated. Also, 45% of bakers and 46% of bread sellers held same views to a little extent. Similarly, 55% of bakers and 46% of bread sellers admitted to a large extent that they always used gloves/forceps or ladles to pick up bread. Moreover, 35% of bakers and 40% of bread sellers did it to some extent. However, 10% of bakers and 14% of bread sellers never did it. A significant number of the respondents (bakers = 95%; bread sellers = 62%) affirmed to a great extent that they often dried their hands with kitchen rag/napkin after hand washing. Only 5% bakers and 38% of sellers practiced it to a slight extent. In addition, 95% of bakers and 54% of bread sellers always sterilized utensils and equipment properly before and after baking/selling of bread to a large extent. 5% of baker and 46% of bread sellers did it to a little extent. Majority of the bakers and bread sellers

practice personal hygiene, maintain tools and equipment used in the preparation and selling of bread because response indicated that, they have uncoated nails, used gloves/forceps or ladles to pick up bread, used kitchen rag/napkin after hand washing and sterilized utensils and equipment properly before and after baking/selling of bread. The practices of bread dealers safeguard the public from the warning of Seaman and Eves, (2006). They warned that food poisoning and other food borne diseases could occur where food and drinks are served or sold by food vendors or other food handlers by several factors which include poor personal and environmental hygiene, poor storage of food and drinks, improper preparation and cooking, and carrier state with unclean hand.

A total of 65% of bakers and 69% of sellers always cleaned and sanitized knives, cutting boards, and wiping cloths properly before and after baking/selling of bread. 35% of bakers and 31% bread sellers practiced it to a slight extent. The majority of the respondents (bakers = 85%; bread sellers = 74%) often washed hands with clean water and soap after using the washroom/toilet. Also, 15% of bakers and 26% of bread sellers did it to a slight extent. More so, a significant proportion (85%) of the bakers and bread sellers (81%) often cleaned food contact surfaces before and after baking/selling of bread. Only 15% bakers and bread sellers 19% practiced it to a little extent.

Food hygiene and sanitation practices of bread bakers and sellers indicated majority involving in good practice and hence this will avert contamination of food which can lead to consumers suffering from ailment from food related diseases. In line with the study, Jarvis (2004) points out that, the source of an infecting organisms on food may be endogenous (that is, the source is the patient's own flora) or exogenous (hospital staff or the inanimate environment within the hospital). Food may be contaminated by

polluted water, insects e.g. flies, rodents and pets, unclean utensils, dust and dirt (Gudeta 2007). Equipment and containers that come into contact with food should be designed to enable easy cleaning and disinfection. The materials used for making the equipment should not have a toxic effect on food.



Table 4.7 Food Hygiene and Sanitation Practices of Bread Bakers/Sellers**(nB = 20; nBS = 100)**

Statement		Responses (%)				
		VGE	GE	SE	VLE	N
As a food handler (baker/bread seller), I.....						
Check or inspect flour, bread & other food deliveries for damages, spoilage/contamination	B	25.0	45.0	20.0	10.0	0.0
	BS	16.0	51.0	29.0	4.0	0.0
Check or inspect date codes/manufacture & expiry dates on receipt of flour, bread delivery & other ingredients	B	20.0	40.0	35.0	5.0	0.0
	BS	30.0	21.0	36.0	13.0	0.0
Clean the surroundings before, during & after baking/vending processes	B	60.0	30.0	10.0	0.0	0.0
	BS	36.0	41.0	23.0	0.0	0.0
Make sure bread is kept/stored at adequate temperature	B	45.0	45.0	10.0	0.0	0.0
	BS	45.0	36.0	17.0	2.0	0.0
Ensure that ingredients for bread are purchased in quantities that correspond to storage space	B	20.0	30.0	25.0	15.0	10.0
	BS	29.0	21.0	24.0	16.0	10.0
Ensure that quantity of bread produced is just enough to be sold in a day	B	10.0	15.0	20.0	40.0	15.0
	BS	9.0	14.0	19.0	42.0	16.0
Make sure that sales area is free from personal belongings such as clothes & footwear	B	15.0	20.0	25.0	30.0	10.0
	BS	16.0	22.0	24.0	29.0	11.0
Ensure that serving dishes/baking dishes are washed clean & disinfect-ted after use	B	25.0	30.0	40.0	5.0	0.0
	BS	20.0	31.0	43.0	6.0	0.0

A significant proportion of the bakers 70% and 67% of bread sellers checked or inspected flour, bread and other food deliveries for damages, spoilage/contamination to a great extent. Similarly, 30% of bakers and 33% of bread sellers held same views to a little extent. A substantial portion 60% of the bakers and 51% of bread sellers checked or inspected date codes (manufacture and expiry dates) on receipt of flour, bread delivery and other ingredients to a high extent. A few of the bakers (40%) and bread sellers (49%) practiced it to a slight extent. According to Cates *et al.* (2009), that the presence of a

certified kitchen manager is protective for the majority of critical food violations, and therefore employing and properly training such a manager is essential to ensuring a safe food product. This means that training of managers will further equip them on how to avert or eliminate critical food violations in the industry. Kneller and Bierma (1990); Mathias *et al.*, (1995) in their study observed that health inspection scores increased after food safety training, thereby implying the knowledge imparted from food safety training is sufficient in achieving higher inspection scores. Although majority of the bakers and bread sellers have good practice in checking or inspecting on some of the factors that can lead to food borne illness on their product, training or educating of the producers or handlers will increase the practice and hence import to train them.

Majority (90%) of the bakers and bread sellers (77%) cleaned their surroundings before, during and after baking/vending processes. 10% of bakers and 23% of bread sellers practiced it to some extent. As the adage goes, cleanliness is next to Godliness. One needs to keep his or her surroundings clean to prevent the growth of microorganisms which can cause disease to any food substance available for use or consumption. Majority of them cleaned their surroundings before, during and after baking/vending which means that they are likely to make their surroundings unfavorable for harborage and growth of micro-organisms which can lead to contamination of food.

The majority 90% of the bakers and bread sellers (81%) ensured to a great extent that bread was maintained at adequate temperature. 10% of bakers and 19% of bread sellers did it to a little extent. This positively deviates from Green *et al* (2005) that, half of their respondents did not use a thermometer to properly ensure safe internal food temperatures and therefore imposes a critical concern regarding food safety.

Again, 50% of the bakers and 50% bread sellers ensured to a large extent that ingredients for bread were purchased in quantities that correspond to storage space. 40% of bakers and 40% of bread sellers practiced it to a little extent. However, 10% of bakers and 10% of bread sellers never practiced it. A few of the bakers (25%) and bread sellers (23%) ensured to a great extent that the quantity of bread produced is just enough to be sold in a day. Also, 60% of bakers and 61% of bakers did it to a slight extent. However, 15% of bakers and 16% of bread sellers never practiced it. 35% of bakers and 38% of bread sellers ensured to a great extent that their sales areas were free from personal belonging such as clothes and footwear. An average margin of 55% of the bakers and bread sellers (53%) practiced it to some extent. Regrettably, 10% of bakers and 11% of bread sellers never practiced it. Similarly, 55% of bakers and 51% of bread sellers ensured to a greater extent that serving dishes/baking dishes were washed clean and disinfected after use. Also, 45% of bakers and 49% of bread sellers practiced it to a slight extent.

The results of this study (refer to Tables 4.5, 4.6, 4.7) that more than 90% of the bakers and bread sellers were quite clean with regard to food hygiene and sanitation practices. The evidence is that they had a quite clean personal appearance. More so, the appearance of their work materials, ingredients, tools, facilities and general work surroundings or environment was quite clean. Most of them covered their hair during food handling; and wore appropriate clean clothing with apron. The majority of them also refrained from, smoking, drinking alcoholic beverages, and chewing gum during bread making and selling periods. Also, they controlled food contamination by flies, rodents and pests. A significant number of them removed, store and disposed waste properly by using containers/dustbins with lids. Similarly, they ensured appropriate cleaning of work

premises, and ensured adequate ventilation. This is to ensure that food do not become contaminated with bacteria as supported by Jevs'niket *al.*, (2006a). According to Jevs'niket *al.*, basic kitchen sanitation guidelines are an important component of any food safety strategy. Käfersteinet *al.*, (2000), also indicated that biological contaminants, i.e. bacteria, viruses and parasites constitute the major cause of food borne diseases and food spoilage which can easily be produced by unclean surroundings, improper waste management and disposal, unclean tools and equipment in the kitchen, expired products purchased and used for production of goods.

