

**DETERMINANTS OF FOOD SAFETY MANAGEMENT IN SELECTED  
HOTELS IN ELDORET TOWN, KENYA.**

**BY**

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IN TOURISM MANAGEMENT**

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## DECLARATION

### **Declaration by the Candidate:**

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## **DEDICATION**

This thesis is dedicated to my husband Dr. Nicholas Onyango and my children, Richalfred Kissinger Onyango and Winston Osteen Onyango who have been very understanding and supportive during the times when I had to spend a lot of time away from home in order to complete this work. I also dedicate it to my late parents Richard and Rael Onjwa without whom I would not have existed and to my parents in-law Pr. Alfred Onyango and Adah Onyango who have been supporting me through their prayers and encouraging words through it all.

## ABSTRACT

Food safety is a critical issue facing the foodservice industry and therefore an understanding of the possible deterrents to Food Safety Management (FSM) is important. The purpose of this study was therefore to assess the determinants of FSM among food handlers in selected hotels in Eldoret Town, Kenya. The specific objectives were to: establish food handlers' knowledge on FSM; investigate food handlers' practices of FSM; analyze the relationship between food handlers' knowledge and practice of FSM; establish the association between food handler's selected demographic factors and FSM; assess the role of management in implementing FSM; and finally explore the effect of kitchen physical environment on food handlers' FSM. The study adopted both descriptive and explanatory research designs. Twelve conventional hotels were purposively selected and all 106 food handlers in the hotels were recruited into the study. Data was collected by use of structured questionnaires, interviews and observation. Quantitative data was analyzed with the help of Statistical Package for Social Sciences (SPSS) version 21 and excel. Pearson Chi-square test of independence and Pearson Correlation analysis were performed to test association between the various variables under study. Content analysis was used to analyze qualitative data and results presented in narrative form. The findings of this study revealed that over 95% of the respondents had adequate knowledge on FSM. However, there was no significant correlation between knowledge and FSM ( $r = .147, p = .174$ ). The results further revealed that there was a significant relationship between position held in the establishment and management of purchase and storage ( $X^2 = 106.013, df = 70, p < 0.05$ ), as well as, management of temperature control ( $X^2 = 132,256, df = 70, p < 0.05$ ). Similarly, there was a relationship between level of education and management of purchase and storage ( $X^2 = 52.901, df = 30, p < 0.05$ ). Results from interviews and observation showed that management factors such as training, supervision, and enforcement of FSM rules as well as kitchen physical environment were crucial in enabling food handlers to manage FSM. From the study it was concluded that knowledge on FSM, position held in the establishment, level of education, kitchen physical environment, and management factors were the main determinants of FSM. This study therefore recommends that adequate kitchen physical environment for food handling should be provided in the hotels and managers should ensure close supervision of food handlers at all times to ensure adherence to FSM rules, and finally, special emphasis should be placed on practical rather than theoretical training on FSM which should target both the food handlers and managers.

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**LIST OF ABBREVIATIONS**

CCP	–	Critical Control Point
CHWs	-	Community Health Workers
DPH	–	Department of Public Health
EC	–	European Commission
EUFIC	–	European Food Information Council
FAO	–	Food Agriculture Organization
FSM	–	Food Safety Management
FSMS	–	Food Safety Management Systems
GMO	–	Genetically Modified Foods
HACCP	–	Hazard Analysis and Critical Control Point
HBM	–	Health Belief Model
IPC	–	Infection Prevention and Control
MICE	–	Meetings, Incentives, Conferences, and Exhibitions
SDGs	–	Sustainable Development Goals
SOP	–	Standard Operation Procedures
SCT	–	Social Cognitive Theory
TRA	–	Tourism Regulatory Authority
WHO	–	World Health Organization

## DEFINITION OF OPERATIONAL TERMS

- Conventional hotels:** Hotels that have dining, accommodation, conference and recreational facilities (fully serviced).
- Danger zone:** Refers to the temperature range (400F to 1400F) in which food-borne bacteria can grow.
- Double hand washing technique:** A procedure of washing hands that is required before starting work, and when your hands come into contact with body fluid. It requires lathering hands with soap and warm water and scrubbing for approximately 20 seconds, rinse, and repeat a second time then dry hands with paper towel or air dryer.
- Food safety:** Ability of food to be free from any form of harm to human body when consumed.
- Food safety management:** Includes a number of routines that should be followed to preserve the quality of food and protect the food from being contaminated.
- Food safety management system:** A process that includes pre-requisite programs in place to ensure food safety.
- Food safety knowledge:** Ability to have a thorough understanding of what causes food contamination and how to keep food from getting contaminated and preserve its quality.
- Food safety practices:** Food handlers' behavior in ensuring food safety management.

- Food handlers:** All the workers in the hotel whose job descriptions directly affect the food flow.
- Food poisoning/food-borne illness:** An illness caused by eating contaminated, spoiled, or toxic food (WHO, 1999).
- Hand washing:** The act of cleaning one's hands with or without the use of water on another liquid, or with the use of soap for the purpose of removing soil, dirt, and/or microorganisms.
- Hotel:** An establishment that provides both accommodation and meals and provides a variety of services needed by customers such as reception, conference facilities and recreation facilities.
- Management:** Refers to the hotel employees at managerial level.

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## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Overview**

This chapter gives the background to the study, problem statement, objectives of the study, study hypotheses, research questions, and the justification of the study.

#### **1.2 Background to the study**

Food safety is a critical issue facing the foodservice industry. Mitchell *et al.*, (2007) state that food is considered to be safe if there is reasonable demonstrated certainty that no harm will result from its consumption under anticipated conditions of use. According to the World Health Organization (WHO), food safety encompasses actions aimed at ensuring that all food is as safe as possible (World Bank, 2000). Homberg (1983) points out that consumer responsibility for food safety and sanitation begins with the purchase of food and extends through many separate steps in its handling, storage, preparation and serving, as well as in the related cleanup and the care and use of leftover food. According to WHO, food safety policies and actions need to cover the entire food chain from production to consumption. The World Bank is in agreement that a progressive food safety regulatory system should include the ability to address food safety from the farm to the table (World Bank report, 2000).

Mitchell *et al.*, (2007) indicate that public exposure to unsafe food handling practices is likely to increase as the popularity of dining out and “take out” grows and therefore Bas *et al.*, (2006) argue that this consumer lifestyle emphasizes the need for better and more effective ways of controlling food hygiene. In agreement, the European Food Information Council (EFIC, 2014) point out that today extensive precautions are taken throughout the food chain to ensure the safety of food and so it is very important that



the consumer understands and follows basic precautions set by professionals working in different stages of the food chain when purchasing, transporting, storing, preparing, and consuming food. In this regard, the European Commission (2005) advises that food business operators should apply a procedure based on Hazard Analysis and Critical Control Point (HACCP) in order to ensure food safety. HACCP is a tool that assesses hazards and establishes control systems that focus on prevention rather than relying mainly on end products-testing in the food chain.

According to the World Bank food safety issues are receiving growing attention worldwide with science documenting new hazards and providing a better understanding of the scope of food-borne illness. Generally, the risks to food safety according to the World Bank fall into four broad categories namely; microbes through improper handling, parasites through improper cooking, physical which may be intentionally or accidentally added into the food, and chemicals which occur naturally in food and those which are in the environment (The World Bank report, 2000). However, the World Health Organization point out that microbial contamination is considered as the greatest risk to food safety and therefore responsible for most of the food-borne illnesses.

According to WHO, food-borne disease causes death and suffering even in the richest countries of the world and is a major obstacle to global development efforts. For instance, in the USA, 76 million cases of food-borne illnesses resulting in 325,000 hospitalizations and 5,000 deaths are estimated to occur each year (WHO, 2008). Hence, failure to invest in food safety will jeopardize the achievement of Sustainable Development Goals (SDGs) since at least six (goals numbers 1, 2, 3, 4, 8, & 12) out of the seventeen SDGS are directly affected by food-borne diseases i.e ending poverty

in all its forms everywhere, ending hunger, achieving food security and improving nutrition and promoting sustainable agriculture, ensuring healthy lives and promoting well-being for all at all ages, ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all, promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, and lastly, ensuring sustainable consumption and production patterns. Food safety management will ensure that consumers are not subjected to unsafe food thus ensuring healthy lives and promoting well-being of everyone. When people are healthy, they are able to go to school and work hard hence promoting the country's economy. This will lead to ending of hunger and poverty which leads to the achievement of food security. With food security, there will be improved nutrition. When people eat well, they are able to be productive at their work hence ensuring sustainable consumption and production patterns.

Elsewhere Cushman *et al.*, (2001) note that food-borne illness outbreaks are on the rise and food safety continues to be a major concern since food borne illnesses has potential to attack patrons through a variety of ways. A study by Hedberg *et al.*, (2006) established that *Norovirus*, an RNA virus known for gastroenteritis outbreaks was confirmed or suspected in 42% of all restaurant food borne illness outbreaks. Bacteria *Salmonella* and *Clostridium perfringens* were the next common microorganisms found in outbreaks that accounted for 19% of identified outbreaks and suspected in 28% of outbreaks. The contributing factors of these outbreaks were infected employees who handled food (65%) and bare-hand contact with food (35%). The researchers point out a lack of effective monitoring of employee illness or a lack of commitment to enforcing policies regarding ill food workers and that food safety certification of kitchen managers appear to be an important outbreak prevention

measure, and emphasize that managing food worker illness should be emphasized during food safety training programs. In support, Scallan *et al.*, (2011) found out that in the US, most (58%) of the food-borne illnesses were caused by norovirus followed by *Salmonella* spp. (11%), *Clostridium perfringens* (10% and *Campylobacter* spp. (9%).

However, according to Mukhola (2000) it is not easy to maintain medical control over food handlers in food establishments due to their rapid turnover. Indeed the temporary nature of food handlers jobs makes it difficult to track them. Besides, Clayton & Griffith (2008), state that the pre-employment and routine medical examination of food handlers is not cost effective and is often unreliable in the prevention of food-borne diseases hence the key to preventing food borne disease is to educate and train food handlers.

Compounding the management of food safety is the fact that the managers themselves are not trained on food safety management. Egan *et al.*, (2006) observe that less than 20% of managers in the foodservice industry have been trained in the supervisory role of food safety; therefore the lack of training restricts their ability to assess food safety risks and convey proper hygiene training to their staff. Given these challenges, Wallace (2014) points out that food safety remains a key public health challenge in the 21<sup>st</sup> century, both in developed and developing countries and empirical data shows that there are weaknesses in the way that food safety is managed, even in large food businesses.

A study by Nyamari (2013) on evaluation of compliance to food safety standards amongst food handlers in selected hospitals in Kenya revealed that there were several barriers that affected compliance to the food safety standards in Kenyan hospitals. In

complement, Kitagwa *et al.*, (2012) conducted a study in Eldoret Town in Uasin Gishu County to assess knowledge, attitudes and practices of food handlers in food kiosks in relation to food and hygiene and found that behavioral practices were inadequate. In regard to this, understanding of the determinants of food safety management in the hotels is therefore crucial.

### **1.3 Problem statement**

WHO regards illness due to contaminated food as one of the most widespread health problems in the contemporary world (Mukhola, 2000). Food safety issues are an important challenge to the public health sector because many cases of food-borne illnesses are unreported and unrecognized, yet this type of illness is a significant contributor to the burden of disease in less developed countries and causes death and suffering even in the richest countries of the world (The Worldbank, 2000).

In Kenya, food poisoning or food-borne illness is quite prevalent. A report by WHO and FAO (2005) indicates that in 2004, the following incidences were observed in Kenya: gastroenteritis (722,275 cases), typhoid (643,151 cases), dysentery (600,660 cases), aflatoxin poisoning (323 cases), brucellosis (198 cases), and cholera (56 cases). However, according to Gachuki (2012) the incidences of food-borne diseases are not easy to estimate in Kenya as most of them are lumped together when recording as diarrheal disease and WHO estimates that up-to 70% of diarrheal diseases may be caused by contamination through unhygienic food handling practices, infected food handlers and lack of appropriate knowledge on food-borne diseases by food handlers (World Bank, 2000). The report by WHO and FAO (2005) further indicates that human resource capacity in Kenya is inadequate in terms of knowledge in food safety management tools and that Kenya lacks a defined and published policy

on food safety as part of a wider National Food and Nutrition Policy although there exists food laws designed to protect the consumers. It is only recently (February 2014) that it was announced over the media that the government is working on developing a food safety policy. A report by WHO (2008) revealed that very little research work and surveillance of food-borne diseases has been done in Africa and Kenya in particular. Ko (2011) notes that a lack of food poisoning knowledge is apparent among food service employees and suggests that further research should be done on catering employees' knowledge, attitude, and behavior toward food poisoning.

Despite the fact that many studies have been done on employee's knowledge and practice of food safety management, they have only been concentrated at assessing the knowledge level and its association with practice among foodservice employees in food kiosks, restaurants, school/college cafeterias, hospitals, and street food vendors. However, no study has been done among food handlers in rated hotels. This could lead to an assumption that food handlers in such facilities practice food safety and so there is no need for any empirical research. It was in this regard that this study attempted to assess the determinants of food safety management among food handlers in conventional hotels.

## **1.4 Objectives of the study**

### **1.4.1 Main objective**

To assess the determinants of food safety management among food handlers in selected hotels in Eldoret Town, Kenya.

### **1.4.2 Specific objectives**

1. To establish food handlers' knowledge and its effects on food safety management in selected hotels in Eldoret Town, Kenya.
2. To investigate food handlers' practices and its effects on food safety management in selected hotels in Eldoret Town, Kenya.
3. To analyze the relationship between food handlers' knowledge on food safety and food safety management in selected hotels in Eldoret Town, Kenya.
4. To establish the effect of food handler's selected demographic factors on food safety management in selected hotels in Eldoret Town, Kenya.
5. To assess the role of management in ensuring food safety management in selected hotels in Eldoret Town, Kenya.
6. To explore the effect of kitchen physical environment to the food handlers' food safety management in selected hotels in Eldoret Town, Kenya.

### **1.5 Research questions**

1. What is the level of knowledge of food handlers on food safety management in selected hotels in Eldoret Town, Kenya?
2. To what extent is food safety management practiced by food handlers in selected hotels in Eldoret Town, Kenya?
3. What role does management play in ensuring food safety management in selected hotels in Eldoret Town, Kenya?
4. To what extent does the kitchen physical environment affect food handlers' food safety management in selected hotels in Eldoret Town, Kenya?

## 1.6 Hypotheses

**H<sub>01</sub>:** There is no relationship between food handlers' knowledge on food safety and food safety management in selected hotels in Eldoret Town, Kenya.

**H<sub>02</sub>:** There is no association between food handlers' selected demographic factors and food safety management in selected hotels in Eldoret Town, Kenya.

## 1.7 Significance of the study

Food safety is a very important component for provision of quality food since food contamination can have several effects which have negative health and economic impacts. Healthwise WHO (1999) reports that in developing countries, diarrheal diseases are a major public health concern while economic impacts include loss of income by the affected individual, cost of health care, loss of productivity due to absenteeism, costs of investigation of an outbreak, loss of income due to closure of businesses, and loss of sales when consumers avoid particular products. For example bacterial food-borne illnesses cost US economy US\$ 6,777,000,000 in 1989 and this can only be far more severe in developing countries like Kenya (WHO, 1999). In agreement, the Centers for Disease Control points out that every year in the US an estimated 48 million illnesses, 12,000 hospitalizations, and 3,000 deaths are the consequence of food-borne illnesses (CDC, 2011). Further, Bekker (2003) and McSwane *et al.*, (2000) are of the opinion that outbreaks of food-borne illness can damage trade and tourism, lead to unemployment, loss of earning, litigation, reduced productivity by victims of the illness, loss of reputation and reduction in consumer confidence.

In order to reduce the high prevalence of food poisoning in Kenya, the government in February 2014 announced that a policy on food safety was being developed. This

makes one to question the level of food safety management in the hotels in the country hence the urgent need to address it. The former Tourism Cabinet Secretary Phyllis Kandie while visiting Western Kenya circuit early in 2015 pledged to revive the Western circuit. She said that:

“a lot of emphasis has been placed on beaches and safaris at the expense of other tourism attractions and that focus must shift to investing in the hotel industry in the area.”

She further stated that:

“the government is committed to promoting investment in the industry but is also concerned about the quality of services provided. We encourage people with big homes here in Kakamega to convert them into tourist sites because we have a shortage of bed-capacity in the region” (Daily Nation, April 12, 2015) (Appendix E).

In a separate incident while speaking in Kisumu during the opening of Wigot Gardens, madam Kandie said that “all hotels in Kenya will be rated to enable them become competitive in the international market.” She however pointed out that most hotels are yet to be registered as rating will make it easy to market our hotels and become competitive” (Appendix F). Indeed the rating was carried out in April 2015 and the results as outlined in the Kenya Gazette of 4<sup>th</sup> September, 2015 had only six out of the twelve hotels under study rated, most (4) being rated as two star, one three star and four star respectively (Appendix G). This is a clear indication that most of the hotels do not meet the required standards.



In agreement, the Cabinet Secretary for Tourism in Uasin Gishu County Phillip Meli while addressing participants at a Meetings, Incentives, Conferences, and Exhibitions (MICE) workshop in Kisumu on July 31<sup>st</sup>, 2015 pointed out that:

“the region lacks adequate accommodation and eating facilities since they are below the required standards thus cannot even be classified/rated. This leads to poor service delivery.”

He further added that “there is no professional body to look at the tourism operations and that the ministry lacks staff/personnel trained on tourism to manage tourism issues.” This leaves no doubt in one’s mind that there is a problem with the level of food service management in the country.

In support of the low standards in Kenyan hotels, the Tourism Regulatory Authority Director-General Lagat Kipkorir said hoteliers in the region had for years been blaming the tourism slump solely on insecurity, yet a drop in hotel standards had also contributed to the situation. He said that for the sector to recover there was a need for hoteliers to upgrade their hotels so that guests are provided with quality accommodation and services adding that tourists of the 20<sup>th</sup> century (I believe he meant 21<sup>st</sup> century) are concerned about quality services, (Daily Nation September 30, 2015, p.20) (Appendix H).

The findings from this study have established the level of knowledge and practice of food safety management in the area of study and outlined some of the factors that affect the practice of food safety management. This data may be useful in curriculum development for future training on food safety management and policy formulation on

guidelines to be included in the food safety policy that is being developed by the Government of Kenya so as to ensure that proper food safety practices are observed continuously in the hotel industry. The findings may also assist the hotel managers in knowing areas of weakness that need improvement so that quality is assured.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Overview**

This chapter includes a review of literature related to food safety management. The topics reviewed include food safety, food contamination, effects of food contamination, food safety knowledge, food safety practices, relationship between knowledge and practice of food safety management, factors affecting food safety management, challenges to food safety management, and food safety management in Kenya. The chapter also presents theoretical framework, and conceptual framework for the study.

#### **2.2 Food Safety**

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food-borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. WHO (2006) defines food safety as actions aimed at ensuring that all food is as safe as possible and outlines the five key principles of food hygiene (five keys to safer food) which should be observed by all food handlers. These five keys to safer food include: keep clean, separate raw and cooked; cook thoroughly, keep food at safe temperature; use safe water and raw materials. Food handlers should ensure personal hygiene which include issues such as washing hands before handling food and often during food preparation, washing hands after going to the toilet, washing and sanitizing all surfaces and equipment used for food preparation, protecting kitchen areas and food from insects, pests and other animals.

When handling food it is important to separate raw meat and seafood from other foods using separate equipment and utensils such as knives and cutting boards for handling raw foods and storing food in containers to avoid contact between raw and prepared foods (WHO, 2006).

The foods should be cooked thoroughly especially meat, poultry, eggs and seafood to a temperature of 70°C to ensure they are safe for consumption. This temperature kills even highly concentrated microorganisms in 30 seconds. A thermometer should be used to check the internal temperature of cooked foods which should be placed in the centre of the thickest part of food. In the absence of a thermometer, cook the meat until the juices are clear and inside no longer pink. Cooked foods should also be reheated thoroughly (WHO, 2006).

Cooked food should never be held at room temperature for more than 2 hours but should be promptly and appropriately cooled and refrigerated. Also all cooked and perishable foods should be stored below 5°C, hot foods should be kept piping hot (>60°C) prior to serving, and generally keep foods out of the danger zone (between 5°C and 60°C), not storing food longer than 3 days in the refrigerator, and not thawing frozen food at room temperatures (WHO, 2006).

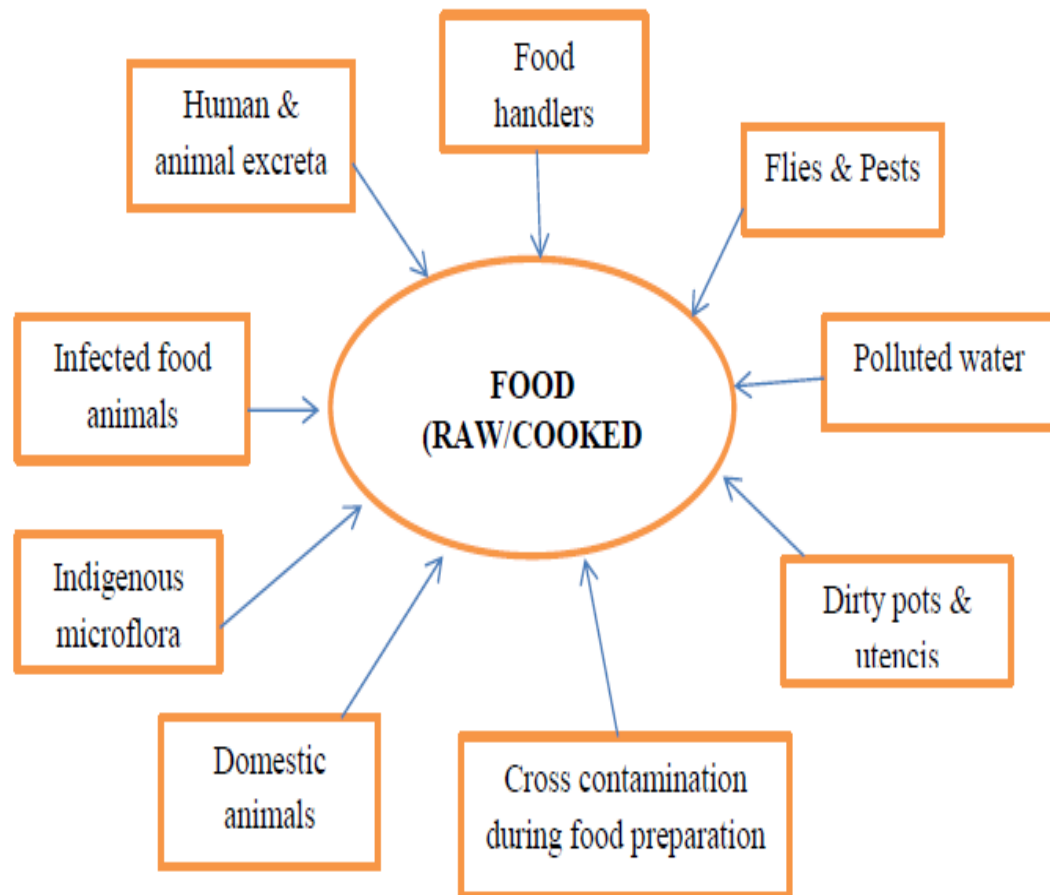
Determination of how food safety is managed in hotels is important in ensuring that foods prepared in the hotels do not pose any danger to the customers.

### **2.3 Food contamination**

WHO (2008) defines contamination as “the introduction or occurrence of a contaminant in food environment which causes food to be unsafe. World Bank states that unsafe food contains hazards that can make people sick, either immediately or by

increasing their risk of chronic disease and outlines the following as hazards that receive attention from policy makers: microbial pathogens which include microorganisms like *Salmonella*, *Listeria*, *Campylobacter*, or *E. coli* that occur naturally in animals, humans, or the environment; zoonotic diseases like tuberculosis or brucellosis that can be transmitted from animals to humans through food; parasites such as intestinal worms that are transmitted through contaminated water or food; adulterants which are physical contaminants in food like metal or glass, or other non-food elements such as rodent feces; mycotoxins which naturally occur on plants or in animal products when animals eat feeds containing mycotoxins; antibiotic drug residues which remain in animals when an animal receives antibiotic drugs through feeds or improper treatment; pesticide residues that result from pesticide use in production and distribution; heavy metals which enter food through the soil or water; and GMOs in which genetically modified foods may contain allergens or toxins that are not found in conventional foods. Out of these, reported incidence of foodborne illness from microbial pathogens has been seen to be on the increase worldwide (The World Bank, 2000). Food may be accidentally or deliberately contaminated by microbiological, chemical or physical hazards.

WHO (1999) developed a framework that outlines the various sources of food contaminations to include food handlers, flies and pests, polluted water, dirty pots and cooking utensils, domestic animals, indigenous microflora, infected food, animals and human excreta (figure 2.1).



**Figure 2.1: Sources of food contamination**

Source: WHO (1999)

However, of these, only a small number of factors related to food handling have been found to be responsible for a large proportion of food contamination and food borne disease episodes everywhere. Ball *et al.*, (2013) outline these factors to include preparation of food several hours prior to consumption, combined with its storage at temperatures which favour growth of pathogenic bacteria and/or formation of toxins, insufficient cooking or reheating of food to reduce or eliminate pathogens, cross contamination, people with poor personal hygiene handling the food, preparation, cooking, storage, serving of food using dirty utensils/equipment.

It is therefore important that a food handler poses a thorough understanding on these factors so that they take the necessary measures to ensure that food is not contaminated at all levels in the food flow.

#### **2.4 Effects of food contamination**

Food contamination can have several effects including social, health and economic impacts. Kitagwa *et al.*, (2012) point out that contaminated food leads to food-borne illnesses which lead to loss of tourism, loss of trade, loss of food, increased health care costs, and loss of productivity which all result in economic losses for a country thus leading to poverty and underdevelopment. Furthermore, Barbara *et al.*, (2012) state that the impacts of food contamination range from thousands of dollars to meet the cost of monitoring analysis, to many millions of dollars due to court prosecutions, bankruptcy, product disposal, compensation for revenue loss, damage to brand or reputation, or loss of life. For example, Marriott (1999) cites Harrington (1992) as reporting that direct costs of food borne illness outbreak can approximate \$75 000 per food service establishment including investigation, clean up, re-staffing and restocking, product loss, settlements and increased regulatory sanctions.