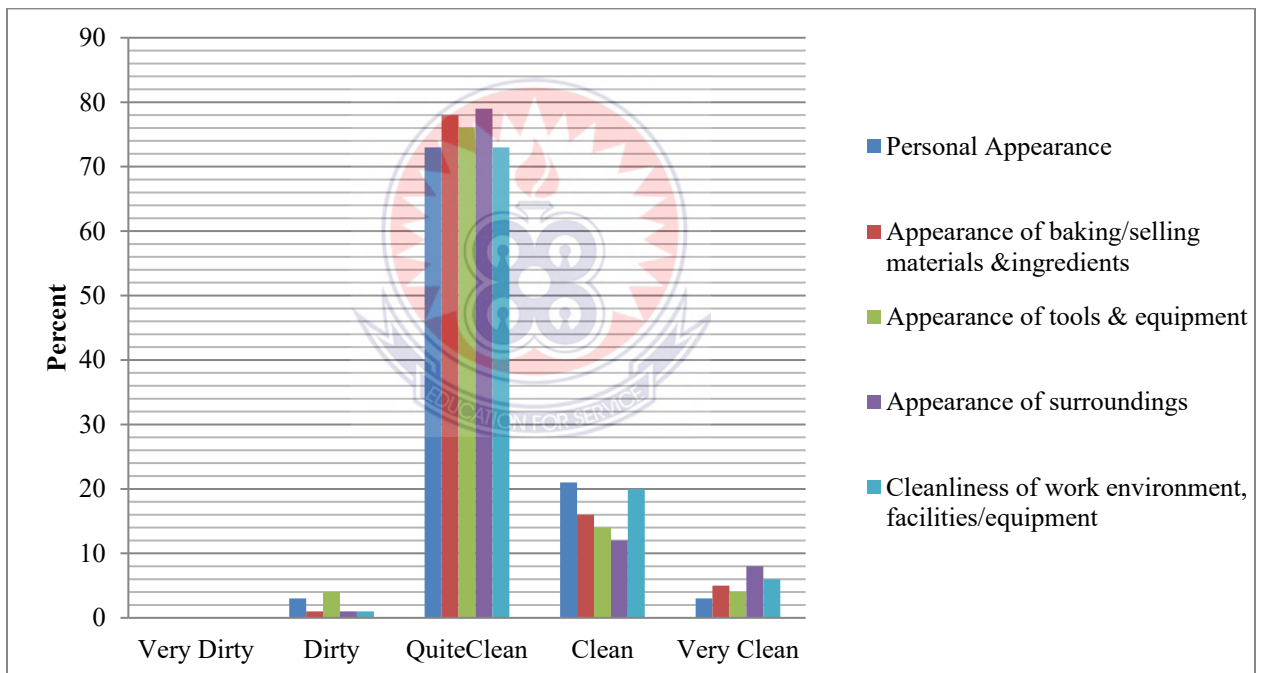


Figure 4.2: Food Hygiene and Sanitation Practices of Bakers

As observed in Figures 2, 72% to 78% of the bakers were quite clean as regards food hygiene and sanitation practices. Similarly, between 12% and 20% of them were clean in appearance; cleanliness of work environment, facilities and equipment. This was followed by very clean personal appearance, work environment, facilities and equipment

(3% to 8%). The least was dirty personal appearance, work environment, facilities and equipment (1% to 4%).

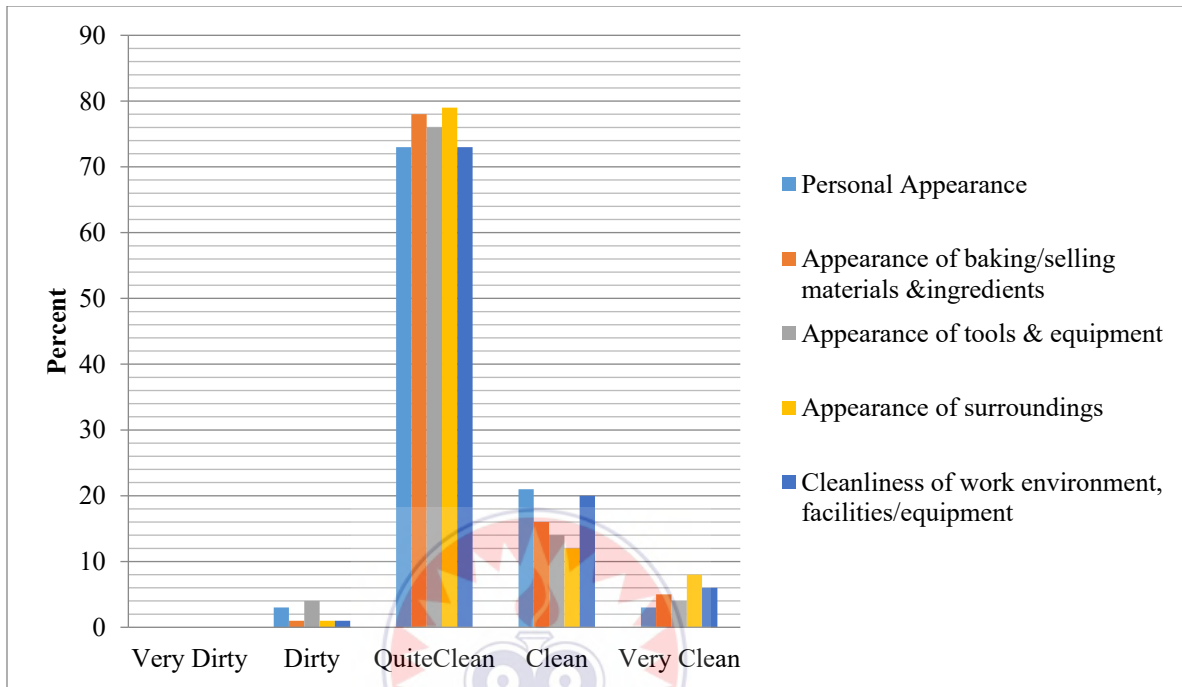


Figure 4.3: Food Hygiene and Sanitation Practices of Bread Sellers

The observation data (refer to Figures 4.2 and 4.3) also shows that over 70% of the bread sellers were quite clean as regards food hygiene and sanitation practices. This was followed by cleanliness in personal appearance; work environment, facilities and equipment (between 12% and 21% bread sellers); very cleans in personal appearance; work environment, facilities and equipment (3% to 8%). The least was dirty personal appearance, work environment, facilities and equipment (1% to 4%).

The result in Figures 4.2 and 4.3 established that a significant number (over 70%) of the respondents were quite clean in personal appearance; work environment, facilities

and equipment. This finding suggests that food handlers in the Kasena-Nankana Municipality do not maintain a high degree of personal cleanliness and hygiene as well as food hygiene. It was also observed that the bread sellers were relatively clean in personal appearance as well as cleanliness of tools, equipment, facilities and general work environment than the bakers. This finding corroborates Clayton and Griffith (2004) who also found in observational studies that food handlers frequently engage in unsafe food preparation practices.

Other studies by WHO-AFRO (2006), Rheinländer, Olsen, Bakang, Takyi, Konradsen Sam and Uelsen (2008) indicated that food safety is a major concern with street foods as these foods are generally prepared and sold under unhygienic conditions, with limited access to safe water, sanitary services, or garbage disposal facilities. Kaferstein (2003) noted that food handlers are the source of contamination and eventual health consequences. Thus, Sabarwala (1999) cautioned that food handlers should maintain a high degree of personal cleanliness and hygiene.

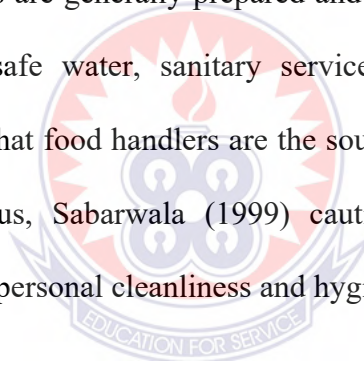


Table 4.8: Bread Bakers/Sellers Comply with Regulations Governing Food Vending in Ghana (nB = 20; nBS = 100)

Statement		Responses (%)				
		VGE	GE	SE	VLE	N
As a food handler (baker/bread seller), I comply with.....						
Prohibition against sale of poor quality food	B	15.0	20.0	65.0	0.0	0.0
	BS	19.0	16.0	60.0	5.0	0.0
Mandatory fortification of food(bread) with iodised salt	B	0.0	10.0	25.0	45.0	20.0
	BS	0.0	9.0	28.0	47.0	16.0
Storage & conveyance of food (bread) in a manner that preserves composition, quality, purity & nutritive properties	B	15.0	30.0	55.0	0.0	0.0
	BS	30.0	16.0	54.0	0.0	0.0
Preparation, packaging, storage or display, conveyance & sale of food(bread) under sanitary conditions	B	25.0	35.0	40.0	0.0	0.0
	BS	36.0	43.0	21.0	0.0	0.0

Table 4.8 provides responses to whether bakers and bread sellers comply with regulations governing food vending in Ghana. A lesser proportion (35%) of the bakers and 35% of bread sellers complied with regulations on prohibition against sale of poor quality food to a large extent. Also, 65% of bakers and 65% of bread sellers complied with it to a little extent. A few (10%) of the bakers and 9% of bread sellers complied with the regulations governing mandatory fortification of food (bread) with iodised salt. 70% of bakers and 75% of bread sellers complied with it to a low extent while 20% of bakers and 16% of bread sellers never complied with it at all.

With respect to mandatory fortification of bread with iodated sated, 35% of bakers and 37% of sellers comply with the regulation to some extent where as 65% of bakers and 63%of sellers either comply to a little extend or do not comply to it at all.

Regarding proper storage and conveyance of bread, 45% of bakers and 46% of sellers comply to some extent while the majority 55% of bakers and 54% of sellers comply to a little extent. A total of 60% bakers and 79% of bread sellers complied with the regulations governing preparation, packaging, storage or display, conveyance and sale of food (bread) under sanitary conditions to a large extent. A few of the respondents (bakers =40%; bread sellers = 21%) complied with it to a slight extent.

It could be concluded from the results in Table 8 that the bakers, and the bread sellers fairly complied with regulations on prohibition against sale of poor quality food; mandatory fortification of food with iodised salt; storage and conveyance of food in a manner that preserves its composition, quality, purity and nutritive properties; and regulations governing preparation, packaging, storage or display, conveyance and sale of food (bread) under sanitary conditions. However, the data revealed that 20% of the bakers and 16% of the bread sellers did not comply with the regulations governing mandatory fortification of food with iodised salt.

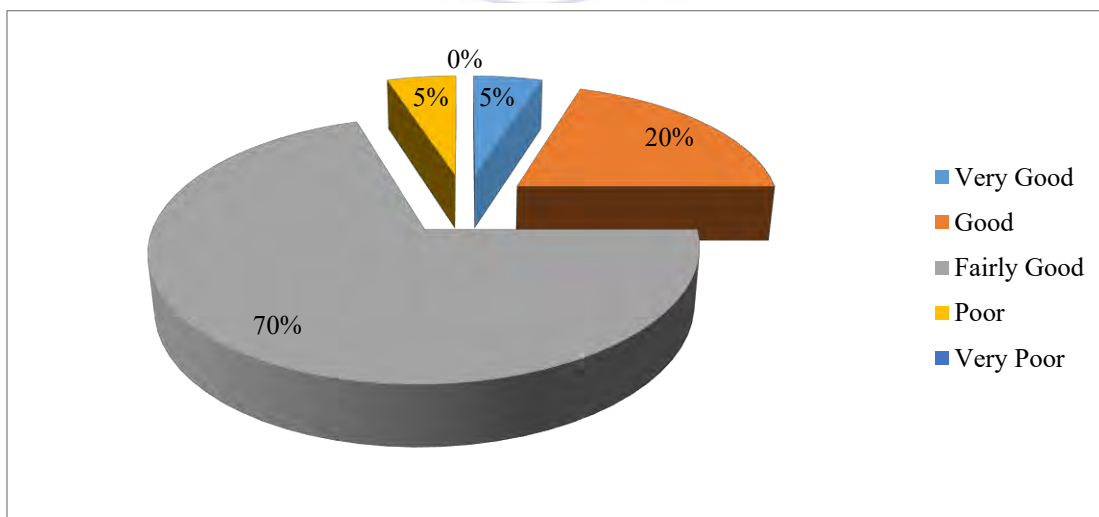


Figure 4.4: Compliance with Food Safety Acts, Laws and Standards in Ghana by Bakers in the Kasena-Nankana East Municipality.

The result in Figures 4.4 indicated that 70% of the bakers satisfactorily complied with food safety Acts, laws and standards in Ghana.

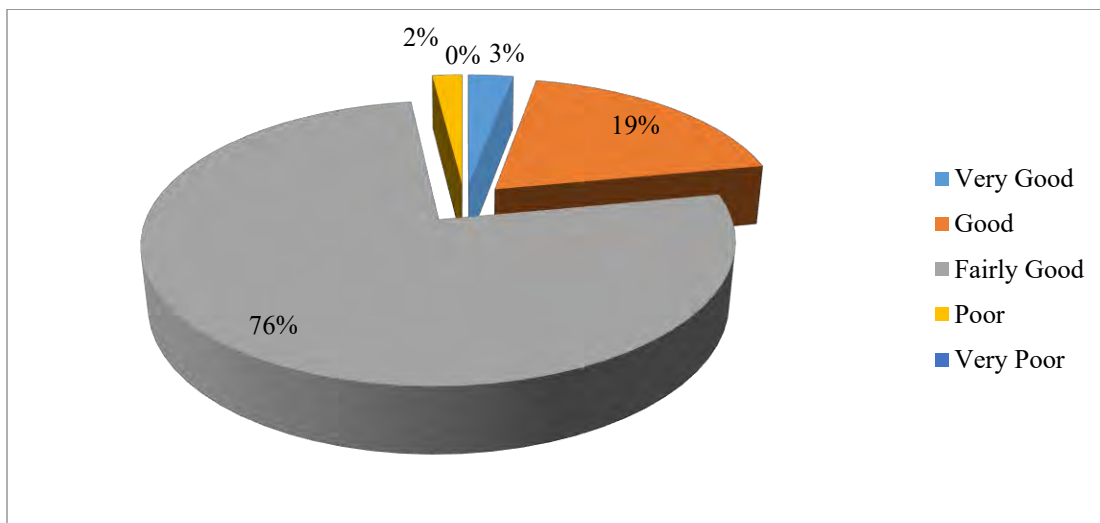


Figure 4.5: Compliance with Food Safety Acts, Laws and Standards in Ghana by Bread Sellers in the Kasena-Nankana East Municipality

Figure 4.5 also shows that 76% of the bread sellers fairly complied with food safety Acts, laws and standards in Ghana.

It could be concluded from the results that a reasonable number 40% of the bakers, and 65% of the bread sellers satisfactorily complied with regulations governing food vending in Ghana. This is also evident in the observation data which shows that 70% of the bakers and 76% of the bread sellers satisfactorily complied with food safety Acts, laws and standards in Ghana. Generally, the result is skewed towards bread sellers. This implies that more bread sellers than bakers fairly complied with food safety Acts, laws and standards in Ghana.

This finding seems to be in consonance with Hammond, Brooks, Schlottman, Johnson and Johnson (2005) who found that critical food violations actually increased after training.

Table 4.9: Agencies which Conduct Inspection on Bakery and Bread Sales Premises in the Kasena-Nankana East Municipality.

Response	Bakers (%)	Bread Sellers (%)
Environmental Protection Agency	0.0	0.0
Municipal Authority Environmental Health Unit	100	100
Ghana Health Service	0.0	0.0
Food and Drugs Board/Authority	0.0	0.0
Other	0.0	0.0
Total	100	100

Table 4.9 shows that the Municipal Authority Environmental Health Unit was responsible for the inspection of bakery and bread sales premises in the district/municipality. The response by both the bakers and sellers recorded 100% each which vividly showed that all the bakers and the sellers are aware that the agency responsible for the inspection on bakery and bread sales premises in the municipality is the Kasena-Nankana East Municipality Environmental Health Unit. This means that the bakers and sellers are aware that their premises need to be inspected to be free from rubbish or debris which can cause disease to the food they produce or sell.