It is therefore important that proper mechanisms are put in place to ensure that food-borne illnesses are prevented as much as possible from occurring so as to ensure the growth of tourism and ensure a healthy productive nation.

#### **2.5 Food safety knowledge**

Food safety is receiving more attention worldwide with a rising incidence of food-borne diseases, concern over new potential hazards and growth in agricultural trade. As such, knowledge and best practices in this field are rapidly evolving and therefore a progressive food safety regulatory system should include the ability to address food

safety from farm to table, the use of comparative risk assessment to prioritize public action, an emphasis on prevention rather than inspection, an open decision making process involving stakeholders, and evaluation of public health outcomes (The World bank, 2000).

Many studies have been carried out to establish food safety knowledge among the stakeholders and some studies have demonstrated that there is inadequate food safety knowledge and practices among all job categories with the highest knowledge score being in personal hygiene and lowest knowledge score been seen in food preparation, purchasing and storage ((Fawzi & Shama, 2009; Ko, 2011). Shu-Yin (2011) found out that part time employees such as students did not have adequate knowledge on food safety management and suggests that emphasis on food safety training for part-time employees is needed to ensure these employees have appropriate food safety knowledge and attitudes to ensure that food safety practices are followed.

In support, Egan *et al.*, (2006) observe that less than 20% of managers in the foodservice industry have been trained in the supervisory role of food safety therefore most of the managers lack food safety knowledge. This lack of training restricts their ability to assess food safety risks and convey proper hygiene training to their staff. To complement this, a study that uncovered food handlers and managers' perceptions of hygiene training, found that 80% of untrained food handlers interviewed indicated that their managers had not discussed nor provided food hygiene training during their early stages of employment (Seaman & Eves, 2009). Reasons for the lack of training were identified to include costs of training programs, a lack of course availability particularly free food safety courses, and a time for when the food handlers would be



trained. Even high employee turnover can mean a loss of food safety practice as soon as the food handler is trained (Hume, 2005).

In an attempt to deal with increasing cases of food-borne illnesses, food safety courses are administered worldwide as a means to inform food service workers on matters of food safety and available data suggest that the food service industries are more likely to hire workers trained in food safety (Hine *et al.*, 2003 as cited in Nyamari, 2013). However, several studies have found conflicting results after these trainings. Hammond *et al.*, (2005) found that critical food violations actually increased after training while Ehiri *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, add 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.

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) as cited by Nyamari (2013) in their study of assessing food safety practices indicated 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 thus calling for the urgent need to improve on the education programs.

Webb & Morancie (2015) conducted a study on food safety knowledge of foodservice workers at a university campus by education level, experience, and food safety training in Trinidad and Tobago. The results showed that a total of 63.5% of the respondents had limited knowledge, 79% were well informed about hygiene practices, while 33.9% knew time-temperature control measures. The researchers reported a lack of strength of the relationship between education level and food safety knowledge in that no significant differences ( $p = 0.426$ ) were observed for mean knowledge scores between groups of food safety trained and untrained persons, and neither education level, nor the length of employment in the foodservice industry had a significant impact on food safety knowledge. The authors recommend that in order to improve food safety knowledge, attention should be given to the planning, implementation, monitoring, and evaluating food safety education programmes. They suggest an urgent need to remodel the food safety education training system to include regular workshops and training sessions. However, no studies have been done to establish food safety level among food handlers in hotel set ups.

## **2.6 Food safety practices**

Several studies have been done on food safety practices among food handlers with varied conclusions. For instance, Kibret and Bayeh (2012) in their study point out to a lack of basic infrastructure, poor knowledge of hygiene and practices in food service establishments as contributing factors to the outbreaks of food-borne illnesses while Green and Carol (2005) highlight the following factors as impacting the food workers and managers safe food preparation practices: time pressure; structural environments,

equipment, and resource; management and co-workers' emphasis on food safety, worker characteristics, negative consequences for those who do not prepare food safely; food safety education and training; restaurant procedures; and glove and sanitizer use. They argue that time pressure caused by high volumes of business and/or inadequate staffing make it difficult for workers to wash their hands, change their gloves, clean their cutting boards, check the temperatures of cooked and held food and cool and reheat foods properly. When it comes to structural environment, equipment, and resources, availability and accessibility of adequate resources such as sinks and adequate resources such as soap and gloves to facilitate hand washing and glove use; multiple color-coded cutting boards and separate work areas for different types of food help prevent cross contamination; and multiple thermometers, well-maintained equipment, and certain kinds of equipment including blast chillers and infrared thermometers to facilitate temperature control hinders practice of food safety. Additionally, not having enough work space, however, make cooling and holding foods at proper temperatures difficult.

The authors continue to say that managers and coworkers who emphasize safe food preparation and who pay attention to others' food preparation practices facilitate food safety. They outline several worker characteristics such as worker's experience, motivation, age, preferences for clean hands, concerns about appearing sanitary to customers, and expectations of reciprocal treatment from other food workers to have been found to have a positive impact on food safety. However, allergies to glove materials negatively impact glove use practices among some workers.

Furthermore, they point out that consequences of a behavior has been found to influence practices/behavior in that workers are more likely to engage in safe

practices when they know there would be negative consequences if they did not. These negative consequences could be for workers, for the restaurants, or for the restaurants' customers (Green and Carol, 2005).

Education and training of workers is also important in food safety management since workers think that food safety education and training is important to safe food preparation and therefore workers should be taught on *why* engaging in safe food preparation practices is important, not just *how* to engage in those practices. Additionally restaurant procedures and policies facilitate safe food preparation. For example, some restaurants require workers to record hand washing activities and food temperatures in logs which will ensure that proper procedures are followed every time. However, use of gloves and sanitizers may sometimes have a negative impact since some workers may sanitize their cutting boards without first cleaning them and use sanitizer instead of washing their hands and glove use may actually lower handwashing rates because some workers used gloves incorrectly (Green and Carol, 2005).

Youn and Jeanie (2002) categorize the barriers to implementing food safety practices into two: employee barriers which have to do with employee training and motivation and resource barriers which include the existence of established HACCP plan and time. This is supported by Chapman *et al.*, (2010) who observed that there is a positive impact on food handlers' behavior which is influenced by the presence of a food safety information sheet on practices within the foodservice environment. According to Yapp and Robyn (2006), the barriers to food safety compliance include the lack of trust in food legislation and enforcement officers, a lack of motivation in dealing with food safety legislation and a lack of knowledge and understanding.

There is therefore need to investigate the level of food safety practices among food handlers in conventional hotels.

### **2.7 Relationship between food safety knowledge and practice**

Van der Heijden *et al.*, (1999) note that despite the fact that “the etiology and mechanism for prevention and control of many food borne diseases are well known, this knowledge is often not applied in practice, even by the health professions.” In support, a study on the level of compliance with infection prevention and control (IPC) measures among health care workers (HCWs) by Gichuhi (2012) at Kapsabet District Hospital in Kenya revealed that HCWs had good knowledge on infection prevention and control. However, the researcher identified some barriers which limit their implementation of IPC. These barriers included frequent shortage of water, inadequate updates on education and an inactive IPC committee. The researcher therefore concluded that there was compliance with IPC, though there were some challenges to implementation that should be addressed. Similarly, Seaman and Eves (2006) indicate that the provision of knowledge to change food safety attitude and behavior has not been adequately proven and argue that food safety training will lead to an improvement in food safety if knowledge imparted reflects a positive change in behavior. According to MacAuslan (2003) training in food safety relies too heavily upon attaining a certificate rather than paying attention to achieving competency in food hygiene practices. In addition, Egan *et al.*, (2007) note that majority of food safety courses rely solely on the dissemination of information with very little emphasis on practice which is ineffective. As a result, Clayton *et al.*, (2002) complement that behavioral changes in food safety will not occur as a result of training alone. Indeed a study by Roberts *et al.*, (2008) revealed that food safety training can have a significant impact on improving knowledge and behaviors of food

operators however an increase in knowledge alone does not necessarily guarantee a change in behavior. Hence, implementation of food safety training regime must target both managers and foodservice workers (Campbell *et al.*, 1998).

Several studies have been done to confirm the above assertions that food safety knowledge alone does not translate into practice. Bolton *et al.*, (2008) researched on food safety knowledge of head chefs and catering managers in Ireland and found out that most Irish restaurant head chefs/catering managers have fundamental knowledge only in some aspects of food safety and practices and therefore concluded that it is important that all personnel in key positions to deliver essential standards in consumer food safety be supported through additional training and routine inspection to ensure that appropriate knowledge is acquired and effectively applied.

Another study by Clayton *et al.*, (2010) on food handlers' beliefs and self-reported practices of food safety management in small to medium food businesses in Wales showed that generally food handlers were aware of the food safety actions they should be carrying out but identified a number of barriers which prevent them from implementing these practices. These barriers included lack of time, lack of staff, and a lack of resources. The researchers state that despite 95% of respondents receiving food hygiene training, 63% admitted to sometimes not carrying out food safety behaviors and concluded that food safety practices will only be implemented given adequate resources and an appropriate management culture.

In Kenya Githiri *et al.*, (2013) conducted a study to assess the knowledge in food hygiene and hygienic practices in food handlers at a hospital in Nairobi. The findings revealed that food handlers performed well in knowledge items compared to the hygienic practices. This further confirms that knowledge in food hygiene does not

always result in a positive change in food handling practices. Hence the researcher concluded that there is a need for educational programs to not only improve knowledge but also emphasize on translation to practice. However, no study has compared the relationship between food safety knowledge and practice among food handlers in hotels.

## **2.8 Food safety management**

Food safety management includes a number of routines that should be followed by food handlers in order to preserve the quality of food and prevent the food from contamination. Ensuring food safety management entails identifying every potential hazard within a food service operation that could, if left uncontrolled, lead to an outbreak of food-borne illness (Payne-Palacio and Monica Theis, 2012). Yiannas (2009) asserts that ensuring conformance to food safety management by employees begins with creating food safety performance expectations that are clear, achievable, and understood by all. This means that employees at all levels need to know what is expected of them and what exactly they must do to achieve it which is the first step in creating a behavior-based food safety management system. He adds that an organization needs to make sure that employees understand the food safety performance expectations of their job and that at all levels they are held accountable for their actions. Organizations with enlightened safety cultures get the employees to do the right things, not because they are held accountable to them, but rather, because the employees believe in and are committed to food safety. They do the right thing not because the manager or customer is watching, but because they know it's right and they care. In this regard therefore, the goal of the food safety professionals should be to create a food safety culture not a food safety program.

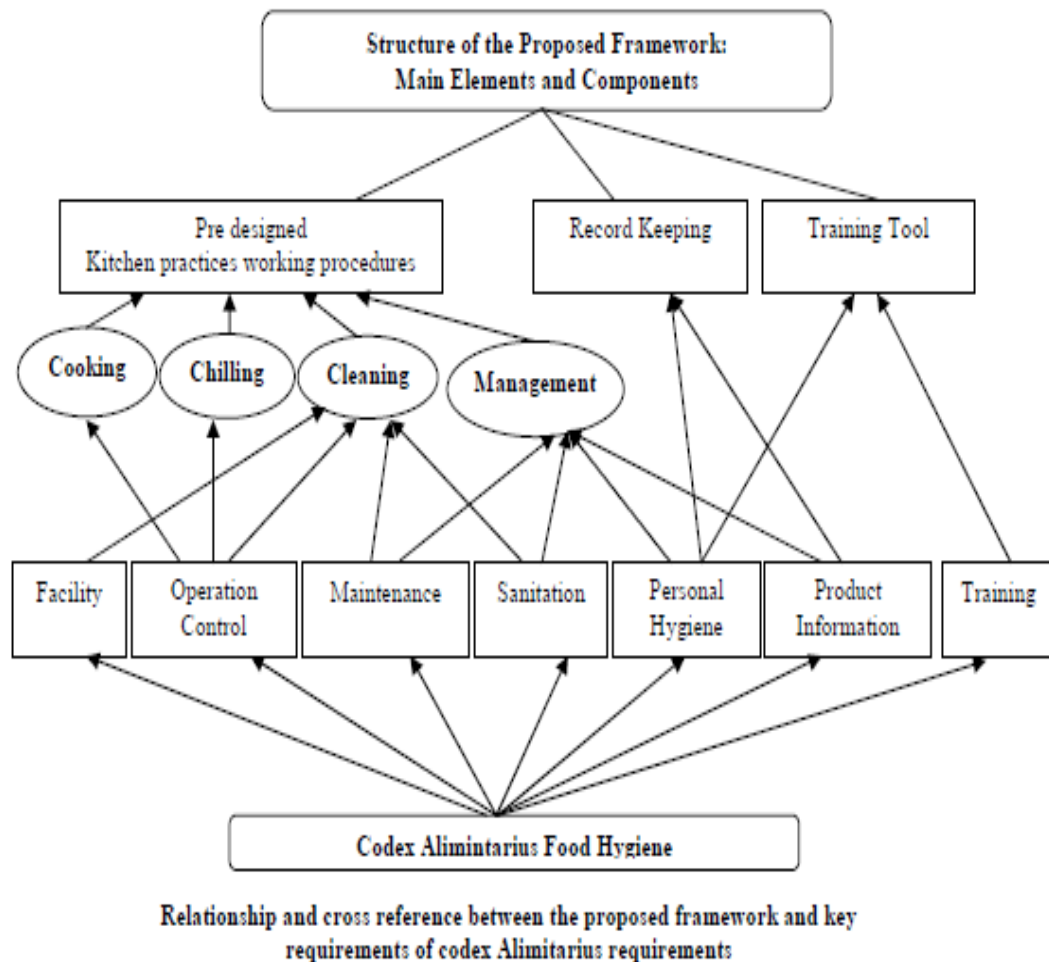
Food safety management is important because food safety issues are an important challenge to the public health sector as food-borne diarrhea remains one of the most common illnesses and cause of death in less developed countries. In fact, food safety is an issue of growing importance due to several worldwide trends in food systems such as growing movement of people, live animals, and food products across borders, rapid urbanization in developing countries, changes in food handling, and the emergence of new pathogens or antibiotic resistance in pathogens which all contribute to increasing food safety risks (The World Bank, 2000).

According to Green *et al.*, (2005), there are three principle components of a food safety management: person, environment, behavior. This means that facilities should be designed with food safety and sanitation in mind and they must comply with all relevant regulatory standards. The right equipment must be selected for the right job and employees must be provided with the proper tools necessary to do their work if food safety management is to be implemented.

Mohamady *et al.*, (2012) proposed a food safety management framework based on codex alimentarius by FAO and WHO which integrates internationally recognized and globally applicable food safety and quality management standards at different stages of the food safety management. The codex alimentarius recommends six general principles of food hygiene which include facility, operation control, maintenance, sanitation, personal hygiene, product information, and training. The framework proposed in figure 2.2 illustrates that in order to ensure food safety there should be pre-designed kitchen practices/working procedures in relation to cooking, chilling and cleaning. There is need to establish effective system to ensure appropriate cleaning and waste management in the facility so that maintenance and sanitation



issues are dealt with adequately. Concerning personal hygiene, it is recommended that those who come into contact with food either directly or indirectly should maintain an appropriate degree of personal cleanliness and behave and operate in an appropriate manner. This requires the maintenance of records of health status for routine medical checkups and training on personal hygiene so a training tool should be developed. It is also important that product information is provided whereby all food products should be accompanied by or bear adequate information to enable the next person in the food chain to handle, display, store, and prepare and use the product safely and correctly. Last, training is paramount in food safety management and therefore those engaged in food operations directly or indirectly should be trained on food safety and/or instructed in food hygiene so that they are aware of their role and responsibility in protecting food from contamination or deterioration. In order for this to happen, a training tool should be developed to take care for both in-service and orientation plans.

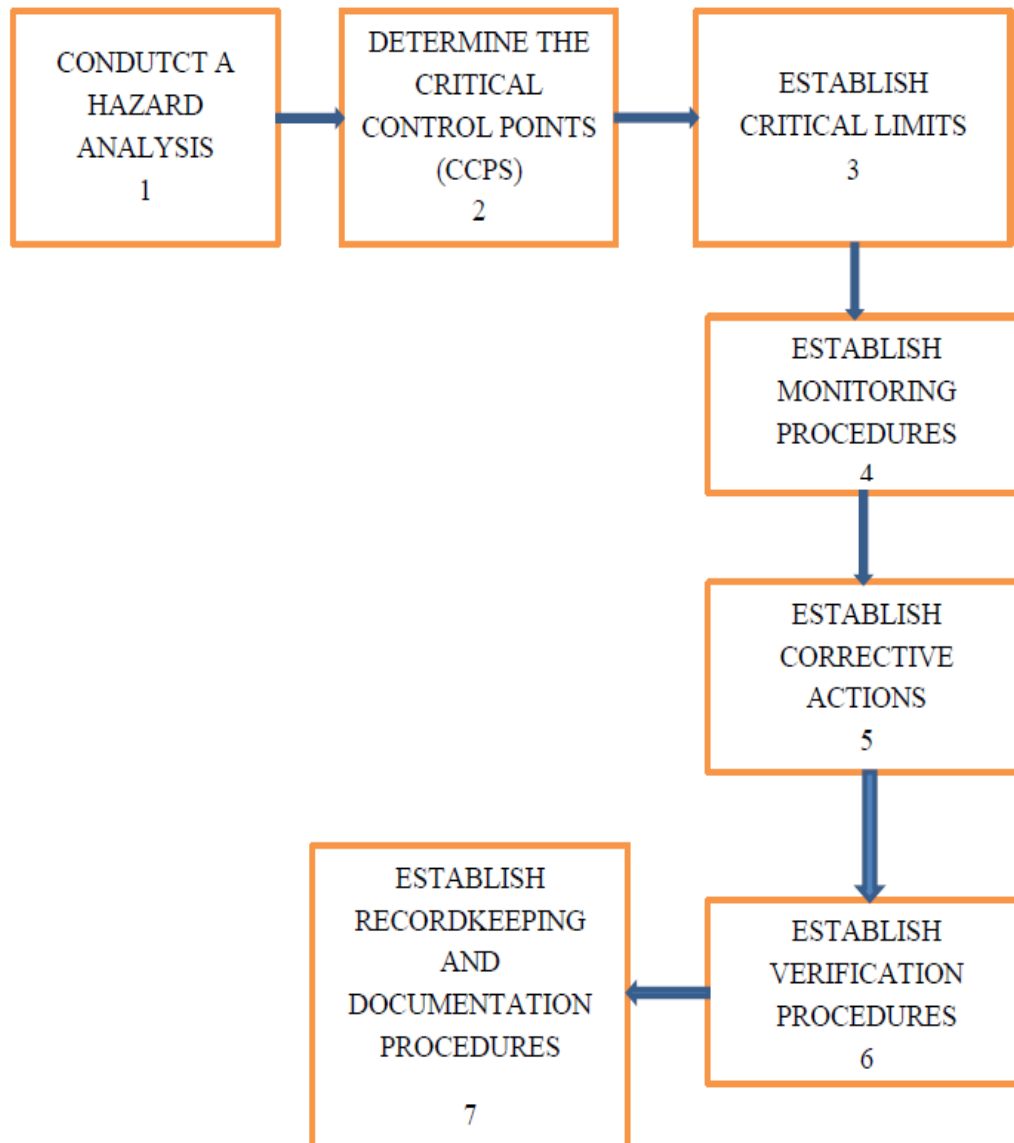


**Figure 4.2: Food safety management framework**

Source: Mohamady et al., (2012, p.143)

In order to implement food safety management in a food establishment, it is recommended that a food safety management system be in place. This system includes having pre-requisite programs in place and good manufacturing practices such as a Hazard Analysis and Critical Control Point (HACCP) (Geller 2005 cited in Yiannas 2009). HACCP is a proactive process of consecutive actions to ensure food safety to the highest degree through the identification and control of any point or procedure in a specific food system, from receiving through service, where loss of control may result in an unacceptable health risk (Payne-Palacio and Monica Theis, 2012). The codex alimentarius recommends a HACCP-based approach to food safety management (Figure 2.3). The HACCP system consists of seven principles which

entail conducting a hazard analysis which requires that potential hazards to the food safety are recognized in addition measures to regulate and control the hazards are identified, determining the (CCPs) whereby the critical points throughout the production process of the product are established, establishing critical limit(s) that must not be exceeded for each activity, establishing a system to monitor control of the CCP, establishing the corrective action to be taken when monitoring indicates that a particular CCP is not under control, establishing procedures for verification to confirm that the HACCP system is working effectively, and establishing documentation concerning all procedures and records appropriate to these principles and their application. This means maintaining a log system of all the CCPs including records of CCP control methods and actions taken to correct potential problems (Payne-Palacio and Monica, 2012). An understanding of food safety procedures and potential factors that cause food-borne illness is very important for all food handlers. Cohen *et al.*, (2001) state that “only knowledgeable, motivated, and skilled employees who are trained to follow the proper procedures together with management that effectively monitors employees’ performances can ensure food safety”. An understanding of management roles in food safety management in hotels is necessary.



**Figure 2.3: Logical sequence for the application of HACCP**

Source: Payne-Palacio and Monica (2012, p.88)

## 2.9 Factors affecting food safety management

Several studies have been done with varied findings on the possible factors that affect food safety management. Ball *et al.*, (2013) identified the following ten background factors, which are deemed to affect the implementation of Food Safety Management Systems (FSMS): Conscientiousness; Adaptability/willingness to change; Work unit factors; Senior manager commitment to food safety; Workplace atmosphere; Training; Firm's production system factors; Firm's production priorities; Firm's

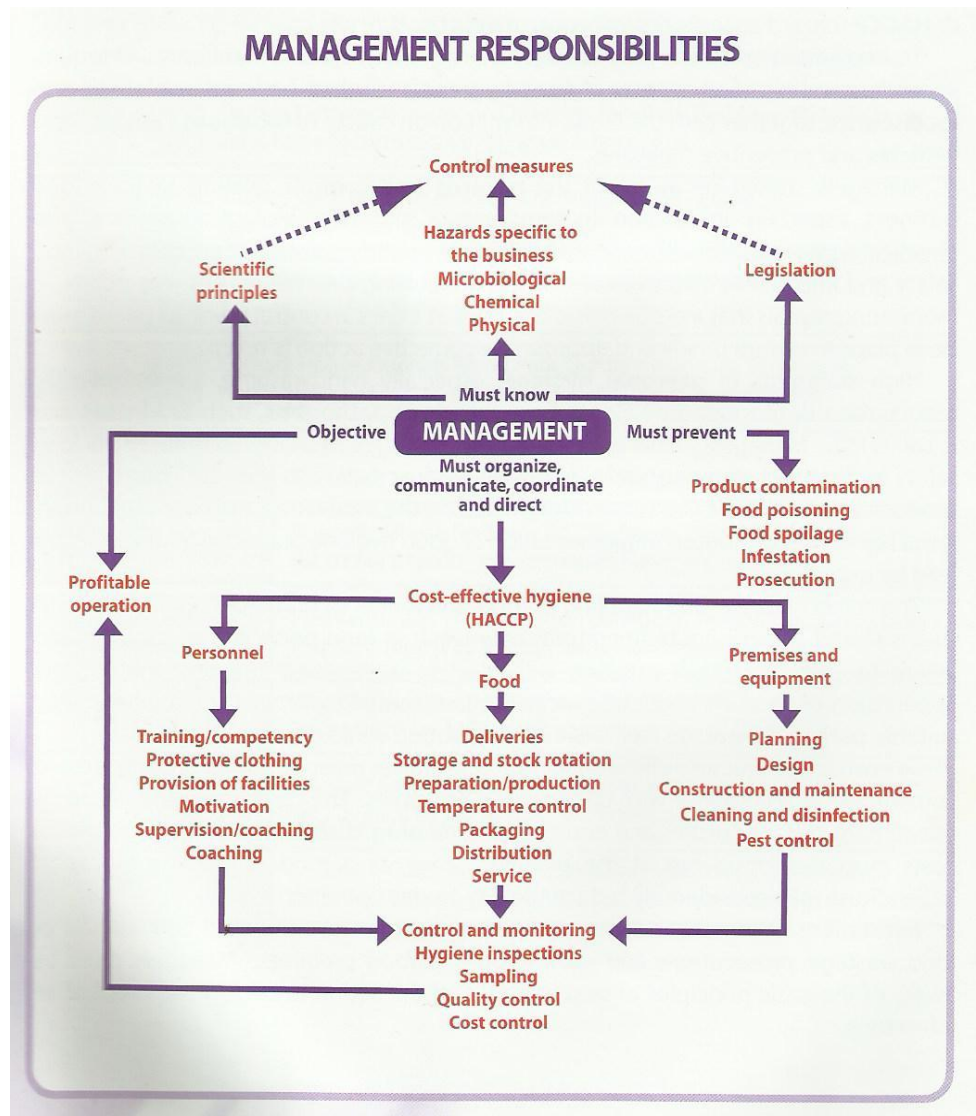
approach to FSMS implementation and Firm's food safety program requirements. Elsewhere, McCabe-Sellers & Beattie, (2004) argue that the reasons for outbreaks include: epidemiological selection, lack of quality assurance in foodservices, and most importantly a failure of food handlers to follow critical behaviors that mitigate the potential for food borne illness.

According to Yiannas (2009) the most common reason managers give as to why people at work don't do what they are supposed to do is, "they don't know what they are supposed to do." Other factors that have been found to be important in food safety management include age, ethnicity, food safety training, and knowledge of food safety while the duration of food vending has been found to have an inverse relation with food practice in that short duration vending maintained better food safety practices (Rahman *et al.*, 2012). However, knowledge of food hygiene practices has been found to be higher than knowledge on food poisoning among the employees as most employees think that food sanitation training was not important (Ko, 2011).

The terms of employment are also factors in food safety management. For example, full time employees have been found to have higher mean total scores for food safety knowledge, attitudes, practices, and training compared to student employees who are on short term employment terms and so emphasis on food safety training for part-time employees is needed to ensure these employees have appropriate food safety knowledge and attitudes to ensure that food safety practices are followed (Lin, 2011).