Table 4.10 Frequency of Inspection on Bakery and Bread Sales Premises by Agencies in the Kasena-Nankana East Municipality

Response	Bakers%	Bread Sellers(%)
Quarterly	0.0	9.0
Twice a year	40.0	20.0
Once a year	60.0	71.0
Once in two years	0.0	0.0
Occasionally	0.0	0.0
Total	100	100

On the issue of frequency of inspection of the bakery and bread sellers premises by the agencies in the Kasena-Nankana East Municipality, 9% of bread sellers indicated that premises were inspected quarterly; 40% of bakers and 20% of bread sellers mentioned twice a year while, 60% of bakers and 71% of bread sellers stated once a year. The data collected showed that, majority of the bakers and sellers premises is inspected and it's usually within the period of one year. Though few indicated their premises is inspected quarterly, and twice a year, this means that the inspection agency in the municipality usually carry out the inspection to ensure that bakers and sellers comply with hygienic and sanitary rules to ensure sale of safe or wholesome food to the public.

Table 4.11: Respondents Comply with all Relevant Food Safety Standards

Response	Bakers (%)	Bread Sellers (%)
Yes	5.0	2.0
No	95.0	98.0
Total	100	100

Only 5% of bakers and 2% of bread sellers complied with all the relevant food safety standards. The majority of the respondents (bakers = 95% and bread sellers =98%) did not complied with the relevant food safety standards. The data collected revealed that,

though the inspection agency make routine visit to their premises majority of the bakers and sellers do not still comply with the relevant food safety standards which contravenes with the Food and Drugs Act 1992 (PNDCL) 305B, Section 5 of the Act on prohibition against sale of poor quality food states:

1. A person who sells to the prejudice of a purchaser a food which is not of the nature, substance or quality of the article demanded by the purchaser commits an offence.
2. It is not a defense to an offence under subsection (1) to plead that the purchaser was not prejudiced because the food was bought for analysis or for a purpose other than for consumption.

Table 4.12: Respondents Work to Hygiene Standards given by the Government

Response	Bakers%	Bread Sellers(%)
Yes	15.0	8.0
No	85.0	92.0
Total	100	100

Table 4.12 the data indicates that majority 85% of bakers and 92% of bread sellers did not comply with hygiene standards given by the government regulatory body. However, few respondents (bakers =15%; bread sellers = 8.0%) affirmed that they work to hygiene standards given by the government regulatory body. This is an indication that majority of the bakers and bread sellers breaches the Food and Drugs Act 1992 (PNDCL) 305B, Section 7 of the Act which is on sale of food under unsanitary conditions. It states:

- (2) A person who sells, prepares, packages, conveys, stores or displays for sale a food under unsanitary conditions commits an offence.
- (3) Food shall be stored and conveyed in a manner that preserves its composition, quality and purity and minimizes the dissipation of its nutritive properties from climatic and any other deteriorating conditions.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study assessed the sanitation and hygiene knowledge and practices among bakers and bread sellers in the Kassena-Nankana East Municipality. The design for the study was a descriptive cross-sectional survey. A total of 20 bakers and 100 bread sellers were randomly and conveniently sampled for study. Structured questionnaire and semi-structured observation guide were used as research instrument as well as documentary review. The data was descriptively and quantitatively analyzed and presented in tables and figures or charts as frequency counts and percentages as well as narratives. This chapter highlighted the summary of the study, conclusions and recommendations drawn from the study. Suggestions for further studies are also put forward.

5.2 Summaries of Major Findings

Among the findings of this study were the following:

- The findings indicate that a significant majority of the respondents had poor and/or inadequate knowledge of food hygiene and sanitation. The bakers and bread sellers had no or insufficient knowledge of HACCP; the regulations governing food vending in Ghana; food safety standards in Ghana; and Food and Drugs Act 1992 (PNDCL) 305B.
- In terms of hygiene and sanitation practices, more than 90% of the bakers and bread sellers were quite clean. They had a quite clean personal appearance; fairly

clean and hygienic work materials, ingredients, tools, facilities and general work surroundings. Bread sellers were found to be fairly more hygienic than bread bakers.

- A reasonable number of 40% of the bakers, and 65% of the bread sellers fairly complied with food safety Acts, laws, standards, and regulations governing food vending in Ghana.
- Generally, bread sellers had more knowledge of food hygiene and sanitation than bakers. Also, they were relatively clean in personal appearance as well as cleanliness of tools, equipment, facilities and general work environment than the bakers. More so, they fairly complied with food safety Acts, laws and standards in Ghana than the bakers.

5.3 Conclusions

Based on the evidence from the study, the following conclusions were drawn:

The findings revealed that, a significant majority of the respondents lacked adequate knowledge of food hygiene and sanitation. Based on this, the study concluded that bread bakers and bread sellers in the Kassena-Nankana East Municipality were largely ignorant about food hygiene and sanitation as well as the relevant regulations on food handling.

Although, bread bakers and sellers lacked requisite knowledge on food hygiene and sanitation practices, the study found bakers and sellers of bread were clean in terms of personal appearance, work materials and general work surroundings. As a result, the study concluded that, bread bakers and sellers in the Kassena-Nankana East Municipality

are reasonably clean and neat in their hygienic and sanitation practices and that bread sellers were more hygienic than bread bakers.

Moreover, the study established that, an average number of bread bakers and sellers fairly complied with food safety Acts, laws, standards, and regulations governing food vending in Ghana. Therefore, the study concluded that, about halve of bread bakers and sellers in the Kassena-Nankana East Municipality flout food safety standards and regulations governing food vending.

5.4 Recommendations

In the light of the findings and the conclusions drawn, the following recommendations are put forward:

- i. Training in hygiene and sanitation for bakers and bread sellers is an essential step towards ensuring food safety. The Kasena-Nankana East Municipal Environmental Health Department should intensify health education regarding food hygiene and sanitation to both food handlers and consumers.
- ii. The Kasena-Nankana East Municipal Environmental Health should carry out periodic food safety education campaigns which should target food handlers including bakers and bread sellers in the Municipality.
- iii. Owners (managers) of bakeries and bread selling ventures should carry out daily inspections of their workers with regard to their health and hygiene.
- iv. The Municipal Environmental Health Department in collaboration with the health directorate should conduct periodic medical examination or screening along with

necessary treatment such as de-worming, typhoid and hepatitis 'B' screening, and vaccination.

- v. The Municipal Environmental Health Department in collaboration with the health directorate should conduct periodic inspection of food joints and restaurants including the bakeries to ensure that the bakers and sellers comply with food safety Acts, laws, standards, and regulations governing food vending in Ghana.
- vi. The current study shows that bread vendors have insufficient knowledge regarding the basics of food hygiene. The Municipality Environmental Health Department in collaboration with the health directorate should implement the HACCP system, as a proactive method for monitoring procedures by food handlers in order to prevent food borne diseases.
- vii. The Municipal Environmental Health Department in collaboration with the health directorate should implement interventions such as food handler's training on food safety, institute periodic focused medical check-up for food handlers, and improve human waste disposal.

5.5. Suggestion for Further Research

It is hypothesized that food safety knowledge does not always translate to safer food safety practices. Thus, food safety training programs does not necessarily translate into positive food safety behaviors. There is the need for further research in assessing the effectiveness of training taking into consideration personal and physical barriers that impede on translating knowledge into positive food safe behaviors.