Environmental/work-site has also been found to affect food safety. According to Nyamari (2013), environmental/work-site barriers must be taken into consideration in order to ensure food safety behavior/practices. Some of the work-site barriers have been identified to include lack of technical resources, poor working conditions, high

staff turnover, lack of funds for training, lack of time, and lack of staff (Seaman & Eves, 2006; Clayton, 2002). WHO (2008) points out that food worker need a work environment that promotes the production and preparation of safe food. Workers particularly in developing countries often lack sanitary and others services e.g appropriate toilet and hand washing facilities that would improve the safety and quality of the foods they produce. Factors that play a significant role on employees' behaviors are directly correlated with organizational structure in the company, the level of job satisfaction, labor conditions and relations between employees and their supervisors. Food safety practices will only be implemented given adequate resources and the proper attitude of management. Seaman & Eves (2006) concur that proper food handling and effective implementation of training programs depend highly on qualified, positive managers. According to Sprenger (2008) managers must know the legal requirements placed on them and the business by having knowledge of relevant food safety acts and regulations, plus the role and powers of enforcement agencies and officers, as well as ensure that the business complies with legislation and can prioritize its food safety activities to remain profitable. Figure 2.4 illustrates the various management responsibilities in FSM.



*Figure 2.4: Management responsibilities in FSM*

Source: Sprenger (2008, p.6)

## 2.10. Challenges to food safety management

According to Alli (2004), the following underlying forces may make food-borne illnesses even more of a problem in the years to come: insufficient training of food handlers, improper food preparations, storage practices among both the food handlers and consumers, emerging pathogens, increasing informal food trade, increasing global food supply, potential risks associated with dioxins and acrylamides formed in foods

during cooking processes or naturally occurring in foods, potential risks of reusing cooking oils, increasing number of people at risk because of aging and compromised capacity to fight food borne illnesses, presence of residues of antibiotics in food, food allergens and allergies, safety of foods from biotechnology (genetically modified organisms), and the safety of some herbal supplements. Additionally, Whitworth (2014) asserts that there has been a significant reduction in food-borne illness program capacity as reported by the National Environmental Health Association (NEHA). The report identifies trends such as staff capacity, environmental health food safety training opportunities, outbreak detection and response capacity, capacity to implement control measures and prevention activities and inter-agency collaborations and co-operations as the major challenges to managing food-borne illness.

Furthermore, several studies have outlined the contributing factors to the high prevalence of food borne diseases as: lack of basic sanitation and use of untreated night soil as fertilizer introduce pathogens into the food chain, time and temperature abuse, poor personal hygiene and improper hand washing, cross contamination, contaminated ready-to-eat foods such as salads, lack of knowledge about food safety measures, lack of fuel for cooking and inappropriate food storage facilities, rapid increase in population growth combined with massive migrations to urban areas which have led to the formation of urban centres of high population density, improved standards of living which have led to the increase in consumption of food of animal origin leading to an increase in the risk of the exposure to meat and poultry borne pathogens, change in lifestyles due to urbanization which has led people to eat more home meat replacements in food establishments, lack of education programs for food handlers, tradition and beliefs such as considering babies stool not to be dirty and eating raw meat, milk and fish despite the risks that they pose, increase in the number



of international travelers, failures/errors during food processing, international trade in food and animal feed, and increase in urban population which has outstripped the development of the health related infrastructure including basic sanitation. In addition, the size and diversity of the food industry, both formal and informal has made it virtually impossible for regulatory officials to continuously monitor all aspects of food safety (Medeiros, 2001; McSwane, *et al.* 2000; Van der Heijden *et al.* 2000 and Marriot 1999).

### **2.11 Food safety management in Kenya**

In Kenya, the responsibility for coordinating the multiple institutions (agencies) involved in food safety management rests on the Department of Public Health (DPH) under the Ministry of Public Health and Sanitation. The basic Kenyan laws for food safety enforced by DPH include the Food, Drugs and Substances Act, Chapter 254, the Public Health Act, Chapter 242 and the Meat Control Act, Chapter 316. However, it is just recently in November 2015 when the Council that was established by an act of parliament No.12 of 2013 (the Public Health Officers and Technicians Council - PHOTC) as a means of addressing the need to streamline and regulate the public health training (Environmental Health) and practice in Kenya was launched on 3<sup>rd</sup> November, 2015 (Daily Nation, 3<sup>rd</sup> November, 2015). It was also the same time that the policy document was disseminated. The objective of the PHOTC is to exercise the general supervision and control over the training, practice and employment of public health officers and technicians in the country.

Food poisoning or food-borne illness is quiet prevalent in Kenya as earlier indicated in a report by WHO and FAO (2005). Several cases of food poisoning have been reported from various parts of the country by the Kenyan Ministry of Health and the

foods that have been found to be involved include milk and milk products, meat and meat products, maize flour, bread, scones and other wheat products, vegetables, lemon pie pudding, beef, chicken and fish. According to Ombui *et al.*, (2001), under-reporting, inadequate investigation of outbreaks and inadequate diagnostic facilities in the country could suggest that food-borne disease outbreaks are more than is recorded by the Ministry of Health. Additionally, a high number of food-borne poisoning cases have been treated as outpatients in various health facilities

Majority of food handlers especially in food kiosks have not received any formal food hygiene training as a result, they do not have a high level of general food hygiene knowledge which leads to poor food handling habits. Consequently, the majority of the foods prepared do not meet the sanitary standards prescribed by Kenyan legislation. For example, with the exception of the water samples analyzed, all the other samples tested positive for microbial growth at 37°C, *Escherichia coli*, *Staphylococcus aureus* and *Salmonella spp.* Food handlers tested positive for *Staphylococcus aureus* in their throats, with 75% of the food handlers having this organism on their hands. Therefore, food handlers act as a good source of contamination (Kitagwa *et al.*, 2012).

A study on evaluation of compliance to food safety standards amongst food handlers in selected hospitals in Kenya revealed that lack of food safety training, poor working conditions, rapid turnover, lack of sufficient equipment, lack of water, lack of recognition by the hospital management and insufficient supervision are some of the major barriers influencing noncompliance to food safety standards in Kenya (Nyamari, 2013). This shows that there is a lot that still needs to be done in order to ensure that food safety standards are practiced in Kenyan hospitals.

The FAO/WHO (2005) reports that human resource capacity is inadequate in terms of knowledge in food safety management tools such as HACCP and Risk Analysis among food inspectors and food safety managers in micro, small, and some medium scale enterprises. Despite the availability of food standards and regulations that make reference to the Codex texts, their implementation and enforcement is not coordinated and reference is made to internationally recommended practices, but do not make reference to local standards. In many countries in the developing world including Kenya, the personnel handling food is not proficient and hence the standards set are not strictly followed (World Bank, 2005).

According to Tompkins (2001) as cited by Nyamari (2013), the human resource involved in inspection and food management is limited in the knowledge of key food safety management tools such as the HACCP and science based risk assessment. Jeo (2010) found out that there is common misplacement of human resource in the food industry in Kenya despite having trained food technologists. For example, food inspection involving visual inspection and random sampling for laboratory analysis is supposed to be done by agencies such as Kenya Bureau of Standards and DPH at various critical points in the food chains (GAIN, 2005) and unsafe food is supposed to be confiscated and destroyed together with closure of unhygienic premises and prosecution of the accused parties.

However in many instances, inspection actions are directed to the end products and not the process involved and often is done in response to an identified case(s), or food borne outbreaks and alarm raised about specific products in the market (Jongen, 2002 in Nyamari 2013). Furthermore, frail enforcement efforts by the agencies, low penalties and widespread corruption have hampered the inspection process.

Compounding this process is the fact that the existing laboratory services used by the regulatory agencies are limited in time and scope (Wangalachi and Oiye, 2010 in Nyamari, 2013). To cater for the gap, the agencies have entered into collaboration with research institutes such as Kenya Agricultural Research Institute and International Livestock Research Institute (ILRI) to cover food safety issues that are not satisfactorily handled (FAO/WHO, 2005).

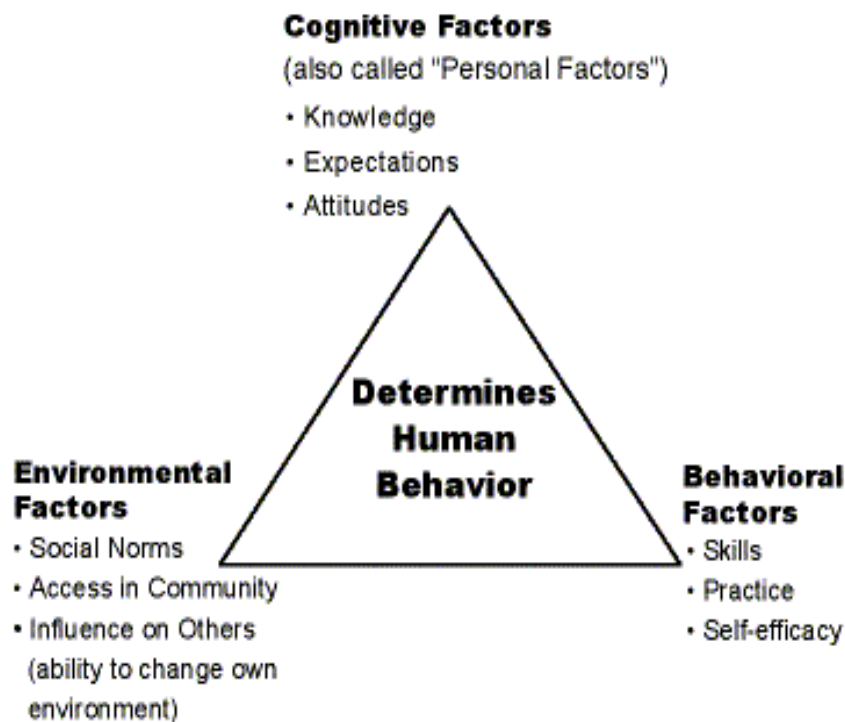
This therefore means that even those that are charged with the responsibility of enforcing the food safety laws lack the ability to perform their duties due to inadequate knowledge and resources.

## **2.12 Theoretical framework**

There are several theories that have been developed to explain human behavior which can be applied in food safety management. These theories include: behavioral theory, social cognitive theory, health belief model, theory of reasoned action, trans theoretical model, and social marketing. This study however was based on two theories: The Social Cognitive Theory and the Health Belief Model.

The Social Cognitive Theory (SCT) by Albert Bandura (1977) emphasizes that learning occurs in a social context and that much of what is learned is gained through observation. There are three core concepts at the heart of social learning theory. First is the idea that people can learn through observation. Next is the idea that internal mental states are an essential part of this process. Finally, this theory recognizes that just because something has been learned, it does not mean that it will result in a change in behavior. There are therefore cognitive/personal, behavioral and environmental factors that determine human behavior. The cognitive/personal factors include knowledge, expectations, and attitudes. The behavioral factors include skills,

practices, and self-efficacy while the environmental factors include social norms, access in community, and influence on others (Huitt & Hummel, 1999). Figure 2.5 illustrates the relationship between the three core concepts in this theory.

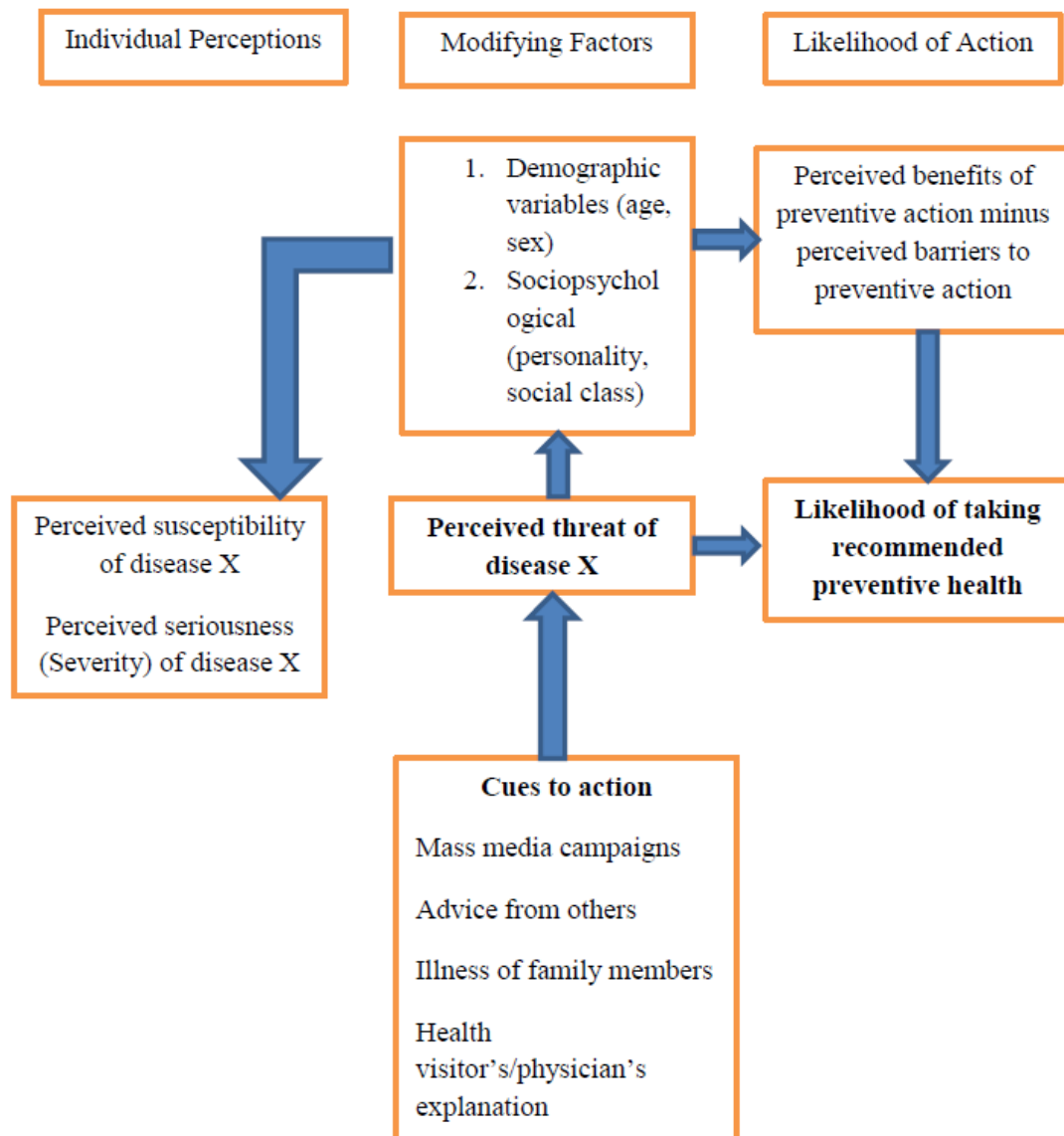


*Figure 2.5: Social Cognitive Theory Model*

Source: Huitt & Hummel (1999, p.21)

The Health Belief Model (HBM) is a psychological model that attempts to explain and predict health behaviors. This is done by focusing on the attitudes and beliefs of individuals. The model is based on the idea that one will only change their health behavior if given a good reason to change it (DiClemente *et. al.*, 2013). The HBM model has the following constructs: perceived seriousness/severity, perceived susceptibility, perceived benefits, perceived barriers, cues to action, motivation factors, and self efficacy. These concepts were proposed as accounting for people's "readiness to act." Perceived seriousness/severity speaks to an individual's beliefs about the serious/severity of a disease while perceived susceptibility speaks about

how one is at risk of getting a disease. The perceived benefit is a person's opinion of the value or usefulness of a new behavior in decreasing the risk of developing a disease. According to Hayden (2014), people tend to adopt healthier behaviors when they believe the new behavior will decrease their chances of developing a disease. Perceived barrier is an individual's own evaluation of the obstacles in his/her way to adopting a new behavior. Motivating factors are the individual characteristics that influence personal perception such as culture, level of education, past experiences, and skills. Cues to action are events, people, or things that move people to change their behavior. They act as reminders to a behavior. Self efficacy is one's belief in his/her own ability to do something (Bandura, 1977). Generally people do not try to do something new unless they think they can do it. If someone believes a new behavior is useful (perceived benefits), but does not think he or she is capable of doing it (perceived barrier), chances are that it will not be tried (Hayden, 2014). Figure 2.6 shows the relationship between the various constructs of HBM.



**Figure 2.6: Health belief model**

Source: DiClemente et al., (2013, p.34)

In this study, the three elements in the Social Cognitive Theory (personal, behavioral and environmental factors) important in determining behavior were found to be applicable in the practice of FSM. From this study it was clear that person factors such as demographic factors and personal hygiene were found to affect food safety management. The behavior of the food handlers in terms of their actual engagement

in food safety practices was also found to affect food safety management and lastly, several environmental factors such as physical features, availability and accessibility of resources, management support and involvement were found to affect food safety management.

The constructs of the Health Belief Model that were identified to have an effect on behavior change as far as FSM is concerned are perceived susceptibility, perceived severity, perceived costs and benefits (barriers and motivators), self-efficacy and cues to action (confidence in engaging in an activity). Susceptibility is the level of risk that the food handler himself/herself is at in acquiring food borne illness if no proper food safety management is practiced. Perceived severity is the magnitude of the effect of food contamination as emphasized by the management. Perceived costs and benefits have to do with what the food handlers see as barriers and motivators of engaging in the desired behavior (FSM). If there are neither consequences of not engaging in good FSM practice nor rewards for engaging in good FSM practice then it is not necessary to engage in the desired behavior of good FSM practice. Cues to action refer to events that trigger a person to engage in a desired behavior. For this case a likely cue to action would be engagement in FSM practices by other food handlers, presence of the supervisor, and presence of food safety information charts. Self efficacy which is the confidence that an individual has on himself/herself to carry out an activity has to do with the skills that a person has to adequately carry out their duties. If one feels that they are not skilled enough then they will not be able to carry out the duty well. Food handlers can only have self efficacy if they are well trained on “how” to do their work rather than just “what” should be done thereby calling for more emphasis on the practical application of the theory learned as far as FSM is concerned if knowledge is to translate into practice.

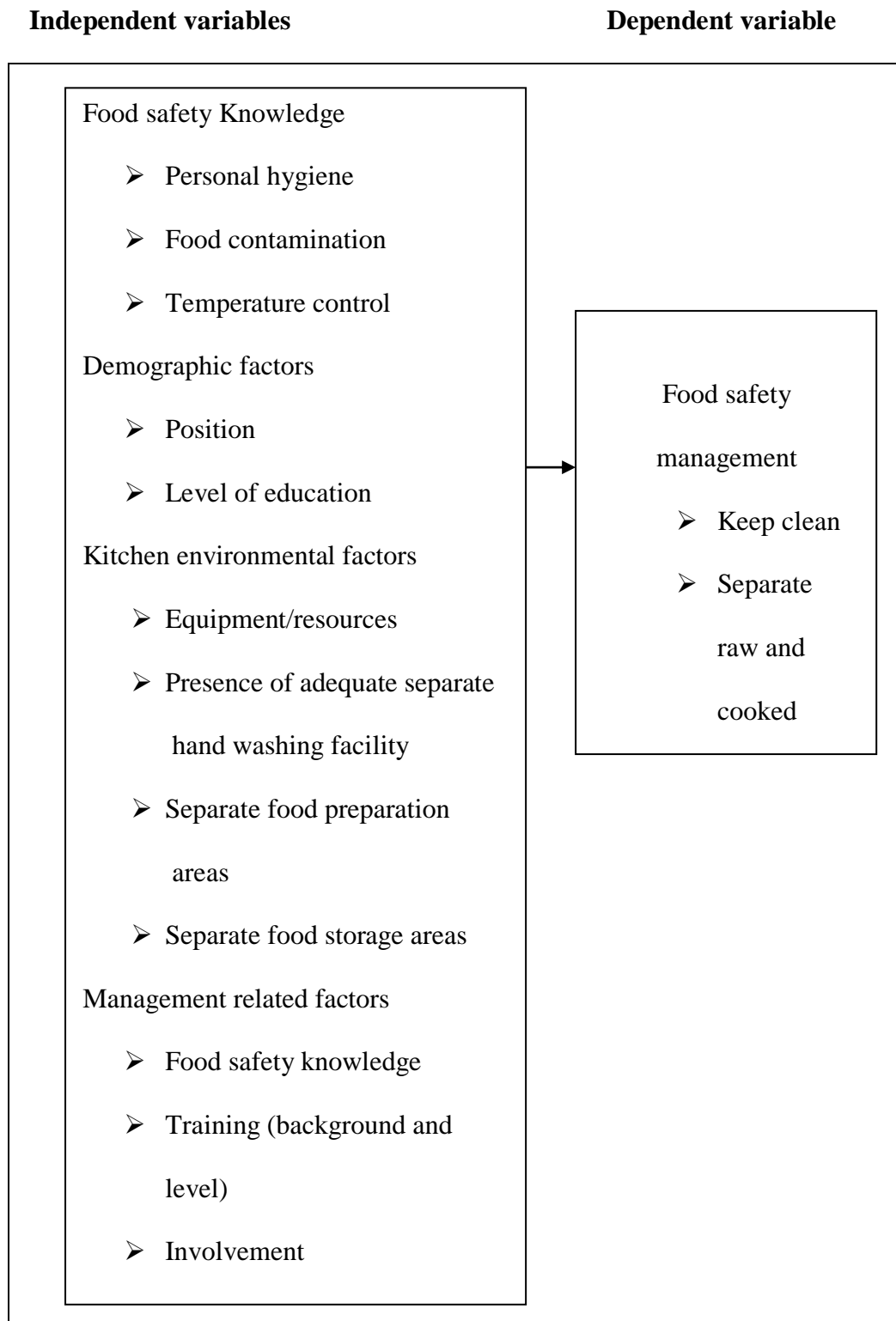


### **2.13 Conceptual framework**

The model in figure 2.5 below illustrates the relationship between the constructs in the study. According to the model, knowledge and practice of FSM in terms of personal hygiene, food contamination and temperature control; demographic factors (position and level of education); management factors (food safety knowledge, training background and level, and involvement); and kitchen physical environmental factors (equipment/resources, set up and quality of work surfaces, presence of adequate hand washing facilities, and availability of separate food preparation areas and food storage areas for raw and cooked) determine whether or not FSM will be achieved by food handlers. According to the model a person's knowledge on FSM will enable one to engage on food safety management and also the more a person practices the knowledge acquired on FSM, the more FSM is ensured since studies have revealed that the older people and those that have better FSM practice than young ones because of their experience. The food handlers demographic characteristics such as position and level of education are also related to FSM in that those in management and supervisory positions tend to engage in FSM more because of their level of exposure which is brought about by their level of education. Also the level of worker turn over is not so high among those in management and supervisory positions hence have more experience in managing FSM as opposed to food handlers who do not stay for long in a given hotel and also experience a high change in the nature of jobs that they do due to the functional flexibility of workers in the hotel industry. When it comes to the kitchen environmental factors, availability of the required equipment and resources such as color coded chopping boards, thermometer, gloves, and refrigerators with correct temperature readings makes it easy for the food handlers to observe FSM. The kitchen set up that provides separate areas for preparing and storing different

food items and quality of work surfaces ensures that there is minimum food cross contamination. When a hotel provides adequate hand washing facilities, the food handlers are able to wash their hands as required in terms of frequency and standards i.e double hand washing thereby limiting the chances of contaminating food. Having food safety charts displayed on the kitchen notice boards enable one to appreciate the level of seriousness of food contamination which necessitates taking of some action in FSM if someone already has knowledge on the same. The findings from this study have shown that safety issues are taken for granted by the food handlers and therefore they do not take them seriously because they do not understand the severity of the consequences of not observing food safety rules. One of the interviewees indicated that the food handlers are trained on food safety but ignore or neglect the training because the management does not enforce the food safety rules (PN). Consequently, constant reminders from the supervisors and colleagues as well as observing what others (colleagues) do and availability of food safety information sheets/charts in a facility serve as cues to action to remind the food handlers of what they already know thereby prompting them to act accordingly. For example, from the interview it was revealed that some food handlers become careful when a supervisor is next to them (PW). According to the HBM, if there are more perceived barriers than the likelihood of engaging in the behavior are slim while if there are more benefits such as rewards and consequences of engaging in the behavior then there is a likelihood of engaging in the behavior. Some managers from the hotels that had adequate FSM practiced reported that they reprimand the food handlers who are found to contravene the food safety rules and so the workers are always alert (enforcement of FSM rules). Also managers will only be able to enforce the FSM rules if they themselves are well trained on FSM and have a thorough understanding of hotel operations which comes

with their training background and level of training attained. The study was guided by the conceptual framework in figure 2.7.



**Figure 2.7: Conceptual Framework**

Source: Researcher (2015)

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Overview**

This chapter presents a detailed description of the study methodology. It discusses the study design, study site, population, sample and sampling techniques, data collection, data analysis, validity and reliability, limitation and delimitations of the study, presentation of data, ethical considerations, and dissemination of findings.

#### **3.2 Study area**

This study was conducted in Eldoret town, Uasin Gishu County, Kenya. Uasin Gishu County is one of the 47 counties of Kenya, located in the former Rift Valley Province. It lies in the mid-west of the Rift Valley and covers an area of 3,345.2 sq km. It borders Kericho County to the south, Nandi County to the south west, Bungoma County to the west, and Trans Nzoia County to the north. Other counties sharing borders with Uasin Gishu are Elgeyo Marakwet to the east and Baringo to the south east. The city of Eldoret (capital and largest town in the county) is the county's administrative and commercial centre which is Kenya's fourth largest town and is about 265km from Nairobi city. Uasin Gishu is located on a plateau and has a cool and temperate climate. It has a temperature range of between 8.4<sup>0</sup>C and 27<sup>0</sup>C. The county has two rainy seasons with average rainfall from 900mm to 1,200mm per annum (Ministry of Tourism North Rift Tourism Guide, 2011).

Uasin Gishu is home to 894,179 people as per the 2009 National Statistics, representing 50% male and 50% female. It is largely a cosmopolitan region, with the Nandi people of indigenous Kalenjin communities having the highest settlement. Kalenjin ethnic groups are renowned for exceptional performance in sporting

activities, especially athletics. Uasin Gishu is referred to as a county of champions and long distance marathon super-stars owing to their prowess in international athletic sports performances.

The county has relatively well established infrastructure including Kenya's third international airport that handles large amounts of cargo from the Middle East. The airport gives the county an opportunity to grow and expand the export market. It has a broad industrial base particularly in and around Eldoret town.

The economy is dominated by agriculture and is one of the largest contributors to food security in Kenya. Wheat, maize and dairy are the leading farming activities earning the county a name for being Kenya's bread basket. Various food and horticultural crops also do well in the highly arable land (Ministry of Tourism North Rift Tourism Guide, 2011).



***Figure 3.1: The Map of Uasin Gishu County***

Source: Ministry of Tourism North Rift Tourism Guide 2<sup>nd</sup> edition (2011)

This study area was chosen because first, the county government of Uasin Gishu is trying to improve the tourism activities in the region and this therefore means that more tourists may want to visit the region hence the need to ensure provision of quality services. Second, for a long time, the region has not had very many conventional hotels. It has always been dominated by Hotel Sirikwa and Wagon Hotel until recently about five years ago that such hotels have started mushrooming at an alarming rate. For instance, within the last five years only, the region has seen more than five hotels that fall under conventional hotels come up and this raises the question on the level of food safety management measures that may exist. More hotels are also coming up currently. With this kind of development taking place, it is important that the quality of services provided is assured. Third, Uasin Gishu County is the home for champions and therefore attracts many tourists who may want to

either come for training in the area or see where the champions come from hence the need to ensure that the services provided are not below the required standard.

### **3.3 Research design**

Mixed research design (descriptive and explanatory) guided this study. According to Rovai *et al.*, (2013), mixing methods can often produce richer findings and a deeper understanding of the research problem via several designs. Descriptive study design was used to obtain information concerning the current status of the phenomena and to describe “what exists” with respect to variables or conditions under study therefore the study described the current food safety knowledge and practices among the food handlers in the hotels under study. Explanatory design first collects quantitative data but then collects qualitative data in an attempt to explain, clarify, expand, or elaborate the quantitative findings (Rovai *et al.*, 2013). This study was explanatory in the sense that the researcher collected quantitative data and then collected qualitative data to clarify and explain the relations between different variables under investigation. The study took both qualitative and quantitative approaches of research since data was collected both quantitatively by use of questionnaires and qualitatively by use of interviews and observation.

### **3.4 Study population**

The study was conducted among 106 food handlers in twelve conventional hotels in Eldoret town. These hotels are a mixture of both old (more than five years) and new (less than five years) hotels in existence. These hotels were chosen because they are fully serviced hotels than most of the food establishments that have been studied as far as food safety practices is concerned (earlier studies have only dealt with street

food vendors, restaurants, cafeterias and hospitals) and also because they are the ones that are often preferred by tourists who are conscious of food safety.

The food handlers comprised of cooks/chefs, waiters, assistant cooks, store keepers, purchasing officers, food and beverage managers, and the general managers from the participating hotels totaling 106.

### **3.5 Sampling technique**

Purposive sampling technique was used to obtain sample size for the hotels in the study within Eldoret town which are classified as conventional hotels. Conventional hotels are the hotels that are fully serviced with dining, accommodation, conference and recreational facilities without necessarily being rated/classified. Purposive sampling was chosen because these hotels met the inclusion criteria. Census was used in choosing the food handlers in the study since the study population was small.

### **3.6 Sample size**

All the 106 food handlers in the twelve conventional hotels were recruited for the study. However, 12 questionnaires were not returned and 4 were not sufficiently filled and therefore were rejected by the researcher. Therefore a total of 90 respondents from the 12 hotels participated in the study (by filling in the questionnaires) as indicated in table 3.1. Letters were used to represent the various hotels under study in order to conceal their identity thereby ensuring anonymity. For the qualitative data, ten hotels were purposively chosen for observation and ten managers were also purposively chosen from the ten hotels to be interviewed. The managers were either the hotel General Managers where applicable or Food and Beverage Managers for the hotels that did not have General Managers. Once again



letters have been used to represent the managers' identity concerning their responses to the interview questions.

**Table 3.1: Distribution of food handlers in the hotels**

No.	Hotel	F & B Managers	Chef/ Cooks	Waiters	Store Keepers	Purchasing managers	Others
1	Hotel K	1	1	2			1
2	Hotel S	1	4	3	1		1
3	Hotel P	2	3	3	1		3
4	Hotel C	1	2	2	1		
5	Hotel W	1	1	3		1	2
6	Hotel B	1	2	2	1		3
7	Hotel H		2	3			
8	Hotel M		2	2	1		
9	Hotel Y		2	2			2
10	Hotel S		1	2		1	3
11	Hotel X		1	3	1		3
12	Hotel N	1	2	2	1	1	2
	Total	8	23	29	7	3	20
	Grand total	90					

Others include bar tenders, cleaners, housekeeping staff and supervisors who also handle food.

**Source:** Managers of various hotels (2015)

### **3.7 Data collection**

Data collection is the process of gathering and measuring information on targeted variables in an established systematic fashion, which then enables one to answer relevant questions and evaluate outcomes. Data collection for this study was carried out between December 2014 and April 2015.

#### **3.7.1 Data collection tools**

Data collection tools used included interviews, structured questionnaires, and observation checklists. According to Frankfort-Nachmias & Nachmias (2008), a researcher can use two or more methods of data collection to test hypothesis and measure variables to minimize the degree of specificity or dependence on particular methods that might limit the validity or scope of the findings. In complement, O'Connor & Gibson (2003) state that findings are more dependable when they can be confirmed from several independent sources. Consequently, this study employed several data collection methods to corroborate the findings.

#### **3.7.2 Data collection procedure**

The interviews were carried out among ten managers in the hotel (General manager/Food and Beverage manager) as was appropriate by use of an interview schedule while questionnaires were administered to all the ninety food handlers. Interviews provide more insight into sensitive issues or unusual phenomena and questionnaires help one get more information within a short period of time. The questionnaire was divided into four parts. Part one included the demographic characteristics of the employees (age, gender, level of education, years of service, and terms of employment), part two solicited information on employees' knowledge on food safety (issues under investigation include personal hygiene, food-borne illness,

time and temperature control, cross contamination), part three was on perception of foodservice employees on the role of management in food safety management, and part four sought information on food safety practice in the various hotels.

The hotel managers provided information on the number of food handlers in each of the hotels after which the researcher sought the help of the Food and Beverage managers in administering the questionnaires to the participants since the participants work in shifts and it was difficult for the researcher to get hold of all of them. Some of the food handlers were also trainees on attachment and so the researcher could not differentiate between trainees and regular workers hence the need for using the Food and Beverage managers to administer the questionnaires.

Observation was also carried out in ten of the hotels to clarify the results given by respondents. The main objective of observation is its directness and it enables the researchers to study behavior in real time as it occurs. The researcher does not have to ask people about their own behavior and the actions of others since the researcher can simply watch them act and speak. It therefore enables the researcher to collect data firsthand, thereby preventing “contamination” or distortion of the data by factors or events standing between the researcher and the object of research (Frankfort-Nachmias & Nachmias, 2008). The researcher conducted a non participant observation to view operations as they actually occurred on the ground as follows:

- a) To check on the hygiene status of the employees in terms of medical examination certificates, cleanliness, clothing (suitability), nails, and hair.

- b) To check on the environment which included:
- i. Physical features i.e availability of separate sink for handwashing, disposable hand towels or presence of a hand dryer, and running warm water with soap.
  - ii. Food preparation as possible source of contamination i.e availability of separate rooms for different food preparation, availability of various color coded chopping boards to avoid cross contamination, storage of cooked and raw foods separately, methods of cooling hot foods, holding temperatures, cooking temperatures, and method of thawing frozen foods.
  - iii. Equipment in terms of cleanliness and maintenance, suitability for use, and usage i.e availability and use of thermometer to check internal temperature of foods, availability and use of gloves, availability and use of differ color coded chopping boards, and availability of various storages with correct temperatures.
  - iv. Lighting and ventilation in the kitchen

### **3.8 Validity & reliability**

Validity is the most critical criterion that indicates the degree to which the data collection instrument measures what it is supposed to measure (Kothari, 2004). Content validity was ensured by pre-testing the data collection instrument (the questionnaire) in four hotels in Nandi County which is a neighboring county and therefore is not part of the study area. The hotels also qualify as conventional hotels in the area hence can be used to give a good judgment on the instrument. After the pilot study was done a reliability test was run to test whether the instrument was

reliable. The value of 0.84 was obtained for the entire instrument which means the instrument met the requirement and therefore was reliable.

Kothari defines reliability as the test carried out to tell whether the data collection instrument will give the same results each time it is used and a measuring instrument is reliable if it provides consistent results (Kothari, 2004). This study applied the Cronbach's alpha reliability coefficient test to test the reliability of the constructs under study. According to Hair *et al.*, (2005) the general agreed upon lower limit for Cronbach's alpha is  $\geq 0.70$ . Rovai *et al.*, (2013) concur that the widely accepted social science cut-off is that Cronbach's alpha should be .70 or higher.

### **3.9 Scope of the study**

This study was limited only to conventional (fully serviced) hotels in Eldoret Town. This therefore means that the inclusion criteria were that the hotel must be a conventional hotel and be located in Eldoret Town. Any hotel that does not meet this criterion was excluded from the study. Secondly, the study was limited to employees who are involved with handling food in the selected hotels and the managers of the participating hotels only. Lastly the study was limited to the assessment of the determinants of food safety management among food handlers and therefore only dealt with factors that affect food handlers' knowledge and practices as far as food safety management is concerned.

### **3.10 Data analysis**

Data analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data groups. Quantitative data was analyzed with the help of Statistical Package for Social Sciences (SPSS) version 21 and excel then presented in descriptive and inferential statistics. Means and Standard deviations

were determined then Pearson Correlation and Chi-square test of independence tests were used to test for relationships and associations between the various variables under study. Pearson Correlation tests are used to find significant relationship between variables therefore it was the relevant statistical tool for the data in this study which sought to establish the relationship between food handlers' knowledge and food safety management. Pearson Chi-square test of independence are procedures that are used to determine the association between two categorical variables and it is a test of independence that compares the frequencies of two nominal variables. It was therefore suitable for this study because the variables whose associations were determined were categorical.

Qualitative data analysis was done by use of content analysis and presented in narrative form. Content analysis is a procedure for the categorization of verbal or behavioral data, for purposes of classification, summarization and tabulation so as to make sense of the data collected and to highlight the important messages, features or findings.

Objective number one was analyzed by use of descriptive statistics (frequencies and percentages). Pearson Correlation was used to analyze objective number three while Chi-square test was used to analyze objectives numbers four and five. Objectives numbers two, six and seven were analyzed qualitatively.

### **3.11 Data presentation**

Data was presented in the form of tables, bar graphs, figures, and plates.

### **3.12 Ethical considerations**

The researcher got the consent of the managers of the participating hotels after the researcher explained to the managers the purpose of the study and therefore the participants participated willingly. Those who were not willing to participate were excluded from the study. Anonymity of the participants as well as for the hotels represented were ensured by asking the participants not to write their names on the questionnaires and codes have been used to conceal the names of those who were interviewed as their responses were quoted. The participating hotels were not revealed either as they were identified by use of codes that is only known to the researcher.

### **3.13 Research procedure**

Before proceeding with the research, the researcher first of all applied for a research permit from the National Commission for Science, Technology and Innovation (appendices N & O). A letter of authorization to conduct the study in Eldoret Town was sought from the Ministry of Education in Uasin Gishu County (appendix L) and the County Commissioner Uasin Gishu County (appendix M). Thereafter, permission to collect data from the various hotels was sought from the Human Resource Managers/Managers of the participating hotels as well (appendix J). Lastly informed consent from the participants especially the managers who were interviewed was sought before carrying out the research (appendix K).

## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND INTERPRETATION

#### 4.1 Overview

This chapter presents the findings, data analysis, presentation and interpretation of the results of the study.

#### 4.2 Socio-demographic profile

Table 4.1 presents the demographic profile of respondents which were analyzed in terms of age, gender, highest level of education, job title, years of service in the hotel/foodservice industry, years of service in the particular hotel, terms of service, and training on food service management.

Most (59.1%) of the respondents were within the age group of 21 to 30 years. Ages 31 to 40 years accounted for 26.1%, followed by 41 to 50 years at 10.2% while those over 50 years accounted for 3.4% and under 20 years was only 1 (1.1%). In regards to gender, majority (56.8%) of the respondents were male, female accounted for 43.2%. In relation to position in the hotel or job title, waiters/waitresses and cooks were the majority accounting for 33.7% and 27.9% respectively. Food & Beverage managers and store keepers accounted for 8.1% respectively while purchasing officers accounted for 3.5%. Others accounted for 18.6%. Most (67.8%) of the respondents had attained college education, followed by those who had attained university education (20%). 6% of the respondents had secondary education and only 3% of the respondents had primary education. Regarding years of service in the hotel industry, 26.4% of the respondents had worked in the hotel industry between 2-3 years followed by those who had worked for 5 years (22.2%), and less than 1 year (17%) while 15.9% had worked for between 1-2 years. The findings also revealed that most



(36.8%) of the respondents had worked in the present hotel for less than one year, followed by those who had worked between 1-2 years and 2-3 years accounting for 23.8% and 21.9% respectively. Those who had worked between 3-5 years and 5 years accounted for 9.2% each. In relation to terms of service, a majority (46.6%) of the respondents were employed on contract terms followed by those who were employed on permanent and casual terms accounting for 36.4% and 17% respectively. A high percentage (87.6%) of the respondents had received some training on FSM while 12.4% had not. Of those who had received the training on FSM, majority (57.6%) had received the training in college while 22.4% and 9.4% of the respondents had received in-service and on the job trainings respectively. However, 10.6% reported that this was not applicable since 12.4% had not received any training on FSM.

**Table 4.1: Demographic profile of respondents**

Variables	Percentage
<b>Age</b>	
Below 20	1.1
21 to 30	59.1
31 to 40	26.1
41 to 50	10.2
Over 50	<u>3.4</u>
	99.9
<b>Gender</b>	
Male	56.8
Female	<u>43.2</u>
	100
<b>Highest level of education</b>	
Primary	3.4
Secondary	6.8
College	69.3
University	<u>20.5</u>
	100
<b>Job title/position in the hotel</b>	
Waiter/waitress	33.7
Cook/chef	27.9
Storekeeper	8.1
Purchasing officer	3.5
Food and beverage manager	8.1
Others	<u>18.6</u>
	99.9
<b>Years of service in the hotel/foodservice industry</b>	
Less than one year	17
Between 1-2 years	15.9
Between 2 – 3 years	26.4
Between 3 – 4 years	18.4
More than 5 years	<u>22.2</u>
	99.9
<b>Years of service in this hotel</b>	
Less than one year	36.8
Between 1 – 2 years	23.0
Between 2-3 years	21.9
Between 3-4 years	9.2
More than 5 years	<u>9.2</u>
	100
<b>Terms of service</b>	
Regular/permanent	36.4
Contract	46.6
Casual	<u>17</u>
	100
<b>Received training on FSM</b>	
Yes	87.6
No	<u>12.4</u>
	100
<b>Where FSM training was received</b>	
College	57.6
In-service training	22.4
On the job training	9.4
Not applicable	<u>10.6</u>
	100

Others include bar tenders, cleaners, housekeeping staff and supervisors who also handle food

These results can be attributed to the fact the nature of the work in the hotel is tedious and requires long hours of standing hence most of the workers are young and mostly male. The majority are cooks and waiters because most activities involve food production and service. The fact that most of the food handlers were on contract terms as well as high turn-over rate in the hotel industry explains why majority had only worked in their present hotels for less than one year. Most of the food handlers had attained college education which explains why most of them reported that they had received training on FSM since most respondents indicated that they had received their FSM training in college.

### **4.3 Knowledge on FSM**

The study sought to establish the food handlers' knowledge on food safety management including circumstances for double hand washing techniques, various ways through which food contamination may occur, possible vehicles through which food can be contaminated, stages in the food flow as likely stages for food contamination, causes of food-borne illnesses, frequency of routine medical examination, danger zone, and barriers to food safety management.

#### **4.3.1 Circumstances for double hand washing technique**

The findings as described on table 4.2 shows the respondents' knowledge on circumstances for double hand washing technique which revealed that 90% of the respondents had adequate knowledge on the various circumstances for double hand washing technique.

**Table 4.2: Circumstances for double hand washing**

<b>Variables</b>	<b>Yes (%)</b>	<b>No (%)</b>
Before handling food	89(98.8)	1(1.1)
After visiting the toilet	85(95.5)	4(4.5)
After coughing or sneezing	79(88.8)	10(11.2)
After smoking	75(85.2)	13(14.8)
After handling raw to working with cooked food	81(91)	8(8.9)
After touching food waste	84(95.4)	4(4.5)

#### **4.3.2 Sources of food contamination**

Similarly, over 95% of the respondents were knowledgeable about the different sources of food contamination though 11.3% of the respondents did not know that improper cooking temperatures can cause food contamination (table 4.3).

**Table 4.3: Sources of food contamination**

<b>Variables</b>	<b>Yes (%)</b>	<b>No (%)</b>
Food handlers	84(95.4)	4(4.5)
Contaminated surfaces	86(96.6)	3(3.4)
Cross contamination	84(95.4)	4(4.5)
Improper cooking	78(86.7)	10(11.3)
Poor handling	87(97.8)	2(2.2)
Improper storage	88(98.9)	1(1.1)

### 4.3.3 Possible vehicles for food contamination

Likewise a large percentage of the respondents had knowledge on the vehicles for food contamination (over 90%). However, 29.5% of the respondents did not know that food can be a vehicle for food contamination as presented in table 4.4. This can be attributed to lack of training on FSM since some of the respondents indicated that they have never received such kind of training.

**Table 4.4: Possible vehicles for food contamination**

<b>Variables</b>	<b>Yes (%)</b>	<b>No (%)</b>
Fingers	83(95.4)	4(4.5)
Flies	86(97.7)	2(2.3)
Food	62(70.5)	26(29.5)
Feaces	81(93.1)	6(6.9)

### 4.3.4 Likelihood of stages in the food flow to cause food contamination

The respondents' knowledge on the potential areas of contamination in the food flow chard are depicted in table 4.5. The largest percentage of the respondents reported that the use of leftovers (65.1%) and storage (64.4%) were the very likely stages to cause food contamination. 30.2% and 26.4% of the respondents indicated that purchasing and receiving are less likely to cause food contamination. Indeed this finding was supported by the different views held by different managers who were interviewed concerning the most important stage in the food flow in ensuring food safety management. Only two managers indicated that all the stages in the food flow are likely to cause food contamination. One of the managers said,

“I think all the stages are important. This is why you find food poisoning being common because people don’t think that all stages are important. I almost died from food poisoning so am very careful” (PW).

However, others had differing opinions as follows:

“All areas must be observed keenly however production areas take a major portion (receiving, storage, production, and service)” (PB);

“Storage mostly due to failure of electricity and lack of automatic generator and preparation because of cross contamination through the person or the surface” (PS);

“Purchase and storage because you can purchase already below standard product which cannot withstand any standard of storage. Storage is to maintain quality that can produce a good end result to the guest. I assume there is no doubt in food preparation because the person is qualified. It is not a practice that you purchase very good food, have a very good storage and sell damaged food” (PY).

**Table 4.5: Likelihood of stages in the food flow to cause food contamination**

Variables	Don’t know (%)	Less likely (%)	Likely (%)	Very likely (%)
Purchasing	8(9.3)	26(30.2)	23(26.7)	29(33.7)
Receiving	6(6.9)	23(26.4)	32(36.8)	26(29.9)
Storing	9(10.3)	8(9.2)	14(16.1)	56(64.4)
Pre-preparation	10(11.5)	17(19.5)	22(25.3)	38(42.2)
Preparation	7(7.8)	16(17.8)	27(30)	37(43.7)
Serving	10(11.6)	21(24.4)	29(33.7)	26(30.2)
Use of leftovers	12(14)	8(9.3)	10(11.6)	56(65.1)

#### 4.3.5 Causes of food-borne illnesses

In relation to knowledge on causes of food-borne illnesses see table 4.6. 84% of the respondents agreed that bacteria, parasites and viruses can cause food contamination leading to food-borne illnesses. Likewise 73% of the respondents agreed that pesticide residues can also cause food contamination. However, 23.3% of the respondents disagreed that food additives can cause food contamination. To complement this finding, the observation carried out in the hotels revealed that foods that are eaten raw such as fruits and vegetables were not thoroughly washed to get rid of the possible dirt and chemical/pesticide residues. Also some of the cooking equipment were too old such that they could easily trap steel wool remains leading to food contamination.

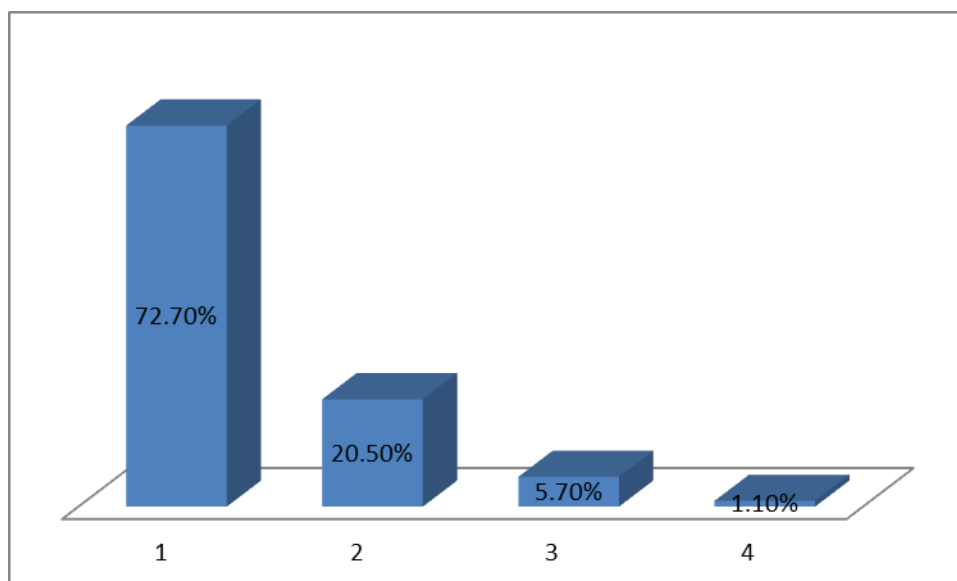
**Table 4.6 Causes of food-borne illnesses**

<b>Variables</b>	<b>Disagree (%)</b>	<b>Neutral (%)</b>	<b>Agree (%)</b>
Pesticide residue can cause foodborne illness	11(12.9)	12(14.1)	62(73)
Bacteria, parasites, and viruses can cause Foodborne illness	11(12.6)	3(3.4)	73(84)
Food additives can cause foodborne illness	20(23.3)	25(29)	41(47.7)

#### 4.3.6 Duration for medical check-up

The respondents' knowledge on the duration for routine medical check-up for food handlers is presented in figure 4.1 presents. The results show that the largest percentage of the respondents reported that routine medical check-up should be done after three months (72.7%). This implies that routine medical check-up probably is never taken serious and therefore the food handlers can go for it as they please or may be it is only done when inspection is about to be done. Indeed in-depth interview

findings also confirmed this discrepancy as to when exactly the examinations should be done with some hotel managers requiring their workers to go for the examination after three months, others after six months. One of the interviewees said that Eldoret is urban unlike Nairobi which is a city and therefore the duration corresponds with the area. For urban it is required that the examination be done after six months and for cities after three months (PY). However, an attempt to see the medical examination certificates from the hotels was futile as each time there was an excuse as to why the certificates could not be accessed.