REFERENCES

- Ababio, P. F., Adi, D. D. & Commey, V. (2012). *Food safety management systems, availability and maintenance systems, availability and maintenance among food industries in Ghana: Food science and technology*. Retrieved on September 9, 2014 from www.fdtjournal.org/node/add/article.
- Adigbo H. & Madam C. K. (2010). Complete Course in Food and Nutrition Kwadoam Publications.
- Angellilo, I. F., Viggiani, N. M. A., Greco, R. M., Rito, D. & the Collaborative group (2001). HACCP and food hygiene in hospitals: knowledge, attitudes, and practices of food-service staff in Calabria, Italy. *Infection Control and Hospital Epidemiology*, 22 (6), 363–369.
- Antle, J. M. (2001). Economics analysis of food safety. In: B. Gardner and G. Rausser (Eds.), *Handbook of agricultural economics* (pp. 1083-1136). Amsterdam: Elsevier Science.
- Askarian, M., Kabir, G., Aminbaig, M., Memish, Z. & Jafari, P. (2004). Knowledge, attitudes, and practices of food service staff regarding food hygiene in Shiraz, Iran. *Infection Control Hospital Epidemiology*, 25, 16-20.
- Australia/ New Zealand (2002). Fact sheet No. 2 on Food Standards. S.l.:s.n.
- Barcnas, M. E. and Rosell, C. M. (2006). Effect of Frozen storage time on the bread crust and aging of par-baked bread. *Food chem.* 95:438-445.
- Bas, M., Ersun, A. & Kivanc, G. (2006). The evaluation of food hygiene knowledge, attitudes, and practices of food handlers in food businesses in Turkey. *Journal of Food Control*, 17, 317 - 322.
- Bas, M., Ersun, A., Kivanc, G. (2006). The evaluation of food hygiene knowledge, attitudes, and practices of food handlers in food businesses in Turkey. *Journal of Food Control*, 17, 317-322.
- Boateng A. E. (2004). Assessment of food hygiene practices by street food vendors and microbial quality of selected foods sold. A study at Dunkwa On Offin, Upper Denkyira East municipality of the Central Region. Unpublished thesis submitted to the Department Of Community Health, College Of Health Sciences, KNUST, in partial fulfilment of the requirements for the degree of MSc. Public Health.

- Boccaletti, S. & Morro, D. (2000). Consumer willingness to pay for G. M food products in Italy. *AgBioForum*, 3 (4), 259-267.
- Bedworth, A. E. & Bedworth, D. A. (1992). *The profession and practice of health education*. Dubuque: Wm: C. Brown Publisher.
- Bekker, J. L. (2002). *Food hygiene IV: Study guide*. Pretoria: Technikon Pretoria Press.
- Bekker, J. L. (2003a). *Food safety and analysis laboratory manual*. Pretoria: Technikon Pretoria Press.
- Bekker, J. L. (2003b). *Principles of food hygiene and safety*. Pretoria: Technikon Pretoria Press.
- Berger, M. C., Blomquist, G. C., Kenkel, D. & Tolley, G. S. (1987). Valuing changes in health risks: A comparison of alternative measures. *Southern Economic Journal*, 53, 967–84.
- Bergstrom, J. C. & Taylor, L. O. (2006). Using *meta-analysis* for benefits transfer: Theory and practice. *Ecological Economics*, 60 (2), 351-60.
- Borch, E. & Arinda, P. (2002). Bacteriological safety issues in red meat and ready to eat meat products as well as control measures. *Meat Science*, 62, 381-390.
- Brom, F. (2004). WTO, public reason, and food public reasoning in the trade conflict on GM-food. *Ethical Theory and Moral Practice*, 7 (4).417–31.
- Calvin, L., Flores, L. & Foster, W. (2003). *Case study Guatemalan raspberries and Cyclospora: 2020 vision briefs* 10 no. 7. Washington, DC: International Food Policy Research Institute.
- Campbell, M. E., Gardner, C. E., Duryer, J. J., Isacs, S. M., Kruger, P. D. & Ying, J. Y. (1998). Effectiveness of public health interventions in food safety: a systematic review. *Canadian J Public Health*, 89, 197-202.
- Cates, S, Kosa K. M., Karns, S, *et al.* (2009). Food safety knowledge and practices among older adults: Identifying causes and solutions for risky behaviors. *J Nutr Elderly*, 28, (2):112–26.
- Clayton, D. A., Griffith, C. J., Price, P. & Peters, A. C. (2002). Food handlers' beliefs and self-reported practices. *International Journal of Environmental Health Research*, 12 (1), 25–39.

- Clayton, D. A. & Griffith, C. (2004). Observation of food safety practices in catering using notational analysis. *British Food Journal*, 106, 211- 227.
- Cook, C. & Casey, R. (2002). Assessment of a foodservice management sanitation course. *Journal of Environmental Health*, 41, 281-284.
- Cook, C. & Casey, R. (1979). Assessment of a foodservice management sanitation course. *Journal of Environmental Health*, 41, 281-84.
- Dickie, M. & List, J. (2006). Economic valuation of health for environmental policy: Comparing alternative approaches, introduction and overview. *Environmental and Resource Economics*, 34, 339–46.
- Egan, M., Raats, M., Grubb, S., Eves, A., Lumbers, L., Dean, M. & Adams, M. (2007). A review of food safety and food hygiene training studies in the commercial sector. *Journal of Food Control*, 18, 1180-1190.
- Ehiri, J. E., Morris, G. P. & Mcewen, J. (1997). Evaluation of a food hygiene training course in Scotland. *Journal of Food Control*, 8, 137-147.
- European Council (2006). Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the registration, evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.
- Florax, R., Travisi, C. & Nijkamp, P. (2005). A meta-analysis of the willingness-to-pay for reductions in pesticide risk exposure. *European Review of Agricultural Economics*, 32 (4), 441–67.
- Food, Land and people. www.foodandpeople.org, retrieved on December 2015.
- Food and Agriculture Organization/World Health Organization (FAO/WHO 2006). Prevention of food borne diseases: The five keys to safer food international Food and Agriculture Organization/World Health Organization (FAO/WHO, 2003). Basic text on food hygiene (3rd ed.). Italy: Codex Alimentarius.

- Gale, F. & Hu, D.(2009). Supply chain issues in China's milk adulteration incident. Paper presented at International Association of Agricultural Economists' 2009 Conference, 16–22 August 2009, Beijing, China.
- Ghana Statistical Service (2014). 2010 Population and Housing Census (2014). District Analytical Report, Kassena Nankana East Municipality. Retrieved at <http://www.statsghana.gov.gh>, on October 7, 2016.
- Goh, K. (1997). Information related to food and water-borne disease in Penang. *Medical Journal Penang Hosp*, 2, 42 - 47.
- Golan, E., Buzby, J., Crutchfield, S., Frenzen, P., Kuchler, F., Ralston, K. & Roberts, T. (2005). The value to consumers of reducing food-borne risks. In: S. Hoffmann and M. Taylor (Eds.), *Toward safer food: Perspectives on risk and priority setting*. Washington, DC:
- Gray, J. A. & Bemiller, J. N. (2003). Bread staling: Molecular Basis and control. *Comprehensive Food Sci. Food Safety* 2: 1-21.
- Green, L., Radke, V. & Mason, R. (2007). Factors related to food worker hand hygiene practices. *Journal of Food Protection*, 70, 661-666.
- Green, L., Selman, C., Banerjee, A., Marcus, R., Medus, C., Angulo, F., Radke, V., Buchanan, S. & EHS-Net Working Group (2005). Food service workers' self-reported food preparation practices: an
- Greig, J. D., Todd, E. C., Bartleson, C. A. & Michael, B. S. (2007). Outbreaks where food workers have been implicated in the spread of foodborne disease. *Journal of Food Protection*, 70, 1752 - 1761.
- Griffith, C., Livesey, K. & Clayton, D. (2010). Food safety culture: The evolution of an emerging risk factor. *British Food Journal*, 112, 426-438.
- Griffith, C. J. (2000). Food safety in catering establishments: Safe handling of foods. New York: Marcel Dekker.
- Hammond, R. M., Brooks, R. G., Schlottman, J., Johnson, D. & Johnson, R. (2005). Assessing the effectiveness of food worker training in Florida: opportunities and challenges. *Journal of Environmental Health*, 68 (3), 19-24.
- Hamilton, D. & Crossley, S. (2004). *Pesticide residues in food and drinking water*. New York: J. Wiley.

- Hammitt, J. C. (2002). Quality-Adjusted Life Years (QALYs) versus Willingness to Pay (WTP). *Risk Analysis*, 22 (5), 985–1001.
- Hammitt, J. C. (2003). Valuing health: Quality-Adjusted Life Years or Willingness to Pay? *Risk in Perspective*, 11 (1), 1–6.
- Hammitt, J. C. & Haninger, K. (2007). Willingness to pay for food safety: Sensitivity to duration and severity of illness. *American Journal of Agricultural Economics*, 89 (5), 1170–75.
- Harrington, W. & Portney, P. R. (1987). Valuing the benefits of health and safety regulation. *Journal of Urban Economics*, 22 (1), 101–12.
- Hasior, D. & Horman, B. (1967). *Personal home and community health*. London: The McMillan Company.
- Hendry, C., Jones, A. & Arthur, M. (1992). Skill supply, training and development in the small-medium enterprise. *International Small Business Journal*, 10, 68-72.
- Hine, S., Thilmany, D., Kendall, P. & Smith, K. (2003). Employees and food safety: Is training important to service managers? *Journal of Extension*, 41.
- Hoseney C. (1994). *Principles of cereal science and technology* 2nd Edition. CRC Press, London, pp 229-275.
- Institute of Medicine (IOM, 2006). *Valuing health for regulatory cost-effectiveness analysis*. Washington, DC: National Academies Press.
- Jevs'nik, M., Hlebec, V. & Raspor, P. (2006). Meta-analysis as a tool for barriers identification during HACCP implementation to improve food safety. *Acta Alimentaria*, 35, 319-353.
- Käferstein, F. K., Motarjemi, Y., Moy, G. G. & Quevado, F. (2000). *Food safety: A world public issue*. S.l:s.n.
- Kalua, F. (2001). *The relationship between knowledge, attitude and practices of care givers and food hygiene in day care centers*. Pretoria: Technikon Pretoria.
- Kassa, H., Silverman, G. & Baroudi, K. (2010). Effect of a manager training and certification program on food safety and hygiene in foodservice operations. *Environmental Health Insights*, 4, 13-20.
- Kaferstein, F. (2003). Actions to reverse the upward curve of foodborne illness. *Food Control*, 14, 101 - 109.

- Kenkel, D. (1994). Cost of illness approach. In G. Tolley, D. Kenkel, and R. Fabian (Eds.), *Valuing health for policy: An economic approach* (pp. 42–71). Chicago: University of Chicago Press.
- Klopfenstein, C. F. (2000). *Nutritional Quality of Cereal-Based Foods* (2nd ed.). New York: Marcel Dekker Inc.
- Knellar, P. & Bierma, T. (1990). Food service certification. Measuring the effectiveness of a state program. *Journal of Environmental Health*, 52 (5), 292-294.
- Krupnick, A. (2004). *Valuing health outcomes: Policy choices and technical issues*. Washington, DC: Resources for the Future.
- Kuchler, F. (2001). *Valuing the health benefits of food safety: A proceedings*. Misc. publication no. 1570. Washington, DC: USDA Economic Research Service.
- Kuchler, F. & Golan, E. (1999). *Assigning values to life: Comparing methods for valuing health risks*. Agricultural Economic Report No. 784. Washington, DC: USDA Economic Research Service, Food and Rural Economics Division.
- Latouche, K., Rainelli, P. & Vermersch, D. (1998). Food safety issues and the BSE scare: Some lessons from the French Case. *Food Policy*, 23 (5), 347–56.
- Lusk, J., Jamal, M., Kurlander, L., Roucan, M. & Taulman, L. (2005). A meta-analysis of genetically modified food valuation studies. *Journal of Agricultural and Resource Economics*, 30 (1), 28–44.
- Macauslan, E. (2003). The boss, the owner, the proprietor, the food hygiene manager?. *The Journal of the Royal Society for the Promotion of Health*, 123, 229-232.
- Marks, L., Kalaitzandonakes, N. & Vickner, S. S. (2003). Evaluating consumer response to GM foods: Some methodological considerations. *Current Agriculture, Food and Resource Issues*, 4, 80–94.
- Marriot, N. G. (1999). *Principles of food sanitation*. Gaithersburg: Aspen publications.
- Marriott, G. (1985). *Principles of food sanitation*. New York: Van N. Ostrand Reinhold Company.
- Martin M. L., Zeleznak, K. J. and Hosoney R. C., (1991). A mechanism of bread firming. Role of starch swelling cereal chem.. 68: 498-500

- Mathias, R. G., Sizto, R., Hazlewood, A. & Cocksedge, W. (1997). The effects of inspection frequency and food handler education on restaurant inspection violations. *Canadian Journal of Public Health*, 86, 46-50.
- Mathias, R. G., Sizto, R., Hazlewood, A. & Cocksedge, W. (1995). The effects of inspection frequency and food handler education on restaurant inspection violations. *Canadian Journal of Public Health*, 86 (1), 46-50.
- McCluskey, J. J., Grimsrud, K. M., Ouchi, H. & Wahl, T. I. (2005). Bovine spongiform encephalopathy in Japan: Consumers' food safety perceptions and willingness to pay for tested beef. *Australian Journal of Agricultural and Resource Economics*, 49, 197–209.
- McSwane, D., Rue, N. & Linton, R. (2000). *Essentials of food safety and sanitation*. New Jersey: Prentice Hall Inc.
- Mead, P. S., Slutsker, L., Dietz, V., McCaig, L. F, Bresee, J. S, Shapiro, C., Griffin, P. M. & Tauxe, R. V. (1999). Food-related illness and death in the United States. *Emerging Infectious Diseases*, 5, 607-25.
- Mukhola, S. M. (2000). *Factors influencing the safety and quality of street food in rural areas*. Pretoria, Technikon Pretoria.
- Nelson, J. P. & Kennedy, P. E. (2009). The use and abuse of *meta-analysis* in environmental and natural resource economics: An assessment. *Environmental and Resource Economics*, 42, 345-77.
- Nnebue, C.C., Adogu, P., Ifeadike, C. & Ironkwe, O. (2014). Assessment of the food hygiene practices of food handlers in the Federal Capital Territory of Nigeria. *Tropical Journal of Medical Research* 17(1).
- Nyarango, R. M., Aloo, P. A., Kabiru, E. W. & Nyanchongi, B. O. (2008). The risk of taeniacid intestinal parasite infections in Kisumu Municipality, Kenya. *BMC Public Health*, 14 (8), 237.
- Oliveira, A. M., Gonçalves, A. M., Shinohara, N. K. S. & Stamford, T. L. M. (2003). Manipuladores de Alimentos: Um fator de risco. *Higiene Alimentar.*, 17, 114-115.
- Pouliot, S. & Sumner, D. A. (2008). Traceability, liability, and incentives for food safety and quality. *American Journal of Agricultural Economics*, 90 (1), 15–27.
- Project food, Land and People (2008).

- Rheinländer, T., Olsen, M., Bakang, J. A. Takyi, H. Konradsen, F., & Samuelsen, H. (2008). Keeping up appearances: Perceptions of street food safety in urban Kumasi, Ghana. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 85, 1.
- Rennie, D. (1994). Evaluation of food hygiene education. *British Food Journal*, 96, 20-25.
- Roberts, K., Barrett, B., Howells, A., Shanklin, C., Pilling, V. & Brannon, L. (2008). Food safety training and foodservice employees' knowledge and behaviour. *Food Protection Trends*, 28, 252-260.
- Rocourt, J., Moy, G., Vierk, K. & Schlundt, J. (2003). *The present state of food-borne disease in OECD countries*. Paris: OECD Publications.
- Rogers, D. E., Zeleznak, K. J., Lai, C. S., and Hosene, R. C. (1988). Effect of Native lipids, shortening and bread moisture on bread firming. *Cereal Chem.* 65: 398-401.
- Roth, A. V., Tsay, A. A., Pullman, M. E. & Gray, J. V. (2008). Unraveling the food supply chain: Strategic insights from China and the 2007 recalls. *Journal of Supply Chain Management*, 44 (1), 22-39.
- Sabarwala, B. (1999). *Community nutrition and health*. New Delhi: Ajay Varma Commonwealth Publishers.
- Sabarwala, B. (1999). *Health and nutritional care*. New Delhi: Commonwealth Publishers.
- Sabarwala, B. (1999). *Nutrition and health promotion*. New Delhi: Commonwealth Publishers.
- Schlundt, J., Toyofuku, H., Jansen, J. & Herbst, S. (2003). Emerging food-borne zoonoses. *Rev SciTech* 23, 513-533.
- Seaman, P. & Eves, A. (2006). The management of food safety: The role of food hygiene training in the UK service sector. *Hospitality Management*, 25, 278-296.
- Shojoei, H., Shooshtaripour, J. & Amiri, M. (2006). Efficacy of simple hand-washing in reduction of microbial hand contamination of Iranian food handlers. *Food Research International*, 39, 525-529.