Key: 1 = six months 2 = three months 3 = one year 4 = don't know

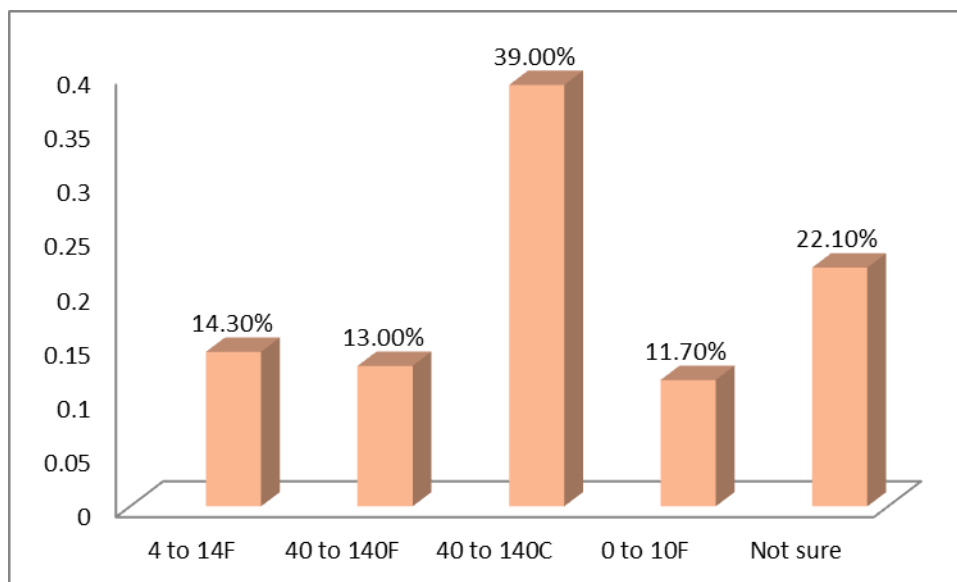
**Figure 4.1: Duration for medical examination**

#### **4.3.7 Danger zone**

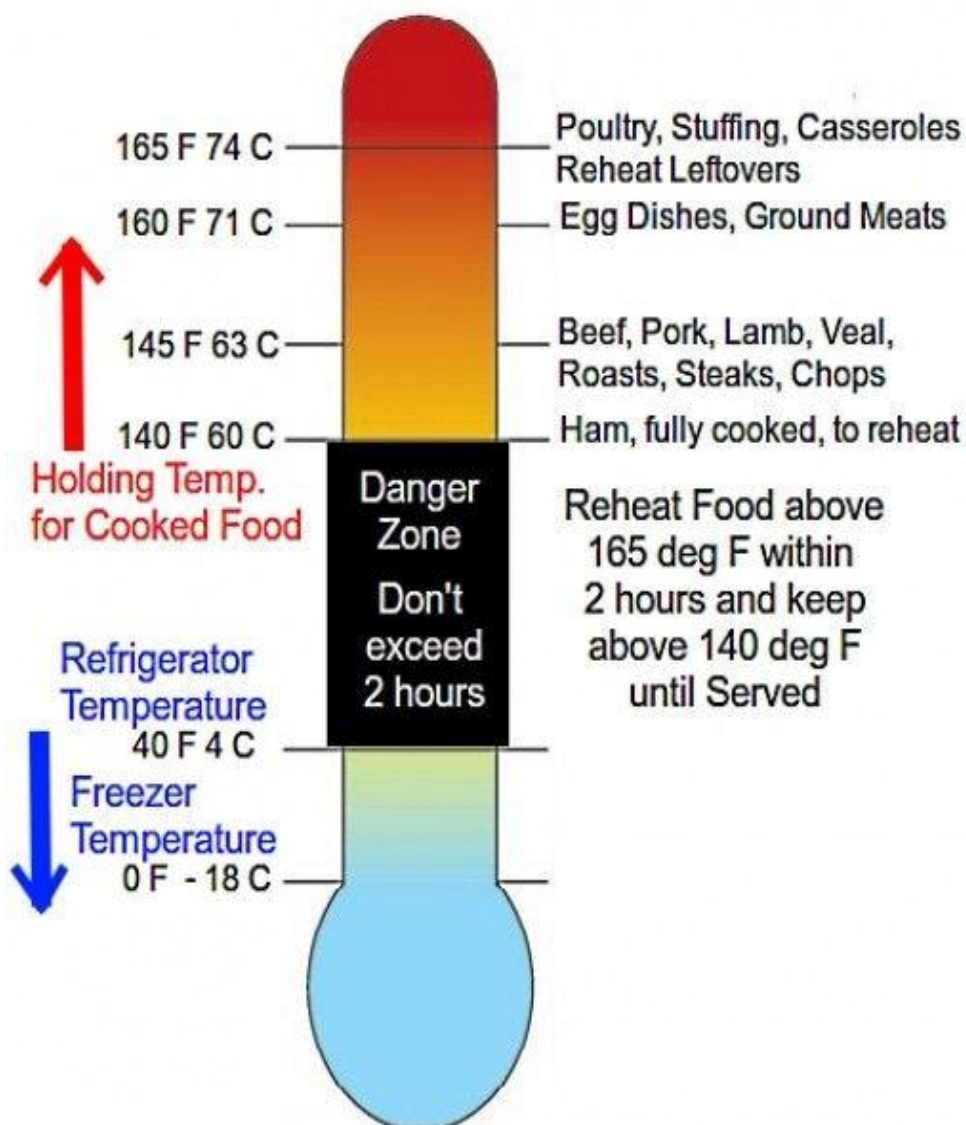
When asked about danger zone, only 13% of the respondents had the correct knowledge as illustrated in figure 4.2. Danger zone is the temperature range that is conducive for bacterial growth in which food should not be allowed to stand for long. This zone is between 40<sup>0</sup>F and 140<sup>0</sup>F or 5<sup>0</sup>C to 65<sup>0</sup>C. This result was supported by observation made in the hotels in which the researcher found out that even in the



hotels that had posters on the notice boards about food safety issues including danger zone, the food handlers still did not know what danger zone is. For instance, in one hotel the chef was seen checking on the notice board to see the danger zone so that he could fill in the questionnaire. This is a clear indication that availability of information charts is not good enough to ensure food safety and only one hotel had food safety information chart displayed as indicated in plate 4.1.



**Figure 4.2: Knowledge on Danger zone**



**Plate 4.1: Displayed food management safety charts in one of the hotels**

#### 4.4 Practice of Food Safety Management

The study investigated the food handlers' practice of food safety management with respect to personal hygiene, temperature control, prevention of cross contamination, purchasing and storage, food safety training and rules, and kitchen physical features.

Table 4.7 shows the frequency with which food safety is practiced in the hotels.

#### **4.4.1 Personal hygiene**

Personal hygiene practices were always observed by 70% of the food handlers. Observation revealed that not all food handlers wear adequate clothing all the time (plates 4.2 & 4.3) and no adequate hand washing facilities are available to ensure double hand washing technique. Only some of the hotels (50%) provide a separate hand washing sink and some do not. And of those that provided the facilities, they lacked soap and hand drying towel (plate 4.4). In other hotels, the chef's sink doubled up as the hand-washing sink as well while in others the sink for washing utensils is the same one that is used for washing hands. With the lack of necessary hand washing facilities, it becomes difficult for the foodservice employees to practice proper hand washing (the double hand washing technique). In some cases it was observed that non-food handlers (cleaners) were allowed to handle food as in illustrated in plate 4.3.

**Table 4.7 Practice of food safety management**

Variables	Never (%)	Sometimes (%)	Always (%)
<b>Personal hygiene</b>			
Food handlers wash their hands before beginning work, sneezing, visiting	3(3.6)	14(16.7)	67(79.8)
Food handlers use the double hand washing technique	5(5.7)	21(24.1)	61(70.1)
Food handlers are examined medically after six months	7(8.1)	9(10.5)	70(81.4)
Food handlers wear appropriate aprons, head gear, and footwear	6(7.0)	7(8.1)	73(84.9)
Food handlers are not permitted to handle food when sick from clinically recognized conditions	11(12.9)	5(5.9)	69(81.7)
<b>Temperature control</b>			
Internal temperature of held foods are checked every two hours	11(13.3)	29(35)	43(51.8)
Leftover foods are promptly cooled using acceptable methods	16(19.3)	9(10.8)	58(69.9)
Highly hazardous foods are cooked to temperatures >70 <sup>0</sup> C	6(7.1)	24(28.6)	54(64.3)
Leftover foods are reheated to temperatures >82 <sup>0</sup> C	12(14.3)	25(30)	47(56)
Prepared foods are never held at temperatures between 4 <sup>0</sup> to 140 <sup>0</sup> F	10(12)	24(29)	49(59)
<b>Cross contamination</b>			
Ready to eat foods and raw foods are prepared separately	8(9.6)	5(6.0)	70(84.3)
Work surfaces are sanitized after cutting raw food	6(7.2)	6(7.2)	71(85.5)
Work surfaces are sanitized before Beginning work	7(8.6)	12(14.8)	62(76.5)
Different color coded chopping boards are used for specific jobs	9(11.0)	14(17.0)	59(72)
Ready to eat and raw foods are stored separately	6(7.2)	7(8.4)	70(84.3)
Periodic facility cleaning is done	9(11.0)	10(12.2)	63(76.8)
<b>Purchasing and storage</b>			
Food is purchased from approved suppliers	5(6.0)	14(16.7)	65(77.4)
Receiving of supplies is strictly done against specifications	9(10.7)	10(11.9)	65(77.4)
Supplies that do not meet the standards are rejected	9(10.8)	12(14.5)	62(74.7)
Food is stored using FIFO method	12(14.5)	14(16.9)	57(68.7)
<b>Food safety training and rules</b>			
Foodservice employees are oriented on FSM rules upon employment	8(9.4)	10(11.8)	67(78.8)
Food safety trainings are organized for food handlers	8(9.4)	15(17.6)	62(73)
Food safety rules are displayed on the notice boards for easy access	17(20.7)	13(15.9)	52(63.4)
<b>Physical features</b>			
Food preparation areas are well lit and ventilated	8(9.4)	3(3.5)	74(87.1)
Different storage areas have correct temperature readings	7(8.2)	8(9.4)	70(82.4)



**Plate 4.2: Lack of head gear**



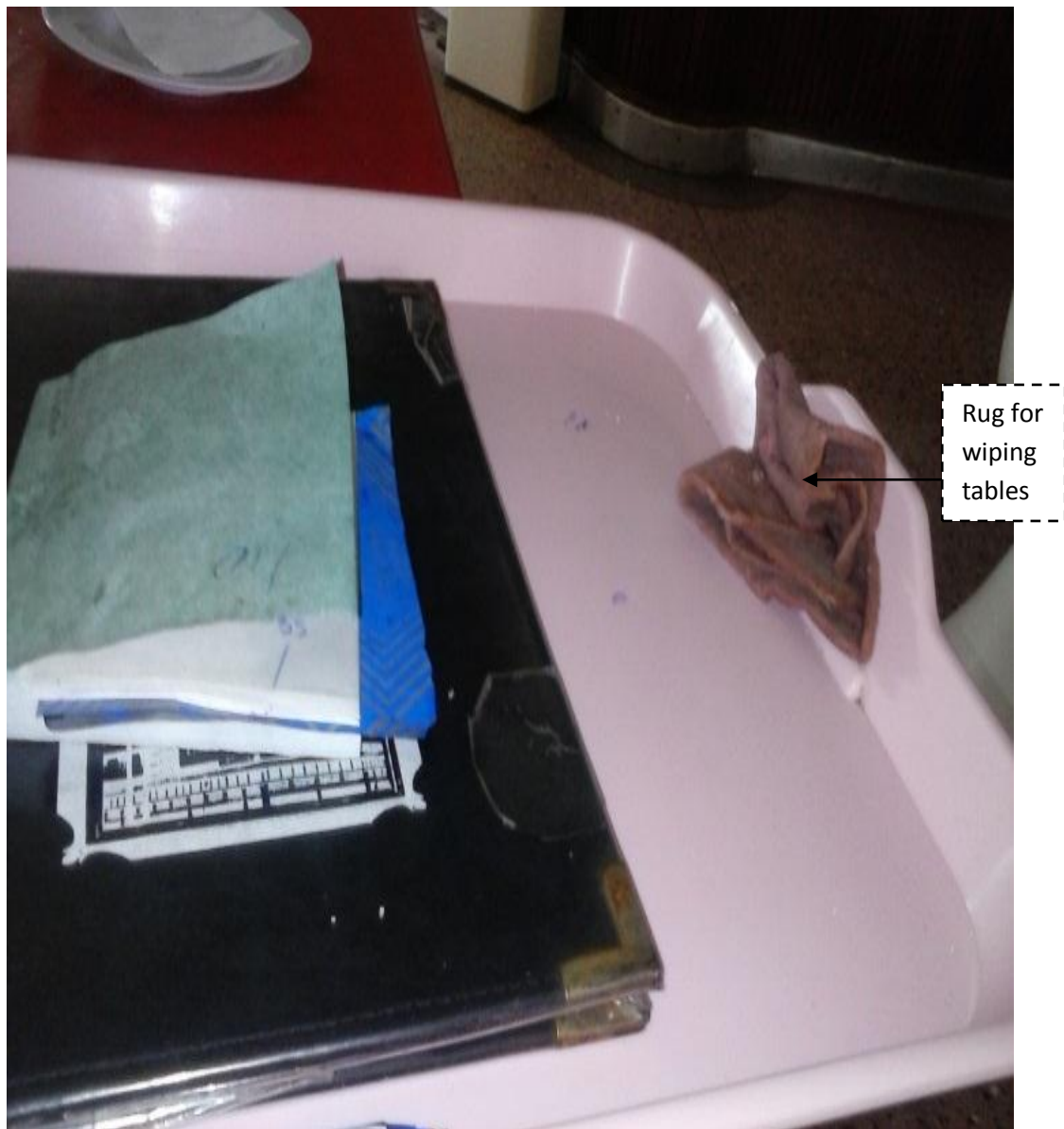
**Plate 4.3: Cleaner handling food**



**Plate 4.4: Separate hand washing sink for food handlers without soap and hand drier**

In one hotel waiters were observed to be sticking their fingers in the nose while waiting on guests and another waiter was observed to be removing food that was stuck in the teeth with fingers while waiting on guests and in both cases hands were never washed before proceeding with the work. In another instance, waiters were observed to be wiping the chairs and tables as they waited for guests to come and proceeded to attend to guests without washing hands. Infact, they just got a dish towel, wiped the glass and served the guests then proceeded with the wiping as they waited to serve other guests. The rug for wiping food spills from the table was also put in the same service tray for carrying food to the guests as shown in plate 4.5.





**Plate 4.5: Possible contamination in the food service tray**

#### **4.4.2 Temperature control**

In relation to temperature control measures, fifty eight respondents (69.9%) reported that leftover foods were promptly cooled using acceptable methods (using a wide container to allow the food to cool faster) and fifty four respondents (64.3%) indicated that highly hazardous foods were cooked to temperatures above 70°C. The results also showed that 35% of the respondents reported that the internal temperatures of held foods are not always checked every two hours, 30% of the respondents indicated



that leftover foods are sometimes reheated to temperatures above 82<sup>0</sup>C. There were twenty four respondents (29%) who reported that highly hazardous foods are not always cooked to temperatures above 70<sup>0</sup>C and also prepared foods are sometimes held at temperatures between 4<sup>0</sup>F to 140<sup>0</sup>F. Table 4.8 highlights that only 59% of the respondents reported that prepared foods are never held at temperatures between 4<sup>0</sup>F to 140<sup>0</sup>F. This finding was confirmed by the in-depth interview and observation in the hotels where it was found out that there is a bit of negligence when it comes to the control of temperature in food. For example foods that were served for buffet were not kept at recommended temperatures. The foods were actually warm.

It was evident that the necessary equipment are lacking for the food handlers to ensure proper temperature control as depicted in table 4.9. However, observation showed that only a few (50%) hotels had adequate storage facility with thermometers temperature readings (plate 4.6 & 4.7). Some freezers and refrigerators did not have temperature readings and so it became difficult to ensure proper storage temperatures. This may lead to food going bad and especially when power goes off for those hotels that do not have generators. Only one hotel had a generator in case of emergency. In one hotel the manager said that they ensure that they have ice blocks to put in the freezers at night to take care of emergency power black outs so that their food does not go bad (PW).

Out of the ten hotels where observation was carried on, none had a probe thermometer although all of the hotels had different ways of ensuring that the internal cooking temperature of meat was attained. For example, when asked how they check the internal temperature of food when cooking to ensure proper cooking the following responses were given:

“I myself taste the food and approve it as ok or not ok to be served to customers. It is the secret of the cook. The responsibility is of the head of cooking to ensure proper cooking” PY.

“We ensure sufficient cooking time” PH.

“We roast and then deep fry” PS.

“We have a tester which we insert (I cannot give it now) or experienced person can tell from the look; when it comes to meat we dissect/pierce and if it does not go through easily then it’s not done. When serving and you see blood oozing out then it’s not done” PB.

When it comes to thawing of frozen foods, five (50%) of the hotels thawed frozen foods using acceptable standards (either using cold water or putting the food to thaw overnight in the refrigerator) while others used other unacceptable means such as leaving the food on the counter overnight, putting in hot water or microwaving. All the hotels cooled leftover foods properly as recommended. However, holding temperatures were quite inadequate as only one (10%) of the hotels was observed to have held hot and cold foods at the appropriate temperatures. Storage temperatures were also observed to be not appropriate in most of the hotels. For instance, only five (50%) of the ten hotels observed had thermometers on their correct refrigerators, two (20%) had thermometers in the cold room (plate 4.9), five (50%) had correct freezer temperature (plate 4.8). Seven (70%) of the hotels had the correct temperatures for the dry goods storage.

**Table 4.8: Temperature control as observed**

Variable	Proportion	Percentage
Probe thermometer available	0	0%
Internal cooking temperature of cooked meat is ensured	10	100%
Frozen food is thawed using acceptable methods	5	50%
Leftover foods are properly cooled and stored	10	100%
Cold foods held at appropriate temperatures <40 <sup>0</sup> F/5 <sup>0</sup> C	1	10%
Hot foods held at appropriate temperatures >140 <sup>0</sup> F/60 <sup>0</sup> C	1	10%
Adequate temperatures for the various storage areas		
Refrigerator (<10 <sup>0</sup> C	5	50%
Cold room ( 4-10 <sup>0</sup> C)	2	20%
Freezer (-18 <sup>0</sup> C)	5	50%
Dry goods store (room temperature)	7	70%

**Plate 4.6: Freezer storage with thermometer**



**Plate 4.7: Cold room storage with thermometer**

#### **4.4.3 Prevention of Cross Contamination**

Regarding cross contamination prevention, seventy-one respondents (85.5%) reported that work surfaces were sanitized after cutting raw food, seventy respondents (84.3%) reported that ready to eat and raw foods were prepared separately and also stored separately. However, fourteen respondents (17%) indicated that different color coded chopping boards are not always used. This is because those boards are not there since some of the hotels only a few boards and therefore the food handlers were forced to share.

These results were complemented with the observations that the researcher did to verify the practice of cross contamination prevention and the findings are presented in table 4.9.

**Table 4.9: Prevention of cross contamination as observed**

<b>Variables</b>	<b>Proportion</b>	<b>Percentage</b>
Ready to eat food and raw food are prepared separately	6	60%
Raw foods are stored below ready to eat foods	1	10%
Foods are stored in FIFO method	8	80%
Raw and cooked foods are stored separately	2	20%
Separate chopping boards are used	7	70%

The above results showed that only one hotel (10%) had separate rooms for preparation of the various food items (plate 4.8) and only two (20%) hotels stored raw and cooked foods separately. Furthermore, most hotels (80%) had foods prepared in the same room though with designated areas for specific tasks (plate 4.9 and one hotel (10%) used the same table for various tasks with imaginary lines to distinguish which section should be used for various tasks as shown in the plate 4.10. One hotel (10%) did not even designate any space for different tasks but any food was prepared in any available space on the same table since different food items were prepared at different times as was reported by the chef. Eight (80%) of the hotels stored foods using FiFo method, and seven hotels (70%) had separate color coded chopping boards for different activities.



**Plate 4.8: Kitchen with different sections for food preparation**



**Plate 4.9: Kitchen with designated work areas**



**Plate 4.10: Kitchen with a central work surface with imaginary boundaries**

Other than inadequate food preparation and storage areas in most of the hotels, three (30%) of the hotels did not have appropriate working surfaces whereby work surfaces were not made of the right material (non-absorbent and inert materials – stainless steel) and in some cases the work surfaces were joined with nails as in plate 4.11 while others had joinery sections i.e was not continuous and had rust as shown in plate 4.12 and some were even made of chipped formica. One hotel (10%) even had a log of wood in the butchery for cutting meat as shown in plate 4.13.





**Plate 4.11: Rusted work surface joined with nails**





**Plate 4.12: None continuous work surface**



**Plate 4.13: Inappropriate work surface with a wooden log for cutting/tenderizing meat**

Observation made in the hotels revealed that six of the hotels that had separate storage for raw and cooked foods, most of them (3 hotels) had raw foods stored together with cooked foods with some foods uncovered, other stores had food together with other things like cleaning detergents and steel wool and spirit, some foods were kept on the floor, and others stored food in the filing room as shown in plate 4.14. Only 1 (10%) hotel had distinct and separate areas for food storage. The rest of the hotels mixed up things, with cooked foods being stored together with raw foods in the same place either in the cold room or in the refrigerator and others not covered with some food items even being put down on the floor. Furthermore, eight of the managers interviewed reported that they did not recycle their leftover foods but instead gave it to their workers but from the plate 4.15, it is evident that the leftovers are stored for a later use.



**Plate 14: Dry goods storage**



**Plate 4.15: Leftover foods in the refrigerator**

Despite all the hotels (100%) under study had different color-coded chopping boards for various tasks, the manner in which the chopping boards were cleaned can be a major cause of food contamination. It was evident that the hotels do not wash the chopping boards clean making them a possible harbor for pathogens as depicted in plate 4.16 and in some cases, the boards were never used for their specified jobs but just used as it was convenient.



**Plate 4.16: Inadequately cleaned chopping board in one of the hotels**

Observation made also revealed that food contamination can easily be done by the presence of rodents. For example, the presence of flies and cockroaches was evident in a number of the hotels under study. Plates 4.17 & 4.18 testify to that fact where a cockroach was seen on the serving surface and a fly landed on the food that the researcher was eating.





**Plate 4.17: Presence of cockroaches in the hotels**



**Plate 4.18: Presence of flies in the hotels**

#### **4.4.4 Purchasing and Storage**

Concerning purchasing and storage practices, 77.4% of the respondents reported that food was always purchased from approved suppliers and that receiving of supplies was strictly done against specifications although fourteen respondents (16.7%) indicated that sometimes food was not purchased from approved suppliers. With regard to storage, fourteen respondents (16.9%) indicated that food was not always stored using FiFo method and another twelve respondents (14.5%) reported that food was never stored using FiFo method. This is due to the fact that some of the hotels do not have adequate storage space in terms of and therefore it becomes a challenge to observe storage rules. In some cases the stored foods were even kept on the floor and in others raw and cooked foods were stored together.

#### **4.4.5 Food Safety Training and Rules**

On food safety training and rules, sixty seven respondents (78.8%) reported that food handlers are oriented on FSM rules upon employment, sixty two respondents (73%) answered that food safety training are organized for food handlers (table 4.8). However, the kind of training given was found to be basically briefings at the beginning of every shift where the employees are reminded of their responsibilities as was reported during the interviews (PN). Only three (30%) out of ten hotels organize periodic trainings for their workers and in such cases only one or two workers were sent for the training at any given time (table 4.7). Fifty two respondents (57.8%) indicated that food safety rules were displayed on the notice boards for easy access though seventeen respondents (20.7%) reported that food safety rules were never displayed on the notice boards (table 4.7). These findings can be attributed to the fact that some of the managers are not trained on FSM and therefore are not in a position to organize for proper trainings for their workers since they do not know what to train them on. This was confirmed during the

interviews in which it was clear that some of the managers were finding it difficult to respond to some of the questions posed on food safety. Observation made revealed that only one hotel had food safety rules on the board, and two hotels had safety rules placed on the doors of the freezers and refrigerator which indicated the temperatures log in charts and temperatures that should be maintained. Interview also revealed that some hotels have food safety training programs planned for their workers regularly (PB). This variation was validated by the interviews done which revealed that while some hotels organized trainings for their workers, others relied on the trainings that the employees got while in college. One manager (PY) pointed out that

“each worker is expected to be knowledgeable on food safety management in their area of specialization so we do not do trainings but only briefings at the beginning of every shift. Also we do not employ those without tertiary training in specific field.”

A different response was gotten from other managers as follows:

“Every shift the chef briefs the workers in which they are reminded of what needs to be done. Every Friday we do some orientation and seminar to new staff. Also on some menu all staff must know what is in it. We follow them up by seeing what they are doing. Those who do not follow are reprimanded and so the workers are afraid of the consequences.” PW

“Food safety management team conducts trainings monthly. The housekeeping team also is included in the training since they take food to the rooms.” PB

This finding shows that there is no adequate orientation on food safety management thereby limiting the food handlers' knowledge on food safety management.



#### **4.4.6 Kitchen physical environment**

Regarding kitchen physical features, majority of the respondents (87.1%) indicated that food preparation areas were well lit and ventilated and 82.4% of the respondents reported that different storage areas had correct temperature readings (table 4.7). This result was supported by the observation made in that most of the hotels had storage areas especially freezer storages with correct temperature reading below 0°C. However, the other storage areas such as the cold room did not have correct temperatures in most of the hotels.

The observation also revealed that the hand washing facilities and food preparation areas in most of the hotels were inadequate. For example, hand washing facilities, despite 80% of the hotels having separate sinks for hand washing, there was no soap and hand driers/towels. Only one (10%) hotel had soap. One supervisor reported that the foodservice workers are expected to take a shower upon arrival and so did not see the need of having a hand-washing facility (PW). With regard to storage and food preparation areas, it has already been pointed earlier that some hotels mixed up their food storage areas with other things while others did not have clear areas in the kitchen for preparing different food items (refer to plates 4.9 & 4.10 respectively).

#### **4.5 Relationship between food handlers' knowledge and FSM in selected hotels in Eldoret Town, Kenya.**

In order to determine the relationship between food handlers' knowledge and food safety management, the researcher determined the mean and standard deviations of each of the category of questions on knowledge and practice. The results were then correlated using Pearson Correlation to establish whether there was any relationship.

Table 4.10 indicates that the food handlers had adequate knowledge on circumstances for double hand washing technique (Mean =1.0738; Standard deviation .15419) with most of them having adequate knowledge on double hand washing technique being done before handling food (Mean=1.00, Standard deviation 0.00), after visiting the toilet (Mean=1.04, Standard deviation .208), after touching food waste (Mean =1.05, Standard deviation .209), and after handling raw food to working with cooked food (Mean=1.09, Standard deviation 0.288). However, the respondents differed on double hand washing technique after sneezing/coughing and after smoking (Standard deviation being .318 and .358 respectively).

**Table 4.10: Mean of knowledge of circumstances for double hand washing technique**

**Descriptive Statistics**

Variables	N	Mean	Std. Deviation
Before handling food	89	1.00	.000
After visiting the toilet	89	1.04	.208
After sneezing/coughing	89	1.11	.318
After smoking	88	1.15	.357
After handling raw food to working with cooked food	89	1.09	.288
After touching food waste	88	1.05	.209
Mean for circumstances for double hand washing technique	89	1.0738	.15419
Valid N (listwise)	87		

1.00-1.49 Adequate knowledge

1.50-2.00 No adequate knowledge

According to table 4.11, the respondents had adequate knowledge on the various ways through which food contamination can occur (Mean=1.0449; Standard deviation .09322). Adequate knowledge was on improper storage (Mean=1.01, Standard deviation.106), poor handling (Mean=1.02, Standard deviation.149), contaminated surfaces (Mean=1.03, Standard deviation.181), and cross contamination (Mean=1.05, Standard deviation.209). However, the respondents lacked adequate knowledge on food handlers (Standard deviation.209) and improper cooking (Standard deviation.319) being ways through which food contamination may occur.