- Shogren, J. F., Fox, J. A. Hayes, D. J. & Roosen, J. (1999). Observed choices for food safety in retail, survey and auction markets. *American Journal of Agricultural Economics*, 81 (5), 1192–99.
- Sundström, K. & Andersson, H. (2009). Swedish consumers' willingness to pay for food safety: A contingent valuation study of salmonella risk. Solna: Swedish National Road and Transport Research Institute.
- South African Bureau of Standards (2001). *Code of practice 049: Food hygiene management*: Pretoria: SA Bureau of Standards.
- Tomohide, Y. (2010). Food safety regulation in the United States: an empirical and theoretical examination. *In Independent Review*, 15, 210-226.
- Uwalaka, E. & Matsuo, H. (2002). Impact of knowledge, attitude and beliefs about aids on sexual behavioral change among college students in Nigeria: the case of the University of Nigeria Nsukka. Retrieved on October 15, 2014 <http://www.africaresource.com/war/vol3.2/uwalaka-matsuo.html>.
- vanRavenswaay, E. O. (1995). Valuing food safety and nutrition: the research needs. In: Caswell, J.A. (Ed.), *Valuing food safety and nutrition*. Boulder, CO: Westview Press.
- Vulicevic, J. R. Abdel-Aal, E. S. M; Mittal, G. S. And Lu, X. (2004). Quality and Storage Life of Part-baked Frozen Breads. *LWT*, 37: 205-213.
- Weir, M., Hansen, L. G., Andersen, L. M. & Millock, K. (2002). Consumer preferences for organic foods. In OECD, *Organic agriculture: Sustainability, markets and policies (pp.257–276)*. Wallingford, UK: Cabi Publishing.
- Wheelock, V. (2006). Food safety in perspective. *British Food Journal*, 93, 31 - 36.
- Will, M. & Guenther, D. (2007). Food quality and safety standards as required by EU Law and the private industry with special reference to MEDA countries' exports of fresh and processed fruits and vegetables, herbs and spices: A practitioners' reference book (2nd ed.). GTZ – Division 45.
- WHO (1999). Food safety: an essential public health issue for the new millennium.
- WHO (2000). Food-borne disease: A focus for health education. Geneva: WHO. Food Safety Authorities Network (INFOSAN), *INFOSAN Information Note No. 5/2006*.

WHO (2001). *Food-borne disease: A focus for health education*. Geneva: WHO.

WHO (2007). Hazard Analysis Critical Control Point System (HACCP). Retrieved on October 23, 2014 from

[http://www.who.int/foodsafety/fs_management/haccp/en/September 23, 2011](http://www.who.int/foodsafety/fs_management/haccp/en/September%2023%2C%202011).

Winarno, F. G. & Allain, A. (1991). Street foods in developing countries: Lessons from Asia. *Journal of Food, Nutrition and Agriculture*, 1.

Worlanyo, E. K., (2013). Knowledge, attitudes and practices of sanitation among market users at the dome market in the Ga East Municipality. Unpublished thesis submitted to the University of Ghana, Legon in partial fulfilment of the requirement for the award of Mphil degree in Adult Education.



APPENDICES

APPENDIX A

QUESTIONNAIRE FOR BAKERS AND BREAD SELLERS

Dear Respondent,

This questionnaire is intended to assess the sanitation and hygiene practices among bakers and bread sellers. The information which you provide is for academic work and will be treated as confidential. **Thank you.**

SECTION A: BIO DATA OF RESPONDENTS (PLEASE *TICK*(✓))

1. Gender: Male Female
2. Age (in yrs): Below 20 years 20 - 29 30 - 39 40-49
50-59 60 years & above
3. Level of education completed: Primary/Middle/Junior high school
Secondary/Vocational/Commercial/Technical Tertiary None
4. Number of years in bread baking/vending industry or business:
Below 5 years 5-10 11-15 16 years & above
5. Description of the type of bread baking/vending industry or business.
Small-scale Medium-scale Big/Large-scale Very large-scale
6. How frequent do you have medical examination per year as part of your work?
None Occasionally Quarterly Bi-annual Once a year
7. Do you have any history of health-related problems/sicknesses over the last few months? Yes No I don't know
8. If yes (in item 8), indicate the specific health problem(s)/sickness(es)
Hepatitis B, C Tuberculosis (TB) Cholera Diarrhoea Typhoid fever

Skin rashes [] Other [], specify:

SECTION B: KNOWLEDGE OF BAKERS AND BREAD SELLERS WITH

REGARD TO FOOD HYGIENE AND SANITATION (PLEASE TICK (✓))

Please tick (✓) to indicate your level of knowledge in food hygiene and sanitation. Use the Likert scale as below: **VGE** = Very Great Extent; **GE**= Great Extent; **SE** =Some Extent; **VLE**= Very Little Extent; **N**= Not at all.

Statement	Responses				
	VGE	GE	SE	VLE	N
I have professional training in and/or knowledge and awareness of					
9. purchasing quality & proper quantity of ingredients for bread making					
10. purchasing quality & proper quantity of ingredients for bread making					
11. Hazard Analysis & Critical Control Points (HACCP)					
12. shelf life & proper storage of bread as well as ingredients for bread making					
13. regulations governing food vending in Ghana					
14. food safety standards in Ghana					
15. Food & Drugs Act 1992 (PNDCL) 305B					
16. personal cleanliness & hygiene practices					
17. food waste/waste management (storage & disposal)					

18. Food pest/pest and insect management and control					
19. General food handling (manufacturing/processing, packaging & distribution) practices					
20. the bread baking/vending industry or business					

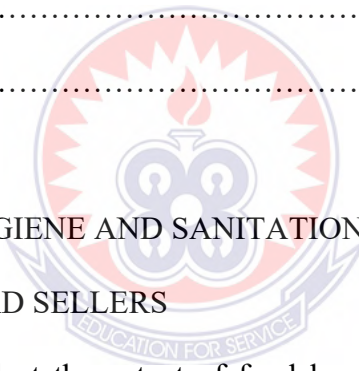
21. Have you heard about the Food and Drug Laws of Ghana and other Food Safety and Standards Act/ Food Safety Act? Yes No I can't remember

22. What do these food safety and standards Act means to you?

.....

.....

.....



SECTION C: FOOD HYGIENE AND SANITATION PRACTICES OF THE BAKERS AND BREAD SELLERS

The statements below reflect the extent of food hygiene and sanitation practices with regard to bread baking and selling. Please *(Tick (✓))*:

Statement	Responses				
	VGE	GE	SE	VLE	N
As a food handler (bakers/bread seller), I					
23. control food contamination by flies, rodents and pests.					
24. ensure adequate natural or mechanical ventilation					
25. refrain from smoking, drinking alcoholic beverages					

and chewing gum					
26. properly remove, store and dispose waste.					
27. use designated containers/dustbins with lids for waste collection and disposal					
28. ensure that all parts of the premises are appropriately cleaned.					
29. remove excess soil at the bakery/sales point by sweeping, wiping or pre-rinsing.					
30. have change room, toilet and ablution facilities					
31. control food contamination by flies, rodents and pests.					
32. ensure adequate natural or mechanical ventilation					
33. refrain from smoking, drinking alcoholic beverages and chewing gum					
34. properly remove, store and dispose waste.					
35. use designated containers/dustbins with lids for waste collection and disposal					
36. completely cover hair during food handling					
37. wear appropriate clean clothing with an apron, which is changed everyday or as often as necessary					
38. refrain from spitting, sneezing, smoking or habits that can compromise food safety					
39. wear rings or bracelets when handling food					

40. bake/sell bread when having a cold, diarrhoea and other communicable diseases					
41. regularly empty and clean the dustbin					
42. Clean baking dishes/pans & equipment					
43. regularly launder/wash kitchen napkins					
44. always use soap for hand washing.					
45. always wear clean clothes that have sleeves.					
46. always use aprons.					
47. always have hair covered.					
48. always have clean nails but not coated.					
49. always use gloves/forceps or ladles to pick up bread.					
50. always wash hands after touching money.					
51. always use wash hands after touching hair					
52. always use wash hands and then put on gloves					
53. always use put on gloves and then wash hands					
54. always use put on gloves without washing hands					
55. always touch a pimple or sore with bare hands while handling food (bread).					
56. often cough or sneeze openly occurs handling food					
57. often dry hands with apron after hand washing					
58. often dry hands with a single-use paper towel after hand washing.					