**Table 4.11 Mean of knowledge of ways through which food contamination may occur**

<b>Descriptive Statistics</b>			
	N	Mean	Std. Deviation
Improper storage	89	1.01	.106
Food handlers	88	1.05	.209
Contaminated surfaces	89	1.03	.181
Cross contamination	88	1.05	.209
Improper cooking temperatures	88	1.11	.319
Poor handling	89	1.02	.149
Ways of food contamination	89	1.0449	.09322
Valid N (listwise)	88		

1.00-1.49 Adequate knowledge

1.50-2.00 No adequate knowledge

In relation to the respondents' knowledge on vehicles through which food contamination can occur, the respondents had adequate knowledge (Mean=1.1080; Standard deviation .16433). More knowledge was on flies (Mean=1.02, Standard deviation.150), followed by fingers (Mean=1.05; Standard deviation .211), then feaces (Mean=1.07, Standard deviation.255). However most did not know that food can actually be one of the vehicles through which food contamination can occur (Standard deviation.459), (table 4.12).

**Table 4.12: Mean of knowledge of vehicles through which food can be contaminated**

<b>Descriptive Statistics</b>			
	N	Mean	Std. Deviation
Fingers	87	1.05	.211
Flies	88	1.02	.150
Food	88	1.30	.459
Feaces	87	1.07	.255
Vehicles for food contamination	88	1.1080	.16433
Valid N (listwise)	87		

1.00-1.49 Adequate knowledge

1.50-2.00 No adequate knowledge

Table 4.13 indicates that the respondents had adequate knowledge on the possible causes of food-borne illnesses (Mean=2.5192; Standard deviation .57535). Adequate knowledge was seen on bacteria, parasites and viruses as being capable of causing food contamination (Mean=2.71, Standard deviation .680) followed by pesticide

residues (Mean=2.60, Standard deviation .710). However, the respondents did not have adequate knowledge on food additives causing food contamination (Mean=2.24, Standard deviation.811).

**Table 4.13: Mean of knowledge of causes of food-borne illnesses**

**Descriptive Statistics**

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Pesticide residues can cause food contamination	85	2.60	.710
Bacteria, parasites and viruses can cause food contamination	87	2.71	.680
Food additives can cause food contamination	86	2.24	.811
Food-borne illnesses	87	2.5192	.57535
Valid N (listwise)	85		

1.00-1.49 No adequate knowledge

1.50-2.49 No adequate knowledge

2.50-3.00 Adequate knowledge

The results in table 4.14 shows that in general, the respondents had adequate knowledge on the possibility of the various stages in the food being capable of causing food contamination (Mean=3.0356; Standard deviation .74476) with very adequate knowledge being on storing, (Mean=3.34, Standard deviation 1.021), pre-preparation (Mean=3.01, Standard deviation 1.051, preparation (Mean=3.08, Standard deviation.967) and use of leftovers (Mean=3.28, Standard deviation 1.113). However, the respondents did not have adequate knowledge on purchasing (Mean=2.84, Standard deviation 0.998), receiving (Mean=2.90, Standard deviation .915), serving (Mean=2.83, Standard deviation 1.113).

**Table 4.14: Mean of knowledge of stages in the food flow that are critical in ensuring food safety management**

**Descriptive Statistics**

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Purchasing	85	2.84	.998
Receiving	87	2.90	.915
Storing	87	3.34	1.021
pre-preparation	87	3.01	1.051
Preparation	87	3.08	.967
Serving	86	2.83	.996
Use of leftovers	86	3.28	1.113
Mean for food flow	87	3.0356	.74476
Valid N (listwise)	83		

0.5-1.49 Not knowledgeable

1.5-2.49 Inadequate knowledge

2.50-3.49 Adequate knowledge

3.5-4.0 Very Adequate knowledge

The mean for personal hygiene as depicted on table 4.15 shows that personal hygiene was adequately practiced ( $M = 2.72 \pm .450$ ).

**Table 4.15: Mean of practice of personal hygiene****Descriptive Statistics**

	N	Mean	Std. Deviation
Food handlers are examined medically once in six months	86	2.73	.602
Food handlers wash their hands with soap and water before handling food, after visiting the toilet, sneezing/coughing	84	2.76	.506
Food handlers use the double hand washing technique to wash their hands	87	2.64	.590
Food handlers wear suitable aprons, head gear, and proper footwear	86	2.78	.562
Food handlers are not permitted to handle food when they are sick from clinically recognizable infections/contagious diseases	85	2.68	.694
<b>PRACTICE OF PERSONAL HYGIENE</b>	87	2.7201	.44841
Valid N (listwise)	82		

1.00-1.49 Inadequate practice

1.50-2.49 Moderate practice

2.50-3.00 Adequate practice

The mean of temperature control practices has been presented in table 4.16 to be  $2.47 \pm .532$  which is not good. However, leftover foods were promptly cooled using acceptable cooling methods ( $M=2.51 \pm .802$ ), and highly hazardous foods were cooked to correct temperatures ( $M=2.57 \pm .626$ ). Likewise the internal temperatures of held foods were not always checked after every two hours as recommended ( $M=2.39 \pm .713$ ), leftovers were never reheated to correct temperatures ( $M=2.42 \pm .732$ )

and at the same time, prepared foods were not always held out of danger zone (M=2.47±.704).

**Table 4.16: Mean of practice of temperature control**

**Descriptive Statistics**

	N	Mean	Std. Deviation
The internal temperature of held foods are checked every two hours	83	2.39	.713
Leftover foods are promptly cooled using acceptable cooling methods	83	2.51	.802
Highly hazardous foods are cooked to a temperature above 70 degrees C	84	2.57	.626
Leftover foods are reheated to a temperature above 82 degrees C	84	2.42	.732
Prepared food is never held at a temperature between 40 and 140 degrees F for long	83	2.47	.704
TEMPERATURE CONTROL	86	2.4702	.53238
Valid N (listwise)	76		

1.00-1.49 Inadequate practice

1.50-2.49 Moderate practice

2.50-3.00 Adequate practice



In regard to the practice of cross contamination prevention, table 4.17 shows that this was adequately practiced ( $M=2.72 \pm .502$ ).

**Table 4.17: Mean of practice of prevention of cross contamination**

**Descriptive Statistics**

	N	Mean	Std. Deviation
Ready to eat foods and raw foods are prepared separately	84	2.76	.633
Work surfaces are sanitized after cutting raw food	84	2.80	.576
Work surfaces are sanitized before beginning work and after work	82	2.70	.642
Different color coded chopping boards are used for specific jobs	83	2.63	.693
Ready to eat foods and raw foods are stored separately	84	2.79	.582
Periodic facility cleaning is done on a weekly basis	83	2.67	.683
<b>CROSS CONTAMINATION</b>	85	2.7224	.50246
Valid N (listwise)	79		

1.00-1.49 Inadequate practice

1.50-2.49 Inadequate practice

2.50-3.00 Adequate practice

There was adequate practice of purchasing and storage ( $M=2.64\pm.510$ ) as depicted in table 4.18.

**Table 4.18: Mean of practice of purchasing and storage**

**Descriptive Statistics**

	N	Mean	Std. Deviation
Food is purchased from trusted and approved suppliers only	84	2.71	.572
Receiving of supplies is strictly done against the specifications	84	2.67	.665
Supplies that do not meet the required standards are rejected	83	2.64	.673
Food is stored using FiFo method	83	2.54	.738
<b>PURCHASING AND STORAGE</b>	84	2.6399	.51013
Valid N (listwise)	82		

1.00-1.49 Inadequate practice

1.50-2.49 Moderate practice

2.50-3.00 Adequate practice

Safety training and rules were adequately practiced ( $M=2.586\pm.621$ ) although there was moderate practice of display of safety rules on the notice boards ( $M=2.43\pm.817$ ) as shown on table 4.19.

**Table 4.19: Mean of practice of food safety training and rules****Descriptive Statistics**

	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Foodservice employees are oriented on food safety management rules upon employment	85	2.69	.637
Food safety trainings are organized for food handlers	85	2.64	.652
Food safety rules are displayed on the notice boards for easy reference by food handlers	82	2.43	.817
<b>FOOD SAFETY TRAINING AND RULES</b>	85	2.5863	.62075
Valid N (listwise)	82		

1.00-1.49 Inadequate practice

1.50-2.49 Moderate practice

2.50-3.00 Adequate practice

The average means of the variables on food safety knowledge and food safety practice have been presented on table 4.20 and table 4.21 respectively.

**Table 4.20: Summary of average means of food safety knowledge**

<b>Variable</b>	<b>No.</b>	<b>Mean (SD)</b>
Circumstances for double hand washing technique	89	1.07±0.15
Ways of controlling cross contamination	89	1.02±0.15
Various vehicles through which contamination can occur	88	1.11±0.16
Stages in the food flow likely to cause food contamination	87	3.04±0.74
Food-borne disease	87	2.52±0.58

**Table 4.21: Summary of average means of food safety practice**

<b>Variable</b>	<b>No.</b>	<b>Mean (SD)</b>
Personal hygiene	87	2.72±0.45
Temperature control	86	2.47±0.53
Cross contamination prevention	85	2.72±0.50
Purchase and storage	84	2.64±0.51
Food safety training and rules	85	2.59±0.62

Pearson Correlation test was used to determine whether any relationship existed between knowledge and FSM. Table 4.22 shows that there was a positive relationship between knowledge of circumstances for double hand washing technique and FSM in terms of cross contamination control ( $r = .301, p = .005$ ), and purchasing and storage ( $r = .260, p = .017$ ). However, there was a significant negative relationship between knowledge of circumstances for double hand washing technique and personal hygiene ( $r = -.350, p = .001$ ) and temperature control ( $r = -.350, p = .001$ ). Further, there was a positive relationship between knowledge on ways that food contamination may occur

and practice of temperature control ( $r = .354, p = .010$ ), as well as between knowledge on vehicles for food contamination and temperature control ( $r = .366, p = .001$ ). A positive relationship existed between knowledge of likelihood of stages in the food flow to cause food contamination and practice of FSM in terms of personal hygiene ( $r = .229, p = .035$ ), cross contamination control ( $r = .287, p = .008$ ), and purchasing and storage ( $r = .297, p = .006$ ). Similarly there was a positive relationship between knowledge on the causes of food-borne illness and practice of personal hygiene ( $r = .247, p = .023$ ) and practice of temperature control ( $r = .255, p = .019$ ).

However, there was negative relationship between knowledge on ways of food contamination and practice of personal hygiene ( $r = -.104, p = .336$ ), cross contamination control ( $r = -.031, p = .781$ ) and no relationship was found between ways of contamination and practice of temperature control ( $r = .028, p = .058$ ) as well as purchasing and storage ( $r = .053, p = .632$ ). Likewise, there was a negative relationship between knowledge of vehicles of food contamination and practice of personal hygiene ( $r = -.172, p = .113$ ), and purchasing storage ( $r = -.057, p = .612$ ) though a relationship existed with contamination control ( $r = .129, p = .242$ ). Further, there was a weak relationship between knowledge on causes of food-borne illness and practice of cross contamination control ( $r = .197, p = .720$ ) as well as purchasing and storage ( $r = .190, p = .086$ ). Contrary to these findings that seem to suggest that there was a relationship between knowledge and FSM (table 4.22), observation results revealed that knowledge was not related to FSM. Furthermore, the strength of the relationships was weak. Null hypothesis number 1 which stated that there is no association between food handlers' knowledge and FSM was therefore accepted.

**Table 4.22 Pearson Correlation on the relationship between food safety knowledge and FSM**

Knowledge	Practice of PH		Practice of TC		Practice of CC		Practice of PS	
	r-value	p-value	r-value	p-value	r-value	p-value	r-value	p-value
Circumstances for double hand washing technique	r=-0.350	p=0.001**	r=-0.350	p=0.001**	r=0.301	p=0.005**	r=-0.260	p=0.017**
Ways that food contamination may occur	r=-0.104	p=0.336	r=-0.354	p=0.01**	r=-0.031	p=0.781	r=0.053	p=0.632
Vehicle for food contamination	r=-0.172	p=0.113	r=0.366	p=0.001**	r=0.129	p=0.242	r=-0.057	p=0.612
Stages in the food flow likely to cause food contamination	r=0.229	p=0.035**	r=0.208	p=0.058**	r=0.287	p=0.008**	r=0.297	p=0.006**
Causes of food-borne illness	r=0.247	p=0.023**	r=0.255	p=0.019**	r=0.197	p=0.072	r=0.190	p=0.086

NB: PH – Personal Hygiene      TC – Temperature Control      CC – Cross Contamination      PS – Purchasing and Storage

#### **4.5 Examination of the effect of food handlers' selected demographic factors on FSM in selected hotels in Eldoret Town, Kenya.**

The researcher sought to investigate whether there is any effect of food handlers' selected demographic factors on food safety management and the findings are presented in table 4.23. The results reveal that there is association between position and level of education on managing purchasing and storage ( $X^2 = 106.013$ ,  $df = 70$ ,  $p < .05$  and  $X^2 = 52.901$ ,  $df = 30$ ,  $p < .05$ ) respectively as well as between position and management of temperature control ( $X^2 = 132.256$ ,  $df = 70$ ,  $p < .05$ ). This is because individuals with a high level of education have been found to be more concerned about food hazard (Lin, 2011) and those with high education are the ones that hold high positions in any given job. There was however no association between level of education and position and the rest of the FSM in the study (personal hygiene, temperature control, and cross contamination control). Similarly, the present study did not find any association between age, gender, years of service, terms of service and training on FSM with FSM. The null hypothesis that stated that there is no relationship between food handlers' demographic factors and FSM was accepted.

**Table 4.23 Association between demographic factors and Practice of FSM**

Variable	Personal Hygiene			Temperature control			Cross contamination control			Purchasing & Storage		
	X <sup>2</sup>	df	P-value	X <sup>2</sup>	df	P-value	X <sup>2</sup>	df	P-value	X <sup>2</sup>	df	P-value
Age	15.284	10	0.122	10.616	10	0.388	15.539	14	0.342	13.418	10	0.201
Gender	6.378	10	0.783	11.364	10	0.330	13.593	14	0.480	12.695	10	0.241
Level of education	34.338	30	0.374	31.862	30	0.374	50.288	42	0.178	52.901	30	0.006*
Position	56.484	70	0.879	132.256	70	0.000*	112.340	98	0.153	106.013	70	0.004*
Terms of service	23.393	20	0.270	23.149	20	0.282	18.517	28	0.912	25.869	20	0.170
Training on FSM	12.531	10	0.251	9.751	10	0.463	15.136	14	0.369	5.722	10	0.838



#### **4.6 Assessment of the role of management in ensuring FSM in selected hotels in Eldoret Town, Kenya.**

There was need to have an in-depth interview with the managers to have a deeper understanding of how food safety management issues are seen by the management. The interview results showed that the managers agreed that food-borne illnesses were a problem in the country. One of the interviewees reported that “right now statistics indicate that Kenya is number two worldwide in food poisoning cases after Indonesia” (PW). The main cause of the high prevalence of food-borne illnesses was reported to be mainly negligence by food handlers in following food safety management rules. PW reported that people do not follow safety procedures when handling food and as a result, the government was developing standard operating procedures (SOPs) which included the kitchen lay out, what should be put in the hotels, the type of employees required, safety in general such as HR policy, fire policy and each hotel to have their own SOPs in place. PM cited lack of knowledge and training as well as taking safety issues for granted by the food handlers as one of the causes of food-borne illnesses. He added that work environment (design of the hotel), lack of professionals (graduates that are hired are not knowledgeable), lack of required resources, and time pressure to be causes of food-borne illnesses. In support, PN pointed out that “the workers are trained but ignore or neglect the training because the management does not enforce the food safety rules.”

In order to deal with the aforementioned causes of food-borne illnesses above, the managers highlighted some of the mechanisms that they had put in place to reduce the occurrence of food-borne illnesses in their hotels to include close supervision. PW reported that the food handlers are careful when the managers are next to them and therefore the managers try to be present to monitor their practice of FSM. Elsewhere

the manager reported that “we do random inspection audit once a week (internal audit) and whoever is found to be contravening the rules is dealt with. We have also contracted SGS company that deals with food safety management as an external audit and they do the audit twice a year” (PB). Some managers reported that they ensured that the food handlers went for annual medical check-up though different managers reported different durations with which this medical check up should be done. Some managers required their food handlers to for the check up after three months, others after six months. One of the managers argued that Eldoret is urban unlike Nairobi which is a city and therefore the duration corresponds with the area. For urban it is required that the examination be done after six months and for cities after three months (PY). An attempt to see the medical examination was however futile as each time there was an excuse as to why the certificates could not be accessed.

On the hotels monitoring of the internal temperature of cooked foods to ensure that the foods are thoroughly cooked, especially the highly hazardous protein foods which were including chicken and sea foods, several responses were received such as “we ensure sufficient cooking time” (PH), “we roast and then deep fry” (PS), “we have a tester which we insert (I cannot give it now) or experienced person can tell from the look – when it comes to meat we dissect/pierce and if it does not go through easily then it’s done. When serving and you see blood oozing out then it’s not done (PB). According to PY “I myself taste the food and approve it as ok or not ok to be served to customers. It is the secret of the cook. The responsibility is of the head of cooking to ensure proper cooking.”

Concerning the stages in the food flow that are considered to be important in ensuring food safety, only one manager thought that all the stages are important. “I *think* all

the stages are important. This is why you find food poisoning being common because people don't think that all stages are important" (PW). Others had different opinions. For example, PB said that all areas must be observed keenly however, production areas take a major portion (receiving, storage, production, and service). PS stated that "storage mostly due to failure of electricity and lack of automatic generator and also preparation area because of cross contamination through the person or the surface." According to PY, "purchase and storage because you can purchase already below standard product which cannot withstand any standard of storage. Storage is to maintain quality that can produce a good end result to the guest. I assume there is no doubt in food preparation because the person is qualified. It is not a practice that you purchase very good food, have a very good storage and sell damaged food."

In response to the question on how the managers ensure that all the food handlers are aware of the importance of their roles in ensuring food safety, the managers reported that they organize food safety trainings for the food handlers and yet others said that they do briefings at the beginning of each schedule to remind the food handlers of what is expected of them. "Every shift the chef briefs the workers in which they are reminded of what needs to be done. Every Friday we conduct some orientation and seminars to new staff. Also on some menu all staff must know what is in it. We follow them up by seeing what they are doing. Those who do not follow are reprimanded and so the workers are afraid of the consequences" (PW). PB reported that "food safety management team conducts trainings monthly. The housekeeping team is also included in the training since they take food to the room." However, PY pointed out that "each worker is expected to be knowledgeable on food safety management in their area of specialization so we do not do trainings but only

briefings at the beginning of every shift. Also we do not employ those without tertiary training in specific field.”

Finally the managers pointed out several challenges that they face as managers in ensuring food safety management in their hotels. These challenges included: “Forgetfulness by workers, lack of information by new workers, lack of willingness of workers to participate in hygienic issues, lack of management follow-up or enforcement, and lack of proper food storage or training for store keepers” (PH). However, PW noted that “mostly suppliers are the challenge. Our suppliers are not hygienic. The supplies are normally dirty. Lack of right personnel spoils everything. Lack of management support, and the training of the manager matters. We have an accountant as a manager and it is hell.” He further states that “food safety is a challenge because when the hotel owners are setting up they do not consider several things such as space for various utilities. You are forced to squeeze everything in a small place and in the process you compromise safety standards. A certified, trained qualified hotel manager should be in place from the time the hotel is being drawn before you go to the architect.”

In summary the role of management in ensuring food safety management was found to include organizing trainings on food safety management for the food handlers, enforcing the food safety rules established by the Government and the hotel, close supervision, and provision of conducive work environment and resources. It was evident that the managers were not well equipped with food safety management knowledge and therefore should also be trained on the same.

#### **4.7 Exploration of the extent of the effect of kitchen physical environment in ensuring FSM in selected hotels in Eldoret town, Kenya.**

The researcher sought to carry out observation in the hotels to verify the information that was provided by the food handlers in the questionnaire as well as those generated from the interview schedules. The findings from the observation carried out in ten of the hotels in the study showed that the physical environment of most of the hotels were not adequate in enabling the food handlers to practice FSM. For example, 80% of the hotels did not have adequate hand washing facilities and this hinders the food handlers from practicing double hand washing technique in the circumstances that it should be applied. Those that had separate sinks for washing hands did not provide soap and hand driers or disposable towels.

Also lack of separate storage and food preparation areas made the practice of control of cross contamination a problem. Observation revealed that some of the hotels mixed raw and cooked items in the same storage area and even with non food items. The freezer, cold room and refrigerator storages were found to be lacking thermometers to ensure that required temperature is maintained at all times. Only one hotel had the required standards where a temperature log was used. When it comes to food preparation areas, lack of separate work stations made it difficult for control of cross contamination as some of the hotels had imaginary boundaries for preparing different foods.

None of the hotels provided gloves for use when handling food and this also can lead to food getting contaminated by the food handlers when they handle foods with bare hands. Similarly, there was no food safety charts displayed to remind the workers of their safety practices a part from only one hotel that had a few charts on display.

#### 4.8 Perceived barriers to FSM

The findings from this study showed that lack of necessary equipment, was the leading perceived barrier to FSM accounting for 70.1% as illustrated in table 4.24.

**Table 4.24: Perceived barriers to food safety management**

Variables	Disagree (%)	Neutral (%)	Agree (%)
Time pressure	18(21.7)	19(22.9)	46(55.4)
Lack of necessary equipment	18(20.7)	8(9.2)	61(70.1)
Lack management support	21(24.7)	28(32.9)	36(42.4)
Too much work	25(30.5)	20(24.4)	37(45.1)
Unconducive work environment in terms of structure (physical features)	29(33.7)	17(19.8)	40(46.5)
Lack of recognition of one's effort at ensuring food safety	30(35.7)	17(20.2)	37(44)
Lack of knowledge on what one is expected to do	21(25)	14(16.7)	49(58.3)

Infact, the observation made in the hotels revealed that most of the hotels did not have the necessary equipment to enable the workers practice food safety management. For instance, most of the hotels lacked adequate hand washing facilities, food preparation and storage areas were not sufficient, and gloves were not provided to the food handlers to use while carrying out their work. The researcher observed that when food is served into either individual plate as in ala carte service or food warmers as the case for buffet service, the cooks arrange the food into the serving dishes using bare hands when handling ready to eat foods without the use of gloves. In all the hotels under

observation none was found to use gloves and when the researcher tried to find out why gloves were not being used, the answer given was that the gloves have not been bought. Plate 4.19 shows chefs arranging cooked fried chicken and vegetables in the food warmers with bare hands in readiness for a buffet service.



**Plate 4.19: Food handling without use of gloves**

The researcher also found that food handlers themselves are also barriers to food safety management since they are reluctant to observe food safety practices. For example, some of the managers interviewed said “when you are next to these people they become careful” (PW) suggesting that close supervision is required. Another manager when asked what he thinks is the main cause of food contamination in hotels

cited lack of knowledge and training as well as taking safety issues for granted by the employees (PM). He further added that “work environment (design of the hotel), lack of professionals (graduates that are hired are not knowledgeable), lack of required resources, and time pressure are some of the challenges that hinder food safety management.” PN points out that “the workers are trained but ignore or neglect the training because the management does not enforce the food safety rules.”



## CHAPTER FIVE

### DISCUSSION

#### 5.1. Overview

This chapter discusses the findings of the study.

#### 5.2. Discussion

##### 5.2.1 Knowledge on FSM

Different studies on food safety knowledge have been done in different parts of the world focusing on foodservice employees at different levels of food establishments such as street food vendors, restaurant foodservice employees, hospital foodservice employees, and university cafeteria foodservice employees with varied contradicting results (Kitagwa, 2012; Hume, 2005; Egan *et al.*, 2006; & Seaman & Eves, 2009). The findings from this study revealed that generally there is adequate knowledge on food safety management among the food handlers especially in regard to personal hygiene in the selected hotels. However, inadequate knowledge was found on some aspects such as in the use of double hand washing technique after coughing /sneezing and smoking, vehicles for food contamination, likelihood of different stages in the food flow to cause food contamination, causes of food-borne illness, duration for routine medical examination for food handlers, temperature control, and danger zone. The finding from this study is consistent with other studies which have found that there is adequate knowledge on food safety among food handlers (Isara *et al.*, 2009; Henroid & Sneed, 2004; Webb & Morancie, 2014). The study however differed with some studies done which found that there was inadequate knowledge among food handlers (Hsu & Huang, 1995; Sneed *et al.*, 2004 & Ko, 2011; Cuprasitrit *et al.*, 2011; Soeres *et al.*, 2012). Fawzi & Mona (2009) report that some studies on food safety have revealed that there is inadequate food safety knowledge and practices

among all job categories with the highest knowledge score being seen in personal hygiene and lowest score being seen in food preparation, purchasing, and storage. As a result, Ko (2011) suggested that further research should be done on catering employees' knowledge, attitude, and behavior toward food poisoning.

Knowledge regarding circumstances for double hand washing technique was found to be adequate except for after coughing/sneezing and smoking. Negligence on the part of the food handlers can be the cause of this lack of hand washing as required since food handlers are the most frequently reported barriers to food safety practices (Panchal *et al.*, 2012). One interviewee reported that the workers themselves are the main cause of food contamination in the hotels since they are trained but ignore or neglect the training because the management does not enforce the food safety rules. This is an indication that more supervision is needed since food contamination can occur through hands that contain droplets after sneezing/coughing and smoking. According to Shojoei *et al.*, (2006) research findings from the food industry suggest that hands play the role of a vehicle in the transmission of enteric pathogens especially those who do not wash hands after visiting the restrooms pose the risk of carrying high loads of microbes such as *E. Coli* and *S. Aureus* on their hands.

Majority of the respondents had adequate knowledge on sources of food contamination and vehicles through which contamination can occur although quite a number did not have adequate knowledge on the fact that improper cooking temperature can cause food contamination and that food can be a vehicle for food contamination. All food handlers should be well trained on sources and vehicles of food contamination. It has been documented that inadequate temperature practices have contributed to several food-borne outbreaks (Panchal *et al.*, 2010). The probable

reason for this lack of knowledge on food being a source and vehicle for food contamination is lack of proper training since a number of respondents reported that they had never been trained on FSM. This therefore means that it is possible for food not to be cooked properly leading to food contamination. Angellilo (2000) suggested a lack of knowledge on common food vehicles that transmit pathogens which explains the reason why a significant number of the food-handlers did not agree that food can be a vehicle for transmitting food contamination.

Food handlers' knowledge on the likelihood of different stages in the food flow to cause food contamination was inadequate since only two stages were seen to be very likely to cause food contamination: storage and use of leftovers. Purchasing, receiving and serving were reported to be less likely to cause food contamination and yet food flow begins with purchasing through storage, pre-preparation, preparation, service, and ends with the use of leftovers and during each of these stages, food safety should be ensured (Homberg (1983). The findings from this study concur with Fawzi & Mona (2009) whose study revealed that food safety knowledge scores were seen in personal hygiene and lowest in food preparation, purchasing and storage. The most likely explanation for this finding again is lack of proper training since the training in food safety relies too heavily upon attaining a certificate rather than paying attention to achieving competency in food hygiene practices (MacAuslan, 2003).

The food handlers' knowledge on food-borne illness was limited as a large percentage of the respondents did not seem to be aware that food additives can cause food-borne illnesses. According to Ababio and Lovatt (2015), all food hazards are detrimental to the health of consumers and require monitoring and control in the country although currently microbiological hazards in ready to eat foods and chemical hazards mostly pesticides from agricultural products including fresh vegetables and

fruits have been highlighted. There is minimal information on physical contaminants/hazards, food allergy and injuries caused by these. This could be due to less awareness and or lack of public education of these hazards. It is therefore necessary that awareness be created among the food handlers on the possibility of food additives causing food contamination.

The food handlers' knowledge on the frequency of undertaking routine medical examination was found to be insufficient since the respondents gave different results concerning when the medical checkup should be done. Interview results revealed that even the managers themselves seemed to differ on the duration of the medical check up with managers from different hotels giving contradicting responses and even accessing copies of the medical examination certificates from the hotels for purposes of verification was futile. This raises the question whether the food handlers adhere to the requirements for medical examination as required by the ministry of public health in the country. Marriot (1999) says that it is not easy to maintain medical control over food handlers in food establishments due to their rapid turnover and this could explain the contradiction and even lack of evidence of the medical examination licenses from the hotels.

Temperature control is one of the critical areas in food safety management and therefore an understanding of the danger zone is very important to food-handlers. The results from this study showed that the respondents' knowledge on temperature control was adequate. However, knowledge on danger zone was limited which was consistent with a study by Panchal *et al.*, (2014) in Italy which revealed that a very low proportion of food handlers correctly identified the temperature range at which germs proliferate. These results could be attributed to the fact that most managers are

not themselves trained on food safety management as Egan *et al.*, (2006) observe that less than 20% of managers in the foodservice industry have been trained in the supervisory role of food safety thereby restricting their ability to assess food safety risks and convey proper hygiene training to their staff. Infact observation made by researcher revealed that the availability of food safety charts with temperature interpretations on the notice boards of some hotels did not help the food handlers have the correct knowledge since the some respondents were seen looking at the charts on the notice board to get the temperature reading for danger zone. This is contrary to an earlier study by Chapman *et al.*, (2010) who found that availability of information sheets with food safety information have a positive influence in behavioral change among food handlers. This could mean that food is never kept at the optimum temperature and therefore is predisposed to the growth and multiplication of microorganisms that may cause food-borne illnesses and therefore it is important that that the importance of cooking temperatures should be emphasized to restaurant managers and food handlers through regular training as part of general efforts to reduce the burden of foodborne diseases.

### **5.2.2 Practice of FSM**

The findings concerning the food handlers' practice of food safety management showed that there was adequate practice of food safety management as far as personal hygiene was concerned apart from practice of double washing technique. This is in agreement with Panchal *et al.*, (2012) whose study in Italy showed that a high proportion of the respondents reported good hygiene practices although he argued that all food handlers should report good hygiene behavior practices. Similarly Sharif *et al.*, (2013) found that the food handlers practiced good hygiene in which the hygiene level had a mean percentage score of 89.4%±9.1% although the following practices

were however found to be inadequate: temperature control, cross contamination control, purchasing and storage, and training on FSM.

Regarding temperature control, the results showed that quite a large percentage of the respondents reported that leftover foods were promptly cooled using acceptable methods. However, a significant number of the respondents reported that leftover foods were not always reheated to core temperatures above 82<sup>0</sup>C. Likewise highly hazardous protein foods were also not always cooked to temperatures above 70<sup>0</sup>C. Most of the respondents reported that internal temperatures of held foods were not always checked after 2 hours and at the same time prepared foods were sometimes held at temperatures between 40<sup>0</sup>F and 140<sup>0</sup>F. The possible reason for this finding was the lack of the required equipment such as probe thermometer to check the temperatures of cooked foods. This is supported by a study by Green *et al.*, (2005) who found out that half of the respondents did not use a thermometer to properly ensure safe internal temperatures.

Cross contamination control was adequately practiced as a majority of the respondents reported that work surfaces were sanitized after cutting raw food and a big percentage of the respondents indicated that they used separate places for preparing raw and ready to eat foods. However, the use of color coded chopping boards for different activities was not always done as reported by 14 respondents. This is due to negligence on the part of the food handlers since all the hotels had different color coded chopping boards as was observed and so it is not a lack of the required equipment. This calls for strict continuous supervision by the supervisors if the food handlers are to engage in the required behavior.

These findings are due to lack of management playing their role of ensuring that the facility planning is well done to ensure food safety management. Geller (2005) pointed out that employees must be provided with the proper tools necessary for their work and Yiannas (2009) adds that facilities should be designed with food safety and sanitation in mind and they must comply with all relevant regulatory standards.

The present study found that there was adequate practice of purchasing in which most of the respondents reported those supplies are always purchased from approved suppliers and receiving strictly done against specifications. However some respondents indicated that this is not always the practice which means that there is likelihood that sometimes substandard supplies can find their way into the hotels. Storage of supplies was not always done using FiFo method and this could mean that some supplies were possibly left in the store for longer periods which could cause their quality to deteriorate. The possible reason for this is lack of information on the likelihood of the various stages to cause food-borne illness as had been pointed earlier where the respondents' knowledge on the likelihood of the stages in the food flow to cause food contamination was inadequate. Previous studies had revealed that there is low knowledge score on purchasing and storage (Fawzi & Mona, 2009; Ko, 2011).

Concerning training on FSM, the results showed that the hotels organized for FSM training for their food handlers either through orientations or arrangement training. This is contrary to Seaman & Eve's (2009) finding where 80% of untrained food handlers indicated that their managers had not discussed nor provided food hygiene training during their early stages of employment. However, the trainings were found to be inadequate in preparing the food handlers to practice FSM. It was clear from the interview that what was called orientation was basically briefings at the beginning of

every shift and in cases where workers are sent for training, not all workers are targeted. One interviewee reported that the workers were expected to have been trained on food safety and therefore there was no need to waste time in training them again. This showed that the managers were reluctant to train the workers as Hume (2005) suggests that lack of training have been cited to include costs of training programs, a lack of course availability particularly free food safety courses, and a time when the food handlers would be trained as well as high employee turnover which can mean a loss of food safety practice as soon as the food handler is trained. During the interviewee, PB reported that they feared training because their competitors poached the employees that they have trained and so they saw it as a loss to invest in training the workers. An employee retention strategy should therefore be developed by the hotel managers to ensure that their employees served in the hotels after their training on FSM so that the hotel can benefit from the training. May be a contract should be signed by the food handlers who are sent for food safety training for them to serve in the given hotel for a particular period of time upon completing the training before leaving the facility. Another reason for lack of organizing for the training of the workers is the fact that even the managers themselves are not well trained on food safety management. Egan *et al.*, (2006) pointed that only 20% of managers in the foodservice industry have been trained in supervisory role of food safety and therefore are limited on their ability to convey proper hygiene knowledge to their staff. Seaman & Eves (2006) add that proper food handling and effective implementation of training programs depend highly on qualified, positive managers. It is important that food safety management training should be organized that targets the managers so that they can be well equipped to undertake their supervisory roles adequately.



### 5.2.3 Relationship between knowledge and practice of FSM

Previous studies on knowledge and practice of FSM showed that knowledge did not necessarily translate into practice. Seaman and Eves (2006) in their study on perceptions of hygiene training amongst food handlers, managers and training providers found out that the provision of knowledge to change food safety attitude and behavior has not been adequately proven. The researchers said that food safety training will lead to an improvement in food safety if knowledge imparted reflected a positive change in behavior.

Furthermore, Roberts *et.al.*, (2008) in assessing food safety training and foodservice employee's knowledge and behavior suggested that food safety training could have a significant impact on improving knowledge and behavior of food operators however, an increase in knowledge alone did not necessarily guarantee a change in behavior. In complement, Howells *et al.*, (2008) in Neal *et al.*, (2012) point out that having knowledge on food safety was not a predictor of correct performance of the task, especially with barriers such as time constraints, poor training and lack of resources to overcome.

In agreement, Sneed *et.al.*, (2004) in their study on evaluating food handling practices, presence of prerequisite food safety programs and employees' food safety knowledge and attitudes in Iowa concluded that employees in assisted foodservice had sufficient food safety knowledge and positive attitudes towards food safety, but food safety practices still needed to improve. All the studies suggested that there was a problem with the training provided. MacAuslan (2003) argues that training in food safety relies too heavily upon attaining a certificate rather than paying attention to achieving competency in food hygiene practices. Egan *et al.*, (2007) argue that

majority of food safety courses rely solely on the dissemination of information with very little emphasis on practice which is ineffective. Moreover, Neal *et al.*, (2012) concur that traditional approaches used to educate and train employees (such as Servsafe) may not be particularly effective and new behavior-based approaches that include food safety education as part of the culture of the organization need to be developed. As a result, Clayton *et al.*, (2002) suggest that behavioral changes in food safety will not occur as a result of training alone. In addition, according to Campbell *et al.*, (1998) implementation of food safety training regime must therefore target both managers and foodservice workers if the knowledge gained is to translate into practice.

The results from the present study corroborated previous studies that there was no significant relationship between knowledge and FSM ( $r = .174, p >.05$ ). The qualitative data through observation showed that most of the workers did not engage in or practice food safety management as they indicated in the questionnaire in most of the areas which suggests that knowledge does not necessarily translate into practice. Green and Carol (2005) pointed to previous research which suggested that “food workers (and consumers) report engaging in food safety practices more frequently than they actually engage in those practices, a phenomenon which is likely the result of the social desirability bias, which is the tendency for people to report greater levels of socially desirable behavior (such as safe food preparation practices) than they actually engage in, or to report their best behavior rather than their typical or worst behavior.”

Infact, Howes *et al.*, (1996a) in Nyamari (2009) asserted that other studies had shown that improved knowledge of food hygiene practices did not always result to the

required transformation in food handling behavior. For instance, Githiri *et al.*, (2009) cited a case in Kenyatta National Hospital in Kenya where food handlers who scored highly in a questionnaire on hygiene practices each contaminated a sample of food they had handled. In complement, Walker *et al.*, (2003) point out that acquiring food safety knowledge was one component in attempting to reduce the likelihood of a food-borne illness. More important was the translation of knowledge into practice. In another case a manager in foodservice establishment in South Carolina received food safety training and passed the test but six months later an outbreak of Salmonellosis involving 135 confirmed cases and approximately 800 affected persons occurred in his establishment (Rennie 1994 in Nyamari 2009) further confirming that the information was not translated into effective food safety practices thereby causing a substantial outbreak. Similarly, Nyamari (2009) assessed food handlers' safety practices before and after education intervention and reported only minimal improvement which was not statistically significant. Elsewhere a study by Fawzi and Mona (2009) on food safety and practices among women working in Alexandria University in Egypt revealed that there was inadequate safety knowledge and practice among all job categories. The authors observed that there seemed to be inconsistencies between knowledge and practices calling for emphasis on the need for implementing repeated food safety education programs. Another study by Rahman *et.al.*, (2012) on food safety knowledge, attitude and hygiene practices among the street food vendors in Northern Kuching city, Sarawak showed that many vendors had sufficient knowledge to ensure hygienic handling of food, such as the knowledge of the dangers of contamination, storage, and preparation of food. However, knowledge was not turned into safe practices, not even by those vendors who had obtained training in food safety.

According to Powell *et al.* (1997), there was no relationship between the level of knowledge of staff and hygiene standards in restaurants. This was because there were problems with the training regimes that tended to rely merely on dissemination of information with no practical reinforcement. Furthermore, Ehiri *et al.*, (1997) stated that there was 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. Infact, Hammond *et al.*, (2005) argued that critical violations actually increased after training and so Hines *et al.*, (1987) suggested that both declarative (knowledge issues) and procedural knowledge (knowledge of action, strategies) were essential for behavioral change.

#### **5.2.4. Relationship between selected demographic factors and FSM**

The findings of this study revealed that demographic characteristics of food handlers' are not associated with practice of FSM except for position and level of education ( $p < .05$ ). Those in high positions and highly learned reported a high percentage on practicing food safety management than their counterparts in lower ranks with less education. This finding supported an assertion by Lin (2011) that several studies had reported that individuals with a higher level of education were more concerned about food hazards contrary to other studies that have also reported that individuals with a higher level of education were less worried about food hazards. This is as a result of either high internal locus of control (Green, 2004), or that these individuals were more optimistic about their skills in conducting a requested task (Benkendorf *et al.*, 1997). However, Isara *et al.*, (2009) asserted that level of education did not significantly influence practice of food hygiene and safety.

The present study did not find any association between age, gender, years of service, terms of service and training on FSM with FSM which contradicts previous findings. For example, according to Lin (1995) older people are more concerned about food safety practices and hazards than young people, and women tended to judge health risks as having a higher potential of danger than men since females scored better than males in food safety knowledge. (Rahman *et al.*, 2012) reported that their study found an inverse relation between the duration of vending and food safety practice in that short duration vending maintained better food safety practices. Elsewhere a study by Cushman *et al.*, (2001) which showed that female student employees had higher mean hygiene practice scores than male student employees and that the length of employment with the facility or organization influenced personal hygiene practices negatively. The researchers concluded that the majority of part-time student employees performed personal hygiene practices properly. Their finding indicated that gender, years of service in a facility and terms of employment affect food safety management in that female workers observe food safety better than their male counterparts, over familiarity with the establishment led to reduced food safety management practice and part-time workers observe food safety practices than regular workers. Likewise Isara *et al.*, (2009) found that food handlers who had worked for longer years in the fast food restaurants had better practice of food hygiene and safety. However, Rheinlander *et al.*, (2008) as cited by Rahman *et al.*, (2012) in their study concluded that neither gender nor vendors' knowledge about health and hygiene were closely related to safe food practices. Instead the wider social, cultural, and everyday context seemed to have a greater influence on handling of food risks and hygiene.

### **5.2.5 The role of management on FSM**

Managers and coworkers who emphasize safe food preparation and who pay attention to other's food preparation practices facilitate food safety. WHO (2008) pointed out that food handlers need a work environment that promote the production and preparation of safe food. Infact, according to WHO, factors that play a significant role on employees' behaviors are directly correlated with organizational structure in the company, the level of job satisfaction, labor conditions and relations between employees and their supervisors. Food safety practices will only be implemented given adequate resources and the proper attitude of management. Seaman & Eves (2006) concurred that proper food handling and effective implementation of training programs depend highly on qualified, positive managers. However, it has been observed that the managers are not themselves trained on food safety management and this restricts their ability to assess food safety risks and convey proper hygiene training to their staff. Less than 20% of managers in the foodservice industry have been trained in the supervisory role of food safety (Egan *et al.*, 2006). A study on food handlers' and managers' perceptions of hygiene training by Seaman & Eves, (2009) showed that majority (80% of individuals interviewed) of untrained food handlers indicated that their managers had not discussed nor provided food hygiene training during their early stages of employment. However, findings from this study showed that there was some level of food safety training being organized by the hotels as in-service or during the orientation process. This is an indication that some managers were concerned about food safety management in their establishments and was making some effort in ensuring that their employees were training on FSM. According to Youn and Jeanie (2002), there are two categories of barriers to implementing food safety practices: employee barriers include employee training and

motivation, and resource barriers which include the resources that must be provided by the management. For example, Chapman *et al.*, (2010) observed a positive impact on food handlers' behavior which was influenced by the presence of a food safety information sheet on practices within with the foodservice environment. This study revealed that availability of information sheets on food safety practices did not influence the food handlers' behavior in food safety management. However, involvement of the management in the day to day activities of the hotel including serving the guests influenced the practice of food safety management by the food handlers. For example it was observed that the food handlers were more careful in the hotels where the managers were constantly present and the hotels that had managers with background on hotel management had better facilities and equipment to enable food safety management to be practiced. This concurs with Cates *et al.*, (2009) who suggested that the presence of a certified kitchen manager was protective for the majority of critical violations and therefore employing and properly training such a manager was essential to ensuring a safe food product.

#### **5.2.6. The effect of kitchen physical environment on FSM**

Structural environment, equipment, availability and accessibility of adequate resources such as sinks and adequate resources such as soap and gloves facilitate the practice of FSM (Green and Carol, 2005). According to Yiannas (2009), facilities should be designed with food safety and sanitation in mind and they must comply with all relevant regulatory standards. In agreement, Geller (2005) pointed out that the right equipment must be selected for the right job and employees must be provided with the proper tools necessary to do their work. This study showed that the main barrier to effectively practicing food safety management was lack of adequate facilities. This is consistent with Kibret and Bayeh (2012) who concluded that lack of

basic infrastructure was among the factors that lead to the outbreaks of foodborne illnesses. From the observation it was evident that the hotels lacked adequate hand washing facilities, separate work stations for different activities, separate storage areas for raw and cooked foods, the storage areas had inadequate temperatures, lacked gloves and also lacked food safety charts. Chaptman *et al.*, (2010) observed that a positive impact on food handlers' behavior which was influenced by the presence of a food safety information sheet on practices within the foodservice environment.

The physical environment in most of the hotels were found to be inadequate in ensuring FSM especially with concerns to food preparation areas, storage areas and hand washing facilities. The possible reason for this inadequacy was the lack of management knowledge on the necessity of such facilities. During the interview PW reported that hotel managers should have a background of training in hotel management and not just business in order for them to appreciate and understand the requirements in managing such an enterprise. He also suggested that hotel managers should be involved in the planning of the layout of a hotel to ensure that proper plan is done that caters for all the activities to be undertaken in a hotel set up. He cited of a case where some of the hotels were meant for other types of business and later transformed into hotels without considering how this would affect the operations especially as far as FSM is concerned. To support this assertion, the former minister for Tourism Ms Kandie encouraged people with big homes to convert them into tourist sites because there is a shortage of bed-capacity (Daily Nation April 12, 2015, p.24).



### **5.2.7 Hypotheses**

The researcher hypothesized that there was no relationship between food handlers' knowledge on food safety and food safety management in selected hotels in Eldoret Town, and that there was no association between food handlers' selected demographic factors and food safety management. The findings from this study supported these hypotheses since the qualitative data revealed that knowledge was not translated to FSM. Furthermore, the association that was found with the quantitative data showed that the strength of the relationships was weak. In regard to the association between food handlers' demographic factors and FSM, only position and level of education were found to be associated with FSM. Therefore the researcher did not reject the null hypotheses but accepted.

### **5.2.8 Research questions**

The findings showed that food handlers in selected hotels in Eldoret Town, Kenya had adequate knowledge on food safety management especially on personal hygiene. However, there limited knowledge was found in sources and vehicles for food contamination, likelihood of different stages in the food flow to cause food contamination, causes of food-borne illness, duration of routine medical examination, temperature control and danger zone. Similarly there was adequate practice of personal hygiene but practice of temperature control, cross contamination control, and purchasing & storage was limited. In regard to the role of management in ensuring food safety management, the findings revealed that manager's training background, training on FSM, supervision, enforcement of food safety rules played a major role in ensuring that FSM is observed. Additionally, the managers need to organize FSM trainings for the food handlers and provide the conducive environment and resources for the food handlers to manage food safety effectively. Lastly, the kitchen physical

environment was found to be very crucial in enhancing the practice of food safety management since the observation results showed that the hotels in which food handlers flouted the FSM rules were those in which the kitchen environment was inadequate such as lack of adequate hand washing facilities, proper storage spaces for raw and cooked foods as well as work surfaces. These hotels also lacked the required resources such as thermometers, gloves.

### **5.3. Conclusions**

The goal of any food service establishment should be the provision of quality food that meets the safety standards. In view of the findings of this study the following conclusions can be made:

#### **5.3.1 Food handlers' knowledge on FSM**

The findings of this established that the food handlers in selected hotels in Eldoret Town, Kenya had adequate knowledge on food safety management especially on personal hygiene. However, there was limited knowledge on sources and vehicles for food contamination, likelihood of different stages in the food flow to cause food contamination, causes of food-borne illness, duration of routine medical examination, temperature control and danger zone.

#### **5.3.2 Food handlers' practices of FSM**

The study findings indicated that there was adequate practice of personal hygiene among the food handlers in selected hotels in Eldoret Town, although the practice of temperature control, cross contamination control, purchasing & storage, and training on FSM was limited.

### **5.3.3 Relationship between knowledge and practice of FSM**

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The results of this study support previous studies that there is no significant relationship between food handlers' knowledge and food safety management among food handlers in selected hotels in Eldoret Town.

### **5.3.4 Association between demographic factors and FSM**

On the basis of this study, it is concluded that demographic factors are not associated with practice of FSM except for position and level of education which are associated with purchasing and storage as well as temperature control.

### **5.3.5 The role of management in FSM**

This study finding shows that manager's training back ground and training on FSM as well as constant supervision and enforcement of food safety rules play a major role in ensuring food safety management in the selected hotels in Eldoret Town.

### **5.3.6 The effect of kitchen physical environment**

The study findings showed that the kitchen physical environment (in terms of the kitchen lay out, work surfaces, equipment and facilities) was found to be crucial in enhancing the practice of food safety management in the selected hotels in Eldoret Town.

## **5.4. Recommendations**

In view of the findings of this study the following recommendations can be made:

#### **5.4.1 Recommendation to the management**

- The current study shows that food handlers in the selected hotels in Eldoret Town have insufficient knowledge regarding sources and vehicles for food contamination, likelihood of different stages in the food flow to cause food contamination, causes of food-borne illnesses, duration of routine medical examination, temperature control and danger zone in spite of the attempts by the hotels to provide safety training to the food handlers. The study therefore recommends that there should be more frequent periodic trainings on FSM for all food handlers at all job levels and a thorough orientation plan on FSM should be given to all new employees. The trainings should be practical since lack of knowledge on what one is expected to do was identified as one of the barriers to FSM.
- Practice of FSM was found to be inadequate due to several barriers especially lack of necessary equipment and so the management should provide the necessary resources such as adequate infrastructure and equipment to ensure FSM.
- This study showed that there is no relationship between knowledge and practice of FSM and therefore in order for knowledge acquired to be translated into practice, the management should ensure that they engage managers with hotel management training background who are familiar with the required operations in the food service and are well trained on FSM. Also the food handlers should be closely monitored/supervised on FSM at all times, and mechanisms/strategies of enforcing observance of FSM rules should be established. There is need to put in place preventive measures to get rid of pests in the establishment.

#### **5.4.2 Recommendation to the tourism industry**

- The findings of this study showed that some of the hotels are reluctant to train their food handlers on FSM because of the high cost of the training and the high worker turn-over rate. The Tourism industry should organize for periodic free/sponsored training on FSM for food handlers.

#### **5.4.3 Recommendations to policy makers**

- The study indicated that the kitchen physical environment is very crucial in FSM yet some hotels did not have adequate facilities. It is important that a policy be developed that outlines the minimum requirements for staff, infrastructure, and equipment for operating a hotel and no establishment should be licensed to operate before meeting these requirements in addition to the current requirements for TRA license for accommodation and restaurant facilities in Appendix I.

#### **5.4.4 Recommendations to the tourist**

- In view of the fact that there is a flaw in the management of food safety in the hotels, this study recommends that people should be careful when eating out even in conventional hotels since food poisoning is likely to occur and always insist on being served hot food hot and cold food cold.

#### **5.5. Suggestions for further research**

1. This study was limited to conventional hotels in Eldoret Town which does not give an overall picture of FSM in the whole country. A similar study should

be done in other counties in the country to give the true picture as far as food safety management is concerned in the hotel industry in Kenya.

2. There is a lot of competition in food service today with many establishments providing food. A similar study should be done among food handlers in such food outlets such as the supermarkets, highly ranked/star rated hotels and airlines.
3. Public Health Officers are charged with the responsibility of assessing food establishments. It is important that a study should be conducted to assess their knowledge on food safety management.

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## APPENDICES

### APPENDIX A: LETTER OF INTRODUCTION

Dorothy Achieng' Onjwa  
Moi University  
P.O. Box 3900  
**Eldoret**

11<sup>th</sup> November, 2014

To Whom It May Concern,

**RE: LETTER OF INTRODUCTION FOR DOROTHY ACHIENG' ONJWA**

I am Dorothy Achieng' Onjwa, registration number SBE/D.Phil/TOU/05/11. I am a student at Moi University pursuing a Doctor of Philosophy in Hospitality and Tourism Management. I am undertaking a research entitled "Determinants of Food Safety Management (FSM) in Selected Hotels in Eldoret Town, Kenya." My objectives are: to establish food handlers' knowledge on FSM; investigate food handlers' practices of FSM; analyze the relationship between food handlers' knowledge and practice of FSM; establish the association between food handlers' selected demographic factors and FSM; assess the role of management in implementing FSM; and finally, explore the effect of kitchen physical environment on food handlers' FSM. The study will be conducted in Eldoret Town, Kenya.

I am therefore requesting for permission to be allowed to conduct this research in your establishment. I promise to ensure confidentiality of the hotel and the participants. Participation is voluntary and anyone is free to withdraw at any time, no obligation to answer questions.

Yours sincerely,

**Dorothy Achieng' Onjwa**  
**(SBE/D.Phil/TOU/05/11)**



## **APPENDIX B: FOOD HANDLERS' QUESTIONNAIRE**

You have been chosen to participate in this study which seeks to examine the foodservice employees' knowledge and practice in food safety management. Kindly answer the questions below to the best of your knowledge. All the information provided will be treated with a lot of confidentiality and will be used for the purposes of this study only. Please do not put your name on the questionnaire to ensure anonymity. Your willingness to participate is highly appreciated.

### **PART ONE: DEMOGRAPHIC PROFILE**

Please put a tick against the answer that best fits your response.