59. often dry hands with a reusable cloth towel after hand washing					
60. often dry hands with rag after hand washing.					
61. often dry hands with a handkerchief after hand washing					
62. often dry hands with kitchen rag/napkin after hand washing					
63. always wash hands properly before and after baking/selling) bread.					
64. always have clean nails but not coated.					
65. always use gloves/forceps or ladles to pick up bread.					
66. always wash hands after touching money.					
67. always wash hands after touching hair					
68. always wash hands and then put on gloves					
69. always put on gloves and then wash hands					
70. always put on gloves without washing hands					
71. always sterilize utensils and equipment properly before and after baking/selling) bread.					
72. always clean and sanitize knives, cutting boards and wiping cloths properly before and after baking/selling) bread.					
73. always prevent cross contamination of bread from					

cutting board, gloves and knives.					
74. have a wash hand basin with a supply of hot water, soap and hygienic hand drying facilities?					
75. wear gloves when you handle (prepare or sell) bread?					
76. wash hands with clean water and soap before preparing or selling bread					
77. wash hands with clean water and soap after using the washroom/toilet?					
78. work when having diarrhoea, lesions on your hands					
79. allow finger nails to grow					
80. clean food contact surfaces before and after preparing/selling bread					
81. dry hands after washing them with towel					
82. check or inspect flour, bread and other food deliveries for damage, spoilage/contamination					
83. check or inspect date codes/manufacture and expiry dates on receipt of flour, bread delivery and other ingredients					
84. always package, cover or wrap flour, bread and other ingredients					
85. always carry out checks or inspection of flour, bread and other ingredients which past their 'Use					

By' (expiry) dates					
86. carefully inspect incoming flour, baking ingredients, bread and other food supplies					
87. clean the surroundings before, during and after baking/vending processes					
88. bread is maintained at adequate temperature					
89. ingredients for bread are purchased in quantities that correspond to storage space					
90. food ingredients are well labeled or identified and stored separately from non-edible products like soap, disinfectant pesticide and other poisonous substances					
91. bakery area is free from any source of contaminants (rubbish, waste water, animals)					
92. equipment is made of easy to clean and disinfect materials					
93. quantity of bread produced, is just enough to be sold in a day					
94. bakery premise & surroundings are free from litter, protected from contaminants originating from domestic animals.					
95. sales area is free from personal belongings such as clothes and footwear.					

96. serving dishes washed cleaned and disinfected after each use.					
97. toilet facility at the premise.					
98. proximity of public toilet facility and refuse dump to premise.					
99. adequacy of equipment for the running of the bakery/place.					
100. unrestrained access of rodents and customers to the premise					

SECTION D: COMPLIANCE WITH REGULATIONS GOVERNING FOOD

VENDING IN GHANA (FOOD & DRUGS ACT 1992 PNDCL 305B,
SECTION 7

Please (*Tick (✓)*the statements below to reflect the extent or level of compliance with regulations governing food (bread) production and vending in Ghana (FOOD & DRUGS ACT 1992 PNDCL 305B, Section 7:

Statement	Responses				
	VGE	GE	SE	VLE	N
<i>As a food handler (bakers/bread seller), I comply with the following provisions in the Ghana Foods & Drugs Act 1992 PNDCL 305B, Section 7 and other food safety standards</i>					

101. prohibition against sale of poor quality food.					
102. mandatory fortification of food (bread) with iodised salt.					
103. storage and conveyance of food (bread) in a manner that preserves its composition, quality, purity and minimizes the dissipation of its nutritive and organoleptic properties from any climatic and any other deteriorating conditions.					
104. preparation, packaging, storage or display, conveyance and sell of food (bread) under sanitary conditions.					

105. Which agencies conduct inspection on your bread production (bakery) and selling premises/?

Environmental Protection Agency [] Municipal Authority Environmental Health Protection (EHP) unit [] Ghana Health Service [] Food & Drugs Board []
 Any other [] specify:

106. How regularly do they visit?

Quarterly [] Twice a year [] Once a year [] Once in two years [] occasionally []

107. I comply with all relevant food safety standards. Yes [] No []

108. Do you think you work 100% to the hygiene standards given by the government?
 Yes [] No [] I don't know []

109. If Yes/No in (question 108) above, give reason(s) for your answer

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APPENDIX B

OBSERVATION CHECKLIST

SANITATION AND HYGIENE PRACTICES AMONG BAKERS AND BREAD

SELLERS IN THE KASENNA NANKANA MUNICIPALITY

Dear Respondent,

This observation is intended to socially interact, physically examine or inspect bread bakers and sellers as well as the work environment and facilities/equipment for baking/vending of bread. **Thank you for the permission, consent and cooperation while you participate in this exercise.** *Please (Tick (✓) or write as appropriate*

SECTION A: BIO DATA OF RESPONDENTS (PLEASE TICK (✓)

1. **Name of Business:**
2. Description of the type of bread baking/vending industry or business.
Small-scale Medium-scale Big/Large-scale Very large-scale.
3. The business is registered and valid certificates of registration/operation are available:
Yes No
4. Gender: Male Female
5. Age (in yrs): Below 20 years 20 - 29 30 - 39 40-49
50-59 60 years & above
6. Level of education completed: Primary/Middle/Junior high school
Secondary/Vocational/Commercial/Technical Tertiary None
7. Number of years in bread baking/vending industry or business:
Below 5 years 5-10 11-15 16 years & above

8. Bread seller/baker has valid and certified medical certificates which are available:

Yes No

SECTION B: FOOD HYGIENE AND SANITATION KNOWLEDGE, PRACTICES

AND ATTITUDES (PLEASE TICK (✓))

9. General knowledge and awareness as well as attitude to food hygiene and sanitation, food safety standards and practices:

Very good Good Quite good Poor Very poor

10. Overall state/condition and appearance of bread seller/baker:

Very dirty Dirty Quite clean Clean Very clean

11. Clothing, hair, nails & other work apparels of baker/seller:

Very dirty Dirty Quite clean Clean Very clean

12. Overall state/condition and appearance of containers, vessels and bags for storage of flour, bread and other baking materials/ingredients and equipment

Very dirty Dirty Quite clean Clean Very clean

13. Overall state/condition and appearance of tools used for baking/selling:

Very dirty Dirty Quite clean Clean Very clean

14. Overall state/condition and appearance of surroundings of the bakery/vending point or point of sale:

Very dirty Dirty Quite clean Clean Very clean

15. Overall rate of cleanliness of work environment, facilities/equipment:

Very often Often Quite often Seldom Very rare/Occasional

16. Natural/mechanical ventilation of surroundings of the bakery/vending point:

Very good & adequate [] Good &adequate [] Fairly good & adequate []

Poor & inadequate [] Very poor & inadequate

17. Water supply and hand washing facilities:

Very hygienic & adequate [] Hygienic &adequate [] Fairly hygienic & adequate

Unhygienic & inadequate [] Very unhygienic & inadequate

18. Toilet/urinal/washroom & ablution facilities or their proximity to public facilities:

Very hygienic & accessible [] Hygienic & accessible [] Fairly hygienic & accessible [] Unhygienic & inaccessible [] Very unhygienic & inaccessible

19. Dustbin & other waste management facilities:

Very hygienic & adequate [] Hygienic &adequate [] Fairly hygienic & adequate

Unhygienic & inadequate [] Very unhygienic & inadequate

20. Disinfectants & other pest control facilities/measures:

Very hygienic & adequate [] Hygienic &adequate [] Fairly hygienic & adequate

Unhygienic & inadequate [] Very unhygienic & inadequate

21. General attitude and compliance with pest control and management measures:

Very good [] Good [] Fairly good [] Poor [] Very poor []

22. General and attitude compliance/adherence with Food Safety Acts, laws and standards:

Very good [] Good [] Fairly good [] Poor [] Very poor []

APPENDIX C



Food Handling Practices by a Baker during the Preparation of Ingredients for Baking of Bread



Food Handling Practices by a Baker during the Preparation of Materials and Equipment for the Baking of Bread



Food Handling Practices by Bread Sellers during the Distribution of Bread



Food Handling Practices by Bread Sellers during the Distribution of Bread



Food Handling Practices by Bakers during the Storage of Ingredients and Equipment for Bakery



Food Handling Practices by Bakers during the Storage of Ingredients and Equipment for Bakery