1. Age in years: **(01)** Below 20 **(02)** 21 to 30 **(03)** 31 to 40 **(04)** 41 to 50  
**(05)** Over 50
2. Gender: **(01)** Male **(02)** Female
3. Highest level of education attained:  
**(01)** Primary  
**(02)** Secondary  
**(03)** College  
**(04)** University
4. Job title/position in the hotel?  
**(01)** Waiter/waitress  
**(02)** Cook/chef  
**(03)** Assistant cook  
**(04)** Storekeeper  
**(05)** Purchasing officer  
**(06)** Food and Beverage Manager

**(07)** General manager

**(08)** Other (Specify)\_\_\_\_\_

5. Years of service in the hotel/foodservice industry:

**(01)** Less than one year

**(02)** Between 1-2 years

**(03)** Between 2-5 years

**(04)** More than 5 years

6. Years of service in this hotel:

**(01)** Less than one year

**(02)** Between 1-2 years

**(03)** Between 2-5 years

**(04)** More than 5 years

7. Terms of service:

**(01)** Regular/permanent    **(02)** Contract    **(03)** Casual

8. Have you received any training on food safety management?

**(01)** Yes    **(02)** No

9. Where did you receive the training?

**(01)** In college    **(02)** In-service training    **(03)** On the job    **(04)** N/A

## PART IIA: KNOWLEDGE ON FOOD SAFETY

10. Please tick in the appropriate section to indicate whether or not double hand washing technique should be applied in each of the circumstances below:

<b>Circumstance for Double Hand Washing Technique</b>	<b>Yes</b>	<b>No</b>
10a. Before handling food		
10b. After visiting the toilet		
10c. After sneezing/coughing		
10d. After smoking		
10e. After handling raw food to working with cooked food		
10f. After touching food waste		

11. Please tick in the appropriate section to indicate whether the following are ways through which food contamination can occur or not:

<b>Various ways through which food contamination may occur</b>	<b>Yes</b>	<b>No</b>
11a. Food handlers		
11b. Contaminated surfaces		
11c. Cross contamination		
11d. Improper cooking temperatures		
11e. Poor handling		
11f. Improper storage		

12. Please tick in the appropriate section to indicate whether or not the following are vehicles through which food can be contaminated:

Possible vehicles through which food can be contaminated	Yes	No
12a. Fingers		
12b. Flies		
12c. Food		
12d. Feaces		

13. Rate on a Likert scale of 1-4 the extent to which you think the following areas/stages in food production flow are critical in ensuring food safety hence are likely to interfere with food safety:

4 = Very likely, 3 = Likely 2 = Less likely 1 = don't know

Food flow	1	2	3	4
13a. Purchasing				
13b. Receiving				
13c. Storing				
13d. Pre-preparation				
13.e Preparation				
13f. Serving				
13g. Use of leftovers				

14. Tick against the section that best describes your opinion concerning each of the statements below:

Agree (A = 3), Neutral (N = 2), Disagree (D = 1),

<b>Food-borne illnesses</b>	<b>1</b>	<b>2</b>	<b>3</b>
14a. Pesticide residues can cause food contamination			
14b. Bacteria, parasites and viruses can cause food contamination			
14c. Food additives can cause food contamination			

15. After how long should food handlers get examined medically?

(01) \_\_\_ Three months (02) \_\_\_ Six months (03) \_\_\_ Twelve months (04) \_\_\_ Don't know

16. Which of the following temperatures is considered as danger zone?

- (01) \_\_\_ 4<sup>0</sup>F to 14<sup>0</sup> F (-15<sup>0</sup>C to -10<sup>0</sup>C)  
 (02) \_\_\_ 40<sup>0</sup>F to 140<sup>0</sup>F (4.4<sup>0</sup>C to 60<sup>0</sup>C)  
 (03) \_\_\_ 40<sup>0</sup>C to 140<sup>0</sup>C (104<sup>0</sup>F to 284<sup>0</sup>F)  
 (04) \_\_\_ 0<sup>0</sup>F to 10<sup>0</sup>F (-17<sup>0</sup>C to -12<sup>0</sup>C)  
 (05) \_\_\_ Not sure

### **PART IIB: PERCEIVED BARRIERS TO FOOD SAFETY MANAGEMENT**

17. Tick against the section that best describes your opinion concerning how each of the issues below make it difficult for you to practice safety food management in this hotel.

Agree (A = 3), Neutral (N = 2), Disagree (D = 1),

<b>Perceived barrier</b>	<b>1</b>	<b>2</b>	<b>3</b>
17a. Time pressure			
17b. Lack of necessary equipment and resources			
17c. Lack of management support			
17d. Too much work			
17e. Unconducive work environment in terms of structure (physical features)			

17f. Lack of recognition of one's efforts at ensuring food safety			
17g. Lack of knowledge on what one is expected to do			

### PART THREE: FOOD SAFETY PRACTICES

Please tick the section that best describes the frequency with which the following food safety measures are practiced in your hotel: Always = 3, Sometimes = 2, Never = 1

	1	2	3
<b>18. Personal Hygiene</b>			
a. Food handlers are examined medically once in six months			
b. Food handlers wash their hands with soap and water before handling food, after visiting the toilet, sneezing/coughing			
c. Food handlers use the double hand washing technique to wash their hands			
d. Food handlers wear suitable aprons, head gear, and proper footwear			
e. Food handlers are not permitted to handle food when they are sick from clinically recognizable infections/contagious diseases			
<b>19. Control of Temperature</b>			
a. The internal temperature of held foods are checked every two hours			
b. Leftover foods are promptly cooled using acceptable cooling methods			
c. Highly hazardous foods are cooked to a temperature above 70°C			
d. Leftover foods are reheated to a temperature above 82°C			
e. Prepared food is never held at a temperature between 40°F and 140°F for long			

<b>20. Control of Cross Contamination</b>			
a. Ready to-eat foods and raw food are prepared separately			
b. Work surfaces are sanitized after cutting raw food			
c. Work surfaces are sanitized before beginning work and after work			
d. Different color coded chopping boards are used for specific jobs			
e. Ready to-eat foods and raw foods are stored separately			
f. Periodic facility cleaning (thorough cleaning) is scheduled and done on a monthly basis			
<b>21. Purchasing and Storage of Foods</b>			
a. Food is purchased from trusted and approved suppliers only			
b. Receiving of supplies is done strictly against the specifications			
c. Supplies that do not meet the required standards are rejected.			
d. Food is stored using the FiFo method			
<b>22. Food safety training and rules</b>			
a. Foodservice employees are oriented on food safety management rules upon employment			
b. Food safety trainings are organized for food handlers			
c. Food safety rules are displayed on the notice boards for ease of reference by foodservice employees			
<b>23. Physical features</b>			
a. Food preparation areas are well lit and ventilated			
b. Food preparation areas are well ventilated			
c. Different storage areas have correct temperature readings			

*Thank you so much for your time and participation.*

**APPENDIX C: IN-DEPTH INTERVIEW SCHEDULE FOR MANAGERS**

1. In your opinion are food-borne illnesses a problem in Kenya? Explain.
2. If so what do you think are the main causes?
3. What mechanisms have you put in place to ensure that your foodservice employees ensure food safety? (Personal hygiene – how often do they get medical examination, cleanliness, policies and procedures, cross contamination prevention – various color coded chopping boards, food safety information sheets, hand washing facilities with hot running water and soap plus disposable towels or dryer, etc)
4. Explain how you monitor the internal temperature of food when cooking?  
(presence of a probe thermometer and if not what happens)
5. Describe how you cool cooked foods before storage.
6. Which foods do you consider to be highly hazardous?
7. How do you handle them to keep them safe for consumption?
8. Which stages in the flow of food do you consider important in ensuring food safety? Give reasons.
9. How do you ensure that all the employees in the foodservice sections are aware of the importance of their roles in ensuring food safety? (Any in-service training or seminars or workshops?) Explain.
10. As a manager, what challenges do you face in ensuring food safety management in this hotel?



**APPENDIX D: BEHAVIORAL OBSERVATION INSTRUMENT**

Date: \_\_\_\_\_

Observation Time: \_\_\_\_\_ until \_\_\_\_\_

Area Observed: \_\_\_\_\_

**Instructions:**

Tick yes or no if the following are practiced:

<b>Hygiene</b>	<b>Yes</b>	<b>No</b>	<b>Remarks</b>
<b>1.</b> Workers well groomed			
- Proper clean attire worn			
- Head gear worn			
<b>2.</b> No touching of body parts when handling food			
<b>3.</b> Hands are washed correctly using the double hand washing technique before handling food, after visiting the toilet, sneezing/coughing, after handling raw food to cooked food, after touching food waste			
<b>4.</b> Hands are washed after visiting the toilet and coughing/sneezing/touching the body or touching raw food, food waster or chemical			
<b>5.</b> Evidence of routine medical check- up i.e certificates of examination for food handlers			
<b>6.</b> Food handlers cover cuts or sores with clean waterproof dressings			
<b>7.</b> Food handlers do not wear jewelry or false nails, which might fall into food			
<b>Temperature control</b>			
<b>1.</b> Probe thermometer available			
<b>2.</b> Internal cooking temperature of food is			

checked			
3. Leftover foods properly cooled and stored			
4. Leftover foods are heated to the correct temperature $>82^{\circ}\text{C}/180^{\circ}\text{F}$ .			
5. Internal temperature of cooked meat is ensured $> 70^{\circ}\text{C}$			
6. Frozen food is thawed using acceptable methods (overnight in the refrigerator or in a container of cold water)			
7. Hot food is cooled using acceptable cooling methods (in a wide container for faster cooling)			
8. Cold food held at appropriate temperature $<40^{\circ}\text{F}/5^{\circ}\text{C}$			
9. Hot food held at appropriate temperature $> 140^{\circ}\text{F}/60^{\circ}\text{C}$			
10. Temperature of held food checked after every two hours			
11. Adequate temperatures for the various storage areas			
- Refrigerator $<10^{\circ}\text{C}$			
- Cold room ( $4^{\circ}\text{C}$ to $10^{\circ}\text{C}$ )			
- Freezer ( $-18^{\circ}\text{C}$ )			
- Dry goods store (room temperature)			
<b>Cross-contamination</b>			
1. Ready-to-eat and raw foods are prepared separately			
2. Raw foods are stored below ready-to-eat foods in walk-in storage areas			
3. Work surfaces and utensils are sanitized after cutting raw food			

4. Foods are stored in FIFO method			
5. Raw foods are stored separately from the cooked foods			
6. Separate equipment for cutting e.g knives			
7. Separate (color coded in possible) chopping boards for cooked and uncooked foods			
8. Gloves when used are changed and disposed of after every use			
<b>Receiving/Purchasing</b>			
1. Raw foods are purchased from licensed suppliers			
2. Proper requirements/standards of supplies are checked during receiving			
<b>Kitchen physical environment</b>			
1. Separate sinks available for hand washing with hot (82°C) running water and soap			
2. Hand drier or disposable towel available			
3. Separate work surfaces provided for different food items			
<b>Analysis of kitchen surfaces</b>			
1. Work surfaces made of non-absorbent materials, inert to food, to detergent and disinfectants			
2. Work surfaces are clean and easy to clean			
3. The kitchen is well lit			

4. The kitchen is well ventilated			
5. Work surface is in sound condition (smooth and not chipped with no rust)			
6. Color of work surfaces ensures easy cleaning			

## APPENDIX E: MS. KANDIE'S VISIT OF WEST KENYA CIRCUIT

# Minister pledges to liven up tourism

BY JOHN SHILITSA

newsdesk@ke.nationmedia.com

Tourism Cabinet secretary has pledged to revive the western Kenya tourism circuit.

Ms Phyllis Kandie (above) said at the Golf Hotel in Kakamega yesterday after a four-day tour that idle tourist sites in the region will soon be up and running in partnership with the respective county governments.

Ms Kandie was among the spectators at the famed bull fighting at Malinya Grounds in Ikolomani. She later visited Ilesi trading centre, which is well-known for its ceramic items.

She also took time to visit another major tourist attraction, the Crying Stone, a few kilometres from Kakamega Town.

"My ministry planned this tour six months ago with the aim of accessing products that range from home stays, agri-tourism and cultural tourism," she told journalists.

She said the western circuit had a huge potential that needed to be exploited to benefit residents.

"We want to liven this circuit to attract both local and international tourists," she said.

## The Crying Stone

Ms Kandie lamented that potential tourism sites in the region had been neglected, citing the Crying Stone, that is almost inaccessible because of the poor road.

"I watched the new breed of bull fighters who we took to Spain for training and the game has improved. It has become more professional and we want to introduce it to areas like Nairobi," she said.

The minister said Kenya placed too much emphasis on beaches and safaris at the expense of other tourism attractions, adding that focus must shift to investing in the hotel industry in the area.

"We encourage people with big homes here in Kakamega to convert them into tourist sites because we have a shortage of bed-capacity in the region," she said.

Kakamega Trade and Tourism Minister Elsie Muhanda said the county government was working with residents to protect tourist sites.

"We are planning to build an eco-lodge in Kakamega to cater for the increasing number of tourists," she said.

Source: Sunday Nation April 12, 2015, p. 24

## APPENDIX F: HOTELS TO BE RATED

# Kandie: Hotels to be rated in February

BY NATION  
CORRESPONDENT

All hotels in Kenya will be rated from next month, Tourism Cabinet Secretary Phyllis Kandie has said.

Ms Kandie (below) who spoke in Kisumu yesterday said rating would boost hotels' marketability.

"This will also enable them become competitive in the international market," said Ms Kandie.

"Most hotels are yet to be registered and this raises doubts about the quality and standards of their services."

The Tourism Regulatory Authority will start the process in western Kenya by pre-classifying hotels where owners and service providers from Kisumu, Migori, Kisii, Homa Bay, Siaya and Nyamira will undergo a five-day training on what is

expected. Quality assurance experts will be engaged.

"Rating will make it easy to market our hotels," said Ms Kandie who spoke during the opening of Wigot Gardens owned by Kenya National Highways Authority Director Meshack Kidenda.

"Standardisation is now a compulsory requirement even as the government strives to add value to the unexploited tourism circuits such as western Kenya," said Ms Kandie.

"The government is committed to promoting investment in the industry but it also is concerned about the quality of services provided" she added.

She called on the Kenya Association of Hotelkeepers to ensure all hotels that expect to be rated have WiFi facilities.

ICT Cabinet Secretary Fred Matiang'i who accompanied Ms Kandie said his ministry would lay more fibre optic cables in counties.

"This will be done in the second phase of the National Fibre Optic Infrastructure.

"We want everyone to benefit from the ICT development," he said.



Source: Daily Nation, 2015

**APPENDIX G: HOTEL RATINGS**

**THE KENYA GAZETTE** - (4<sup>th</sup> September, 2015)

**THE TOURISM ACT**

*(No.28 of 2011)*

THE TOURISM REGULATORY AUTHORITY REGULATIONS, 2014

*(L.N. 128 OF 2014)*

**PUBLICATION OF CLASSIFIED TOURISM ENTERPRISES**

IN EXERCISE of the powers conferred by regulation 7(1) of the Tourism Regulatory Authority Regulations, 2014, the Tourism Regulatory Authority publishes the name, location, address and class of hotels, lodges and restaurants in the Nyanza, Western and North Rift tourism circuits set out in the Schedule.

**SCHEDULE**

<b>HOTELS</b>						
No.	Establishment	County	Location	Capacity		Star Rating
				Rooms	Beds	
1.	Boma Inn, Eldoret	Uasin Gishu	Ramogi Drive	68	80	****
2.	Hotel Nyakoe	Kisii	Kisii-Kisumu highway	75	86	***
3.	Sovereign Hotel	Kisumu	Lolwe Road	32	64	***
4.	Imperial Hotel	Kisumu	Bonyo Street	78	90	***
5.	The Vic Hotel	Kisumu	Off Kisumu/Nairobi Road	106	122	***
6.	The Noble Conference Center	Uasin Gishu	Kapsoya Road off Eldore/Nairobi Rd	53	67	***
7.	Golf Hotel	Kakamega	Khasakhala Road	62	124	**
8.	Dados Hotel	Kisii	Hospital Road	57	72	**
9.	St. Johns Manor – Le Savannah Country Lodges & Hotels	Kisumu	Busia Road	49	49	**

10.	Le Savannah Country Lodge & Hotel	Kisumu	Nyerere Road	39	78	**
11.	Sunset Hotel	Kisumu	Aput Lane	50	100	**
12.	Poa Place Resort	Uasin Gishu	Kaptagat Junction	15	35	**
13.	Hotel Winstar	Uasin Gishu	Sosiani Street	85	95	**
14.	Hotel Comfy & Lodge	Uasin Gishu	Ronald Ngala	96	110	**
15.	Cicada Hotel	Uasin Gishu	Utalii Utamaduni Road	56	56	**
16.	Kenmosa Resort	Uasin Gishu	Kaptagat Road	17	26	**
17.	Starbucks Hotel and Restaurant Ltd	Uasin Gishu	Airport Road	93	182	**
18.	The Pearl Tourist Hotel Ltd	Uasin Gishu	Elgeiyo Road	42	42	**
19.	Hotel Horizon	Uasin Gishu	Utalii Utamaduni Road	60	75	**
20.	Dewchurch Drive Hotel	Kisumu	Mara Asembo Road	13	16	**

<b>LODGES</b>						
No.	Establishment	County	Location	Capacity		Star rating
				Rooms	Beds	
1	Kerio View Lodge	Elgeyo Marakwet	Off Iten/Eldoret Road	28	40	***
2	Samich Resort	Elgeyo Marakwet	Nyaru Iten	15	30	***
3	Jambo Impala Eco-lodge	Kisumu	Impala Park	12	24	***
4	Rondo Retreat Center	Kakamega	Kakamega Forest	20	40	***
<b>RESTAURANTS</b>						
	Haandi Restaurant (Kisumu) Ltd	Kisumu	Mega Plaza Shopping mall	--	-	**

Dated the 25<sup>th</sup> August, 2015

KIPKORIR LAGAT  
 Director-General  
 Tourism Regulatory  
 Authority



APPENDIX H: SPEECH BY THE DIRECTOR OF TOURISM REGULATORY  
AUTHORITY

**Mombasa >>**

## Refurbish hotels to win over tourists, says agency

BY MATHIAS RINGA

Hoteliers at the Coast have been urged to refurbish their hotels to international standards to enable them to attract more tourists from abroad.

Tourism Regulatory Authority Director-General Lagat Kipkorir said hoteliers in the region had for years been blaming the tourism slump solely on insecurity, yet a drop in hotel standards had also contributed to the situation.

He said for the sector to recover, there was a need for hoteliers to upgrade their hotels so that guests are provided with quality accommodation and services.

The official also advised the business people to be innovative and keep abreast with modern trends in the hospitality industry.

"Tourists visit Egypt in large numbers because hotels there offer quality accommodation and services.

"The local hotels should take a leaf from the Egyptian resorts," said Mr Kipkorir.

He said tourists of the 20th century are concerned about quality services.

*Source: Daily Nation, September 30<sup>th</sup> 2015, p. 20.*

**APPENDIX I: REQUIREMENTS FOR TRA LICENCE  
(ACCOMMODATION AND RESTAURANT FACILITIES)**

- Public health clearance certificate
- Lease agreement/Title Deed of premises occupied by office
- Copy of menu and tariff (hotel and restaurant)
- Curriculum vitae and relevant certificate of the manager
- Manager's letter of appointment
- Number of expatriates in employment or required and their respective work entry permits
- Health insurance certificates for food handlers
- Certificates of good conduct, identity cards and professional certificates

**Source:** Tourism Office, Uasin Gishu County, 2014

**APPENDIX J: LETTER OF PERMISSION FOR PARTICIPATING HOTELS****To Whom It May Concern,**

This is to request you to allow Ms. Dorothy Achieng' Onjwa Onyango registration number SBE/D.Phil/TOU/05/11, to conduct the observation of Food Safety Behavioral Practices in Foodservice Employees in your hotel. The observation study is being conducted to find out if foodservice employees practice food safety management in food handling. She will hold an informational meeting to explain to the foodservice employees the purpose of her study, field any questions, and to ask for their participation. She will be obtaining written consent as well as asking the employees who wish to participate to fill out a demographic questionnaire, which is also voluntary. The observations will take place in the kitchen. The foodservice employees' participation in the observation study is entirely voluntary.

The foodservice employee who wishes to participate in the study should know that their behaviors observed will not contribute to any kind of performance review or termination of their position. None of the information from the demographic questionnaire or from the observation checklist will have employees' names listed on it nor will any distinguishing characteristics that may describe or distinguish a person in any way. The employees will be made aware at the informational meeting that their participation in the study will have no impact on their employment as well as no impact on their performance reviews and in no way can the behaviors they perform in the kitchen be linked to their names. The employees' participation in this study will not place them at any risk.

**APPENDIX K: INFORMED CONSENT FOR STUDY PARTICIPANTS**

Dear Participant,

You are being asked to volunteer to participate in a research study entitled “Determinants of Food Safety Management Among Food Handlers in Selected Hotels in Eldoret Town, Kenya” by Dorothy Achieng’ Onjwa Onyango, registration number SBE/D.Phil/TOU/05/11, which is being conducted to help develop training methods and to decrease the number of unsafe food practices that occur in back-of-the-house operations. You have the right to be informed about the procedures and your role in the study in order to decide whether you would like to participate. Please feel free to ask the researcher about any words or procedures that you do not understand. Your participation is **voluntary**; you do not have to be in the study if you wish not to and you may stop your participation in the study at any time.

The purpose of the study is to examine the knowledge and practice of food safety management among foodservice employees. You will also be asked to fill out a demographic questionnaire that will only be used to describe the population being studied. Your willingness to participate in this study is highly appreciated.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

**APPENDIX L: LETTER FROM THE MINISTRY OF EDUCATION, UASIN  
GISHU COUNTY**

REPUBLIC OF KENYA



**MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY  
STATE DEPARTMENT OF EDUCATION**

Telegrams: "EDUCATION", Eldoret  
Telephone: 053-2063342 or 2031421/2  
Mobile : 0719 12 72 12/0732 260 280  
Email: [cdeuasisingishucounty@yahoo.com](mailto:cdeuasisingishucounty@yahoo.com)  
: [cdeuasisingishucounty@gmail.com](mailto:cdeuasisingishucounty@gmail.com)

When replying please quote:

Office of The County Director of Education,  
Uasin Gishu County,  
P.O. Box 9843-30100,  
**ELDORET.**

Ref: No. **MOEST/UGC/TRN/9/190**

24<sup>th</sup> October , 2014

Dorothy Achieng' Onjwa  
Moi University  
P.O Box 3900-30100  
**Eldoret.**

**RE: RESEARCH AUTHORIZATION**

This office has received your request for authority to carry out research on "**Analysis of the Relationship Between Employees' Knowledge and Practices of Food Safety Management: The Case of Selected Hotels In Kenya**". Within Uasin Gishu County.

We wish to inform you that your request has been granted for a period ending **31<sup>st</sup> August, 2015**. The authorities concerned are therefore requested to give you maximum support.

We take this opportunity to wish you well during this research.

Martin Cheruiyot  
For: County Director of Education  
**Uasin Gishu County**

cc:

Moi University  
P.O Box 3900-30100  
**Eldoret.**

**APPENDIX M: AUTHORIZATION FROM THE COUNTY  
COMMISSIONER UASIN GISHU COUNTY**



**NATIONAL COMMISSION FOR SCIENCE,  
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,  
2241349, 310571, 2219420  
Fax: +254-20-318245, 318249  
Email: secretary@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

9<sup>th</sup> Floor, Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No.

Date:

3<sup>rd</sup> October, 2014

NACOSTI/P/14/4128/3396

Dorothy Achieng' Onjwa  
Moi University  
P.O. Box 3900-30100  
ELDORET.

**RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on "*Analysis of the relationship between employees' knowledge and practices of food safety management: The case of Selected Hotels in Kenya.*" I am pleased to inform you that you have been authorized to undertake research in Uasin-Gishu County for a period ending **31<sup>st</sup> August, 2015.**

You are advised to report to **the Managers of selected Hotels, the County Commissioner and the County Director of Education, Uasin-Gishu County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

  
DR. S. K. LANGAT, OGW  
FOR: SECRETARY/CEO

Copy to:

The Managers  
Selected Hotels.

The County Commissioner  
The County Director of Education  
Uasin-Gishu County.

*Placed  
24<sup>th</sup> October, 2014*  
COUNTY COMMISSIONER  
UASIN GISHU COUNTY

**APPENDIX N: AUTHORIZATION FROM NACOSTI**

**NATIONAL COMMISSION FOR SCIENCE,  
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2213471,  
2241349, 310571, 2219420  
Fax: +254-20-318245, 318249  
Email: secretary@nacosti.go.ke  
Website: www.nacosti.go.ke  
When replying please quote

9<sup>th</sup> Floor, Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref: No.

Date:

3<sup>rd</sup> October, 2014

NACOSTI/P/14/4128/3396

Dorothy Achieng' Onjwa  
Moi University  
P.O. Box 3900-30100  
ELDORET.

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You are advised to report to **the Managers of selected Hotels, the County Commissioner and the County Director of Education, Uasin-Gishu County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

  
DR. S. K. LANGAT, OGW  
FOR: SECRETARY/CEO

Copy to:

The Managers  
Selected Hotels.

The County Commissioner  
The County Director of Education  
Uasin-Gishu County.





### APPENDIX O: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:  
MS.DOROTHY ACHIENG ONJWA  
of MOI UNIVERSITY, 2500-30100  
eldoret, has been permitted to conduct  
research in Uasin-Gishu County

Permit No : NACOSTI/P/14/4128/3396  
Date Of Issue : 3rd October,2014  
Fee Recieved :Ksh 2,000

on the topic: ANALYSIS OF THE  
RELATIONSHIP BETWEEN EMPLOYEES  
KNOWLEDGE AND PRACTICES OF FOOD  
SAFETY MANAGEMENT: THE CASE OF  
SELECTED HOTELS IN KENYA



for the period ending:  
31st August,2015

  
Applicant's  
Signature

  
for Secretary  
National Commission for Science,  
Technology & Innovation

#### CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.



REPUBLIC OF KENYA



National Commission for Science,  
Technology and Innovation

RESEARCH CLEARANCE  
PERMIT

Serial No. A 3445

CONDITIONS: see back page